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This research was undertaken to identify variables that accounted for major changes in academic performance between high school and college. Differences between predicted and actual college GPA were used to classify students as gainers or decliners among a group of sophomores and a group of seniors at a medium-sized research university.

A model composed of nine variables was developed to explain the change in performance. Each variable was classified as an Environmental Triggering Mechanism (environmental stimulus), an Internal Psychological State (a cognitive response to the stimulus), or an Academic Behavior. Seven of the variables were derived from the literature of academic achievement in college. Two of the variables were identified in the course of exploratory interviews with senior performance changers.

Two-way discriminant function analysis was performed to determine which of the variables contributed most to classifying students as gainers or decliners. Correlation analysis was performed to examine the relationships

between variables.

Academic expectancies, the number of terms required to adjust to college academically, and the students' approach to study (consistency and priority of study) emerged as making the strongest contribution to the discriminant function for both sophomores and seniors.

Significant correlations were found between some, but not all, of the variables in each category, supporting the basic structure of the model. Variables categorized as Environmental Triggering Mechanisms played a secondary role with respect to those Internal Psychological States and Academic Behaviors that contributed most to academic performance change.

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MODELING ACADEMIC PERFORMANCE CHANGE FROM HIGH SCHOOL TO COLLEGE

INTRODUCTION

For many students who persist in college, academic performance follows a pattern that is similar to their performance in high school. For others, academic performance in college takes a significant departure - either for better or worse. It is this change in the pattern of performance that provides the basis of inquiry for this research. The primary goal is to determine if a common set of conditions exist among students who experience significant gain or decline in their high school-to-college grades.

In order to get closer to the research problem, exploratory interviews were undertaken with eight OSU seniors, who had experienced significant changes in academic performance from high school to college (four "gainers" and four "decliners"). These students were asked to reflect on why their grades had changed from high school to college using a common interview guide of open-ended questions (see appendix for summary). A profile of one such person in each category is presented below as a means of introducing the research problem. A decliner is presented first.

Ken came to OSU from a small high school that had a high percentage of blue-collar families in it. His

parents, however, set high academic expectations. He studied a great deal, received solid 'B' grades, was student body president his senior year, and enjoyed a high level of interaction with number of his teachers. He enjoyed discussing politics. He tended to view his peers as immature so he did not spend a lot of time socializing with them. Teachers encouraged his attendance at college and created the expectations that college would be a place of continued intellectual stimulation as well as a collegial atmosphere. He carried a great deal of idealism regarding college as he entered. "This was going to be the place where a person could really learn and explore."

The freshman year was a great disillusionment. In retrospect Ken believed he took "too many" pre-engineering courses. All of them were very narrow in focus. Some family problems diverted his attention first term and he was sick a great deal during his second term. He made several attempts to meet with his professors ("just to get to know them") and was rebuffed on one occasion ("come see me when you have a problem") and had repeatedly broken appointments with another. Courses were more difficult in that there was little feedback on performance ("only a midterm and final").

The result was a great deal of ambiguity and confusion regarding what he was to do as a student. Ken had encountered a different set of expectations regarding his role as a student. Poor grades the first year

compounded the confusion and he began to doubt his competency as a student.

His goals as a student began to change. He became more pragmatic about college, wanting simply to "get out." Another goal was gain some social skills. In high school he had divorced himself from his peers somewhat, considering them immature. In college, his living group became the source of the stimulating discussions. He took on some responsibility with the Inter-fraternity Council and the Memorial Union Program Council, though not at the level of involvement that he had experienced in high school. Overall he believes that the significant gains he has made in college has been on the social side of the ledger.

Finding engineering "too narrow," he moved to business management with a minor in the social sciences. Classes have tended to be more satisfying but if they do not contain anything of "practical value" his interest wanes. He would like to get good grades. "Every term I begin with the idea that I am really going to do well but then I lose drive or interest." He doesn't think he studies as many hours of the week as he did in high school. After the initial difficulties of the freshman year "I just seem to have established a pattern of not being very motivated even though I still think about trying to get at least one term of 4.0 before I graduate."

The profile of the "gainer" is substantively different than the decliner.

Daryl didn't work particularly hard in high school. While a number of his friends did achieve well academically, his emphasis was more on athletics. He was outgoing and did value his relationships with teachers. Both his english and biology teachers made a significant impression on him, in that they shared an interest in sports but also valued intelligence.

Entry to college had an initial impact. The size, the fact that no one knew him, the realization that college was important and required an adjustment on his part motivated him to work very hard academically and socially. His first term grades were much better than his high school grades. "I got a great start."

He credited his fraternity several times with providing the positive climate and expectation for quality academic performance. "It's a place where achievement and service oriented people live - where people are trying to better themselves."

His sense of satisfaction seemed to vary with the course. The instructor's expectations, sense of professionalism, preparation, and sincerity were very important to both Daryl's satisfaction and motivation. "The size of the class doesn't matter much. It does help if I have a natural interest in the course. It also helps if I make the class a priority. For the most part, the

course work has not been overwhelmingly difficult." Daryl is a business major.

Daryl describes himself as a person who has a lot of confidence, noting that athletics in high school was in part, responsible for creating the confidence. College has strengthened his sense of competence as a student. "It seems like I can do more things well in college. In high school it was primarily athletics."

Another change he cites as significant has been in his view of education. While he came to OSU thinking that college "is important" because of its direct bearing on his career, he has found that it became even more important in terms of his ability to make a contribution to a world "with a lot of social, political, and economic problems." Education has expanded his understanding of what is important.

Daryl indicates that he does spend a bit more time studying in college than high school but that he does not spend extended periods of time doing so. "I do better by keeping concepts and ideas from my classes in constant awareness in my mind. I like to keep an active mind."

Work has been a minor diversion while in college, though he sees it as neither a help nor a hindrance to his academic performance. Significantly, he considers his involvement with faculty and staff highly motivating - a real addition to his education at OSU.

In summary, both of these students were males, had

the same major, lived in an organized men's living group, were active in high school, had similar grades at college entrance, and had varying degrees of satisfaction with college course work. The notable differences in their profiles is in their first year experience at college (the pattern was set in both cases), the differential reinforcement of their living group peers, the level and nature of their interaction with faculty, and a difference in attitude about what was important educationally. These two profiles are helpful in summarizing some of the salient differences between the small sample of gainers and decliners who were interviewed. (A summary of these results is included in the Appendix.)

The points of difference between these two groups are most clear in terms of satisfaction with classes, study habits, involvement with faculty, source of academic expectations, and sense of initial ambiguity with college. Gainers were more satisfied, had a clearer and consistent approach to study, were more highly involved with faculty, had a more internalized source of academic performance expectation, and had a shorter period of adjustment to the academic demands of college.

Among the decliners, it was clear that two of them were rebounding. They were more satisfied with their upper-division classes, had recently taken control of their time to accommodate academic activities and demands, and were establishing their own academic expectations

instead of responding to the expectations of their parents.

It is obvious that gainers and decliners in this preliminary investigation experienced college differently at several key points. Studying the phenomena in more depth moves the researcher into the literature of academic achievement and influences on grade point average (GPA).

Academic Achievement and Grade Point Average

Despite the challenge to broaden the criteria for evaluating college student achievement (Boyer, 1987), student grades in course work continue to be the primary means of evaluating educational achievement. Student evaluations, primarily in the form of accumulated grade point average (GPA), are the basis of admission to college, to certain majors, honor's programs, scholarships, graduate school, and, in some cases, a consideration in post-college employment. It is little wonder then, that so much research has gone into understanding the influences on, and the prediction of college student GPA.

For example, Harris (1940) summarized over 300 research articles related to influences on college student grades. He found studies that investigated relationships between college grades and intelligence, gender, age, family background, physical characteristics, personality characteristics, vocational interests, maladjustment,

liberalism, type and location of high school, subjects taken in high school, size of high school, study habits, effectiveness of study courses, time spent in study, instructional methods, incentives, academic load, living group arrangement, part-time work, performance in specific subject areas, major and occupational choice, extra-curricular activities, and athletics. His rather terse conclusion was that academic achievement in college was a function of aptitude, effort, and situational variables.

Despite the comprehensive nature of Harris's (1940) review, the concern for a better understanding of academic achievement continues. Reviews of the literature on academic achievement have become more specialized in recent years. Research has been reported on such areas of investigation as interaction with faculty (Pascarella, 1980), locus of control (Findley & Cooper, 1983), college intervention programs (Kulik, Kulik, & Shwalb, 1983), study skills programs (Entwisle, 1960), college environmental influences (Pascarella, 1985), size of class (Williams, Cook, Quinn, & Jensen, 1985), and self-concept (Scheirer & Kraut, 1979).

Mathiasen (1984) reviewed over 60 articles on predicting academic achievement in college and clustered the predictor variables studied into the following groups: high school performance and college entrance exam scores, study behavior and scholastic attitudes, and personality traits. Even the degree of optimism possessed by the

student (Prola & Stern, 1984) and the effect of certain life events (Lloyd, 1980) have been examined with respect to academic achievement.

The point of this enumeration of research related to factors affecting academic achievement is to emphasize its scope. Yet, while many factors may affect achievement, not all of them are related to changes in academic achievement. Again, such change will be the focus of this research.

Achievement verses Academic Performance Change

Change in academic achievement may better be expressed as change in academic performance. The difference in meaning between the terms "achievement" and "performance" is subtle but worth noting for this research. Achievement connotes an attainment or accomplishment - an end state. Performance implies process. For example, the Olympic athlete receives an achievement award in the form of a medal for his or her performance. The athlete's performance in the event is a function of many personal and situational conditions such as mental attitude, nutrition, and training. The award is a form of recognition. It also serves as an indicator of performance.

College GPA serves a similar dual function. It is a recognition of achievement. It is also viewed as a performance indicator (Pascarella, 1985; Fincher, 1984),

presumably one that reflects student academic learning. As has been indicated, many factors contribute to a student's GPA as a final outcome. When GPA is viewed as a performance indicator, the focus, at least in this research, narrows to identifying the processes that lead to achievement (Tabor & Hackman, 1976: Frisbee, 1984). Changes in those processes will differentially influence the student's achievement.

Some of those processes are external to the student such as student/faculty interaction. Some are internal such as changes in the student's expectations for academic success.

Demographic variables, high school grades, and scores on a college entrance examination, while having a relationship to college academic achievement, do not account for changes in achievement during college. For example, a student does not become more male, nor are high school grades changed as a function of going to college. The study of academic performance change, then, is actually a study of those intervening processes that represent sources of variance in each student's collegiate experience which contribute to academic achievement.

Even though high school grades are considered to be the single best predictor of college grades (Arnold, Calkins & Willoughby, 1983; Wilson, 1983; Fincher, 1984), this does not mean that a student's college grades will be the same as the student's high school grades. For

example, at Oregon State University (OSU), the mean high school accumulated GPA of the group of freshmen who entered the university in the fall of 1985 and had attained senior status in the winter of 1989 was 3.37 (sd=.46). As seniors the mean GPA was 2.96 (sd=.43).

While high school grades can help identify a general pattern of academic performance in college, it is equally clear that high school grades do not represent all there is to know about how a college student will perform. Some college students achieve significantly higher grades than they did in high school. Others will achieve significantly lower grades.

Using OSU as an example again, some 14% of the students attaining senior status in their fourth year at the university had experienced changes in their high school to college GPA that were significantly different than would have been predicted on the basis of high school grades (using linear regression with high school GPA as independent variable and accumulated college GPA in the senior year as the dependent variable). The rest of the students performed within plus or minus 1.5 sd of their predicted college GPA. Certainly, the existence of extreme changes in academic performance raises some questions. Are there identifiable conditions, both environmental and personal, which contribute to academic performance change? Is there a framework for studying this phenomena? These are the issues that provide the focus for the following discussion.

Need For a Model of Academic Performance Change

Academic performance change as a concept has not been singled out as an area of study in higher education. While it is true that the retention and attrition literature has been concerned with academic variables related to dropout occurrences, and underachievement has long been a concern, it must be recognized that both emphases are broader in scope and focus only on the most negative consequences of academic performance change - leaving the institution. Neither provide insight into sustained changes in academic performance. Both of these approaches are necessarily limited in understanding the dynamics of academic performance change.

A descriptive model would provide both practitioners and researchers alike, a means of exploring relationships among relevant variables and a way to test new variables which may contribute to performance change. Such knowledge should be of assistance in minimizing negative change and reinforcing positive change.

A model could also provide a way to integrate the extant literature and underscore the fact that performance change is a multi-dimensional construct.

In preparation for this research, a model of academic performance change was developed, based on the literature related to changes in college GPA and anecdotal material collected during exploratory interviews with seniors who

had experienced significant grade changes from high school to college.

Academic Performance Change Model

The model, as presented here, is based on the assumption that humans are essentially responsive beings that process and act on stimuli from the environment. It also implies that enduring changes in behavior are essentially adjustments of the individual to external stimuli. The model is straightforward, following a sequential format that begins with environmental stimuli which are processed cognitively by the individual and lead to academic behaviors which result in the outcome of change in academic performance. The nature of the model is not dissimilar from those used in understanding organizational behavior (Luthans, 1977) or student outcomes in higher education (Pace, 1979). Its uniqueness, however, is to be found in the variables identified and their relationship to each other as well as to performance change.

The model identifies three categories of intervening variables that contribute to the process of academic performance change from high school to college: 1) Environmental Triggering Mechanisms (ETM); 2) Internal Psychological States (IPS); and 3) Academic Behaviors (AB).

First, the student experiences certain key "triggering mechanisms" in the college environment.

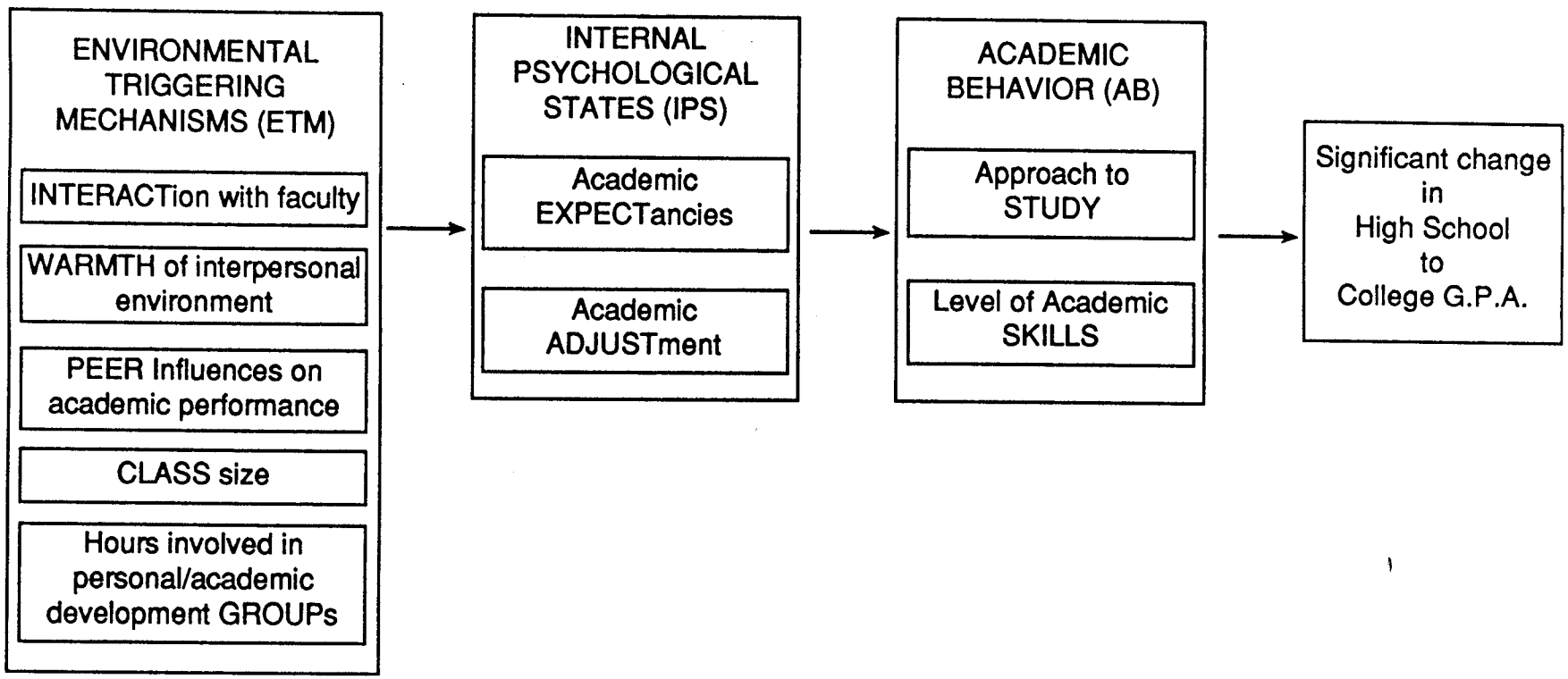

Figure 1.
Model of Academic Performance Change from High School to College

Environmental Triggering Mechanism refers to experiences students have in college which "set the stage" for change in performance. They provide avenues of socialization related to the meaning and behavior of being a student. These triggering mechanisms include the quality and frequency of interaction with faculty, the influences of peers on academic performance, the amount of small group or class participation, and the degree of perceived interpersonal warmth within the campus community. It seems reasonable that higher levels of these experiences would be related to gains in performance, whereas lower levels would be related to declines in performance.

These triggering mechanisms in the environment result in cognitive processing which alters the student's Internal Psychological States - the second category of variables related to performance change. Academic expectancies and adjustment to the academic demands of college take place are the variables at this level of the model.

Academic expectancies, the beliefs students hold about their ability to perform academic work, are alterable by external events. For example, students who experience the confidence of an instructor may have more positive beliefs about their ability to perform well than students who experience a lack of confidence from an instructor. This line of reasoning is supported by the

work of Rosenthal and Jacobson (1968) with respect to the "Pygmalion" effect and has been the basis of much of the work on expectancy effects in education.

There is another line of thought and scholarship referred to as Expectancy Theory. Popularized by the work of researchers in the discipline of Organizational Behavior (Vroom, 1964, and Lawler, 1971), it provides an expanded framework with which to understand individual motivation and change in an organizational context. Essentially, the theory states that changes in performance are directly influenced by the individual's perception of their ability to accomplish a task, the existence of a "pay-off" for task accomplishment, and recognition that the pay-off is personally important or valuable.

This research will be relying on students' self-expectancies in relation to their academic performance and the degree of change in those expectancies from high school to college. Certainly, Expectancy Theory offers an intriguing avenue to explore academic performance change, but brings with it a high level of complexity from a methodological standpoint (Mitchell, 1974). Additionally, its application to higher education has been limited.

Adjustment is particularly critical in periods of transition (Nicholson, 1984). The transition from high school to college is such a time in each student's life. If the transition is experienced with a great deal of ambiguity and confusion, the student does not receive clear expectations regarding academic tasks. Under such

conditions, organizational role theory would suggest that performance would suffer. (However, the studies undertaken at this point have been conducted exclusively with employees in work settings rather than students in collegiate settings.) This model is concerned with the rate of the student's adjustment - that is the rapidity with which the new college student can identify the differences in academic demands between high school and college and respond appropriately to those changes. Being able to identify salient differences between learning environments is, in part, a function of receiving and processing appropriate information about the environment. Failure to adjust would result when inadequate or inappropriate inputs were received, or if their significance were misinterpreted.

Finally, environmental triggering mechanisms or changes in individual internal psychological states are not sufficient in themselves to result in changes in academic performance. Such conditions alone create a situation where the individual is aware of the need to change and even sees change as possible and good but does not take any action that would result in change.

The third and last set of variables in the model identifies the critical Academic Behaviors associated with differences in GPA in college. These would include: the adequacy of study time, level of class attendance, level of class participation, level of writing and research

skills, and the degree of consistency, efficiency, and priority dedicated to study. This latter variable is referred to in the model as approach to study.

Again, many factors contribute to the academic achievement (GPA) of college students. Not all these factors represent sources of change, either in the collegiate environment or in the individual student. The model presented here includes only those variables related to academic achievement that are supported in the research or were derived from the exploratory interviews with gainers and decliners and that are subject to a great deal of change during the student's experience in college. Presumably other variables could be added to each category that would further explain the phenomenon of academic performance change.

Implicit in the model are different intervention methodologies. Policy and program development are important at the level of environmental triggering mechanisms. Such efforts would be concerned with the number, quality, timeliness, and accessibility of such mechanisms. Counseling and teaching would seem to be important methods for affecting change in the student's internal psychological state. The behavioral emphasis in the third set of variables is easily supported by training with clearly defined learning objectives and activities.

Using this model of performance change as the point of perspective, it makes sense that the programs most successful in enhancing academic performance will be

characterized by a great deal of close faculty/student and student/student interaction, interpersonal warmth, clarified academic expectations and heightened student academic expectancies for success, and clear instruction on the behaviors needed for academic success. Outside of a structured program, students experience these sources of influence in somewhat of a random manner. Logically, it would appear that the greater the concentration (or dispersion) of these influences, the greater the performance change.

Purpose of the study

The purpose of this study is to test this model as to its efficacy in explaining changes in academic performance from high school to college for groups of "gainers" and "decliners" in their sophomore and senior years.

Research Questions

Four essential research questions provide the focus for this research:

1.) What relationship, if any, exists among the discriminating variables categorized as Environmental Triggering Mechanisms, Internal Psychological States, and Academic Behaviors?

2.) Does a useful discriminant function exist for the group of sophomore gainers and decliners?

3.) Does a useful discriminant function exist for the

group of senior gainers and decliners?

4.) What similarities or differences exist in the useful discriminant functions between sophomore and senior gainers and decliners?

Hypotheses

Research question number one is explored by examining the the following hypotheses:

a.) There are no significant correlations between the variables identified as Environmental Triggering Mechanisms and Internal Psychological States among sophomore gainers and decliners.

b.) There are no significant correlations between the variables identified as Environmental Triggering Mechanisms and Internal Psychological States among senior gainers and decliners.

c.) There are no significant correlations between the variables identified as Internal Psychological States and Academic Behavior among sophomore gainers and decliners.

d.) There are no significant correlations between the variables identified as Internal Psychological States and Academic Behavior among senior gainers and decliners.

e.) There are no significant correlations between the variables identified as Academic Behaviors and change between predicted and actual college GPA among sophomore gainers and decliners.

f.) There are no significant correlations between the variables identified as Academic Behaviors and change between predicted and actual college GPA among senior gainers and decliners.

Limitations of the Study

Single Institution Study

Only OSU sophomore and senior academic performance changers were included in this study, thereby making it impossible to determine if the type of institution would be a factor in academic performance change. Theoretically, size of institution could be a factor. Smaller residential institutions conceivably provide students with greater opportunities for interaction with faculty and instruction in smaller classes. However, the purpose of this study is not to generalize to all students experiencing performance change across all institutional types. By limiting the subjects to one institution, any contamination resulting from having more than one type of institution represented, is controlled.

It is important to note that OSU, as a comprehensive doctoral granting institution, does represent a significant segment of American colleges and universities. It also has an enrollment large enough to generate a sufficient amount of academic performance changers to make the research possible. Therefore, the degree to which the model of academic performance change has merit for OSU

gainers and decliners will be a factor in future development and application of the model.

Comparison of two separate cohorts of students

Here the concern is not to assume that any differences which may occur between the sophomore and senior group of gainers and decliners are solely attributable to being a sophomore or senior. Certainly a longitudinal research design would better control differences between groups. Due care will be taken in the analysis not to over-interpret the results.

Size of the Research Group

Little guidance is offered in the literature regarding sample size for a discriminant function analysis, except for the truism, "larger is better." However, Stevens (1986) recommends that there be twenty cases for each discriminant (independent) variable in the analysis. Such a ratio makes generalizing to the population a legitimate exercise. This study included the entire population of senior gainers and decliners at OSU. The number of sophomore gainers and decliners approximates 50% of the entire population. Since most of the subjects in the study represent a population rather than a sample, the issue of generalizability is reduced. With a ratio of 1:10, this study has an adequate number of subjects.

Self-Reported Data

This study does not attempt to control for the attributions students make for their gain or decline in high school-to-college GPA. Attributions (inferences that

individuals make ablout their own, or others, internal states based upon overt behavior) can distort a student's assessment of those factors that are related to performance change, expecially when the data are collected from a self-report survey instrument. For example, students who rely on internal explanations for their decline in GPA (such as lack of effort) might underestimate their level of interaction with faculty or the amount of involvement in academic or personal development groups.

Definition of Terms

Academic Performance Change

An understanding of the institutional and individual processes that contribute to greater than anticipated changes in student grades from high school to college.

Academic Behaviors

A component of the model of academic performance change that includes active involvement in the classroom, writing and research skills as well as the consistency of application and level of priority given to using those skills.

Discriminant Function

A set of independent (discriminant) variables that differentiates between groups - in this instance, gainers and decliners.

Decliner

An Oregon State University student whose predicted college GPA is more negative than or equal to minus 1.5sd from the mean difference between predicted and actual college GPA.

Environmental Triggering Mechanisms

A component of the model of academic performance change that identifies those means of college student socialization that "set the stage" for changes in academic performance. These mechanisms include interaction with faculty, peer influences, involvement in small classes, and level of perceived interpersonal "warmth" in the college environment.

Gainer

An Oregon State University student whose predicted college GPA is greater than or equal to 1.5sd from the mean difference between predicted and actual college GPA.

Internal Psychological States

A component of the model of academic performance change that identifies student cognitive responses to Environmental Triggering Mechanisms - specifically the development of academic expectations and the speed with which a student can identify and adjust to differences in academic rigor between high school and college.

Model

A conceptual framework used to classify and show the relationships between variables in the study of a

particular phenomena - in this instance, academic performance change.

REVIEW OF LITERATURE

The literature of academic achievement is broad and diverse in terms of the populations studied, variables chosen for investigation, and the methodological approaches taken. The fact that academic achievement is consistently a subject for research by professionals in the social sciences is surely a compelling statement regarding the value placed on learning and the activity of the mind.

The focus of this literature review, while a part of the literature of academic achievement, is directed only to those studies that provide insight into changes in college student academic performance as measured by changes in the students' grade point average (GPA). It is not organized along the three major dimensions of the model presented in chapter one because no such model has existed to guide research on academic performance change. Rather, the literature review is structured around the major lines of inquiry into student learning and development that have used student GPA as a dependent variable, or exploratory studies that have sought to understand differences between non-achieving and achieving college students. Six categories have been identified in the literature of college academic achievement that can be referred to as the "literature of performance change:" 1) faculty and peer influences; 2) institutional intervention

programs; 3) student effort and expectancies; 4) the extra-curriculum; 5) institutional characteristics; 6) descriptive studies on underachievement and overachievement.

Faculty/Peer Influences and Academic Performance

College and university faculty are an important environmental stimulus and a primary source of expectations regarding the quality of academic work performed by students.

Two decades ago, Chickering (1969) underscored the important connection between informal student/faculty contact and various educational and achievement outcomes among college students. Researchers in the last ten years have focused more on the nature as well as the frequency of the contact and its relationship with academic performance.

In a single institution sample, using a longitudinal design, Pascarella, Terenzini, and Hibel (1978) investigated the relationship between student\faculty interactions and GPA in college freshmen. "Residual" GPA was calculated for each person in the sample as the difference between predicted and actual GPA. Using the residuals, the researchers were able to control for the influence of certain pre-enrollment characteristics (sex, major, ethnic status, aptitude, secondary school achievement, parent's level of formal education and four

measures of personality). These variables were entered into a multiple regression equation with residual GPA as the dependent variable. Approximately fourteen percent of the residual GPA was explained by informal student contact - specifically contacts that dealt with career, intellectual, and course matters. The researchers noted, however, that the longer the contacts occurred, the less effect the contacts had on residual GPA. The conclusion was that particular informal contacts between faculty and college freshmen do have a statistically significant, though "incremental" positive influence on student academic performance.

In 1980, Terenzini and Pascarella attempted to replicate their earlier findings. Again, pre-enrollment characteristics were identified and controlled in an effort to discover the contribution that informal student/faculty interaction had on predicting freshman GPA. Peer interaction and extra-curricular activities were also entered into the regression analysis. Eight variables related to student/faculty interaction were found to account for just over 13% on the increase in freshmen GPA. Intellectual, course, and career concerns were the most influential types of interaction.

Intrigued with the qualitative dimension of student/faculty interaction addressed by Pascarella's et al. (1978) work, Masters (1982), completed a small field experiment using subjects from an economics class. The

class was divided into three groups. Group 1 was to come to the professor's office a set number of times during the term for a consultation. The content of the faculty/student dialogue was restricted affective material. The subjects were asked about their feelings and reactions to the class material. Group 2 had the same number of contacts during the term but their dialogue with the class instructor was limited to cognitive material - ideas, principles, and matters of understanding the course content. Group 3 had out-of-class contact with the instructor but the content was not controlled. All three groups were exposed equally to the same course content in the same format. At the end of the term all groups took a standardized content test in economics - the dependent measure. Group 1 scored significantly higher on the test than the other two groups.

Students involved in a freshman honors program which was structured around extra informal contact between faculty and participants got better first year grades than a similar sample of freshmen (based on high school GPA and ACT scores) who opted not to participate in the program (Pflanm, Pascarella, & Duby, 1985).

Finally, in terms of positive findings, Rucker (1984) investigated a normal sample of freshmen from his university and a sample of freshmen honors students for variables that affect second term freshmen GPA. Five independent variables were chosen for study to include

student/faculty interaction. In an analysis of variance with four partial regressions he found that honor's students' contact with faculty affected second term GPA, after controlling for the influence of ACT scores and gender. No similar report was made for students in the general sample.

In his comprehensive reviews of the literature of college outcomes and the influence faculty/student informal contact, Pascarella (1980, 1985) raises the issue of causality in the relationship. Typically, student/faculty interaction is entered into the analysis as the independent variable, yet the question exists as to whether such a relationship is accurate.

To better understand the direction of causality, Bean and Kuh (1984) employed a causal model which suggested that GPA and student/faculty interaction were both outcomes of combinations of the same set of independent variables. Specifically, they posited that faculty/student contact was a function of academic integration, academic difficulty, intent to transfer, memberships, advisor contact and talking in class. Grade point average was posited as the function of academic integration, academic difficulty, memberships, and performance. The model further specified that a reciprocal relationship existed between GPA and faculty/student contact. College freshmen and sophomores at one university were the population studied in this research.

While the relationships between the combination of independent variables and the two outcome measures were generally supported, no statistically significant relationship was found in either direction between faculty/student contact.

The study began as an investigation of causality and finished essentially negating the relationship. Other studies also demonstrate a less clear relationship between faculty/student contact and GPA.

In 1982 Terenzini, Pascarella, and Lorang expanded their study of the educational institution's contribution to freshman year outcomes. Again, regression analysis was used. The independent variables included not only measures of student\faculty interaction but a number of variables that measured various components of student academic and social integration into the university. Outcome measures were expanded to include personal growth, gains in academic skills, content, and goals, as well as freshmen year GPA.

The results were less persuasive. The only component of faculty/student interaction that made a significant contribution to freshmen year GPA was interaction that related to the discussion of career concerns. A larger contribution to freshmen GPA was made by the students' involvement in the classroom and their commitment to the institution.

Rossman (1967, 1968) conducted some small field

experiments using academic advisors in a special program of formal and informal group discussions with 60 students. Sixty other students, receiving the normal advising assistance acted as the control group. The experimental group reported higher satisfaction than the control group but there was no difference in GPA between the groups.

Despite the lack of uniform results between out of class student/faculty contact and changes in GPA, Pascarella (1985) concludes:

> The weight of evidence suggests that when student pre-college characteristics, such as academic aptitude, secondary school achievement, and personality traits, are controlled statistically, the frequency and quality of student non-classroom interactions with faculty tend to be significantly and positively associated with student academic achievement. (p. 43)

In other words students with limited or negative informal contact with faculty would be expected to experience some negative impact on GPA, all other factors considered equally.

The influence of college student peer groups on a variety of personal outcomes has been well established (Newcomb & Wilson, 1966; Bradshaw, 1975; Pascarella, 1985). With regard to achievement outcomes, much of the research has been devoted to the impact of living groups.

In 1980 Williams, Reilley, and Zglicznski published a comprehensive review of the impact of residence living on college students. It included over 100 articles and spanned over more than decades of work. It is clear from

their conclusions that residence halls can have a differential impact on academic performance. They report as follows:

> Students living in a residence hall for at least the freshman year had better grade averages and are more likely to finish their degree programs than are students living at home or in off-campus housing.
>
> Freshman roommates who are also enrolled in the same course will achieve higher grades than roommates who are not so enrolled.
>
> Roommates who are very dissatisfied with one another will experience less academic success than other roommates.
>
> High-ability students make better grades and feel they live in a more academic environment when assigned together to a specific floor or corridor. (p. 315)

The nature of the studies that resulted in the above conclusions was essentially descriptive. Williams et al. (1980) point out that much still is to be learned about the specific variables that produce the positive effects.

Moos (1979) has done a great deal of research on measuring social environments and their impact on students. Of particular interest here are those aspects of a living group's social environment that have a relationship to GPA. Moos (1979) administered his University Residence Environment Scale (URES) to 52 residence groups (n=868) and found that the "supportive achievement" and "independence oriented" subscales had significant positive correlations with end of year freshman grades. Taken together, these facets of the residence social environment suggest that students who

experience non-competitive support for academics and minimal sanctions for individualistic behavior are more apt to perform better than predicted based on student input measures (e.g. aptitude).

The social environment of three fraternities with high GPAs and three fraternities with low GPAs was assessed using the URES by Winston, Hutson, and McCaffrey (1980). Here the scales related to intellectuality, academic achievement, and independence differentiated the groups. A social environment that fostered independence was more characteristic of the houses with the low GPAs in contrast to the study by Moos (1979). The fraternities could not be differentiated on the basis of SAT scores so the researchers concluded that the social environment contributed to differences in performance.

Citing the low response rate, the failure to include high school performance along with SAT scores as a control variable, and the use of fraternities with extreme GPA averages as problematic in the Winston, Hutson, and McCaffrey (1980) research, Schrager (1986) reinvestigated the impact of social environment on academic performance with four types of living groups at the University of Illinois. Male freshmen were the target population. Greek and residence hall groups were included in the sample. Residual GPAs were computed for each living group and reflected the difference between predicted and actual GPA. Scores on the URES subscales were correlated with residual GPA.

The pattern of correlations between social climate and residual GPA was different between the residence hall and fraternity groups. Specifically, freshmen residence groups with high ratings on Traditional Social Orientation (emphasis on dating) had lower residual GPAs. No similar relationship was found among fraternities. Social environments that were rated high in competition and academic achievement were positively correlated with higher residual GPA in fraternities but not residence groups.

The question of causality in these relationships still remains ambiguous, primarily due to the self-selection issue. Schrager (1986) points out that self-selection, in the case of fraternity members, probably confounds the relationship between achievement and certain aspects of the social environment. However in the residence halls, random assignment underscores the probability that peers, through the formation of certain aspects of social climate, affect academic performance.

College Intervention Programs and Academic Performance

American higher education, sensitized to a diverse population of students and market pressures to stabilize enrollments, has a long history of establishing programs to assist students in meeting the academic demands of college work. Trow (1982) notes that the 19th century college addressed the problem of underpreparedness among

students by developing preparatory departments. By 1895 as many as 40% of the college students matriculated through these preparatory departments.

In an exhaustive review of over three hundred articles on factors affecting college grades, Harris (1940) identifies the efficacy of study skill courses on GPA as early as the twenties.

Certainly concern for the success of students in college has been given more than lip service by institutions of higher education. Intervention programs have traditionally centered around improvement in study skills. As college and university counseling services have expanded, other interventions have emerged such as academic contracts, support groups, stress reduction, and specialized orientation programs. The comprehensive, or "total push" program (Kulik, Kulik, & Shwalb, 1983) has emerged on many campuses in response to the many needs presented by what Klingelhofer and Hollandar (1973) refer to as the "new student." These are students who, for a combination of cultural, academic, and social reasons, have a more difficult time competing academically. These programs provide a variety of academic and personal support services for target student populations through out the students' stay at college. The discussion that follows will focus on a number of different types of intervention programs used by counseling and student personnel professionals.

Several researchers noted the positive value of study skills courses on improvement of academic performance (Harris, 1940; Entwisle, 1960; Brozo, Schmelzer, & Thurber, 1982). The key to improvement, of course, is the extent to which the student consistently implements the skills learned. Effective study skills may be mediated by the students' self-concept and certain personality characteristics.

Gadzella and Williamson (1984) studied the relationship between scores on standardized measures of self-concept, study skills and student GPA. Both measures had significant positive correlations with college GPA (self-concept, R=.26, study skill, R=.52).

Using the Myers-Briggs Type Indicator as a measure of personality types with a group of underachieving and non-underachieving study skills students, Robyak and Downey (1978) found that all groups benefited from the study skills intervention. However, underachieving "judgers" made greater gains in GPA after the intervention than underachieving "perceivers." The underachieving students also made greater gains, regardless of personality type, than the non-underachieving students.

Much of the intervention on college campuses with underachieving students has been initiated by counseling professionals. Perhaps this is because underachievement is considered to have its roots in emotional problems (Robyak & Downey, 1978) or other forms of "maladjustment"

(Kirk, 1965). Nevertheless, a great deal of effort has been made on behalf of college students who experience academic difficulty. The interventions are many and the outcomes are inconsistent.

In a review of 31 articles on the effects of group treatment approaches for college underachievers and bright failing underachievers, Mitchell and Piatkowska (1974) concluded: "Practical gains from the published literature are so low that an urgent need for better treatment programs is indicated" (p.500). In all of the studies reviewed, GPA was one criteria of the effectiveness of the group interventions. Only eight of the studies reviewed reported significant positive changes in student GPA. Other conclusions in the report suggested that unstructured and long-term interventions were "superior" to structured and short-term interventions, volunteer subjects make greater gains than non-volunteers, and that the behaviors targeted for change in many of the interventions did not result in changes in GPA. No real pattern emerged with respect to the type of group intervention. The patterns reported to have a significant positive impact on GPA ran the gamut from non-directive counseling to didactic study skills instruction.

Using meta-analysis to summarize the effectiveness of a variety of programs designed to meet the needs of high-risk and disadvantaged college students, Kulik et al., 1983) report quite different findings:

> A total of 57 of the 60 studies contained GPA results. The effects reported in these studies were basically positive. In 44 of the 57 studies, GPA were higher for students from the special programs; 13 studies reported higher GPA's for control students. Seventeen of the 57 studies reported statistically significant differences in GPA for groups in special programs; results of 1 study favored the control treatment. If special programs for high-risk students had no systemic effect on student GPA, about half the results would have favored the special programs. Instead, a clear majority of the studies favored the special programs. We can therefore conclude with some confidence that the special programs had a positive effect. (p. 401)

While the type of interventions reviewed by each of the above research teams noted above are similar, the target populations for the interventions were defined somewhat differently - underachievers vs. high risk students. The essential differences between the two groups would most likely be on measures of ability, aptitude, and past performance. Underachievement is typically defined as academic performance substantially below what would be predicted. High risk students may have a performance pattern more consistent with what would be predicted. The two reviews also used different methodologies for analysis. Mitchell and Piatkowska (1974) did not use a quantitative analysis of the studies. An obvious conclusion is that intervention programs are also mediated by the presenting characteristics of the students being treated.

More recent research related to improvement in academic performance of high risk students underscores the

value of program structure in producing changes in student GPA.

Using an experimental design, Landward and Hepworth (1984) developed a treatment program based on Bednar and Weinberg's (1970) criteria for effective programs dealing with underachievers. The criteria called for a program that was clearly structured, lasted a full term, was content oriented related to the dynamics of underachievement, offered high levels of warmth and understanding, and attempted to be relevant to the needs of the target population. The dependent measure for both the experimental and control group consisted of GPA at the end of the treatment period (fall term) and each subsequent term throughout the freshmen year. Freshman year persistence rates were also compared. Experimental group members had significantly higher grades than controls at the end of the first term. Subsequent term GPA comparisons showed a drop in the GPA of the experimental group with no significant difference between groups. The treatment effect was short-lived. No significant difference was reported in freshman year persistence though a higher percentage of the experimental group completed the year.

At Eastern Michigan University, Abrams and Jernigan (1984) developed a treatment program for high-risk students that lasted for the entire freshman year and included advising assistance, academic support, and

tutoring. Stepwise multiple regression analysis of fall and winter data demonstrated that number of hours spent in the reading and study skills course and the number of tutor contacts were the best predictor of fall and winter GPA, respectively. It should be noted, however, that the total variance in GPA for all independent variables was only 26%, emphasizing the complexity of the concept of performance.

Structured intervention in the form of an academic development contract with a complementary, highly structured counseling protocol was compared with a non-directive counseling technique (Hudesman, Avramides, Loveday, Wendell & Griemsmann, 1986). Some 247 freshmen, identified as high-risk students, were the population under study. The students were divided into two treatment groups. During fall and spring terms, group A received the structured intervention and group B received the non-directive intervention. During winter term, both groups received the non-directive intervention. Analysis of variance revealed significantly higher GPA for group A fall term and no difference between the groups in the successive two terms. Spring term GPA for group A was higher than group B. However, the reduction of the sample size and the increased variability of the GPA's seemed to be responsible for the lack of significance.

Erlund (1984) used a human potential seminar with a group of students on academic probation and a randomly

selected group of students who were not experiencing any academic difficulty. Control groups were established for each treatment group. Student GPA as well as several other personality variables served as the criterion measures. Probationary students receiving the treatment had significantly higher grades at the end of treatment than probationary students in the control group. No such difference was noted between experimental and control groups among non-probationary students.

Noting that low achieving students experience higher levels of anxiety than high achievers and that "multicomponent" treatment programs seem to be more powerful in affecting target behaviors, Williams, Decker and Libassi (1983) paired a study skills and a stress reduction intervention with a small (n=22) group of probationary students. The students were randomly assigned to two groups. Group A received 14 sessions of a study skills intervention. Group B received 14 sessions of a study skills and stress management intervention. While no significant difference between the groups' GPA existed before treatment, Group B had significantly higher grades for the term in which the treatment was given. The stress management training in combination with the study skills development appeared to be more effective.

Another multicomponent approach composed of study skills and three therapeutic modalities generally referred to as "self-control training" was developed by Greiner and

Karoly (1976). Again, GPA was the dependent variable for all treatment groups. The treatment group making the greatest gains in GPA was the one that included instruction in study skills, self-monitoring, self-reward, and planning strategies. The target population for this study was not composed of students identified as high-risk or underachieving.

Finally, Bron and Gordon (1986) investigated the impact of a semester-long new student orientation program on the first and second semester grades of the participants. The program was didactic in nature and carried academic credit. Topics ranged from the history and purposes of higher education to learning theory, study skills, and career development. The classes had approximately 20 students each. Posttreatment analysis found significant differences between the students who passed the orientation course and those students who did not, and between students who passed and students who did not take the course. In both cases, the GPA of the students who successfully passed the course were higher, and for both first and second semester GPA. No random assignment was used in defining the groups making self-selection as possible issue in the differences between group GPAs.

It seems clear from the research presented here that students' GPA can be improved by structured academic and personal support programs that continue over a sufficient

period of time; thus allowing the program participant to enact behaviors that result in academic performance changes. Multiple component interventions seem more effective than single component programs. This seems to be true for underachievers, high-risk students and non-underachievers.

It is interesting to note that all of the intervention programs reviewed would be considered highly interactive. Students are typically in some sort of small group treatment format with frequent, purposeful, and intense contact with a professional member of the college or university community. These are similar characteristics to those that were related to increases in GPA resulting from informal interaction with faculty and the influence of peers in living group situations.

The primary concern with regard to participation in structured intervention programs is that participation is not a guarantee of long-term increases in academic performance. Both the lack of longitudinal studies on intervention programs and GPA improvement, and the reports of Landward and Hepworth (1984) and Kulik et al. (1983) raise this issue. While important in aiding students to experience some success academically, these programs appear limited to short-term gains unless other conditions or behaviors effecting academic improvement are experienced by the student.

Student Effort, Expectancies, and Academic Performance

Student effort with respect to GPA has been conceptualized in several ways. Generally, the more narrow the concept of effort is operationally defined, the less relationship it has with GPA.

Pace (1984) points out that the measurement of educational processes - what the student actually does in college - is the "missing link" in much of the research on educational outcomes. The content of student behavior can generally be regarded as effort. He further proposes that such effort has qualitative dimensions. When quality of effort is added to the prediction of achievement, an increase of 10 to 15 percentage points is added to performance on various achievement criteria. He concludes, "granted the importance of all the elements that influence who goes where to college, once the students get there what counts most is not who they are or where they are but what they do" (Pace, 1984, p.43).

Effort in college, for Pace, has 14 dimensions measured by the College Student Experiences Questionnaire (CSEQ). Each scale measures the amount of time and the level of involvement a student puts into the use of key college facilities (e.g. recreational and cultural) and opportunities for personal experiences and group associations (e.g. involvement in classes, with peers and with faculty). Not all of the quality-of-effort (QE) scales are related to GPA.

Using the CSEQ, Michael, Nadson, and Michael (1983) conducted a correlational study using the quality of effort measures as independent variables and several dependent variables, including self-reported GPA. The scales measuring faculty/student involvement and classroom involvement had the highest correlations (.25 and .34, respectively) with GPA. Regression analysis was also carried out using the quality of effort scales as independent variables and GPA as the dependent variable. The researchers concluded:

> it would appear that the QE scales indicated a degree of relationship with self-reported grades and with perceived attainments (estimates of gains in academically related activities) nearly as high as that traditionally found with standardized scholastic aptitude tests. (Michael et al., 1983, p. 506)

Both cognitive and noncognitive variables were identified in Tabor and Hackman's (1976) investigation of undergraduate performance. Of the cognitive variables, those that clustered around the dimension of academic effort and achievement had the greatest correlation ($r=.39$) with accumulated GPA at Yale University. The measure of academic effort and achievement included such behaviors as commitment to learning, being organized and efficient, fulfilling course requirements, being admitted to professional or graduate school, and general effort. Measures related to academic ability and self-directed behavior were also positively correlated with accumulated GPA.

Frisbee (1984) conducted an interesting study to determine the degree to which course grades were a function of student aptitude and effort, and/or course and teacher characteristics (such as class size, use of required text, number of assignments, years of teaching experience). Effort was measured as the amount of time a student gave to a particular class - both in attendance and out of class preparation. Effort, so defined, did have a positive effect on course grade. The effect of effort, however, was somewhat negated. The course characteristics (assignments, exams, and required texts) that increased effort also had a direct negative effect on course grade. The explanation offered for this peculiar turn of events was that teachers who provide more exams, assignments, and use of a required text may raise the grading standards on the assumption such course structure constitutes an aid to student mastery of the course content.

Finally, when effort is defined as only the amount of time a student spends studying for a class, no relationship is demonstrated with GPA (Mitchell & Nebeker, 1973; Delucchi, Rohwer, & Thomas, 1987; Schuman, Walsh, Olson, & Etheridge, 1985; Michael et al., 1983). Schuman et al. (1985) did find that class attendance was positively correlated with GPA. This finding supports the investigations of both Frisbee (1984) and Michael et al., 1983). The reason, for the lack of relationship between

study time and GPA, no doubt, is that studying is a complex phenomena. Mere hourly totals of time spent simply do not reflect that complexity. Thomas and Rohwer (1987) point out that studying encompasses "several classes of cognitive and self-management activities, that are, for the most part, learner initiated, directed, and maintained" (p. 381).

The self-expectancies students hold with respect to their academic performance has been shown by several investigators to be positively related to actual academic performance (Holahan, Curran & Kelley, 1982; Mitchell & Nebeker, 1973; Lent, Brown & Larkin, 1984). The positive contribution that expectancy effects have on performance are enhanced if cooperative (warm and friendly) conditions exist between teachers and students (Johnson, 1970).

Erkut (1983) found that males have higher expectancies for academic performance than females, though actual performance between males and females was non-significant. The self-expectancies in these studies involved having students estimate their expected grades or the degree to which effort was related to grades.

Another variation on expectancy studies has been to analyze the effects of differing teacher expectations on student performance. The results seem quite clear with respect to the positive relationship between teacher expectations and student performance (Johnson, 1970; Rosenthal & Rubin, 1978). More recently some studies have

compared the efficacy of manipulating teacher's expectation vs. the student's academic expectations directly. These latter studies are important because they describe a mechanism whereby student performance can be increased.

Haynes and Johnson (1983) contrasted the effects of manipulating both students' and teachers' academic performance expectancies. The students were primarily black female freshmen enrolled in a special academic program designed to aid their adjustment to college and increase the skills required for successful completion. The average high school GPA for these students was 2.0.

Students were randomly assigned to four treatment groups that involved raising teacher expectancies, student expectancies, or some combination of both. Each group had a different teacher. The condition of accentuated teacher expectancy was accomplished by sending the teacher a list of students in their group and indicating that the students were above average. To heighten student expectancy, students in a different group were sent letters informing them they were above average as well. A third group received both types of expectancy input and a fourth group acted as a control. GPA's were higher for the groups with heightened self-expectancy. Furthermore, no differences in the expectancy effects were noted between males and females.

Eden and Ravid (1982) conducted a similar experiment

using adult military trainees enrolled in a 7-week clerical course. Again, the conditions of affecting teacher expectancy and of directly affecting the trainee's expectancy was introduced in an experimental design using two treatment group and a control. In addition, all groups members expressed a level of self expectancy by indicating whether they expected to perform better than 20, 40, 60, or 80 percent of all trainees.

Ratings on the performance criteria (standardized test and instructor ratings) were highest for the condition of trainee expectancy, followed by teacher expectancy and the control group. Having trainees indicate how well they expected to perform (self-expectation) in the course at the beginning, middle and end of the course did not seem to affect the potency of either the condition of teacher expectation or trainee expectation when self-expectancy was used as the covariate.

Obviously, there are ethical implications in distorting the truth about someone's ability to increase their performance. Yet the display of confidence in a student's ability by people perceived (by the student) to recognize ability plays a significant role in academic performance change. It may be that students whose performance is affected through greater interaction with faculty or from intense and highly interactive intervention programs, are, in part, being affected

through a change in expectancies. Those changes may be in the beliefs students have with respect to their ability to perform well or how well the student perceives their effort will result in better grades. Such interaction may also, in the case of instructors, affect their perception of a student's ability or clarify expectations regarding specific academic tasks.

The Extra Curriculum and Academic Performance

Students use a large proportion of their time involved in activities other than those required for successful completion of a degree program. In some respects academic demands are simply one more component in a life that is composed of working, forming familial support networks, and developing a private life. Being a student is no a longer unitary activity. Huber (1987) writes of college students today: "They are persons who among other things are studying. They live in more than one world" (p.165).

Given the fact that students direct their energies into a variety of activities, some researchers have investigated the impact, if any, of this diffusion of effort on students' academic performance.

Fifty years ago Harris (1940) found contradictory results on the relationship between involvement in extra-curricular activities, work, and students' GPA. He concluded that whatever effect extra-curricular

involvement had on GPA was unique to the institution and the students being studied.

More recently Harnett (1965) noted that students' grades tended to decline during terms of greater extra-curricular involvement. However, he did not consider the effects of participation vs. non-participation. His sample included only students participating in extra-curricular activities.

Shuker (1987) reports a small but significant negative correlation ($r=-.10$, $p=.01$) between number of activities involved in (including on-campus employment) and GPA. Micheal et al. (1983) reports similar small correlations between amount of time spent involved in clubs, organizations, and intramurals and GPA.

Noting that more recent research on the student employment/academic performance link had done nothing to clear up the controversy, Ma (1984) decided to introduce levels of course satisfaction as an independent variable into the analysis of the problem. No significant differences were found in the GPAs of satisfied or dissatisfied students with respect to number of hours worked or the job's relevance to the student's major. (Number of hours worked included students who did not work at all.) Satisfied students showed no difference between those students who work in white-collar jobs and those students who worked in blue-collar jobs. Dissatisfied students who had white collar jobs did have significantly

higher grades than dissatisfied students with blue collar jobs. The cell size for this last analysis was quite small making the result of limited value. The conclusion was that course satisfaction was more related to GPA than hours worked.

Ehrenberg and Sherman's (1987) study assessed the relationship between employment while in college, GPA, and post-college outcomes. Again, the number of hours worked had no relationship to GPA. Hours worked did, however, relate to attrition.

It would appear, then, that the decision to be involved in some form of extra-curricular activity in and of itself, will not be the determining factor in academic performance changes during college. This point is underscored by Winston, Hutson and McCaffrey's (1980) research with fraternities with high and low GPAs. Despite differences in the performance of the both fraternities, neither type could be differentiated on measures of involvement, either in the house and outside the house.

Institutional Characteristics and Academic Performance

College is different from high school. Sooner or later students feel the impact of that change. For some, the change generates a series of obstacles that can interfere with academic performance. For others, the change is a stimulus for increased performance.

Lamenting the abruptness of change between high school and college in 1917, Boraas (cited in Williamson, 1939) identified a number of problems that new college students face. These include: large classes, course difficulty, different instructional methods, lengthy assignments, voluminous reading, disinterested faculty and a host of other personal adjustment problems. Writing about the transition from high school to college some 60 years later, Boyer (1987) urges colleges to provide more helpful information to new students about the nature and realities of the institutions to which they apply. His assumption is that such information will provide students a smoother transition to college and a better chance at performing at a level consistent with their potential.

Pascarella (1985) reviewed several studies that investigated the relationship between institutional characteristics and achievement outcomes. Typically, the criterion measures used were scores on standardized subtests of the GRE or NTE rather than college grades. Institutional characteristics usually studied included library size, student/faculty ratio, selectivity of the student body, and degree composition of the faculty. The usual form of statistical analysis used was multiple regression.

He concludes that when the effects of pre-enrollment characteristics of students are statistically controlled, institutional characteristics account for a "relatively

minor" percentage of the variance in the dependent variable. The apparent efficacy of different institutional characteristics on achievement outcomes is in the degree to which they influence interaction with the major sources of socialization in students - faculty and other students. The factor that seems to be most clearly related to achievement outcomes, though small, is the level of degree attainment by the faculty.

One institutional characteristic not included in Pascarella's (1985) review was the relationship between class size and GPA. Harris (1940) found no clear relationship in his research review. In 1985, Williams et al., conducted another extensive review of the extant literature. Again findings were contradictory enough that they launched their own study of the problem. Using scores on objective tests used as the dependent variable, they entered class sizes ranging from 13 to 1006 as well as type of class into a regression formula. Class size simply did not account for any significant variance in test scores. They concluded that the effect of class size on achievement should not be a consideration in administrative decisions.

In sum, institutional characteristics would seem to offer minimal understanding to academic performance changes in terms of direct effects. However, one notable weakness in all of the studies on class size was that they were limited to assessing the effect of single classes on

the criterian measures. Considering the effectiveness of small group interventions and interaction between faculty and students, it seems possible that continuous exposure to small classes might make a contribution to increases in GPA because of possible similiar qualitative dynamics.

Under and Overachievement - Descriptive and Comparative Studies

Underachievement is generally conceived as a measure of academic achievement somewhat less than what one would predict or expect on the basis of past performance and/or aptitude. The subjects selected for many studies of underachievement in the college setting consist of students on academic probation or students whose grades fall below a 2.0 GPA level. Studies involving underachievers, then, are really about a population of students whose academic performance has changed.

The matter of underachievement has been of major concern throughout all levels of the educational system and has been the subject of much research. Kornrich (1965) reviewed over 500 articles on underachievement when he was compiling his book on the subject.

Judging from the low number of articles in the literature, less is known about college students who perform better than predicted. Certainly high achieving students have been the subject of much research, but not necessarily those whose academic performance has changed significantly in a positive direction.

The literature reviewed in this section is primarily descriptive and exploratory. It focuses on comparing underachievers with non-underachievers in college in terms of behaviors, thought by the researchers, to be important to academic success. Also included are studies involving college students' assessment of the factors related to their decline or gain in performance.

One of the questions addressed by researchers has been whether underachievers can be differentiated from non-underachievers in the area of study skills knowledge and use. Brozo, Schmelzer, and Thurber (1982) used a random sample of 93 "successful" students (3.5 GPA or better) and 56 underachieving students (less than a 2.0 GPA), to determine if differences could be found on a study skills habits measure. Test-taking and basic academic preparation were not the problem with underachievers. The problems were more associated with the behaviors required to thoroughly understand and complete academic assignments.

Significant differences were found on six of the eight measures. These included time scheduling problems, note-taking problems, organization and study effort, concentration/distraction, motivation and goals, and possible emotional problems.

Using a different measure of study skills knowledge and attitudes, as well as a personality inventory, Robyak and Downey (1979) tried to predict underachievement and

non-underachievement among a group of students who had taken a study skills improvement course. Discriminant analysis was the form of statistical analysis used.

Both underachievers and non-underachievers had similarly low scores on study skills use. The variables used in the study that had the greatest influence in differentiating the underachievers from the non-underachievers were a preference for introversion and high study skills knowledge among the non-underachievers. It was suggested that the lower study skills use scores among non-underachievers was a function of their more reflective nature as introverts. According to the measure used, introverts work through understanding information internally. The ability to manage a large amount of information in such a manner was thought to preclude the high use of traditional study skills methods. In effect, the introvert is always working at processing information. In contrast, the underachievers had neither high study skills use nor high study skills knowledge.

Janos, Sanfilippo, and Robinson (1986) contrasted underachieving and non-underachieving accelerated college students of high school age. Their study was unusual in that they defined underachievement as a GPA of less than a 3.0 instead of the more usual 2.0 cutoff.

Included in the variables studied were: study skills knowledge and attitudes, family relationships, personality characteristics, and the importance of and satisfaction

with several social and intellectual elements of college life. Transcripts were also analyzed with respect to performance patterns. No significant differences were found between groups in any of the measures taken. Both groups scored high on measures of study skills and satisfaction with their collegiate experience. The primary difference reported was in the transcript analysis. Underachievers were much more erratic, having more incompletes and more variance in GPA from term to term.

Noting the lack of any meaningful theory orientation to much of the research on underachievement, Todd, Terrel and Frank (1965) chose to investigate differences between "normal" (3.0 GPA or higher) and underachieving college students (less than 2.0 GPA) with respect to achievement need, vocational goals, expectancies for success, and expectancy that academic performance would lead to desired long term goals. Underachievers reported less clear vocational goals and lower expectancy for academic success than normal achievers.

Using more discriminating categories than high and low achieving students, Larsen, Alvord, and Higbee (1982) looked for differences between honors, average, academic warning, and probationary students. Honors students (3.30+ GPA) reported fewer problems with college, fewer personal and financial problems, fewer physical illnesses, and fewer difficulties selecting courses. They were

better than the other groups at concentrating and allocating time for academic matters. Average students (2.00 to 3.29 GPA) reported more problems taking exams than honors students and more problems in the selection of a major. Warning students (term below 2.00 but accumulated GPA above 2.00) took fewer credit hours than average and honors students and reported more learning and studying problems. The probationary students (term and accumulated GPA below 2.00) were similiar to the warning students and also reported more problems in general with college.

There is also a line of research that has focused on individuals and their personal assessment of changes in academic performance, or clinical assessments of the change in performance. Again, most of the inquiry has centered on the underachiever - the student with less than a 2.0 GPA.

Sarnoff and Raphael (1965) used an in-depth interview approach to study five failing college students during the second semester of the freshman year. The all male sample was interviewed 8 to 12 times with the goal of trying to determine how the individual student experiences failure - to look at the individual interacting with the collegiate environment. Several patterns emerged. In addition to demonstrated poor motivation and a lack of appreciation for scholarship, the students had "personality problems", poor study habits and a propensity to be distracted

through involvement in a variety of extra-curricular activities.

Interviewing was also the technique used to determine why students who had above average college entrance scores received below average grades. Teitelbaum (1983) reports that most of the 44 students indicated a lack of self-discipline in the face of the greater demands of college work. The problem of poor performance was intensified when the student was involved in part-time employment.

In another exploratory study, Hart and Keller (1980) developed a questionnaire containing 68 factors that could negatively affect academic performance. It was given to each first term residence freshman with a GPA of less than 2.0. Students were asked to rate the importance of each reason as it related to their poor performance. The reasons students perceived as contributing the most to their poor performance fell into two groups - personal and institutional.

> Overall, 8 of the top 10 factors that the respondents believed were important reasons for their poor academic achievement were related to the students' own lack of motivation, initiative, or ability. Nonetheless, many students indicated that their personal limitations could not completely account for their performance. They believed that other factors (e.g. university and divisional course requirements, faculty teaching and examining procedures, educational background in English and science, the quality of academic advising and tutorial help, and residence hall atmosphere) also contributed to their academic problems. (p. 530)

The authors also make the point that these freshmen underestimated the demands of academic life in college.

Freshmen in DeBoer's (1983) study covered the spectrum in terms of GPA. They were asked to identify the factors perceived to have the most effect on their academic performance during their first term at college. These perceptions were then analyzed for their relationship to students' affective reactions to their performance, future expectancy for success, and actual second term performance. The students were also divided into low success and high success groups based on whether their first term grades were worse or better than anticipated.

Among low success students, only luck and social distractions were considered to have a negative impact on performance. The factor perceived to have the most positive effect was the desire for high grades.

Among high success students, only social distractions were considered to have a negative impact. Again, the desire for high grades was considered to be the most important factor in academic performance. High success students also believed that the ability to work hard and long on difficult tasks and aptitude, contributed to their success.

However, when perceptions for success were correlated with actual second term performance, only the perception of the importance of academic aptitude among successful students was related to actual performance ($r=.27$).

This partial correlation, with first-term GPA

> controlled, indicates that students who believed that their first term success was attributable to their ability actually improved their performance in the second-term more than students who believed that their ability was a less positive factor. (p. 347)

The effect of the belief in one's ability here is similar to what was demonstrated in the self-expectancy studies reviewed earlier. The difference, of course, is that here the belief about aptitude was not experimentally manipulated.

Finally, one study was found that explored only those student perceived factors that contributed to greater than expected academic performance. Easton and Ginsberg (1983) identified 26 community college students who had entered college with low reading placement test scores. Subsequent to their enrollment each of students had performed well enough to be eligible for the honor society. Data were gathered through interviews regarding the students' learning processes. They were found to be very involved in class by attendance, note-taking, and verbal participation. They were also selective in the courses taken, demonstrated a strong orientation to establishing goals and planning, and consistently incorporated a review and restudy cycle in their class preparation. These, of course, are all skills that can be learned and are often taught in study skills courses.

At first glance, it seems curious that the standardized tests used to measure study skills fail to provide a consistent picture of students who perform

differently. However, not all studies used the same instrument. The one used by Brozo, et al., (1982) seemed to emphasize habitual study behavior. Such habitual behavior may be the key. Students need to not only know about effective study methods, they need to consistently incorporate such behaviors when approaching academic work. Underachieving students themselves, seem to underscore this fact by pointing out the lack of self-discipline as an important factor in less than satisfactory grades, whereas the consistent use of specific study skills were identified by high achieving/lower ability students as important to their performance. The picture of the underacieving student is one where conditions that once supported a respectable level of performance no longer exist. They fall prey to distractions of various sorts and fail to consistently engage the types of behaviors that would assure academic success.

Summary

While there are many factors related to a student's GPA, this review has focused on those that may account for a change in performance from one point in time to another. Certain behaviors, when present in greater amount, are related to higher grades. When those factors are present in lesser amounts grades are lower.

Lacking in these studies is any widely used, comprehensive theory of performance change. More

typically, researchers focus on often significant but minuscule pieces of the puzzle. Effect sizes, correlations, and sources of variance tended to be significant but small. Performance change as a phenomenon has not been the subject of quantative analysis. A framework for the analysis of academic performance change is needed.

A number of the variables studied clearly originate from the college environment. These include time spent interacting with faculty related to academic, career, and personal concerns. Peers can be a source of both distraction and reinforcement for effort directed towards academic performance. The kind of social environment present in a college living group also contributes to changes in performance.

College sponsored intervention programs have the potential to be powerful stimuli for changes in performance. Underachieving and underprepared students seem to benefit from such programs, particularly when they are well structured and focused, are characterized by interpersonal warmth, and operate over a period of at least several weeks. Unfortunately, the effectiveness of such programs on changes in performance may only last as long as the intervention program.

Obviously, the content of such intervention programs and the population of students served varies, yet neither of these variables appear to have any effect on GPA in the

studies cited. Human potential, self-control training, stress reduction, study skills development, and non-directive counseling have all been connected with increased GPA. It is equally true that not all interventions result in increased GPA. Therefore, the qualitative dimensions of the intervention surely play a significant role in academic performance change. If this to be true, then it is also possible that a higher percentage of small classes may have similiar results. There is evidence for this at the elementary and secondary levels (Glass & Smith, 1978).

Changes also occur within the individual. The most powerful internal change related to changes in academic performance appears to be associated with changes in students' academic expectancies - the beliefs that students hold about their capability to accomplish the work required. Such beliefs can be affected and are thus, a source of influence that leads to changes in academic performance.

At the behavioral level, the individual must do certain things to experience positive performance change. Participation in the class through discussion, attendance, and active note-taking also seem to account for some fluctuation in grades, as does a consistent approach to study that supports quality task completion. Taken together, such behaviors can be taken as an indication of effort on the student's part.

When students are asked the reasons for succcess or failure in college they corroberate the more quantitative research just noted. Freshmen also note a number of differences in the collegiate, as contrasted with the high school, experience that they perceive to contribute to poor performance. Included are differences in examinations, amount of work required and teacher styles. Yet, while these factors may be percieved as contributing to lower performance, they are factors that are part of the experience of all college students.

Overall, the process of academic performance change is a dynamic one. Students experience the environment differentially. If significant stimuli, internal changes, and behaviors are muted, the student may experience a decline in performance. If those environmental stimuli, internal changes, and behaviors are fully realized, academic performance increases are more likely to be experienced.

METHODOLOGY

Defining the Population

Two populations of gainers and decliners were used in this study. Both were drawn from the larger undergraduate student population of Oregon State University (OSU). One group had completed the first term of their senior year. The other had completed only their freshman year.

OSU is a land and sea grant institution in the category of "doctoral granting university" as defined by the Carnegie Commission. As such, it provides graduate training and research in a broad range of academic disciplines. These activities are consistent with the institution's research mission and its national reputation as a research institution.

During winter term 1989, the Office of the Registrar provided a list of OSU seniors who had started as freshmen in the fall of 1985 and had been continuously enrolled at OSU since that time. The list included each student's name, ID number, current mailing address, academic major, high school GPA, gender, and accumulated college GPA through the completion of students' fall 1988 term (N=804).

Sophomore gainers and decliners were drawn from a random sample (N=973) of sophomores who had started at OSU in the fall of 1988 and had achieved sophomore status by the fall of 1989. Accumulated college GPA for this group

only included the freshman year. The other information requested was the same as it was for the seniors.

Gainers and decliners for both groups were identified as follows. First, high school grades and accumulated college GPAs were entered into a linear regression model. High school GPA was identified as the independent variable and used to calculate a predicted college GPA. Then the differences between predicted and actual college grades (residual GPA) were calculated as a more accurate point of comparison between high school and college academic performance. Differences between predicted college GPA and actual college GPA in excess of plus or minus 1.5 sd from the mean difference were then used to define significant gains or losses in GPA from high school to college. This procedure resulted in 74 senior gainers, 47 senior decliners, 71 sophomore gainers and 52 decliners. All of the students so defined were included in the survey process.

Survey Instrument

In addition to the data provided by the Office of the Registrar, a survey instrument was designed composed of selected scales from the College Student Experiences Questionnaire (CSEQ) as well as other items developed for this research.

First published in 1979 (with a second edition in 1983 and format revisions in 1986), the CSEQ is a

standardized self-report survey that provides student demographic data, information on the students' status in the college or university, an index of satisfaction with college and three sets of scales that provide information on: 1) quality of student effort with respect to those aspects of the college environment that are "intended for learning and development", 2) student perceptions of the collegiate environment, and 3) student perceptions of their gains on a variety of educational goals.

The instrument is based on an educational model the author refers to as "student development and college impress" (Pace, 1979). The model recognizes that students come to college with many individual differences in terms of expectations, abilities, values and backgrounds. They enter the college, a diverse environment composed of facilities, programs and relationships that offers many unique opportunities for learning and personal development. As students interact with these facets of the college environment they will experience movement towards a variety of personal and academic outcomes.

The CSEQ has been normed on the basis of samples from 74 institutions, involving 25,606 students in four institutional categories: doctoral granting universities, comprehensive colleges and universities, general liberal arts colleges, and selective liberal arts colleges. The institutional classification corresponds to the ones used by the Carnegie Commission. Scores from doctoral granting

universities are considered by the author as being "very stable." The samples from these institutions are the most representative in terms of geographic distribution, male female ratio, and class levels included. Comprehensive CSEQ reports generated for these institutions over a three year period show little variance.

The alpha reliability coefficient for each of the quality of effort scales range from .82 to .92. Construct validity is reported primarily in terms of scale construction. Item intercorrelations within each of the scales range from the .30s to the .60s. Using factor analysis, one factor solutions produced median factor loading's that ranged from 48 on one scale to 70 or higher on five of the scales. In the words of the author, "In general, it is fair to conclude that the activities in the scales go together in making a positive contribution to the definition and clarity of the measure" (Pace, 1987, p.58).

Seven of the CSEQ scales were incorporated into the research instrument. The four "quality of effort" scales used were identified by Pace (1987) as being most directly related to academic achievement outcomes. The content of these scales are relevant to variables in the model of academic performance change. They include a measure of the student's interaction with faculty, participation in class, and the sophistication of the student's library and writing skills.

Each item in the quality of effort scales is arranged in an order of ascending complexity. Based on this arrangement, the last item has "greater potential for influencing learning and growth" (Pace, 1987, p. 13) than the items that come before it. Four response categories are possible for each scale item: "never," "occasionally," "often," and "very often." The response "never" gets 1 point, "occasionally" gets 2 points, "often" gets 3 points, and "very often" gets 4 points. The sum of these weights for each item in the scale forms the total score for the scale. In a ten item scale the maximum score would be 40 and the minimum score would be 10.

Three other scales from the CSEQ are included in the survey instrument. They provide measures of the student's experience of the institution's interpersonal environment (e.g. the degree to which the student experiences other students, faculty or administrators friendly, approachable, or helpful).

The rest of the questions used on the survey were developed with the assistance of Oregon State University's Survey Research Center. Seven additional rating scales were developed to measure the student's academic expectancies, influence of peers on academic performance, and their approach to study. Also asked was the percentage of classes the student had been enrolled in that had fewer than 35 students, the number of hours spent

in academic or personal growth groups, and the number of terms required for the student to adapt to the academic rigors of college life.

Because average GPAs among students at OSU vary according to college affiliation (OSU Fact Book, 1989) and gender (Office of the Registrar, 1988-89), the population of gainers and decliners was examined for similar distributions of those characteristics. Student gender, year in college, and academic area of major were coded on each student's survey and used as control variables. A summary of variables used in the study is outlined below.

Variable List

From Student Questionnaire

VARIABLE LABEL	WARMTH
EXPLANATION	Warmth of interpersonal environment
SCALE TYPE	Interval
VALUE RANGE	3 - 21
MEASURED BY	The score on three, seven-point CSEQ college environment rating scales
CLASSIFICATION	Environmental Triggering Mechanism (Discriminant variable)

VARIABLE LABEL	CLASS
EXPLANATION	Percentage of classes with an enrollment of 35 students or less
SCALE TYPE	Ordinal
VALUE RANGE	1 - 5
MEASURED BY	The student's estimate of the percentage of classes he/she participated in with 35 or fewer than 35 students enrolled: less than 20%, 21 - 40%, 41 - 60%, 61 -80%, more than 80%
CLASSIFICATION	Environmental Triggering Mechanism (Discriminant Variable)

VARIABLE LABEL	INTERACT
EXPLANATION	Level of interaction with faculty

SCALE TYPE	Interval
VALUE RANGE	10 - 40
MEASURED BY	The CSEQ quality of effort scale - Experiences with faculty
CLASSIFICATION	Environmental Triggering Mechanism (Discriminant Variable)

VARIABLE LABEL	PEER
EXPLANATION	Peer influence on academic performance
SCALE TYPE	Interval
VALUE RANGE	1 - 7
MEASURED BY	Seven point rating scale
CLASSIFICATION	Evironmental Triggering Mechanism (Discriminant Variable)

VARIABLE LABEL	GROUP
EXPLANATION	Number of hours involved in academic or personal development groups
SCALE TYPE	Interval
VALUE RANGE	0 - 682
MEASURED BY	The number of group involvements multiplied by the number of hours spent in each involvement
CLASSIFICATION	Environmental Triggering Mechanism (Discriminant Variable)

VARIABLE LABEL	EXPECT
EXPLANATION	Academic performance expectancies
SCALE TYPE	Interval
VALUE RANGE	2 - 14
MEASURED BY	The score on two, seven-point rating scales
CLASSIFICATION	Internal psychological state (Discriminant variable)

VARIABLE LABEL	ADJUST
EXPLANATION	Number of terms required to adjust to the academic rigors of college life
SCALE TYPE	Ordinal
VALUE RANGE	0 - 6
MEASURED BY	The estimated number of terms transpired before adjusting to the academic rigors of college life
CLASSIFICATION	Internal Psychological State (Discriminant Variable)

VARIABLE LABEL	SKILLS
EXPLANATION	Academic skills
SCALE TYPE	Interval
VALUE RANGE	10 - 40
MEASURED BY	The average score on three CSEQ scales that measure student quality of effort in the classroom, library usage

	skills, and writing skills
CLASSIFICATION	Academic Behavior (Discriminant Variable)

VARIABLE LABEL	STUDY
EXPLANATION	Student approach to study
SCALE TYPE	Interval
VALUE RANGE	1 - 7
MEASURED BY	The score on three, seven-point rating scales that measure ability to concentrate, as well as priority and consistancy given of study
CLASSIFICATION	Academic Behavior (Discriminant Variable)

Derived From Information Provided by the Office of the Registrar

VARIABLE LABEL	DEPEND
EXPLANATION	Dependent variable (gainer or decliner)
SCALE TYPE	Nominal
VALUE RANGE	0, 1
MEASURED BY	Plus or minus 1.5sd from the mean difference between predicted and actual college GPA
CLASSIFICATION	Dependent Variable

VARIABLE LABEL	CHANGE
EXPLANATION	Change between actual and predicted college GPA - used in correlation analysis
SCALE TYPE	Interval
VALUE RANGE	0 - 304
MEASURED BY	Multiplying the difference between actual and predicted college GPA by 100 and adding a constant
CLASSIFICATION	Performance Change

VARIABLE LABEL	MAJOR
EXPLANATION	Academic major area
SCALE TYPE	Nominal
VALUE RANGE	0 - 3
MEASURED BY	Classifying the student's major into one of four academic areas
CLASSIFICATION	Control (Independent) Variable

VARIABLE LABEL	GENDER
EXPLANATION	Male, Female
SCALE TYPE	Nominal,
VALUE RANGE	0, 1
MEASURED BY	Male=0, Female=1
CLASSIFICATION	Control (Independent) Variable

VARIABLE LABEL	STATUS
EXPLANATION	Year in college
SCALE TYPE	Nominal
VALUE RANGE	0, 1
MEARSURED BY	Sophomore=0, Senior=1
CLASSIFICATION	Control (Independent) Variable

Data collection

Students were mailed a letter that explained the need for their participation, the uniqueness of their status as students who had undergone significant changes in academic performance, and the process of completing the survey. The survey was enclosed with the cover letter along with a postage paid return envelope. Surveys were coded to determine who returned them. Seniors who received, but did not return the survey within 10 days were telephoned, asking for their cooperation. An additional survey was provided if needed. Sophomores who did not return their survey within 10 days were contacted again with a post card requesting their cooperation.

Analysis Procedures

The analysis procedures for this research problem follow three distinct steps. First, descriptive statistics were calculated for each of the variables already described. Secondly, an intercorrelation matrix was produced on the discriminant variables in the model. This procedure had two purposes in this research - to check for multicollinearity between the independent

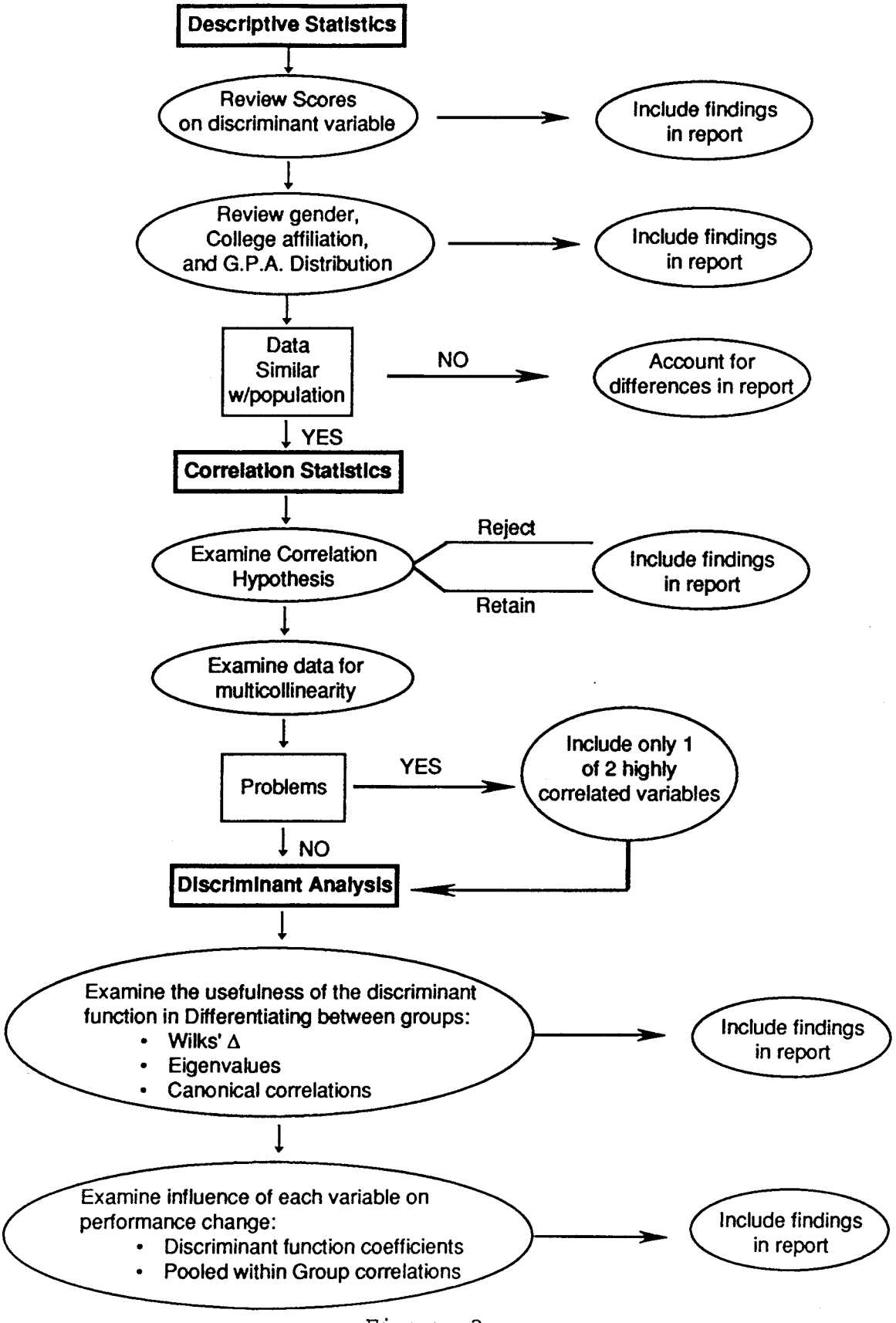

Figure 2
Analysis Procedures

variables and to test the correlation hypotheses. Highly correlated independent variables were to be dropped from the discriminant analysis. Third, a discrimanant analyis was conducted to determine the usefulness of the discriminant variables in differentiating between gainers and decliners.

The Pearson's Product Moment statistic was chosen to examine the relationships between variables in the model. The two-tailed test of significance was used to determine the significance of the correlation coefficients.

A multivariate form of statistical analysis was chosen to examine the contribution of the discriminant variables in the model to the condition of academic gain or decline from high school to college. Multivariate statistical techniques have been advanced by Cohen and Cohen (1983) as being useful in addressing many of problems posed by the social sciences. The primary reason given is that much of the phenomena studied are the composite results of many interacting factors. Multivariate procedures provide an efficient method for investigating such complexity.

Certainly, investigating academic performance change as a function of the the person's interaction with the environment brings the researcher into the arena of complexity. In recognition of such complexity, researchers interested in college student academic achievement have turned to multivariate techniques to

address their research problems. For example, most of the research efforts of Pascarella and his associates cited in this research, have typically relied on multivariate analysis.

Two-way discriminant function analysis was chosen as the statistical tool to use with this study. It may be thought of as a form of multiple regression; the advantage being that the dependent variable (group classification) may be categorical in nature (Sanathanan, 1975; Kerlinger & Pedhazur, 1973; Hedderson, 1987). Discriminant variables may be of any scale type, though nominal data must be "dummy coded" (Cohen & Cohen, 1983).

Two-way discriminant function analysis has two basic purposes (Kerlinger & Pedhazur, 1973). One is for classification and diagnoses. The other is to support the study of relationships among variables between different groups. Stevens (1986) refers to this latter purpose as "descriptive discriminant analysis." It is the search for relationships that forms the primary thrust of this study. The classification purpose will serve to validate the variables that will comprise the discriminant function.

Klecka (1980) specifies seven criteria that should be met when performing a discriminant analysis. These criteria will be identified along with how each is met.

First, there must be at least two mutually exclusive groups with each case in the study being classified in no

more than one of the groups. In this research, the group of academic performance changers are classified as gainers or decliners based on differences between actual and predicted college GPA.

Second, each group must have at least two cases each. Both the sophomore and senior study group had more than enough cases to adequately meet this assumption - 87 and 97 respectively. However, due to missing values among the respondents, only 79 seniors and 87 sophomores were included in the discriminant analysis.

Third, the number of discriminating variables is limited to the total number of cases minus two (n -2). This study begins with nine potential discriminating variables.

Fourth, discriminating variables should be interval measures. However, both Hedderson (1987) and Cohen & Cohen (1983) indicate that non-interval measures may be used if they are "dummy coded" (given a numeric value such as 0,1,2). Of the nine discriminating variables, seven are interval, and two are of ordinal scale type.

Fifth, no variable can be a linear combination of other discriminating variables. For example, the variable INTERACT could not be combination of both GROUP and CLASS and included in the analysis along with the separate variables, GROUP and CLASS. The point here is that each discriminating variable must be distinct, lacking redundance. Variables defined by some linear combination

of variables add no new information. Further, discriminant analysis will not work when discriminating variables are linearly dependent.

Sixth, the variance-covariance matrices on the discriminating variables for each group (gainers and decliners) should be equal. Conceptually, this can be thought of as homogeneous variance for both gainers and decliners on the discriminating variables. Even though the expectation is that scores will be different for each group, the variability in the scores should be similar for both groups. There do not appear to be any factors which would suggest gross differences in the variances between the two groups.

Finally, each group should be drawn from a population with a multivariate normal distribution of scores on the discriminating variables. When the discriminating variables are jointly distributed as multivariate normal, discriminant analysis predicts better and allows for a more accurate computation of tests of significance. When variables are multivariate normal, the individual distributions will also be normal. While the converse is not necessarily true, if the individual distributions are normal, no compelling reason exists to assume the absence of multivariate normality.

These latter two assumptions are of particular concern when discriminant analysis is used for classification (Stevens, 1986). Since classification is

not the purpose of this research, less consideration needs to be given in assuring that these assumptions are met.

Hedderson (1987) adds one other consideration when performing a discriminant analysis - reducing multicollinearity. This condition occurs when two or more variables are highly correlated. The idea of "highly correlated" variables is subject to interpretation but Hedderson (1987) suggests eliminating one of two variables that are correlated at .70 or higher. When two or more variables are highly correlated the precise contribution of those two variables to the discriminating function is ambiguous. The correlation matrix of the discriminating variables will provide the information needed to determine if multicollinearity exists.

Morrison (1980) identifies Fisher's discriminant function model that serves as the basis for this study:

$$Z_i = b_o + b_1 X_{i1} + b_2 X_{i2} + \ldots b_p X_{ip}$$

where:

Z_i = the ith individual's discriminant score;

b_o = the fixed constant;

b_1 = the discriminant coefficient for the ith individual;

X_{ip} = the ith individual's value of pth independent variable:

p = the number of independent (discriminating) variables.

While the application of the above mathematical model produces several types of results, this particular study

is concerned with results that address two related issues. First, the discriminant function needs to be examined with respect to its usefulness in differentiating between gainers and decliners. Second, the influence of each independent variable on academic performance change needs to be examined. The statistical output that addresses each issue is described in the paragraphs that follow.

The following statistical output examines the relative usefulness of the discriminant function in differentiating between gainers and decliners.

The canonical correlation coefficient describes the relationship of the discriminating variables with the groups variable. Values for this coefficient range from 0.0 to 1.0. The higher the value the greater the discriminant function differentiates between groups.

The eigenvalue and the Wilks' Lamda assist the researcher in evaluating the importance of the discriminant function. The eigenvalue compares between groups variance with within groups variance by dividing the two values. The resulting values, if over .40, are considered to be good evidence of the worth of the discriminant analysis.

Wilks' Lamda is calculated by dividing the within-groups sum of squares by total sum of squares. Again, this ratio has a range of 0.0 to 1.0. However, the lower the value, the better predictor variables are able to differentiate between groups.

A final calculation accomplished in connection with a discriminant analysis is a table comparing actual group membership with predicted group membership. Such information can serve to validate the discriminant function, as well as provide a practical indicator of its usefulness.

Two measures are calculated to examine the contribution of each discriminating variable to the discriminant function: the standardized discriminant function coefficients, and the pooled within-group correlation with function.

The standardized discriminant function coefficients (sometimes referred to as standardized discriminant weights and analogous to beta weights in regression analysis) address the first issue. They equalize the measurement scales, removing the effects of the differing means and standard deviations among the independent variables. These standardized coefficients have a mean of 0 and a sd of 1. The higher the coefficient the greater the effect of the variable on the discriminant function.

The pooled within-group correlation with function provides a more dependable measure of each variable's contribution (Stevens, 1986; Hair, Anderson, Tatham, and Grablowsky, 1979), and should be use with smaller study groups. It is this measure that will be most relied upon in interpreting the results of this research.

The pooled within-group correlation with function

(sometimes referred to as discriminant loadings or structure correlations) measure the linear correlation between each independent variable and the discriminant function. These correlations reflect the variance the discriminating variables share with the discriminant function.

The final method used to interpret the contribution of an individual discriminant variable is to repeat the discriminant analysis, dropping a different variable from the analysis each time. After a variable has been dropped, those measures that provide information as to the strength of the discriminant function are examined to determine if they have changed.

The foregoing discussion on the output of a discriminant analysis was drawn primarily from Hedderson (1987) and Williams (1979).

Summary of Statistical Analysis Procedures

Four different statistical procedures will be performed in connection with this research: 1) linear regression, to predict college grades from high school grades, resulting in the identification of gainers and decliners, 2) descriptive statistics, 3) the development of an intercorrelation matrix of independent variables to determine multicollinearity and relationships between categories of variables, and 4) a two - way discriminant analysis that produces standard discriminant function

coefficients, canonical correlation coefficients, eigenvalues, Wilks' Lamda, and the percent of correctly classified cases.

RESULTS

Introduction

This study is concerned with identifying some of the contributing factors to significant change in academic performance among sophomore and senior gainers and decliners attending Oregon State University. In carrying out the study, a model of academic performance change from high school to college was developed and used in analyzing similarities and differences between the two groups. Essentially, this study is both exploratory and comparative in nature. Data from both sophomores and seniors is presented together, where possible, to facilitate the comparative process. The results will be introduced and discussed in the following topical order:

Descriptive Statistics

Correlation Results

Discriminant Analysis

Descriptive Statistics

Gainers and decliners were derived from the current sophomore and senior classes. Gainers and decliners from both classes began as freshmen and completed the required number of credits annually to make the normal progress to the next academic class. Transfers, returning students, or students not accumulating enough credits to progress to the next academic class were not included in the cohorts

from which the gainers and decliners were identified. By controlling the cohorts in this manner there was no likelihood of performance change being affected by differences in institutions or maturational changes among students who "stopped out" and returned at a later time.

There were twice as many sophomores meeting the cohort requirement as seniors. Therefore, the manner in which gainers and decliners were derived from the sophomore cohort was somewhat different than the process for senior gainers and decliners (Table 1).

A random sample of 973 sophomores meeting the cohort requirements yielded 123 gainers and decliners. Questionnaires were mailed to all 123, and 97 were returned.

A random sample of the senior cohort was not necessary as only 862 seniors met the cohort requirement, yielding 123 gainers and decliners. Eighty-seven of the senior performance changers returned questionnaires.

The breakdown of gainers and decliners in each class is noted in Table 2. Return rates for all categories ranged form 85% (sophomore decliners) to 69% (senior decliners).

Even though grades from high school to college tend to move downward, gainers out numbered decliners (in both classes) in this study. Certainly one contributing factor to this apparent contradiction was the inclusion of students identified as gainers whose actual GPA from high

TABLE 1
Research Group Formation

Group	Class	
	Soph	Senior
No. of students meeting cohort requirements	approx. 1600	862
No. of students in sample	973	N/A
No. of students with usable data	950	804
No. of performance changers	123	123
No. of students returning questionnaires	97	87

TABLE 2
Return Rates Among Gainers and Decliners

Group	Class	
	Soph	Senior
Performance changers receiving questionnaires		
Gainers	71	74
Decliners	52	49
Performance changers returning questionnaires		
Gainers	53	53
Decliners	44	34
Percentage return		
Gainers	75%	72%
Decliners	85%	69%
Overall return rate	79%	71%

school to college had declined. This occurred among seniors whose high school GPA was above a 3.75 GPA and college GPA was in the mid to upper three-point range. For example, the predicted college GPA for seniors with a high school GPA of 4.00, was 3.29. Any senior who had a 4.00 high school GPA and received at least a 3.81 GPA in college (1.5 sd above the mean difference between actual and predicted college GPA) would be classified as a gainer.

Three issues were identified as potentially influencing the outcome of the research beyond the variables identified in the explanatory model. Since the average GPAs are higher for women than men at OSU (Office of the Registrar, 1988-89), one concern was the gender distribution between gainers and decliners in both classes. Under these circumstances, conceivably women could be over-represented among gainers. However, among gainers and decliners who received the questionnaire and those who returned it, males had the greater representation. This was true of both sophomores and seniors (Table 3). Apparently, the contribution that being female has on academic achievement at OSU is not the same that being female has on change in academic performance from high school to college.

A second concern was the distribution of gainers and decliners among the various colleges of the university. Average GPA's vary a good deal between the colleges, with

TABLE 3
Distribution of Gainers and Decliners by Gender

	CLASS			
	Soph		Senior	
	STATUS			
Gender	Gainer	Decliner	Gainer	Decliner
Students who received questionnaires				
Male	47	26	40	25
Female	24	26	34	24
	N=123		N=123	
Students who returned questionnaires				
Male	36	23	27	19
Female	17	21	24	15
Gender Missing	-	-	2	-
	N=97		N=87	

the College of Education having a 3.69 GPA and the College of Science having a 2.58 GPA. If gainers tended to be in high GPA colleges and decliners in low GPA colleges then academic performance change could well be conceived as being a function of college affiliation at OSU. Again, the opposite is true. Gainers are over represented in the colleges with lower GPAs, with the exception of seniors in the College of Education. The fact that no sophomore gainers and decliners are listed under the College of Education is a function of the application requirements for teacher certification. At the time of collecting the data, sophomores would not have completed enough course work to make application for teacher certification. Tables 4 and 5 provide the breakdown of gainers and decliners by school. It is also important to note that the proportion of gainers and decliners is similar for students both receiving the questionnaire and students returning it.

The third issue is concerned with the distribution of high school and college GPAs. It would seem logical that gainers would have lower high school GPAs than decliners, and vice versa. To some extent this pattern is correct. However, the data summarized in Table 6 show a high degree of similarity in high school performance -certainly enough similarity to preclude assuming gainers and decliners had a significantly different level of high school achievement. What is different is the variability in high

TABLE 4
Distribution of Sophomore Academic Performance Changers by School Affiliation

	GROUP			
	Received Questionnaires		Returned Questionnaires	
	STATUS			
School	Gainer	Decliner	Gainer	Decliner
Education (3.69 GPA)	-	-	-	-
Health & PE (3.43 GPA)	-	3	-	3
Vet. Med. (3.27 GPA)	-	-	-	-
Forestry (3.26 GPA)	1	1	1	1
Ag. Science (3.17 GPA)	1	3	1	2
Oceanography (3.07 GPA)	-	-	-	-
Engineering (3.03 GPA)	19	10	15	9
Home Ec. (2.94 GPA)	2	3	2	2
Lib. Arts (2.79)	15	6	10	6
Pharmacy (2.66 GPA)	1	5	-	4
Business (2.65 GPA)	15	8	11	5
Science 2.58 GPA)	13	6	10	6
Undecided	2	7	1	6
	N=123		N=97	

GPA Information from OSU Fact Book (1989).

TABLE 5
Distribution of Senior Academic Performance Changers by School Affiliation

	GROUP			
	Questionnaires Received		Questionnaires Returned	
	STATUS			
School	Gainer	Decliner	Gainer	Decliner
Education (3.69 GPA)	9	1	8	1
Health & PE (3.43 GPA)	1	4	-	4
Vet. Med. (3.27 GPA)	-	-	-	-
Forestry (3.26 GPA)	1	1	1	1
Ag. Science (3.17 GPA)	4	3	2	3
Oceanography (3.07 GPA)	-	-	-	-
Engineering (3.03 GPA)	13	2	11	1
Home Ec. (2.94 GPA)	4	2	2	2
Liberal Arts (2.79 GPA)	14	10	8	8
Pharmacy (2.66 GPA)	-	7	-	4
Business (2.65 GPA)	14	9	12	6
Science (2.58 GPA)	14	10	7	4
	N=123		N=87	

GPA information from OSU Fact Book (1989)

TABLE 6
Comparative GPA Summary

	Descriptive Statistics				
	N	Mean HSGPA*	SD	Mean CGPA**	SD
Sophomores	950	3.45	.41	3.03	.50
Gainers	71	3.33	.54	3.73	.26
Decliners	52	3.55	.30	2.20	.26
Gainers returning Questionnaires	53	3.35	.52	3.73	.28
Decliners returning Questionnaires	44	3.54	.30	2.20	.27
Seniors	804	3.37	.45	2.96	.43
Gainers	74	3.34	.55	3.64	.29
Decliners	49	3.48	.27	2.38	.17
Gainers returning Questionnaires	53	3.44	.54	3.65	.29
Decliners returning Questionnaires	34	3.48	.28	2.36	.17

* High School GPA (HSGPA)
** College GPA (CGPA)

school achievement among gainers and decliners. Gainers have a flatter distribution of high school grades than decliners, suggesting a more diverse range of high school performance.

There appears to be very little difference between the students receiving questionnaires and those returning them with respect to gender, school affiliation and high school achievement. Such a condition makes the actual study group representative of the population of gainers and decliners at OSU along the above mentioned dimensions.

The last descriptive statistics to be discussed are those of the discriminant variables in the model of academic performance change. Recall that the model had three major components with specific variables under each component:

Environmental Triggering Mechanisms (ETM)

INTERACT	Level of interaction with faculty
WARMTH	Perceived warmth of the interpersonal environment
PEER	Peer influence on academic achievement
CLASS	Percentage of classes with an enrollment of 35 or less
GROUP	No. of hours spent in academic or personal development groups

Internal Psychological States (IPS)

EXPECT	Academic performance expectancies
ADJUST	Number of terms required to adjust to the academic rigors of college life

Academic Skills (AS)

SKILLS	Academic skills (research, writing, class involvement)
STUDY	Approach to study (consistency and priority of study)

In the discussion that follows, significant differences (T-Test, p=.05 or greater; see Appendix I)

between sophomores and seniors will be noted where applicable. Environmental Triggering Mechanisms (Table 7) will be summarized first. Senior gainers and decliners had significantly higher levels of interaction with faculty (INTERACT) than their sophomore counterparts. No significant differences between cohorts existed on the variable WARMTH, though senior gainers were significantly more positive in their perception of the university's interpersonal climate than senior decliners. Peer influences on academic performance (PEER) were similar for gainers and decliners in both cohorts. Gainers tended to have more small classes (CLASS) than decliners in both cohorts with seniors having significantly fewer large classes than sophomores. Sophomore gainers spent the highest average number of hours in personal/academic development (GROUP) situations - nearly three times as many as sophomore decliners. The greater number of hours spent in academic and personal growth groups reported by Senior decliners (than senior gainers), did not reach significance.

Descriptive statistics on those variables identified as Internal Psychological States (Table 8) show gainers in both cohorts reporting higher expectancies for academic success (EXPECT) than decliners. Sophomore decliners scored significantly higher than senior decliners with respect to academic expectancies. The number of terms required to adjust to the academic rigors of college

TABLE 7
Environmental Triggering Mechanisms
Descriptive Statistics

	CLASS			
	Soph		Senior	
	STATUS			
Environmental Triggering Mechanisms	Gainer	Decliner	Gainer	Decliner
INTERACT	M 18.11	M 16.44	M 20.47	M 19.71
WARMTH	M 14.12	M 13.16	M 14.65	M 12.00
PEER	M 5.02	M 4.46	M 5.06	M 4.20
CLASS				
1 < 20%	54.7%	70.5%	28.3%	50.0%
2 21 - 40%	26.4%	20.5%	37.7%	35.3%
3 41 - 60%	17.0%	6.8%	15.1%	11.8%
4 61 - 80%	-	2.3%	-	-
5 > 80%	1.9%	-	3.8%	2.9%
GROUP	M 76.73	M 24.88	M 29.45	M 36.61

TABLE 8
Internal Psychological States
Descriptive Statistics

	CLASS			
	Soph		Senior	
	STATUS			
Internal Psychological States	Gainer	Decliner	Gainer	Decliner
EXPECT	M 11.17	M 8.34	M 10.77	M 7.09
ADJUST				
0 Immediate	73.6%	9.1%	47.2%	2.9%
1 1 or 2 terms	22.6%	38.6%	34.0%	14.7%
2 3 or 4 terms	1.9%	36.4%	7.5%	23.5%
3 5 or 6 terms	-	-	7.5%	26.5%
4 7 or 8 terms	-	-	1.9%	11.8%
5 9 or more terms	-	-	-	-
6 Nonadjustment	1.9%	13.6%	-	17.6%

TABLE 9
Academic Skills
Descriptive Statistics

	CLASS			
	Soph		Senior	
Academic Skills	Gainer	Decliner	Gainer	Decliner
SKILLS	M 25.36	M 24.02	M 26.00	M 27.65
STUDY	M 16.83	M 12.93	M 16.53	M 12.06

(ADJUST) was markedly different for gainers and decliners in both cohorts. Nearly 74% of the sophomore and 47% of the senior gainers indicated their adjustment to college was immediate. Decliners in both cohorts were more inclined to view their adjustment as ongoing or to indicate that their academic adjustment never occurred.

The descriptive information on the Academic Skills component of the model is summarized in Table 9. Senior decliners reported the highest level of academic academic skill (SKILLS) used, significantly higher than sophomore decliners and senior gainers. Scores between cohorts were nonsignificant for gainers and decliners on the variable STUDY.

Correlation Analysis

Before conducting a discriminant analysis, discriminant variables need to be examined for multicollinearity. Pearson product moment correlation coefficients were calculated to develop an intercorrelation matrix among the discriminating variables. The two-tailed test of significance was applied due to the exploratory nature of the research. With Hedderson's (1987) recommendation as a criteria ($r=.70$ or higher), none of the discriminant variables were found to be correlated enough in either cohort to be dropped from the discriminant analysis (Tables 10 and 11).

Correlation hypotheses were developed to investigate

TABLE 10
Intercorrelation Matrix - Sophomore Cohort

	Variables									
	1	2	3	4	5	6	7	8	9	10
1	-	.34*	.21*	.29*	.24*	.20*	-.11	.46*	.23*	.20
2	.34*	-	.29*	.07	.16	.18	-.19	.13	.23*	.17
3	.21*	.29*	-	.06	.18	.24*	-.21*	.33*	.31*	.17
4	.29*	.07	.06	-	.05	.04	-.06	-.05	.07	.15
5	.24*	.16	.18	.05	-	.33*	-.09	.05	.14	.27*
6	.20*	.18	.24*	.04	.33*	-	-.33*	.28*	.55*	.53*
7	-.11	-.19	-.21*	-.06	9.09	-.33*	-	.02	-.38*	-.49*
8	.46*	.13	.33*	-.05	.05	.28*	-.02	-	.32*	.02
9	.23*	.23*	.31*	.07	.14	.55*	-.38*	.32*	-	.50*
10	.20	.17	.17	.15	.27*	.53*	-.49*	.02	.50*	-

* p=.05 or smaller

ETM
1 - INTERACT — Interaction with faculty
2 - WARMTH — Warmth of interpersonal environment
3 - PEER — Peer influence on academic performance
4 - CLASS — Class size
5 - GROUP — Hours involved in personal/academic development groups

IPS
6 - EXPECT — Academic expectancies
7 - ADJUST — Terms required to adjust academically

AB
8 - SKILLS — Level of academic skills
9 - STUDY — Priority/consistency given to study

PERFORMANCE CHANGE
10- CHANGE — Difference between predicted and actual college GPA

TABLE 11
Intercorrelation Matrix - Senior Cohort

	Variables									
	1	2	3	4	5	6	7	8	9	10
1	-	.20	.24*	.05	.20	.11	-.09	.49*	.08	.12
2	.20	-	.36*	.11	-.13	.22*	-.30*	-.01	.22*	.43*
3	.24*	.36*	-	.03	-.10	.23*	-.33*	.28*	.42*	.30*
4	.05	.11	.03	-	.03	.16	-.04	-.03	.01	.19
5	.20	-.13	-.10	.03	-	.01	.15	.07	-.03	-.09
6	.11	.22*	.23*	.16	.01	-	-.50*	.02	.48*	.68*
7	-.09	-.30*	-.33*	-.04	.15	-.50*	-	.19	-.55*	-.65*
8	.49*	-.01	.28*	-.03	.07	.02	.19	-	.05	-.16
9	.08	.22*	.42*	.01	-.03	.48*	-.55*	.05	-	.57*
10	.12	.43*	.30*	.19	-.09	.68*	-.65*	-.16	.57*	-

* p=.05 or smaller

ETM
1 - INTERACT — Interaction with faculty
2 - WARMTH — Warmth of interpersonal environment
3 - PEER — Peer influence on academic performance
4 - CLASS — Class size
5 - GROUP — Hours involved in personal/academic development groups

IPS
6 - EXPECT — Academic expectancies
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8 - SKILLS — Level of academic skills
9 - STUDY — Priority/consistency given to study

PERFORMANCE CHANGE
10- CHANGE — Difference between predicted and actual college GPA

the relationships between the major components of the explanatory model. Each hypothesis is presented with the relevant findings. Discussion follows each hypothesis. Tables 10 and 11 provide the supporting documentation for the correlation results. Following Guilford's (1965) observation that any significant correlation demonstrates a psychological principle regardless of the size of the coefficient, all correlations reaching at least a .05 level of significance are summarized.

Research Question 1

What relationship, if any, exists among the discriminating variables categorized as Environmental Triggering Mechanisms, Internal Psychological states, and academic Behaviors?

Hypothesis a)

There are no significant correlations between the variables identified as Environmental Triggering Mechanisms and Internal Psychological States among sophomore gainers and decliners.

This hypothesis is rejected. The following ETM/IPS variables do have low but significant correlation coefficients for sophomores:

INTERACT/EXPECT	r=.20
PEER/EXPECT	r=.24
GROUP/EXPECT	r=.33
PEER/ADJUST	r=-.21

To some extent, as students interact with faculty,

their performance expectations increase. When peer influence is more positive, performance expectations are higher. More hours spent in personal and academic development groups are related to higher performance expectations. When peer influences are positive, the length of time required to adjust to the academic rigors of college life was reduced.

Hypothesis b)

There are no significant correlations between the variables identified as Environmental Triggering Mechanisms and Internal Psychological States among senior gainers and decliners.

This hypothesis is rejected. The following ETM/IPS variables have low but significant correlation coefficients for seniors:

WARMTH/EXPECT	r=.22
PEER/EXPECT	r=.23
WARMTH/ADJUST	r=-.30
PEER/ADJUST	r=-.33

When the interpersonal environment of the university is experienced as warm and peer influences are positive, academic expectancies are higher and academic adjustment time decreases.

Unlike the sophomore cohort, seniors' academic expectancies and rate of academic adjustment are also related to their experience of the university's interpersonal environment. Perhaps longevity at the

university is an issue here. The ability of students to experience the universilty interpersonal environment as warm may be a function of the length of time spent at the campus.

The PEER/EXPECT and PEER/ADJUST relationships exist for sophomores as well as seniors. The fact that the GROUP/EXPECT relationship did not occur for seniors may be explained by their movement towards autonomy - part of the maturational process. Perhaps as students become more autonomous, they are less likly to be involved in academic and personal development groups.

Hypothesis c)

There are no significant correlations between the variables identified as Internal Psychological States and Academic Behaviors among sophomore gainers and decliners.

This hypothesis is rejected. The following IPS/AB variables show moderately strong correlation coefficients for sophomores:

EXPECT/SKILLS	r=.28
EXPECT/STUDY	r=.55
ADJUST/STUDY	r=-.38

These relationships are reinforced by the basic logic of the model of academic performance change. Sophomores who have higher academic expectancies would tend to place a higher priority on academic skills. The reverse makes sense too. Certainly high academic expectancies are

complementary to studying consistently and making study a priority. Failure to be consistent in study and make study a priority would prolong the academic adjustment time.

Hypothesis d)

There are no significant correlations between the variables identified as Internal Psychological States and Academic Behaviors among senior gainers and decliners.

This hypothesis is rejected. The following IPS/AB variables show moderately strong correlation coefficients for seniors:

EXPECT/STUDY r=.48

ADJUST/STUDY r=-.55

With the exception of the EXPECT/SKILLS relationship, the correlations indicated above are the same as those identified for sophomores. The strength of the correlation coefficients are similar as well.

Hypothesis e)

There are no significant correlations between the variables identified as Academic Behaviors and change between predicted and actual college GPA among sophomore gainers and decliners.

This hypothesis is rejected. The Academic Behavior variable STUDY has a significant correlation coefficient of r=.50 with change between predicted and actual college GPA. When study is done consistently and given higher

priority, GPA increases.

Hypothesis f)

There are no significant correlations between the variables identified as Academic Behaviors and change between predicted and actual college GPA among senior gainers and decliners.

This hypothesis is rejected. The Academic Behavior variable STUDY has a significant correlation coefficient of r=.57 with change between predicted and actual college GPA. Again, when study is done consistently and given higher priority, GPA increases.

Both hypotheses "e" and "f" were tested by applying the Pearson Product Moment correlation statistic. Doing so involved removing the dummy codes of 0 and 1 as the designations for decliner and gainer and substituting the actual numeric differences between actual and predicted college GPA for each case, along with a constant to convert all numbers to positive values.

Not every ETM/IPS, IPS/AB, or AB/performance change combination of variables possible had significant correlations. Some significant correlations occurred between variables among components of the model not covered by the hypotheses in this study. The fact that such relationships exist may reflect the rather arbitrary manner in which the nine discriminating variables were grouped. Such relationships also may suggest that the model of academic performance change is not linear in

nature.

Discriminant Analysis

Discriminant analysis can be used to describe the relationships variables have to the phenomena under study, for classification purposes, or both. The focus of this research is concerned with examining the relationships among the various discriminating variables identified in the explanatory model to the phenomena of academic performance change in both sophomores and seniors at OSU.

Such an analysis is primarily concerned with: 1) the strength of the discriminant function in differentiating between gainers and decliners, and 2) the contribution of each discriminating variable to the discriminant function. Both will be presented and discussed in response to each of the discriminant analysis research questions.

The eigenvalue, the canonical correlation, the Wilks' Lamda, and the percentage of correctly classified classes were calculated to determine the strength of the discriminant function.. The relative contribution of each of the discriminating variables to the discriminant function is determined through an examination of the discriminant function coefficients, and/or the pooled within group correlations with the discriminant function. The contribution of the individual discriminant variables can be further examined by pulling each variable, one at a time, from the analysis and observing the changes in those

measures that provide information on the usefulness of the discriminant function.

The direct, rather than the stepwise method of entering the discriminating variables, was chosen in performing the discriminant analysis. In the direct method, all discriminating variables are entered into the analysis simultaneously. The discriminant function, then, is composed of all the variables regardless of their individual discriminating power. Such a method is appropriate when testing a theoretical model (Hair, Anderson, Tatham, & Grablowsky, 1979). Tables 12 and 13 provide the necessary information to respond to Research Question 2.

Research Question 2

Does a useful discriminant function exist for the group of sophomore gainers and decliners?

A useful discriminant function does exist for sophomore gainers and decliners. The lower the Wilks' Lamda, the greater the discriminating power of the model. A lamda of .503 indicates the differences between gainers and decliners account for nearly 50% of the variance in the discriminating variables. The statistical significance level of the Wilks' Lamda is .000.

The eigenvalue for sophomores is .988. While eigenvalues have no upper limit in discriminant analysis, Hedderson (1987) points out that an eigenvalue of .40 or better is considered excellent.

TABLE 12
Discriminant Analysis - Sophomore Cohort

	Eigen-value	Canonical Correlation	Wilks Lamda	% of correctly classified cases
All Discriminant Variables	.988	.705	.503*	86.26
INTERACT missing	.982	.704	.504*	86.36
WARMTH missing	.985	.704	.504*	85.39
PEER missing	.988	.705	.503*	85.39
GROUP missing	.983	.704	.504*	86.67
EXPECT missing	.776	.661	.563*	82.76
ADJUST missing	.740	.652	.574*	81.82
SKILLS missing	.925	.693	.519*	82.76
STUDY missing	.832	.674	.546*	84.09
CLASS	.927	.694	.519*	87.36

* p=.000

TABLE 13
Contribution of Discriminant Variables to Discriminant Function - Sophomore Cohort

Variable	Discriminant Function Coefficients	Pooled Within-Group Correlations with Functions
INTERACT	.104	.179
WARMTH	-.062	.171
PEER	.022	.178
CLASS	.268	.177
GROUP	.077	.219
EXPECT	.530	.648
ADJUST	-.514	-.593
SKILLS	-.328	.026
STUDY	.462	.613

Measured on a scale from 0 to 1.0, the canonical correlation squared is the ratio of the between-groups variance in scores on the function to the total variance in scores. The score for sophomores is .705.

The discriminant function is able to correctly classify 86.21% of the sophomore study group. The chance classification percentage, given the unequal size of the gainer/decliner groups, is 51% (squaring the proportion of each group and summing the squares), an obvious improvement on chance.

Given the fact that the discriminant function for sophomores differentiates between gainers and decliners quite well, it is appropriate to examine the contribution of each discriminating variable to the discriminant function. The purpose here is to determine which of the variables are most critical in differentiating between the groups.

Clearly the variables EXPECT, STUDY, and ADJUST contribute most to the discriminant function (Table 13). Both the coefficients and the pooled within-groups correlations support this conclusion simply by those values being higher than the other variables. These same variables, when removed from the analysis, also result in the greatest changes in those measures that describe the legitimacy of the discriminant function when all variables are included (Table 12).

The variables SKILLS and GROUP are more difficult to

evaluate. If the discriminating variables were to be rank ordered on the basis of the correlations, the variable SKILLS would be ninth on the correlation list (.026). Yet the effect this variable has on measures of the discriminant function's usefulness (TABLE 12), does account for a moderate degree of change. On the other hand, the variable GROUP has a pooled within-group correlation of (.219), yet its accounts for virtually no variation in the discriminant function when it is removed from the analysis.

To better determine the relative contribution of these two variables, separate analyses were undertaken. GROUP and SKILLS were entered separately with EXPECT, STUDY, and ADJUST, and compared with the usefulness of those variables with lower pooled within-groups correlations.

As can be seen from Table 14, the variable SKILLS (when grouped with EXPECT, STUDY, and ADJUST) results in a stronger eigenvalue and canonical correlation, more correctly classified cases, and a lower Wilks' Lamda, than the GROUP variable. These four variables appear to provide the more parsimonious explanation of differentiation between sophomore gainers and decliners.

Using Hedderson's (1987) recommendation as a criteria (pooled within-group correlations with a value of less than .20 have only a weak association with the discriminant function), none of the other variables in the

TABLE 14
Relative value of GROUP and SKILLS with Sophomores

Discriminant Function with EXPECT STUDY ADJUST	Eigen value	Canonical Correlation	Wilks' Lamda	% of correctly classified cases
GROUP	.833	.674	.545	82.61
Discriminant Function with EXPECT STUDY ADJUST				
SKILLS	.885	.686	.529	86.32

function make a singularly profound contribution to the discriminant function, including the Environmental Triggering Mechanisms.

Research question 3

Does a useful discriminant function exist for the group of senior gainers and decliners?

The means of analysis used to answer this question are the same as used in question 1. Tables 15 and 16 provide the needed information.

A useful discriminant function does exist for seniors. A Wilks' Lamda of .345 indicates the differences between senior gainers and decliners account for nearly 66% of the variance in the discriminating variables. Both the eigenvalue and canonical correlation strongly support the ability of the discriminating variables to differentiate between gainers and decliners. The discriminant function correctly classifies 91.14% of cases. Given the unequal size of the gainer and decliner groups only 50% of the cases would have been correctly classified by chance.

The individual contribution that each of the discriminating variables make to the discriminant function varies. The pooled within-group correlations suggest the variables WARMTH and CLASS (ETM), EXPECT AND ADJUST (IPS), and STUDY (AB) make a contribution to differentiating between the groups. However, WARMTH appears to make less of an impact as far as the of the number of cases

TABLE 15
Discriminant Analysis - Senior Cohort

	Eigen-value	Canonical Correlation	Wilks' Lamda	% of correctly classified cases
All Discriminant Variables	1.899	.809	.345*	91.14
INTERACT missing	1.862	.807	.349*	91.14
WARMTH missing	1.812	.803	.356*	91.36
PEER missing	1.897	.809	.345*	88.89
GROUP missing	1.899	.809	.345*	91.95
EXPECT missing	1.193	.738	.456*	87.34
ADJUST missing	1.675	.791	.374*	88.89
SKILLS missing	1.592	.784	.386*	87.94
STUDY missing	1.685	.792	.372*	88.61
CLASS missing	1.711	.794	.368*	92.50

*p=.000

TABLE 16
Contribution of Discriminant Variables to Discriminant Function - Senior Cohort

Variable	Discriminant Function Coefficient	Pooled Within-Group Correlation with Function
INTERACT	.175	.015
WARMTH	.226	.246
PEER	.038	.179
CLASS	.321	.219
GROUP	.017	-.021
EXPECT	.637	.617
ADJUST	-.380	-.555
SKILLS	-.525	-.173
STUDY	.382	.447

correctly classified are concerned.

Research Question 4

Do any differences exist among the useful discriminant functions between sophomore and senior gainers and decliners?

The answer to this question is yes. The comparative analysis that follows will endeavor to identify both the similarities and differences in the discriminant functions of the sophomore and senior cohorts.

The discriminant functions (with all discriminating variables included) for both sophomores and seniors do an excellent job in differentiating between gainers and decliners. When applied to seniors, the discriminating variables more decisively make the differentiation. This is apparent upon examination of those values that assess the usefulness of the discriminant function. In each case those values are stronger for seniors than for sophomores.

The same three variables make the strongest contribution to the discriminant function of both seniors and sophomores. These include: student level of academic expectation and confidence in their academic ability (EXPECT), the priority and consistency given studying (STUDY), and the number of terms required to make the academic adjustment to college (ADJUST). These uniformly strong variables probably form the core points of differentiation in the academic experiences of gainers and

decliners in this study.

Neither interaction with faculty (INTERACT), the number of hours spent in personal or academic development groups (GROUP), nor the influence of student peers on academic performance (PEER) offer much in the way of differentiating between gainers and decliners in either cohort.

Having identified the three most and least powerful discriminating variables in academic performance change for both sophomore and seniors, raises the question of why CLASS, SKILLS, and WARMTH have a differential impact on the two cohorts. The fact that class size (CLASS) has some discriminating power between senior gainers and decliners suggests that it could be a factor among sophomores as well. The probable reason it does not is that more small classes are simply less available to lower division students. Therefore fewer sophomores reported having them.

SKILLS (a factor for sophomores) and WARMTH (a factor for seniors) could simply reflect the differences between the cohorts. However, seniors do have greater opportunity (more time) to experience the interpersonal climate (WARMTH) of the university.

Certainly the early application of class involvement skills, library usage, and writing skills (SKILLS) would make sense as a factor in the differentiation between gainers and decliners among sophomores. As students

mature academically, they develop more individualistic and major-specific success strategies. Therefore, the more standard academic skills assessed in this study may not be equally applicable to sophomores and seniors.

In summary, the most discriminating variables for sophomores were the two IPS variables, EXPECT and ADJUST, and the AB variable STUDY. The least discriminating variables are INTERACT, WARMTH, PEER, CLASS GROUP and STUDY. The ETM variable, GROUP made a marginal contribution. For seniors, the most discriminating variables include the the IPS variables EXPECT AND ADJUST, and the AB variable STUDY. Among seniors the least discriminating variables are the ETM variables INTERACT, PEER, and GROUP and the AB variable SKILL. The ETM variables WARMTH and CLASS made a marginal contribution.

Table 17 compares the relative strength of the least powerful and most powerful discriminating variables (with the marginal variables included with the most powerful variables) when entered into a Discriminant analysis separately. The weak discriminating variables only result in correctly classifying 59.55% of the cases for sophomores. The stronger discriminating variables correctly classify 82.61% of the cases. For seniors, the weak discriminating variables only result in correctly classifying 65.12% of the cases. The stronger discriminating variables correctly classify 88.75% of the

TABLE 17
Comparison of Strong vs. Weak Discriminating Variables Among Sophomores and Seniors

	Eigen value	Canonical Correlation	Wilks' Lamda	% of correctly classified cases
Strong Discriminating Variables - Sophomores	.833	.674	.545	82.61
Weak Discriminating Variables - Sophomores	.110	.315	.901	59.55
Strong Discriminating Variables - Seniors	1.562	.781	.390	88.75
Weak Discriminating Variables - Seniors	.208	.415	.828	65.12

cases.

Final evidence of the strength of EXPECT, ADJUST, and STUDY, is provided in Table 18 (Appendix A). T-Test values, correlation coefficients and pooled within-group correlations with discriminant function values are summarized for each of the discriminant values identified in the model of academic performance change. Note that regardless of the statistic used, the variables EXPECT, ADJUST, and STUDY, across both cohorts, are significantly related to academic performance change.

CONCLUSIONS

Summary

This research was undertaken to identify variables that accounted for major changes in academic performance between high school and college. Differences between predicted and actual college GPA were used to classify students as gainers or decliners. Gainers and decliners were then identified among first term sophomores and first term seniors at OSU. These students responded to a questionnaire designed to collect relevant information on those variables explicated in the model of academic performance change developed for this research.

The model of academic performance change is composed of nine variables. Seven of the variables were derived from the literature of academic achievement that seemed to account for changes in college GPA. Two of the variables were identified in the course of exploratory interviews with eight gainers and decliners in their senior year.

The variables in the model are classified in one of three categories: Environmental Triggering Mechanisms, Internal Psychological States, and Academic Behaviors. Only behaviors and experiences that can be influenced or adjusted during the student's tenure in college are included in the model. This decision was based on the assumption that high school GPA is the single best predictor college GPA. Therefore, significant change in

academic performance from one level to another must be accompanied by changes occurring during the student's college experience.

Most of the related research examined the relationship of only one variable to changes in GPA or other academic performance outcomes (e.g. score on an examination). This particular research was designed to determine how useful the nine variables in the model were in differentiating between gainers and decliners. A further goal was to determine if particular variables in the model contributed more to the process of academic performance change than others. The last objective was threefold: to determine if Environmental Triggering Mechanisms and Internal Psychological States were correlated, if Internal Psychological States and Academic Behaviors were correlated, and if Academic Behaviors and academic performance change were correlated. Comparisons were made between the sophomore and senior cohorts of gainers and decliners along all the lines of inquiry indicated, noting similarities and differences between the classes. Major findings are summarized below.

1. Taken together, the nine discriminating variables in the model of academic performance change did differentiate gainers and decliners among both sophomores and seniors. Nearly 50% of the variance in the model is explained by the discriminating variables for sophomores. Nearly 66% of the variance was explained by the discriminating

variables for seniors.

2. Three variables in the model were similarly strong in making the differentiation between gainers and decliners for both sophomores and seniors. These were academic expectancies, the number of terms required to adjust academically to college, and the students' approach to study.

3. Significant correlation coefficients were found between some, but not all, variables classified as Environmental Triggering Mechanisms and variables classified as Internal Psychological States. The same was true for variables classified as Internal Psychological States and variables classified as Academic Behaviors and for variables classified as Academic Behaviors and actual performance change.

Conclusions

Conclusions necessarily occur within certain limitations. A major consideration with respect to the conclusions that follow is the fact that neither discriminant function analysis nor correlation coefficients demonstrate causation. They simply demonstrate a relationship between variables. Therefore, it could be argued that academic performance change, the dependent variable in this research, is an independent variable.

Any implied direction of causation is a result of the

theoretical orientation of the model of academic performance change, not the result of the statistical analysis. That orientation recognizes that humans receive stimuli from their surroundings, process those stimuli cognitively, and make behavioral responses.

Thus, while this research does not empirically demonstrate causation, it does support several conclusions concerning the efficacy of the model of academic performance change as it relates to OSU sophomores and seniors. Both the usefulness of the variables as well as their relationships with each other, will be considered. Additionally, similarities and differences will be noted between the outcomes of this research and conclusions drawn by researchers referred to in Chapter Two.

First, academic performance change is multi-dimensional and merits investigation as such. Gainers and decliners at OSU can be differentiated along more dimensions than GPA - suggesting something of the complexity of the process. It follows then, that single dimension conditions are less significant by themselves with respect to major changes in academic performance. This is demonstrated by the fact that the nine discriminating variables in the model of academic performance change, taken together, differentiate well between gainers and decliners who completed three academic terms and who completed ten academic terms at OSU.

Second, as the model was originally conceptualized,

Academic Behaviors are the antecedents to change, with the others variables having an indirect effect. However, the data show that Internal Psychological States (academic expectancies and rate of adjustment) have a direct relationship with performance change along with only one of the variables (approach to study) classified as an Academic Behavior. These three variables emerged to provide the greatest contribution to the discriminant function. This suggests that performance change with OSU gainers and decliners is more than behavioral. For example, not studying (a behavior) is perhaps symptomatic of a more fundamental deficiency.

Third, academic performance change hinges on three subjective and individualized processes for both sophomores and seniors at OSU. Academic expectancies are those personally held beliefs, regarding one's own or someone else's performance. The length of time required to adjust to the academic rigors of college is necessarily limited or enhanced by the student's own perception of collegiate reality. And while the student's approach to study (consistency, efficiency, and priority given to study) was classified as an Academic Behavior, it could be argued that it should be classified as an internal psychological process. Certainly consistency is as much attitudinal as behavioral and priorities are value-driven. All occur and change as a result of a complex web of personal and environmental factors. The emergence of

these variables lead to two observations.

If these variables are the primary mechanisms for academic performance change, they present a challenge to the college administrator attempting to foster change in a positive direction. Modifying Environmental Triggering Mechanisms or Academic Behaviors to "assure" academic gains, would be comparatively simple. Promoting positive changes in academic performance through the individual's Internal Psychological States is subject to more uncertainty. This is not to imply that Environmental Triggering Mechanisms or Academic Behaviors are not important to the process of academic performance change. Any change in performance will have a stimulus event (or events) and behavioral implications as well. However, their contribution to the process seems to be moderated by the student's Internal Psychological States.

If level of academic skills only makes a questionable contribution to differentiating between sophomore gainers and decliners (and no contribution to senior gainers and decliners), and if approach to study is as much an Internal Psychological State as an Academic Behavior, then this study offers little insight into the behaviors of academic performance change.

Fourth, Environmental Triggering Mechanisms appear to have a secondary relationship to the variables making the greatest contribution to differentiating between gainers and decliners (EXPECT, ADJUST, and STUDY). None of the

variables so classified made a strong contribution to the discriminant function. However, a review of the correlation coefficients indicate that several of them do have a relationship with the primary variables that differentiate between gainers and decliners. Environmental stimuli, then, appear effective, only as they impact students' expectations, their adjustment, and their approach to study.

These secondary relationships are summarized below. They are important because they represent what Pervin (1978) refers to as "points of engagement" between individuals and their environment through which a given change can take place. In other words, these secondary relationships demonstrate how academic expectancies, rates of academic adjustment and positive approaches to study might be influenced so that academic performance can change. Certainly the search for additional stimulus events needs to continue.

Among sophomores, academic expectancies correlate positively with faculty interaction, level of academic skills used, peer influence, and number of hours spent in academic and personal development activities. Among seniors, academic expectancies correlate positively with perceived interpersonal warmth of the institution and peer influences.

Among sophomores, the longer it takes to adjust to college academics, the more negative the influence of

peers on academic performance. Among seniors, the length of adjustment time lengthens as perceived interpersonal warmth of the institution and peer influences on academic performance decrease.

As a sophomore's approach to study becomes more consistent, efficient, and of higher priority, a corresponding rise occurs on measures of perceived institutional interpersonal warmth, interaction with faculty, and peer influence on academic success. With the exception of interaction with faculty, similar relationships exist among seniors.

Fifth, despite the apparent usefulness of the discriminant function in differentiating between gainers and decliners, this research suggests the model of academic performance change, could be modified. Some of the variables, as measured, have no direct or secondary impact on performance change among sophomores and seniors at OSU. By dropping them from the model, the model loses virtually none of its explanatory power and encourages the researcher to explore, understand, and control the variables that explain more of the phenomena under study in a more focused manner.

Figures 3 and 4 are summary representations of academic performance change for sophomores and senior performance changers at OSU as supported by this research. The results are a more parsimonious expression of the relationships involved. The primary mechanisms through

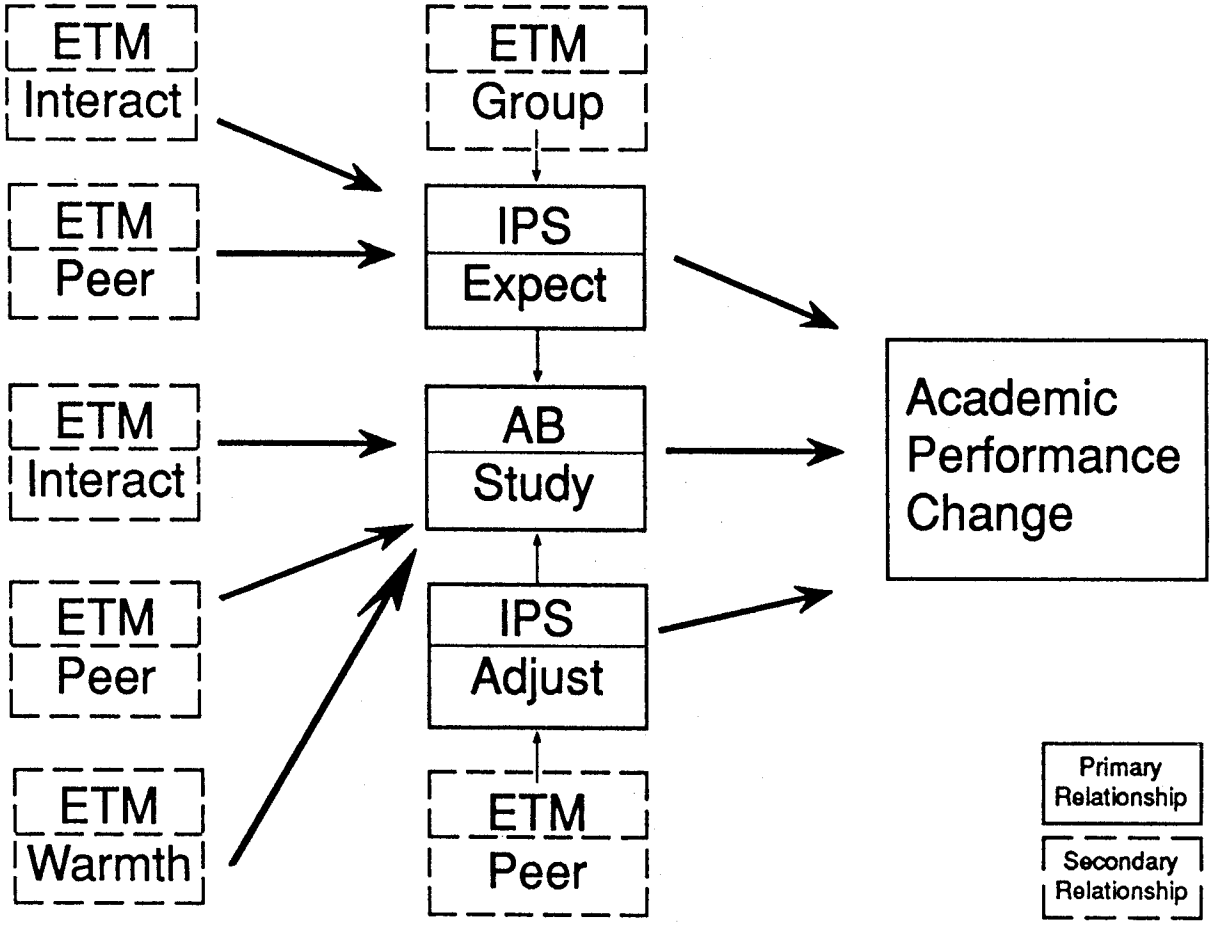

Figure 3
Academic Performance Change - Sophomores

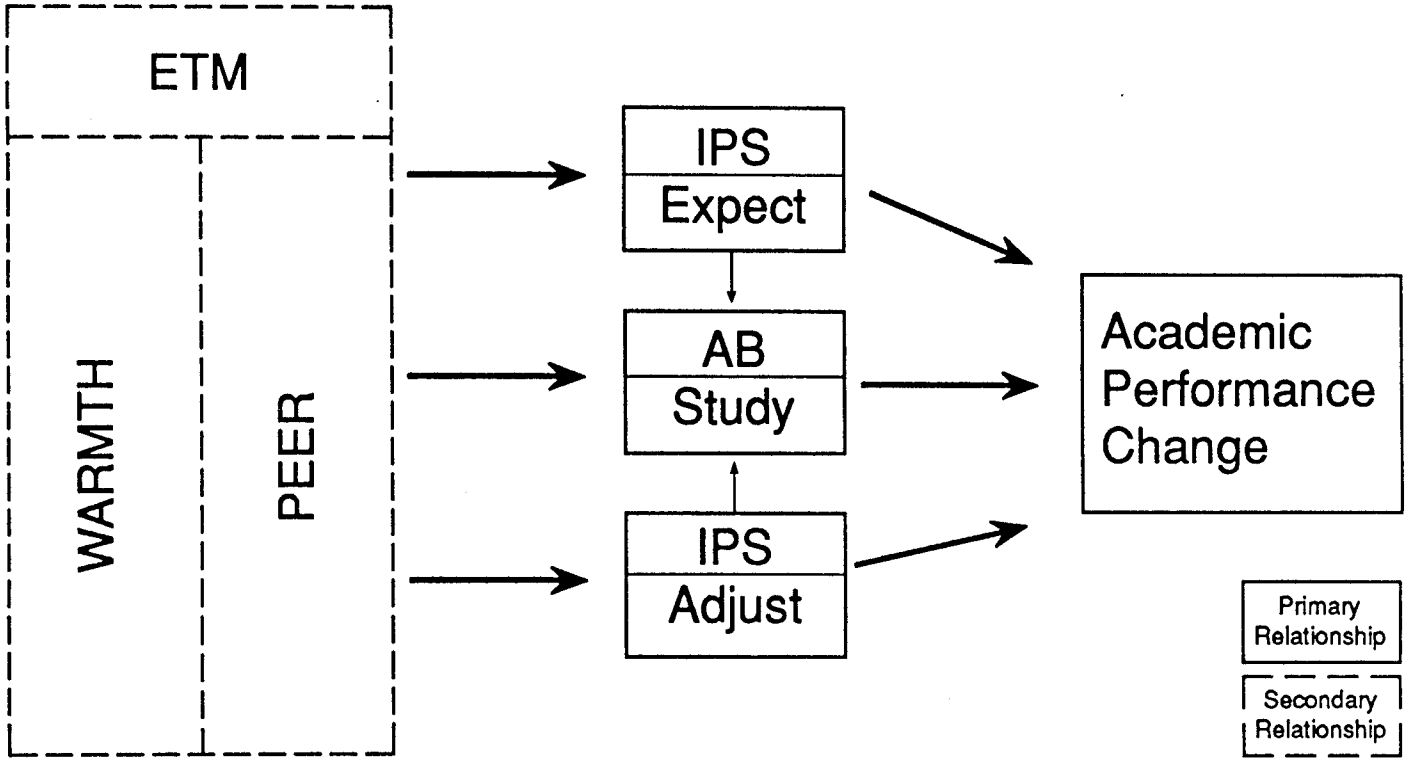

Figure 4
Academic Performance Change - Seniors

which performance change takes place are personal (Internal Psychological States and Academic Behaviors). The role of Environmental Triggering Mechanisms are secondary, having no direct bearing on academic performance change. Variables identified as making a marginal contribution to the discriminant function were not included among the primary variables.

Sixth, the fact the model could be modified raises the issue of whether it should be modified. In other words, is the apparent failure of some of the variables to contribute to an understanding of performance change a function of the inherent qualities of the variables, the manner in which they were measured, or the arbitrary way they were classified? Given the degree to which most of the variables contributed to the discriminant function, other means of measurement should be employed before determining their irrelevance.

The final comments in this section will be directed toward identifying the degree to which this study supports the related research. The results of this study would appear to be somewhat different than Pascarella's (1985) conclusion regarding the relationship between interaction with faculty and academic achievement. Rather than having a direct bearing on academic performance change, interaction with faculty is related to an intervening process (academic expectancies) which is related to academic performance change. This study did support the

findings of Pascarella, Terenzini, and Hibel (1978) with respect a diminished relationship after the freshman year. It should be noted, however, that the measure of faculty interaction was somewhat different in the studies just cited.

A similar observation can be made about the relationship of peer influence with achievement. Both Schrager (1986) and Moos (1979) identified certain aspects of peer influence to be related to achievement. While this study used a more generalized measure, the influence of peers was related to several intervening processes which, in turn, had a relationship with academic performance change.

Several researchers identified a positive relationship between study skills classes and increases in GPA. Gadzella and Williamson (1984) noted a positive relationship between study skills and GPA. In this research, the relationship study skills had with the discriminant function was, at best, ambiguous among sophomores, and nonexistent among seniors. Additionally, no significant correlation was found between the variables. The use of different measurment instruments might explain this discrepancy.

This research does complement the line of research reported by Tabor and Hackman (1976) and Brozo, et al. (1982). In those studies, the consistency, efficiency, and priority of study was measured rather than skills such

as note-taking and test-taking. Possibly the success of study skills classes in affecting GPA, is in large part a function of the degree to which success-oriented attitudes towards study are learned.

Chapter Two reviewed a number of studies that evaluated the impact of various small group interventions on GPA, many of which seemed to result in improved GPA. In an attempt to measure such wide-spread group involvement, this study simply asked gainers and decliners to report the number of hours spent in a variety of such activities during the course of their tenure at OSU. This variable proved to be somewhat suspect. Many students reported no such involvement. One person reported more than 600 hours of involvement. The resulting standard deviation was twice as large as the mean and the distribution was not normal. Therefore, it is difficult to know if such involvement was, or was not a factor in the academic performance change of the study groups reported herein.

This research does appear to support the work of others (Haynes & Johnson, 1983; Eden & Ravid, 1982; and Todd, Terrel, & Frank, 1965) who have found a relationship between self-expectancies for academic success and improved academic performance. Such academic expectancies had a pervasive and obvious relationship with performance change in this study.

Implications

The student role has changed dramatically over the decades. In other eras, being a student calls to mind the pursuit of knowledge for its own sake, living alone spending endless hours reading and writing, or "plumbing the depths of knowledge" with professors and peers into the early morning hours. Such devotion to truth and singleness of purpose are not usually the first image that come to mind with respect to the modern student.

The role is much more diffused and fragmented. Today's student may have a family, is usually working, is concerned about mounting school debts, and spends late nights in escapist activities. Formal learning is more often a means than an end, as educational legitimacy is measured by its return on investment. The intrinsic rewards of quality scholarship are lost in the scramble for prestigious positions, or graduate school offers. Yet, while the role of and motives for being a student may have changed, the successful conclusion of a collegiate education still depends on developing a repertoire of skills and attitudes that positively effect the student's motivation and adjustment, and hence, performance in college.

What, if any, is the role of student affairs practitioners in directly supporting positive changes in academic performance? Much of the activity of student affairs practitioners is directed toward managing

supportive, but nonacademic service units within the institution. Indeed, claims to educational partnership in the academic enterprise are based upon the apparent ability of student affairs practitioners to assure the institution that students graduate more completely (not merely intellectually) developed. Such comprehensive student development runs the gamut from moral to aesthetic development, maturity to value clarification. Given the nonacademic focus of student affairs work, academic performance would seem to be more of an issue for those engaged in formal classroom instruction.

However, the primary mechanisms for academic performance change identified in this research do fall within the domain of influence of student affairs professionals as well. For example, potential exists to alter student academic expectancies in a positive direction by informing new students of both the realities of college academics and indicating they have been chosen because of their ability to manage those realities well. When positive student beliefs about their academic ability are nurtured in the context of increased interaction with faculty and successful peers, possibly within small groups that are characterized by genuine warmth, then increased academic performance is more likely. This scenario supports much of the current emphasis among student affairs practitioners on extended small group orientation programs being developed at

colleges and universities throughout the country.

This research supports the idea that the sooner students recognize and respond to the academic differences between high school and college, the more likely they will experience positive academic performance change. What can be done to enhance such adjustment among students?

College staff and faculty probably need to have a better grasp of high school academics so they are better able to inform new students of how college will be different from past educational experiences. Admissions counselors need to be able to "sell" academics in a way that reflects the academic facts of their own institutions - both verbally and in written materials. Orientation programs need to be more closely joined with the academic units of institutions. The use of returning students in orientation programs and as undergraduate teaching assistants who mentor and lead study groups (instead of grade papers) would seem to support the academic adjustment process. Academic "trouble-shooting" (determining how well a student is adjusting academically) needs to be as important a skill for academic advisors as course scheduling.

The variable referred to as "approach to study" was operationalized as the degree to which students made study a priority, and were consistent and efficient in studying. Certainly, everything mentioned in regard to supporting more positive student academic expectancies and academic

adjustment could also reinforce an appropriate student approach to study. Additionally, clear expectations for academic output and level of involvement in the classroom should stimulate students' approach to study.

It is interesting to note that peer influence does have a secondary relationship with each of the primary discriminating variables among both sophomores and seniors, though not directly on performance change. The relationship is not great but it is pervasive. Such a relationship underscores the importance of peer programs currently being implemented on college and university campuses. Learning communities, peer advising, theme residence halls, and leadership programs may be very important to academic performance change insofar as they influence student academic expectancies, assist students in understanding academic demands, and help in setting priorities for study.

Whereas "student development" among student affairs practitioners typically refers to the management of nonacademic programs or activities that are directed to the development of the "whole" student, it can and should contribute directly to the development of the student as one who studies, a learner, an academic performer. As that contribution is made and recognized in institutions, the partnership between student affairs and academic affairs in the academic arena moves beyond rhetoric and the number of students realizing academic gains increases.

Recommendations

1. Academic performance change should be studied longitudinally. By gathering data annually throughout the collegiate years from the same group of performance changers, the researcher would be in a better position to note the differential impact of discriminating variables over time. Such information would give more guidance to college administrators as to the relative influence of different experiences on academic performance change, resulting in "fine-tuning" programs designed to contribute to such change.

2. The measurement of the discriminating variables in the model is, in some cases, rather crude. By interviewing gainers and decliners, the researcher would be able to probe student academic expectancies and adjustment, approach to study, the nature of peer influence, and the dimensions of interpersonal warmth as they relates to institutional climate. In so doing, the concepts could be refined, resulting in better assessment. Interviews would also aid in the discovery of additional variables that may contribute to academic performance change.

3. Future studies should include gainers and decliners from both large and small institutions. Institutional size may well be a factor on the presence and power of those Environmental Triggering Mechanisms that are related

to EXPECT, ADJUST, and STUDY.

4. As variables that differentiate between gainers and decliners are better understood and become more refined, path analysis should be applied to more clearly understand the causative direction of the variables in the model of academic performance change.

5. While the three basic components of the model are theoretically valid, the clustering of variables in the model of academic performance change was intuitive, arbitrary, and subject to possible error. As previously pointed out, STUDY, classified as an Academic Behavior, may have more in common with those variables classified as Internal Psychological States. Statistically clustering the variables through factor analysis is recommended as a further refinement to the research.

6. Future research should consider the multi-dimensionality of academic performance change in the research design. Rather than determine the effect of a single variable on performance, multivariate approaches should be used.

7. Due to the student profile of Oregon State University, the study groups in this research included few nontraditional students. Future research should address the performance change of such students.

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APPENDICES

Appendix A
Table 18: Summary Statistics

Variable	T-Test	R	Pooled Within-Group Correlations with Discriminant Function
SOPHOMORES			
INTERACT	-1.84	.20	.179
WARMTH	-1.64	.17	.171
PEER	-2.23*	.17	.175
CLASS	-1.61	.15	.177
GROUP	-2.03*	.27*	.219*
EXPECT	-6.05*	.53*	.648*
ADJUST	5.74*	-.49*	-.593*
SKILLS	- .40	.02	.026
STUDY	-5.78*	.50*	.613*
SENIORS			
INTERACT	- .60	.12	.015
WARMTH	-3.62*	.43*	.246*
PEER	-2.97*	.30*	.179
CLASS	-2.19*	.19	.219*
GROUP	.65	-.09	-.021
EXPECT	-8.04*	.68*	.617*
ADJUST	7.50*	-.65*	-.555*
SKILLS	1.92	-.16	-.173
STUDY	-6.37*	.57*	.447*
	*p=.05	*p=.05	*greater than .20

Appendix B
Interview Protocol

INTERVIEW GUIDE

NAME_____ GAINER DECLINER

YOU HAVE MADE WHAT I WOULD IDENTIFY AS A SIGNIFICANT CHANGE IN PERFORMANCE FROM HIGH SCHOOL TO COLLEGE AS MEASURED BY YOUR HIGH SCHOOL GPA AND YOUR CURRENT ACCUMULATED GPA. HOW WOULD YOU EXPLAIN THAT DIFFERENCE IN PERFORMANCE?

Satisfaction/dissatisfaction with courses

Courses easier/harder

Sense of personal competence

Change in expectations/goals

Use of time/discipline in studying

Involvement with faculty/staff

Involvement with different referent group

Poor study skills

Work

Feedback(e.g. provides more clarity in classes or social situations.

Ambiguity

Conflict

Class size

Teacher experience/quality/expectations

Appendix C

Status	Gender	Major	Satisfaction w/classes	Perception of couse difficulty	Source of performance expectations	Sense of Academic Competence	Study Habits	Involvement w/faculty	Involvement w/ peers/student activities	Sense of Ambiguity or Confusion	Class size	Class Climate	Comments
Decliner	F	Textiles	Low at first Increasing in major	Harder than H. S.	Parents in H.S. Self now	High	Poor at first Better now through time mgmt.	Limited	Highly involved	High first year	Small preferred	Friendly teacher	Took control late but sees pay off for effort expended
Decliner	F	Hotel Mgmt.	Disliked Gen. Ed. likes major	Harder than H. S.	Parents in H.S. Self now	Good	Poor at first Better now through time mgmt.	Limited	Highly involved	High first 2 years	Small preferred	Warm likes to be known by teacher	Same as above
Decliner	F	Lang. /Soc.	Varies w/ class	Harder than H. S.	Parents and Counselor	Low	Vague Inconsistent	Very Limited	Limited	Still evident	Small preferred	Friendly teacher	Support of friends/ counselor kept her in college
Decliner	M	Bsn/ Soc. Sci.	Dissatisfied	Harder than H. S.	Parents and Teachers	Low	Vague Inconsistent	Negative	Highly involved	Still evident	Not reported	Not reported	Bad start w/ classes, teachers, never regained
Gainer	M	Poly. Sci.	Higher than H.S. More choice	Harder than H. S.	Self	Good	Consistent Plans ahead	High and Positive	Not Reported	None	Small preferred	Friendly Open discus-sion	College viewed as important "driven by fear"
Gainer	F	Dietetics	Very High More choice	Harder than H. S.	Parents in H.S. Self now	High	Systematic Focused Consistent	High and Positive	Highly involved	None	Small preferred	Friendly approach-able faculty	Competitive, Views grades as viable reward
Gainer	M	Bsn	High	Harder than H. S.	Self	High	Systematic Efficient	High and Positive	Highly involved	None	Makes no difference	Not reported	Always tried to do well, viewed college as important
Gainer	M	Bsn	High	Not much different than H.S.	Self	High	Efficient	High and Positive	Highly involved	Short-lived	Makes no difference	Friendly Pro-fessional	Strongly affected by high achieving fraternity

Figure 5
Interview Summary

Appendix D
Survey Instrument

A SURVEY ON ACADEMIC PERFORMANCE CHANGE
FROM HIGH SCHOOL TO COLLEGE

1. DIRECTIONS: In your experience at OSU, about how often have you done each of the following related to your interaction with faculty? Circle the appropriate response for each statement.

	Very Often	Often	Occasionally	Never
a. Talked with a faculty member	4	3	2	1
b. Asked your instructor for information related to a course you were taking (grades, make-up work, assignments, etc.)	4	3	2	1
c. Visited informally and briefly with an instructor after class.	4	3	2	1
d. Made an appointment to meet with a faculty member in his/her office.	4	3	2	1
e. Discussed ideas for a term paper or other class project with a faculty member.	4	3	2	1
f. Discussed your career plans and ambitions with a faculty member	4	3	2	1
g. Asked your instructor for comments and criticisms about your work.	4	3	2	1
h. Had coffee, cokes, or snacks with a faculty member	4	3	2	1
i. Worked with a faculty member on a research project	4	3	2	1
j. Discussed personal problems or concerns with a faculty member	4	3	2	1

2. DIRECTIONS: In your experience at OSU, about how often have you done each of the following related to your use of the library? Circle the appropriate response for each statement.

	Very Often	Often	Occasionally	Never
a. Used the library as a quiet place to read or study materials you brought with you	4	3	2	1
b. Used the card catalogue to find what materials there were on some topic	4	3	2	1
c. Asked the librarian for help in finding material on some topic.	4	3	2	1
d. Read something in the reserve book room or reference section.	4	3	2	1
e. Used indexes (such as the Reader's Guide to Periodical Literature) to journal articles	4	3	2	1
f. Developed a bibliography or set or references for use in a term paper or other report.	4	3	2	1
g. Found some interesting material to read just by browsing in the stacks	4	3	2	1
h. Ran down leads, looked for further references that were cited in things you read.	4	3	2	1
i. Used specialized bibliographies (such as Chemical Abstracts, Psychological Abstracts, etc.).	4	3	2	1
j. Gone back to read a basic reference or document that other authors had often referred to.	4	3	2	1

(PLEASE TURN THE PAGE)

3. DIRECTIONS: In your experience at OSU, about how often have you done each of the following related to course learning? Circle the appropriate response for each statement.

	Very Often	Often	Occasionally	Never
a. Took detailed notes in class.	4	3	2	1
b. Listened attentively in class meetings.	4	3	2	1
c. Underlined major points in the readings	4	3	2	1
d. Tried to see how different facts and ideas fit together.	4	3	2	1
e. Thought about practical applications of the material.	4	3	2	1
f. Worked on a paper or project where you had to integrate ideas from various sources.	4	3	2	1
g. Summarized major points and information in your readings.	4	3	2	1
h. Tried to explain the material to another student or friend	4	3	2	1
i. Made outlines from class notes or readings.	4	3	2	1
j. Did additional readings on topics that were introduced and discussed in class	4	3	2	1

4. DIRECTIONS: In your experience at OSU, about how often have you done each of the following related to your experiences in writing? Circle the appropriate response for each statement.

	Very Often	Often	Occasionally	Never
a. Used a dictionary or thesaurus to look up the proper meaning of words	4	3	2	1
b. Consciously and systematically thought about grammar, sentence structure, paragraphs, word choice, and sequence of ideas or points as you were writing	4	3	2	1
c. Wrote a rough draft of a paper or essay and then revised it yourself before handing it in.	4	3	2	1
d. Spent at least five hours or more writing a paper (not counting time spent in reading or at the library)	4	3	2	1
e. Asked other people to read something you wrote to see if it was clear to them	4	3	2	1
f. Referred to a book or manual about style of writing, grammar, etc.	4	3	2	1
g. Revised a paper or composition two or more times before you were satisfied with it	4	3	2	1
h. Asked an instructor for advice and help to improve your writing.	4	3	2	1
i. Made an appointment to talk with an instructor who had criticized a paper you had written.	4	3	2	1
j. Submitted for publication an article, story, or other composition you had written	4	3	2	1

(GO ON TO NEXT PAGE)

5. DIRECTIONS: The next three ratings refer to relationship among people at OSU. Thinking of your own experience, how would you rate these relationships on the seven point scale? Circle the appropriate number.

a. Relationships with other students, student groups, and activities

FRIENDLY, SUPPORTIVE, SENSE OF BELONGING	7	6	5	4	3	2	1	COMPETITIVE, UNINVOLVED, SENSE OF ALIENTATION

b. Relationships with faculty members

APPROACHABLE, HELPFUL, UNDERSTANDING, ENCOURAGING	7	6	5	4	3	2	1	REMOTE, DISCOURAGING, UNSYMPATHETIC

c. Relationships with administrative personnel and offices

HELPFUL, CONSIDERATE, FLEXIBLE	7	6	5	4	3	2	1	RIGID, IMPERSONAL, BOUND BY REGULATION

6. DIRECTIONS: The next five questions refer to your academic expectations, study habits, and peer influences. How would you rate yourself on the seven point scale? Circle the appropriate number.

a. To what extent have your expectations regarding your academic performance changed in college from what they were in high school?

MY EXPECTATIONS ARE MUCH HIGHER FOR MY PERFORMANCE NOW THAN IN HIGH SCHOOL	7	6	5	4	3	2	1	MY EXPECTATIONS ARE MUCH LOWER FOR MY PERFORMANCE NOW THAN IN HIGH SCHOOL

b. To what extent are your grades in college congruent with the grades you expected to receive?

MY GRADES GREATLY EXCEEDED MY EXPECTATIONS	7	6	5	4	3	2	1	MY GRADES ARE MUCH LOWER THAN I EXPECTED

c. To what extent have your beliefs related to your academic ability changed from high school to college?

I AM MUCH MORE CONFIDENT OF MY ABILITY AS A STUDENT NOW THAN IN HIGH SCHOOL	7	6	5	4	3	2	1	I AM MUCH LESS CONFIDENT OF MY ABILITY AS A STUDENT NOW THAN IN HIGH SCHOOL

d. Students vary a great deal in their approach to studying in college. Rate yourself along the following dimensions.

CONSISTENT STUDY HABITS	7	6	5	4	3	2	1	INCONSISTENT STUDY HABITS
GOOD ABILITY TO CONCENTRATE	7	6	5	4	3	2	1	POOR ABILITY TO CONCENTRATE
STUDYING IS A MAJOR PRIORITY	7	6	5	4	3	2	1	STUDYING IS A LOW PRIORITY

(PLEASE TURN THE PAGE)

e. How would you rate the influence of your friends at OSU on your academic performance?

INFLUENCE WAS EXTREMELY POSITIVE	7	6	5	4	3	2	1	INFLUENCE WAS EXTREMELY NEGATIVE

7. Many students find the academic demands in college are a lot different than what they experienced in high school (e.g., more reading, more writing, fewer exams, etc.). How many terms, if any, did it take you to adjust to these differences in academic rigor? Circle one number.

0 I EITHER ADJUSTED IMMEDIATELY OR ADJUSTMENT WASN'T NECESSARY
1 ONE OR TWO TERMS
2 THREE OR FOUR TERMS
3 FIVE OR SIX TERMS
4 SEVEN OR EIGHT TERMS
5 NINE OR MORE TERMS
6 I DON'T BELIEVE I HAVE ADJUSTED ACADEMICALLY

8. What percentage of your classes at OSU had 35 or fewer student in them? Circle one number.

1 LESS THAN 20%
2 21% TO 40%
3 41% TO 60%
4 61% TO 80%
5 MORE THAN 80%

9. Read the following list of academic, personal development, and orientation group experiences and write in the approximate number of actual hours (not credits), if any, you spent in those experiences in the space provided. Write in 0 if you have not participated in the activity.

GROUP EXPERIENCE	NO. OF HOURS
NEW STUDENT ORIENTATION GROUP(S)	_____
STUDY SKILLS CLASS(ES)	_____
READING IMPROVEMENT CLASS(ES)	_____
IMPACT TRAINING	_____
RESIDENT ASSISTANT TRAINING CLASS	_____
GREEK LEADERSHIP DEVELOPMENT CLASS(ES)	_____
GROUP TUTORING OR FORMAL STUDY SESSIONS	_____
GROUP COUNSELING/PERSONAL GROWTH GROUP(S)	_____
LEADERSHIP RETREAT(S)	_____
PROGRAM/DEPARTMENTAL RETREATS	_____
OTHER GROUP EXPERIENCE _____	_____

10. Your college grades are signficantly different than what was predicted based on your high school grades. Briefly indicate the factor(s) that you believe <u>contributed most</u> to your change in performance.

_____

_____

_____

(THANK YOU FOR YOUR COOPERATION)

Appendix E
Pace Permission Letter

UNIVERSITY OF CALIFORNIA, LOS ANGELES

UCLA

BERKELEY · DAVIS · IRVINE · LOS ANGELES · RIVERSIDE · SAN DIEGO · SAN FRANCISCO

SANTA BARBARA · SANTA CRUZ

CENTER FOR THE STUDY OF EVALUATION
UCLA GRADUATE SCHOOL OF EDUCATION
405 HILGARD AVENUE
LOS ANGELES, CALIFORNIA 90024-1521
(213) 825-4711
(213) 206-1532

7/19/89

Wayne E. Brown
2955 NW Orchard Street
Corvallis, Oregon 97330

Dear Wayne,

You have my permission to use the four academic QE scales from the CSEQ and the three relationship scales from the environment section for your dissertation study.

Missing data in the QE scales is handled in the following manner. If any one of the items within a scale is missing, then a scale score is not computed for that case.

Best of luck with your academic endeavors.

Sincerely,

C. Robert Pace

CRP/pwl

Appendix F
Cover Letter - Sophomore

Office of the
Dean of Students

Oregon State University

Administrative Services A200
Corvallis, OR 97331-2133

(503) 737-3661
~~(503) 754-3661~~

November 15, 1989

Dear

You are one of a small group of sophomores at OSU whose freshman year grades were significantly different from what was predicted based on your high school grades. It is because your actual grades are so much different than your predicted ones that I am contacting you now.

I am a doctoral student in the School of Education, working in cooperation with the Dean of Students Office. My research is directed towards understanding those essential experiences during college that may have uniquely contributed to a change in performance. By completing the enclosed questionnaire (it only takes ten minutes), you will be doing a lot to help me understand the phenomena of academic performance change. The real concern, of course, is to be able to better provide the conditions that foster positive change in academic performance and to minimize the conditions that contribute to negative change.

Note that your questionnaire is numbered. This is a way for me to contact those who have not returned their completed questionnaires without burdening those who have. Identifying numbers will be deleted once the questionnaire is returned and there is no way anyone can link your name to your response. The ultimate benefit of this or any other survey depend on the thoughtful responses and willing participation from those who are asked to help. Your willingness to participate is important and very much appreciated. Please return your completed questionnaire using the enclosed self-addressed envelope.

Regardless of whether your college grades have increased or declined since high school, your continued enrollment will contribute to your future success. Congratulations!

I'll be looking for your response next week.

Sincerely,

Wayne E. Brown

Oregon State University is an Affirmative Action/Equal Opportunity Employer

Appendix G
Cover Letter - Senior

Office of the
Dean of Students

Oregon State University

Administrative Services A200
Corvallis, OR 97331-2133

(503) 754-3661

May 18, 1989

^F1^
^F2^
^F3^

Dear ^F4^,

You are one of a small group of seniors at OSU whose college grades are significantly different from what was predicted based on your high school grades. It is because of your significant change in academic performance that I am contacting you now.

I am a doctoral student in the School of Education, working as a graduate assistant in the Dean of Student's Office. My research is directed towards understanding those essential experiences during college that may have uniquely contributed to a change in performance. By completing the enclosed questionnaire (it only takes ten minutes), you will be doing a lot to help me understand the phenomena of academic performance change. The real concern, of course, is to be able to better provide the conditions that foster positive change in academic performance and to minimize the conditions that contribute to negative change.

Note that your questionnaire is numbered. This is a way for me to contact those who have not returned their completed questionnaires without burdening those who have. Identifying numbers will be deleted once the questionnaire is returned and there is no way anyone can link your name to your response. The ultimate benefit of this or any other survey depend on the thoughtful responses and willing participation from those who are asked to help. Your willingness to participate is important and very much appreciated. Please return your completed questionnaire using the enclosed self-addressed envelope.

Regardless of whether your grades have increased or declined, the completion of college is a significant achievement. Congratulations!

Should you have any questions, or be interested in the results of the research, please contact me at 754-3661. I'll be looking for your response next week.

Sincerely,

Wayne E. Brown

Oregon State University is an Affirmative Action/Equal Opportunity Employer

Appendix H
Follow-up Notice

A few days ago you received a questionnaire from me about "academic performance change." If you've already returned it, please ignore this reminder. If you haven't returned it, please do so right away. Due to the small number of students who fit the criteria for the study, it's important that I hear from you. If you need another questionnaire, contact the Office of the Dean of Students and ask for Eric Olsen (737-3661).

Thanks,

Wayne Brown

P.S. Don't forget to include your entry form for the $25.00 drawing with your questionnaire.

STATUS: 0 SOPHOMORE

T-TEST

GROUP 1 - DEPEND EQ 0 decliner
GROUP 2 - DEPEND EQ 1 gainer

VARIABLE		NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	F VALUE	2-TAIL PROB.	POOLED VARIANCE ESTIMATE T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.	SEPARATE VARIANCE ESTIMATE T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.
INTERACT	INTERACTION WITH FACULTY												
	GROUP 1	43	16.4419	3.763	0.574	1.69	0.082	-1.84	94	0.069	-1.89	93.76	0.062
	GROUP 2	53	18.1132	4.890	0.672								
SKILLS	ACADEMIC SKILLS												
	GROUP 1	44	24.0227	4.207	0.634	1.04	0.878	-0.40	95	0.693	-0.40	91.01	0.694
	GROUP 2	53	24.3585	4.115	0.566								
WARMTH	INTERPERSONAL ENVIRONMENT												
	GROUP 1	44	13.1591	2.925	0.441	1.11	0.718	-1.64	93	0.105	-1.63	89.38	0.106
	GROUP 2	51	14.1176	2.776	0.389								
EXPECT	ACADEMIC EXPECTANCIES												
	GROUP 1	44	8.3409	2.342	0.353	1.08	0.779	-6.05	95	0.000	-6.03	90.31	0.000
	GROUP 2	53	11.1698	2.251	0.309								
STUDY	APPROACH TO STUDY												
	GROUP 1	43	12.9302	4.008	0.611	2.46	0.002	-5.78	94	0.000	-5.53	68.26	0.000
	GROUP 2	53	16.8302	2.555	0.351								
PEER	PEER INFLUENCES												
	GROUP 1	43	4.4651	1.275	0.195	1.25	0.452	-2.23	93	0.028	-2.20	85.32	0.030
	GROUP 2	52	5.0192	1.146	0.159								
ADJUST	NUMBER OF TERMS TO ADJUST												
	GROUP 1	43	1.9767	1.752	0.267	3.59	0.000	5.74	94	0.000	5.41	60.62	0.000
	GROUP 2	53	0.3774	0.925	0.127								
CLASS	PERCENT OF SMALL CLASSES												
	GROUP 1	44	1.4091	0.726	0.109	1.52	0.161	-1.61	95	0.110	-1.64	94.96	0.104
	GROUP 2	53	1.6792	0.894	0.123								
GROUP	INVOLVEMENT IN SMALL GROUPS												
	GROUP 1	42	24.8810	45.445	7.012	12.49	0.000	-2.03	92	0.046	-2.22	60.87	0.030
	GROUP 2	52	76.7308	160.630	22.275								

STATUS: 1 SENIOR

T - T E S T

GROUP 1 - DEPEND EQ 0decliner
GROUP 2 - DEPEND EQ 1gainer

VARIABLE		NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	F VALUE	2-TAIL PROB.	POOLED VARIANCE ESTIMATE T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.	SEPARATE VARIANCE ESTIMATE T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.
INTERACT	INTERACTION WITH FACULTY												
	GROUP 1	34	19.7059	4.109	0.705	1.81	0.071	-0.69	85	0.490	-0.74	83.08	0.462
	GROUP 2	53	20.4717	5.532	0.760								
SKILLS	ACADEMIC SKILLS												
	GROUP 1	34	27.6471	3.575	0.613	1.31	0.418	1.92	85	0.058	1.98	77.11	0.051
	GROUP 2	53	26.0000	4.086	0.561								
WARMTH	INTERPERSONAL ENVIRONMENT												
	GROUP 1	32	12.0000	3.663	0.648	1.53	0.175	-3.62	81	0.001	-3.44	55.77	0.001
	GROUP 2	51	14.6471	2.959	0.414								
EXPECT	ACADEMIC EXPECTANCIES												
	GROUP 1	33	7.0909	2.052	0.357	1.02	0.971	-8.04	84	0.000	-8.06	68.54	0.000
	GROUP 2	53	10.7736	2.072	0.285								
STUDY	APPROACH TO STUDY												
	GROUP 1	34	12.0588	3.293	0.565	1.11	0.729	-6.37	85	0.000	-6.30	67.85	0.000
	GROUP 2	53	16.5283	3.125	0.430								
PEER	PEER INFLUENCES												
	GROUP 1	34	4.2059	1.610	0.276	2.29	0.007	-2.97	85	0.004	-2.72	51.50	0.009
	GROUP 2	53	5.0566	1.064	0.146								
ADJUST	NUMBER OF TERMS TO ADJUST												
	GROUP 1	33	3.0303	1.723	0.300	2.91	0.001	7.50	83	0.000	6.71	46.12	0.000
	GROUP 2	52	0.8077	1.011	0.140								
CLASS	PERCENT OF SMALL CLASSES												
	GROUP 1	34	1.7059	0.906	0.155	1.42	0.293	-2.19	83	0.032	-2.26	78.52	0.026
	GROUP 2	51	2.1961	1.077	0.151								
GROUP	INVOLVEMENT IN SMALL GROUPS												
	GROUP 1	33	36.6667	54.528	9.492	1.36	0.323	0.65	84	0.516	0.63	60.30	0.532
	GROUP 2	53	29.4528	46.818	6.431								

DEPEND: 1 GAINER

T - T E S T

GROUP 1 - STATUS EQ 0 sophomore
GROUP 2 - STATUS EQ 1 senior

VARIABLE		NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	F VALUE	2-TAIL PROB.	POOLED VARIANCE ESTIMATE T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.	SEPARATE VARIANCE ESTIMATE T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.
INTERACT	INTERACTION WITH FACULTY												
	GROUP 1	53	18.1132	4.890	0.672	1.28	0.377	-2.33	104	0.022	-2.33	102.46	0.022
	GROUP 2	53	20.4717	5.532	0.760								
SKILLS	ACADEMIC SKILLS												
	GROUP 1	53	24.3585	4.119	0.566	1.02	0.954	-2.06	104	0.042	-2.06	103.99	0.042
	GROUP 2	53	26.0000	4.086	0.561								
WARMTH	INTERPERSONAL ENVIRONMENT												
	GROUP 1	51	14.1176	2.776	0.389	1.14	0.654	-0.93	100	0.354	-0.93	99.60	0.354
	GROUP 2	51	14.6471	2.959	0.414								
EXPECT	ACADEMIC EXPECTANCIES												
	GROUP 1	53	11.1698	2.251	0.309	1.18	0.553	0.94	104	0.348	0.94	103.30	0.348
	GROUP 2	53	10.7736	2.072	0.285								
STUDY	APPROACH TO STUDY												
	GROUP 1	53	16.8302	2.559	0.351	1.50	0.147	0.54	104	0.588	0.54	100.00	0.588
	GROUP 2	53	16.5283	3.129	0.430								
PEER	PEER INFLUENCES												
	GROUP 1	52	5.0192	1.146	0.159	1.16	0.594	-0.17	103	0.863	-0.17	102.11	0.863
	GROUP 2	53	5.0566	1.064	0.146								
ADJUST	NUMBER OF TERMS TO ADJUST												
	GROUP 1	53	0.3774	0.925	0.127	1.19	0.525	-2.28	103	0.025	-2.28	101.82	0.025
	GROUP 2	52	0.8077	1.011	0.140								
CLASS	PERCENT OF SMALL CLASSES												
	GROUP 1	53	1.6792	0.894	0.123	1.45	0.185	-2.67	102	0.009	-2.66	97.18	0.009
	GROUP 2	51	2.1961	1.077	0.151								
GROUP	INVOLVEMENT IN SMALL GROUPS												
	GROUP 1	52	76.7308	160.630	22.275	11.77	0.000	2.06	103	0.042	2.04	59.45	0.046
	GROUP 2	53	29.4528	46.818	6.431								

DEPEND: 0 DECLINER

T-TEST

GROUP 1 - STATUS EQ 0 sophomore
GROUP 2 - STATUS EQ 1 senior

VARIABLE		NUMBER OF CASES	MEAN	STANDARD DEVIATION	STANDARD ERROR	F VALUE	2-TAIL PROB.	POOLED VARIANCE ESTIMATE T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.	SEPARATE VARIANCE ESTIMATE T VALUE	DEGREES OF FREEDOM	2-TAIL PROB.
INTERACT	INTERACTION WITH FACULTY												
	GROUP 1	43	16.4419	3.763	0.574	1.19	0.585	-3.63	75	0.001	-3.59	67.84	0.001
	GROUP 2	34	19.7059	4.109	0.705								
SKILLS	ACADEMIC SKILLS												
	GROUP 1	44	24.0227	4.207	0.634	1.38	0.335	-4.02	76	0.000	-4.11	75.27	0.000
	GROUP 2	34	27.6471	3.575	0.613								
WARMTH	INTERPERSONAL ENVIRONMENT												
	GROUP 1	44	13.1591	2.925	0.441	1.57	0.170	1.53	74	0.130	1.48	57.50	0.144
	GROUP 2	32	12.0000	3.663	0.648								
EXPECT	ACADEMIC EXPECTANCIES												
	GROUP 1	44	8.3409	2.342	0.353	1.30	0.439	2.44	75	0.017	2.49	73.13	0.015
	GROUP 2	33	7.0909	2.052	0.357								
STUDY	APPROACH TO STUDY												
	GROUP 1	43	12.9302	4.008	0.611	1.48	0.246	1.02	75	0.309	1.05	74.87	0.298
	GROUP 2	34	12.0588	3.293	0.565								
PEER	PEER INFLUENCES												
	GROUP 1	43	4.4651	1.279	0.195	1.59	0.158	0.79	75	0.433	0.77	62.01	0.446
	GROUP 2	34	4.2059	1.610	0.276								
ADJUST	NUMBER OF TERMS TO ADJUST												
	GROUP 1	43	1.9767	1.752	0.267	1.03	0.931	-2.62	74	0.011	-2.62	69.57	0.011
	GROUP 2	33	3.0303	1.723	0.300								
CLASS	PERCENT OF SMALL CLASSES												
	GROUP 1	44	1.4091	0.726	0.109	1.56	0.172	-1.61	76	0.112	-1.56	62.13	0.123
	GROUP 2	34	1.7059	0.908	0.155								
GROUP	INVOLVEMENT IN SMALL GROUPS												
	GROUP 1	42	24.8810	45.449	7.012	1.44	0.270	-1.02	73	0.311	-1.00	62.04	0.322
	GROUP 2	33	36.6667	54.528	9.492								

Appendix J
Table 19: R to Z Correlation Comparisons

	Sophomores		Seniors		
ETM/IPS Variables	R	Z	R	Z	Z Comparison
INTERACT/EXPECT	.20*	.20	.11	.11	.60
WARMTH/EXPECT	.18	.18	.22*	.22	.27
PEER/EXPECT	.24*	.24	.23*	.23	.07
CLASS/EXPECT	.04	.04	.16	.16	.80
GROUP/EXPECT	.33*	.34	.01	.01	2.20*
INTERACT/ADJUST	-.11	-.11	-.09	-.09	.13
WARMTH/ADJUST	-.19	-.19	-.30*	-.31	.80
PEER/ADJUST	-.21*	-.21	-.33*	-.34	.87
CLASS/ADJUST	-.06	-.06	-.04	-.04	.13
GROUP/ADJUST	-.09	-.09	.15	.15	1.60
IPS/AB Variables					
EXPECT/SKILLS	.28*	.29	.02	.02	1.80
ADJUST/SKILLS	.02	.02	.19	.19	1.13
EXPECT/STUDY	.55*	.62	.48*	.52	.67
ADJUST/STUDY	-.38*	-.40	-.55*	-.62	1.47
AB/CHANGE Variables					
SKILLS/CHANGE	.02	.02	-.16	-.16	1.20
STUDY/CHANGE	.50*	.55	.57*	.65	.69

*p=.05 or less