1989

# College student involvement and cognitive outcomes: a study utilizing the CSE and the COMP

Roger K. Hadley
*Iowa State University*

## INFORMATION TO USERS

The most advanced technology has been used to photograph and reproduce this manuscript from the microfilm master. UMI films the text directly from the original or copy submitted. Thus, some thesis and dissertation copies are in typewriter face, while others may be from any type of computer printer.

The quality of this reproduction is dependent upon the quality of the copy submitted. Broken or indistinct print, colored or poor quality illustrations and photographs, print bleedthrough, substandard margins, and improper alignment can adversely affect reproduction.

In the unlikely event that the author did not send UMI a complete manuscript and there are missing pages, these will be noted. Also, if unauthorized copyright material had to be removed, a note will indicate the deletion.

Oversize materials (e.g., maps, drawings, charts) are reproduced by sectioning the original, beginning at the upper left-hand corner and continuing from left to right in equal sections with small overlaps. Each original is also photographed in one exposure and is included in reduced form at the back of the book. These are also available as one exposure on a standard 35mm slide or as a 17" x 23" black and white photographic print for an additional charge.

Photographs included in the original manuscript have been reproduced xerographically in this copy. Higher quality 6" x 9" black and white photographic prints are available for any photographs or illustrations appearing in this copy for an additional charge. Contact UMI directly to order.

U·M·I

University Microfilms International
A Bell & Howell Information Company
300 North Zeeb Road, Ann Arbor, MI 48106-1346 USA
313/761-4700 800/521-0600

Order Number 9014902

# College student involvement and cognitive outcomes: A study utilizing the CSE and the COMP

Hadley, Roger K., Ph.D.

Iowa State University, 1989

U·M·I
300 N. Zeeb Rd.
Ann Arbor, MI 48106

College student involvement and cognitive outcomes: A study utilizing the CSE and the COMP

by

Roger K. Hadley

A Dissertation Submitted to the
Graduate Faculty in Partial Fulfillment of the
Requirements for the Degree of

DOCTOR OF PHILOSOPHY

Department: Professional Studies in Education
Major: Education (Higher Education)

Approved:

Signature was redacted for privacy.

In Charge of Major Work

Signature was redacted for privacy.

For the Major Department

Signature was redacted for privacy.

For the Graduate College

Iowa State University
Ames, Iowa
1989

# TABLE OF CONTENTS

# LIST OF TABLES

## LIST OF FIGURES

# INTRODUCTION

There is nation-wide concern about improving the educational system in the United States. First, the concern was limited to the elementary and secondary levels, but now it includes post secondary education. At the same time there is a growing demand by state and federal officials for assessment (Palmer, 1988; "Time for Results", 1986).

Generally this demand relates to improving educational outcomes, primarily cognitive outcomes. Improved educational outcomes are deemed crucial to increased economic development and to gains in the international market place (Educational Commission of the States, 1986), to reduction in poverty and unemployment, and to an improved standard of living and quality of life.

Historically, research has shown that factors such as ability and socioeconomic status (SES) are related to cognitive outcomes. Recent research indicates that student involvement is a significant factor related to cognitive outcomes (Astin, 1985; Education Commission of the States, 1986; Heller, 1988; National Institute of Education, 1984; Pace, 1984).

But, more needs to be known about student involvement (Astin, 1985). What kinds of involvement contribute to cognitive outcomes? Do outcomes for certain kinds of involvement vary for different students?

Research is also needed which measures involvement and cognitive outcomes with standardized measures (Pascarella, 1985a; Anderson, 1988). The commonly used measure of cognitive outcomes, the GPA, is not sufficient because its meaning varies from department to department and from institution to institution.

Using standardized measures to determine the contribution of involvement to cognitive outcomes is an important step to improving educational outcomes and is the main purpose of this study. Improving outcomes is especially significant in this time of concern about the quality of undergraduate education and the present demand for assessment. More importantly, however, improving outcomes will contribute toward the development of students, this nation's most important resource.

This chapter is divided into the following sections: the problem, the purpose of the study, sources and treatment of data, theory related to involvement, hypotheses, definitions, significance of the study, and summary. The problem section is divided into two parts: inadequate indicators of excellence and inadequate measures of variables.

## The Problem

### Inadequate indicators of excellence

Grossman (1988) suggests that the wrong indicators of institutional excellence have been used. Alexander Astin (1985) maintains that some of the move toward assessment is a result of dissatisfaction with

institutional reputation as a primary measure of institutional effect. Rather than looking at the number of Ph. D.'s, number of books in the library facilities or size of budgets, Astin (1985) suggests that student involvement is a better indicator of excellence. He defines involvement as "the amount of physical and psychological energy that the student devotes to the academic experience" (1985, p. 134). Astin's research (1985, 1977) has shown a number of ways college students change (including greater interpersonal and intellectual competence) are related to involvement. In referring to one aspect of involvement, extracurricular activities, he writes (1985, p. 115),

> "In certain respects, these activities offer an opportunity to develop skills that are more relevant to later life than the knowledge and cognitive skills acquired in the classroom. Undergraduate extracurricular activities may be the forerunner of adult achievement in a variety of fields...".

Several others have written about the potential value of involvement. According to Pace (1984, p. 86), "quality of effort" is the best predictor of students' progress to attainment of educational goals. He defines "quality of effort" as the amount, scope and quality of engagement in college experiences. Pace writes that effort has a quality dimension; that processes requiring the greater effort are potentially more educative. For example, working with a faculty member on a research project is more educative, according to Pace, than visiting informally and briefly with an instructor after class. He writes, "By measuring 'effort' we may have the key to judging the

quality of the educational process" (1984b, p. 6). Pace states that what counts most toward students' educational attainment is not so much who they are or where they are, but what they do (1984, p. 96). Pace clearly indicates the importance of student involvement.

The theme of the report, Involvement in Learning, by the Study Group on Conditions of Excellence in American Higher Education (National Institute of Education [NIE], 1984) is involvement improves learning. One recommendation of this report calls on academic and student service administrators to "provide adequate fiscal support, space and recognition to existing cocurricular programs and activities for the purposes of maximizing student involvement" (p. 35).

Inadequate measures of variables

Grade point average Research on involvement's contribution to cognitive outcomes has been limited by inadequate measures. As Lavin (1965, p. 19) suggests, low correlations in studies may be due to uncontrolled sources of variations in grades. GPA, the most often used criterion measure of cognitive outcomes, is not a highly valid measure. Nettles, Thoeny and Gosman (1985, p. 4) state that the instability (of GPA) is caused by different types of students, taking different types of courses from different instructors who utilize different grading standards. The problem is compounded when samples of different institutions with different standards and programs are pooled. Nettles et al. (1985) cite another problem with GPA as a

criterion measure. The restricted range of the college GPA, almost entirely between 2.0 and 4.0, leads to attenuation of correlation coefficients.

In a review of research on learning and cognitive development, Pascarella (1985a) states that a serious problem with research has been the use of the GPA as a global measure of learning. He writes (p. 52), "Clearly, an important line for future research would be to determine direct and indirect effects of such factors as peer cultures, residence environments, and non-classroom interactions with faculty on standardized measures of learning." According to Pace (1979, p. 4) Astin's longitudinal data as well as research reviewed by Lenning and Munday and by Feldman and Newcomb does not include students' achievement on standardized tests. The preceding studies and the reviews by Pascarella (1985a) and Pace (1979) indicate validity problems with GPA as a criterion measure and point out the need for standardized measures of student achievement.

Self reported gains Some research studies such as those by Pace (1984) use self reported gains as the criterion measure of cognitive outcomes. Pascarella writes (1985a, p. 25), "Clearly the use of self-reported gains is a methodological problem with Pace's analyses. The ability of the quality of effort scales to predict less subjective measures of achievement and cognitive development waits upon additional analyses." Self reported gains are student perceptions of their gain or progress on various dimensions such as "ability to

function as a team member" or "ability to think analytically or logically". According to Borg and Gall (1983, p. 465), "... people often bias the information they offer about themselves, and sometimes they cannot accurately recall events and aspects of their behavior in which the researcher is interested." On the other hand, Baird's review (1976) of research accumulated over thirty years found that students' reports of their grades are about as usable as school-reported grades.

GPA and self reported gains are inadequate criterion measures of cognitive outcomes. Standardized measures of cognitive outcomes are clearly needed in future research.

Standardized tests have become a basic part of methodology in educational research (Borg and Gall, 1983). Reliable, valid, unbiased tests can be used, administered and scored without permitting bias to occur. Standardized measures provide for greater objectivity than does the GPA or the self-report. Another advantage of using standardized tests in research is that others can replicate and expand on the research. Yet another advantage of standardized measures is the norms which allow researchers to compare the performance of their subjects to the performance of subjects from a specified population.

While using standardized measures of the criterion is important in research so is using standardized measures of the predictors. Lavin (1965, p. 34) cites the importance of standardization of predictors since many predictors that have the same name may, in fact, be measures of different content. "Involvement" may mean "athletic

involvement" for one researcher and to another researcher it may mean a broader involvement including other activities such as music, drama and clubs. Using standardized measures of predictors is also important because some predictors differently defined on the conceptual level may not be independent of each other. For example, "General Education Skills" and "Intellectual Skills" may not be independent of each other. They need to be defined in a measurable way and then a factor analysis done to determine whether they are separate factors (predictors).

## Purpose of the Study

Astin's research with involvement does not relate involvement to cognitive outcomes using standardized measures (Pace, 1979) and Pace's research, while relating involvement (quality of effort) to cognitive outcomes, uses student self reports of gains as the dependent variable. Other research on involvement uses GPA as the dependent variable. Involvement's relationship to cognitive outcomes needs to be examined, and examined using standardized measures. That is the primary focus of this study. The Quality of Student Experiences questionnaire (Pace, 1983) is used to measure quality of effort (involvement) and the American College Testing Program's (ACT)

College Outcome Measures Project (COMP) is used to measure cognitive outcomes.

Other needs for further research, according to Astin (1985), include determining whether the effects of involvement vary by student characteristics such as age, sex, race, ability or educational aspiration or SES; and determining which kinds of involvement such as residential living or student-faculty relations, contribute to cognitive outcomes.

Pascarella also cites the need for this kind of research. He cites the need for determining the effects of peer cultures, residence environments, and non-classroom interactions with the faculty. These three areas plus athletics and cocurricular activities were the kinds of involvement included in this study. Athletics was included because the literature review revealed mixed findings about the impact of athletic involvement on cognitive outcomes. Cocurricular activities was included because it represented a broad measure of involvement. The literature research indicated a relationship between these five variables and cognitive outcomes, but few of these studies used standardized measures of variables.

Pascarella also cited the need for determining if the effects of involvement vary by student characteristics. He writes (1985a, p. 47), "It is unlikely that all students will benefit equally from the same institution, program, or instructional emphasis." Students differing in ethnicity, gender, socioeconomic status, aptitude, and personal learning

styles, but experiencing the same program might not benefit equally. Research is needed to determine if involvement provides differing outcomes for different students.

While the use of standardized measures of variables is a major contribution of this study, the hypotheses in this research will address the needs for further research on involvement regarding possible differing outcomes for different students.

## Sources and Treatment of Data

This study involving 88 students was conducted on three four-year and one two-year campus in the Midwestern, Eastern and Southern parts of the United States. Each participating student took the College Outcomes Measures Program (COMP) as an entering student. Two or four years later each student took the COMP again and also completed the College Student Experiences Questionnaire (CSE). In this study, five involvement variables (cocurricular activities, student-faculty interaction, residence programs, peer interaction and athletics) and certain involvement/student characteristics interaction variables were used with both step-wise and enter multiple regression procedures to determine their ability to predict cognitive outcomes as measured by the total score on the Objective Test of the COMP.

## Theory Related to Involvement

This section discusses work by Pace, Astin and others that relates involvement to learning. First, "Quality of Effort" developed by Pace is discussed and then "involvement" promoted by Astin. The section concludes with a brief look at learning theory related to involvement which is espoused by Piaget, Montessori and Kolb.

As stated earlier, Robert Pace (1984) has developed the concept of quality of effort, a concept closely related to involvement. Quality of effort is defined as the amount, quality and scope of effort a student expends in college experiences. Pace views education as both process and product. Product includes outcomes such as knowledge acquired or skills learned. Process includes experiences or methods such as observation or discussion. Pace says that both process and product are important, but just as some products are better than others so some processes are better than others. He maintains that those processes which result in greater learning are more valuable (hence the quality aspect).

According to Pace (1985) all learning requires time and effort. Effort also has a quantity dimension. For example, it takes more effort to work with a faculty member on a research project than to just talk with a faculty member. Educational processes requiring more effort have the potential to be more educative. The breadth or scope

of the effort is closely related to the breadth of the outcomes - the greater the scope the greater the breadth of the outcomes.

Another aspect of quality of effort is that it emphasizes the student's responsibility in learning. While characteristics of the institution likely have an impact on student learning, what the student does is very important. A college may have a fine program promoting student faculty interaction, but if the student puts no effort forward to get involved, the program will have no learning impact on the student. Students must take advantage of opportunities designed to promote learning. Quality of effort measures the use of events and conditions which the institution provides that are intended to facilitate student learning and development. Pace writes, "The underlying quality or concept was that of capitalizing on the potential for learning and development inherent in the nature of the particular category of experience" (1984, p. 9). It is through student use of facilities and experiences the college provides, that learning occurs.

Astin relates involvement to learning in a theory which says that students learn by becoming involved (1985, p. 133). He describes his theory of involvement as follows:

1. Involvement refers to the investment of physical and psychological energy in various "objects". The objects may be highly generalized (the student experience) or highly specific (preparing for a chemistry examination).

2. Regardless of its object, involvement occurs along a continuum. Different students manifest different degrees of involvement in a given object, and the same student manifests different degrees of involvement in different objects at different times.

3. Involvement has both quantitative and qualitative features. The extent of a student's involvement in, say, academic work can be measured quantitatively (how many hours the student spends studying) and qualitatively (does the student review and comprehend reading assignments, or does the student simply stare at the textbook and daydream?).

4. The amount of student learning and personal development associated with any educational program is directly proportional to the quality and quantity of student involvement in that program.

5. The effectiveness of any educational policy or practice is directly related to the capacity of that policy or practice to increase student involvement. (1985, p. 135)

Alexander Astin's concept of involvement is related to Pace's quality of effort concept. Pace (1984) defines quality of effort as "the amount, quality and scope of effort a student expends in college experiences" and Astin defines involvement as "the amount of physical and psychological energy that a student devotes to the academic experience" (p.134). As Pace, Astin's work on involvement deals with

the behavioral aspect of involvement--what a person does as opposed to what he thinks or feels.

Kaufman (1987, p. 10) writes, "Involvement subsumes aspects of the concept of effort, which for Astin is narrower; both concepts emphasize behavior or what students do on campus. Thus, when 'quality of effort' is used as a synonym for involvement, it is the behavioral component of the latter that is being equated with effort." This more clearly defines the relationship between involvement and quality of effort.

Student involvement (quality of effort) has a dual nature. It is simultaneously an effect of some variables (then a dependent or outcome variable) and a cause or mediator of others (then an independent or predictor variable). For example, a small size school may effect involvement of students in cocurricular activities and, in turn, involvement of students in cocurricular activities may increase academic achievement. In this example involvement mediates the effect of school size on academic achievement. In the design of this study, involvement is used as an independent variable. Most of the literature review examines research where involvement is the independent variable.

Involvement in out-of-class activities may have the potential for significant impact on learning since a student spends so much more time out of class than in class. How that time out of class is spent,

related to the academic goals of the classroom, contributes to the learning or detracts from it.

Learning theories support the concept of involvement. Piaget (Lall & Lall, 1983) describes how intelligence is shaped by experience. Intelligence is a product of a person and his/her environment. Montessori stresses the importance of individual initiative and self-direction (Lall & Lall, 1983).

The humanistic perspective on learning as described by Fuhrman & Grasha (1983) supports the relationship between involvement and learning. The humanistic view of learning emphasizes the development of the whole person. It brings together the cognitive and affective aspects of the learning experience. Fuhrman and Grasha (1983, p. 73) describe the kind of teaching needed to do this. "Such instructors are not as concerned with teaching static knowledge as they are with helping students learn how to learn. They encourage students to explore content on their own, to use resources when they need them, and to reflect on the joy, excitement, frustration, anxiety, and other emotions related to learning. To do this humanistic teachers interact extensively with students ..." This kind of teaching involves both the teacher and the student in the learning process.

Kolb (1984) has developed a comprehensive model of learning which also supports the relationship between involvement and learning. He emphasizes the importance of experience in learning and that learning involves the whole person. According to Kolb (1984, p. 20):

> This differentiates experiential learning from rationalist and other cognitive theories of learning that tend to give primary emphasis to acquisition, manipulative, and recall of abstract symbols, and from behavioral learning theories that deny any role for consciousness and subjective experience in the learning process.

Kolb (1984) suggests that experiential learning theory offers a holistic integrative perspective on learning that combines experience, perception, cognition and behavior.

Learning takes place in human settings -- in classrooms, on the athletic field, in a board meeting or in a grocery aisle. "Through experiences of initiation and communication with others and interaction with the physical environment, internal development potentialities are enacted and practiced until they are internalized as an independent development achievement" (Kolb, 1984, p. 133). Learning results from involvement in various experiences.

Kolb (1984, p. 30) describes four abilities necessary for effective learners: concrete experience abilities (CE), reflective observation abilities (RO), abstract conceptualization abilities (AC), and active experimentation abilities (AE).

> That is, they must be able to involve themselves fully, openly, and without bias in new experiences (CE). They must be able to reflect on and observe their experiences from many perspectives (RO). They must be able to create concepts that integrate their observations into logically

sound theories (AC), and they must be able to use these theories to make decisions and solve problems (AE).

These abilities are based on learning through experience. Kolb's model lends support to the idea that cognitive learning also occurs outside the classroom.

## Hypotheses

The primary purpose of this study is to explore the relationship between quality of effort and cognitive outcomes using standardized instruments to measure these variables. A secondary purpose is to determine if certain kinds of involvement are related to different outcomes for different students.

Hypothesis 1: Quality of effort is a predictor of cognitive outcomes.

Hypothesis 2: Quality of effort in cocurricular activities is a predictor of cognitive outcomes.

Hypothesis 3: Quality of effort in student faculty interaction is a predictor of cognitive outcomes.

Hypothesis 4: Quality of effort in residence programs is a predictor of cognitive outcomes.

Hypothesis 5: Quality of effort in peer interaction is a predictor of cognitive outcomes.

Hypothesis 6: Quality of effort in athletics is a predictor of cognitive outcomes.

Hypothesis 7: Quality of effort in athletics results in relatively greater cognitive outcomes for females than males.

Hypothesis 8: Quality of effort in cocurricular activities results in relatively greater cognitive outcomes for lower SES than higher SES students.

Hypothesis 9: Quality of effort in student-faculty interaction results in relatively greater cognitive outcomes for lower SES than higher SES students.

Hypothesis 10: Quality of effort in residence programs results in relatively greater cognitive outcomes for lower SES than higher SES students.

Hypothesis 11: Quality of effort in athletics results in relatively greater cognitive outcomes for lower SES than higher SES students.

Hypothesis 12: Quality of effort in peer interaction results in relatively greater cognitive outcomes for younger than older students.

## Definitions

### Quality of effort

Quality of effort is defined as the amount, scope and quality of effort a student invests in college events and experiences which are at

least in some respects designed to facilitate student learning and development (Pace, 1984). It is used interchangeably with "involvement" in this study.

In this study, quality of effort is measured by the scores on scales of Pace's College Student Experiences questionnaire (CSE) (1983). There are seven facility scales: classroom, library, science facilities, cultural facilities, student union, athletic and recreational facilities and residence facilities. There are seven opportunities for personal or interpersonal experiences scales: experience with faculty, clubs and organizations, experiences in writing, personal experiences, student acquaintances, topics of conversation and information in conversations. In this study five scales will be used to measure quality of effort: Clubs and Organizations, Experiences with Faculty, Dormitory or Fraternity/Sorority, Topics of Conversation, and Athletic and Recreational Facilities.

Cognitive outcomes

Cognitive outcomes are defined and limited to general knowledge and skills -- what is commonly called general education. The composite score on the American College Testing Program's (ACT) College Outcome Measures Project (COMP) is used to measure cognitive outcomes.

In the COMP, six outcomes are organized in two dimensions (content and process) and are described by Forrest and Steele:

Process areas

**Effective communicating** is defined as the ability to communicate about social, scientific, and artistic topics.

**Effective problem solving** is defined as the ability to solve social, scientific, and artistic problems.

**Effective clarification of values** is defined as the ability to clarify social, scientific, and artistic values.

Content areas

**Effective functioning within social institutions** is defined as the ability to communicate about social institutions, solve social problems, and clarify social values.

**Effective use of science and technology** is defined as the ability to communicate about science and technology, solve scientific and technological problems, and clarify scientific and technological values.

**Effective use of the arts** is defined as the ability to communicate about the arts, solve artistic problems, and clarify artistic values. (1982, p. 9-10)

Student background characteristics

Six student background variables are used in this study because research has shown they are related to cognitive outcomes. These variables are: ability, gender, social-economic status, race, educational aspiration and age.

## Significance of the Study

Examining the relationship between involvement and academic performance is important for a number of reasons. First, if involvement is related to cognitive outcomes it could be used as a variable in a casual model to predict cognitive outcomes. Secondly, it would mean educators should look for conditions and ways to foster involvement. Thirdly, the value of educational processes could be evaluated, in part, by their ability to involve students.

As mentioned earlier, there are problems with using GPA or student self-reported gains as a dependent variable. Most of the research on involvement uses one or the other. A major contribution of this study is that it examines the relationship between quality of effort and cognitive outcomes using standardized instruments to measure both of these variables.

## Summary

National concern about the quality of higher education and the demand, in some quarters, for assessment of outcomes requires a search for ways to measure and improve outcomes in higher education. Traditional indices of institutional quality (number of books in the library, size of budget) and methods of measurement (GPA and self reports) are inadequate.

Recent research indicates that increasing student involvement is a way to increase learning outcomes. More needs to be known about student involvement. What kinds of involvement contribute to educational outcomes? Do outcomes for certain kinds of involvement vary for different students? Twelve hypotheses are formulated to help answer these questions.

To avoid problems associated with GPA and self reports, standardized measures of involvement and cognitive outcomes are used in this study. The College Student Experiences questionnaire is used to measure involvement and ACT's College Outcomes Measures Program is used to measure cognitive outcomes.

The study involves 88 students from three four-year campuses and one two-year campus in the Midwestern, Eastern and Southern part of the United States. Each student took the COMP as an entering student. Two or four years later each student took the COMP again

and also completed the CSE. In this study, five involvement variables and six involvement/student background variables are used with multiple regression procedures to determine their ability to predict cognitive outcomes.

This chapter also reviewed theory related to involvement and concluded with a section on the significance of the study. The main significance is that the study is longitudinal and uses standardized instruments to determine student involvement's ability to predict cognitive outcomes.

# REVIEW OF LITERATURE

## Introduction

The primary source of references for this review came from a computer search of the ERIC data base and Dissertation Abstracts International. Bibliographies from primary references also yielded relevant literature. Other references came from literature reviews, from professional journals, from an ACT institute regarding cocurricular activities and from selected professional conferences.

The review of the literature is divided into five majors sections: general consequences of involvement, involvement and cognitive outcomes, involvement and time, student background variables related to educational outcomes, and interactions between student background variables and involvement. The section, involvement and cognitive outcomes, reviews five involvement areas: cocurricular activities, student faculty interaction, residential programs, peer interaction and athletes.

## General Consequences of Involvement

This first section describes a variety of outcomes associated with involvement. The following sections deal with involvement and cognitive outcomes.

College activities outside the classroom were considered by many to be a valuable part of the educational experience. In some instances, experiences outside the classroom provided students the opportunity to apply things learned in the classroom. School activities provided opportunities to develop leadership, interpersonal, and decision making skills. Achievement in activities developed confidence which enhanced other aspects of a student's life. Involvement in activities contributed to student satisfaction and retention.

A 1974 study by ACT investigated four possible predictors of life success. Success was measured by the self-satisfaction of individuals and their participation in a variety of community activities when surveyed two years after college. Of the predictors--major achievement in cocurricular activities, high grades in high school and high scores on college entrance exams--only achievement in cocurricular activities was related to success.

A study with related findings was done by Warren Willingham of the College Board (1985). The purpose of the study was to identify other predictors of college success beside high school grades, class rank and standardized test scores. The project began in 1978 by collecting data on 25,000 students at nine Eastern colleges for the class of 1983, and included another 4,814 who had enrolled in 1979. The final report was based on 3,676 who graduated on time.

An important part of Willingham's study (1985) was the definition the nine colleges gave for college success:

Scholarship

1. college honors
2. department honors

Leadership

3. elected to major campus office
4. appointed to major campus office

Significant Accomplishment

5. scientific/technical achievement
6. artistic achievement
7. communications achievement
8. physical achievement
9. organizational achievement
10. other independent achievement

A significant finding of the study was that prediction of college success could be improved by considering evidence of a student's record of productive follow through to accomplishment. Willingham called these students, "extracurricular producers." Follow through plus three other factors--high school honors, the personal statement, and the school reference--improved the prediction of "most successful" students by 25 percent. They improved prediction of leadership by 65

percent, accomplishment by 42 percent, and scholarship by 6 percent (p. 178).

Alexander Astin's study (1985) demonstrated that college attendance tends to strengthen a student's competence, self-esteem, artistic interest, liberalism, hedonism and religious apostasy and to weaken business interest (p. 147). He decided to study involvement more intensively after he found that various forms of involvement contributed to retention.

In the research reported in 1985, Astin used longitudinal data on more than 200,000 students and explored the effects of several kinds of involvement: place of residence, honors programs, undergraduate research participation, social fraternities and sororities, academic involvement, and involvement in student government.

Specific changes attributable to given forms of involvement were:

> **Resident vs. Commuter**--greater gains in artistic interests, liberalism and interpersonal self-esteem. Greater satisfaction with student friendships, faculty-student relations, institutional reputation and student life.
>
> **Honors program**--gains in interpersonal self-esteem, intellectual self-esteem and artistic interests. Satisfaction with quality of science program, closeness to faculty and quality of instruction.
>
> **Academic involvement**--less change in all areas except need for status. Satisfaction with all aspects of college life except friendships with other students.

> **Faculty-Student interaction**--greater satisfaction with all aspects of their institution than other forms of involvement.
>
> **Athletic involvement**--smaller than average increases in political liberalism, religious apostasy, and artistic interest and a smaller than average decrease in business interests. Satisfaction with institution's academic reputation, the intellectual environment, student friendships, and institutional administration. (p. 147)

In conclusion, Astin (1977) found the effects of involvement to be pervasive. In some cases, the effects of involvement were greater than the changes associated with entering student characteristics or institutional characteristics.

Hanks and Eckland (1976) indicated that cocurricular involvement can stimulate and shape the success orientation of individuals to goals. Within this framework, participation in the extracurricular program seems to serve two important functions:

> "(a) it generates and reinforces educational success goals by exposing students to a network of social relations, consisting in part of school personnel and achievement-oriented peers, with the immediate benefit of binding these students to the school and to its normative structure; and (b) it facilitates the achievement of such goals by students acquiring the kind of knowledge, interpersonal skills, self-confidence, and other attitudes that not only engender compliance but equip them with the personal resources needed in the long run to translate goals into effective action (Hank & Eckland, 1976, p. 1-2)."

Other effects of involvement in cocurricular activities have been cited by Morrell and Morrell (1986). Cocurricular experiences can teach students about group processes, decision-making, organizational and administrative skills, budgeting and accounting, and bureaucratic and programming skills. Participation in activities can enhance maturity, help students gain management skills and facilitate career decision making.

Clearly, there are many consequences of student involvement. Those cited in this section have dealt with consequences other than cognitive outcomes. The next section will address the area of involvement and cognitive outcomes.

Summary This section described a variety of outcomes related to involvement. Involvement provided opportunities to develop leadership, interpersonal and decision making skills.

Studies indicated that involvement stimulated and shaped success orientation toward goals and was related to success in college and in life. Astin's research (1985) demonstrated that college attendance tends to strengthen a student's competence, self esteem, artistic interest, liberalism, hedonism and religious apostasy, and to weaken business interest.

## Involvement and Cognitive Outcomes

### General studies

Most studies of involvement dealt with one or two forms of involvement such as student-faculty interaction (Endo & Harpel, 1981, 1982; Pascarella & Terenzini, 1978) or residential patterns (Blimling & Hample, 1979; DeCoster, 1966, 1968; Riker, 1981). This section contains studies (Holland & Nichols, 1964; Richards, Holland & Lutz, 1967b) that deal with several areas of involvement. One of these by Pace (1984) used the questionnaire, College Student Experiences (CSE), the instrument used to measure the independent variable in this study.

Pace (1984) reported a study designed to examine the ability of quality of effort, measured by the College Student Experiences questionnaire, to predict self-reported gains. Eight colleges and 2299 students were included in the sample.

The College Student Experiences questionnaire included fourteen activity scales, seven "use of facilities" scales and seven "opportunities for personal and interpersonal experiences" scales. Self-reported gains were statements of gains on 18 objectives such as vocational training, ability to think analytically and logically, and writing clearly and effectively. The 18 objectives were grouped into four categories of achievement: personal/social development; intellectual skills; general

education, literature and arts; and understanding science (Pace, 1984, p. 112).

Pace found that for every one of the four major achievement areas, one or more of the fourteen quality of effort scales made the greatest contribution toward explaining that achievement. For example, the best predictor of student's progress toward acquiring intellectual skills was the quality of effort they devoted to course learning. The best predictor of progress in understanding science was the quality of effort they put into using science laboratories.

When the variables background or status, college status, and environment, were placed in the prediction equation, about 24-36 percent of the variance in prediction was explained. Pace noted that this was very comparable to what studies have generally found (1984, p. 43). When quality of effort measures were added, Pace found that 39-47 percent of the variance in the prediction of all gains was explained. For gains in general education, the increase was from 48 percent to 55 percent; for gains in intellectual skills the increase was from 37 to 46 percent. Quality of effort was a better predictor than family background, social or ethnic identification, age, sex, marital status, or various characteristics of the college environment.

Findings by Pace were dramatic, but they must be interpreted with reservation as the reliability of the self-reported gains is generally viewed as questionable. Pascarella (1985a) described these results as "intriguing" and wrote that "considerations of the extent and quality of

student effort will play an increasingly important role in future investigations of college impact" (p. 25).

Part of Alexander's study (1985) determined whether the relationship between quality of effort in specific areas of college life and estimated gains from the college experience (i.e., Personal/ Interpersonal Understanding, Intellectual Competencies, General Education, and Understanding Science) differed significantly for older (aged 23+) and younger (aged 18-22) students. A second objective of her study was to determine the major predictors of estimated gains for each group. Her research provided further support for the relationship between involvement and cognitive outcomes.

Alexander's (1985) study involved 300 students on the main campus of the Pennsylvania State University. She used two main quality of effort variables which were composed of combined scores from the quality of effort scales of the CSE shown in parentheses. The two quality of effort variables were Academic/Intellectual quality (Library Experiences, Experiences with Faculty, Course Learning and Writing Experiences) and Personal/Interpersonal quality (Personal Experiences, Student Acquaintances, Topics of Conversation and Information in Conversations).

To see if predictors of gains differed by age, Alexander used multiple correlation. Three broad areas of predictors were used: Background and College Student Experience characteristics (gender, residential history, term standing, GPA, college of enrollment, amount

of school work per week, and satisfaction with the college experience); Perceptions of the Environment (Supportive Relationships - including relationships with other students, faculty members, administrative offices and officials, and Intellectual, Critical and Esthetic Emphasis); and Quality of Effort (the eight scales previously cited).

Alexander's (1985) findings indicated the contribution of Quality of Effort toward gains in General Education and Intellectual Competencies for both age groups. For ages 18-22, environment, QE and background explained 5, 19 and 19 percent, respectively of the variance in General Education, and 4, 42, and 54 percent, respectively of the variance in Intellectual Competencies. For ages 23 and above, environment, QE, and background explained 14, 8, and 22 percent, respectively of the variance in General Education, and 3, 15 and 11 percent, respectively of the variance in Intellectual Competencies.

In summary, Alexander's (1985) study indicated the important contribution of quality of effort toward gains in general education and intellectual competencies for both age groups. It also indicated some other differences on the basis of age. The most significant for this study was that quality of effort in the social sphere was a stronger predictor of gains for the younger students. This is directly related to one of the research hypotheses in this study: involvement in peer interaction will be related to greater cognitive outcomes for younger than older students. The possible differential outcomes of peer

interaction related to age will be addressed later in this study in the section, "Involvement and Student Background Interactions".

Additional support for the relationship between effort and learning was indicated from a study by De Boer (1981). In his study it was hypothesized that a number of intellective and non-intellective variables directly affect high school performance and that high school performance in turn affects college performance. It was also hypothesized that these predetermined variables had a direct effect on college performance that was not mediated by high school performance. Subjects for the study were 1037 male and 649 female students at a selective four-year liberal arts college who entered as freshmen during 1974, 1975 and 1976 and who took part in the colleges freshman testing program during orientation week. These numbers of subjects represented 90% of the students who entered the college during those years.

The dependent variable was first semester GPA. Predictor variables were aptitude, high school achievement, peer influence, persistence, home influence and self control. Stepwise multiple regression analyses were performed to calculate standardized partial regression coefficients for use in a path analysis. Calculation of the coefficients of effect of the hypothesized model demonstrated that persistence was the most important of the non-intellective factors and that the effects for the other variables were negligible when persistence was present in the model. This result was observed for

both male and female students. The Persistence subscale of the Personal Values Inventory was comprised of a set of questions which required students to indicate their perceptions of their reputation with respect to their persistence and to state whether they considered themselves to be hard workers.

Another finding was that little of the effect of aptitude and persistence flowed through high school achievement to college achievement which De Boer (1981) suggested meant that a substantially different learning environment existed at the two levels. Finally, when persistence was examined as the predictor, the coefficient of total effect for males was .237, but only .169 for female students. De Boer concluded there was something in the college environment that caused females to perform less predictably than their male counterparts. He suggested that this difference might be explained by the concept of person-environment fit. According to Pascarella (1985a, p. 36) the concept of person-environment fit has "solid theoretical underpinnings in Lewin's (1936) social-psychological formula for explaining human behavior, b = f(p,e). This formula posits that behavior (b) can be understood as a function (f) of the interaction or fit between the individual personality (p) and the environment (e)." De Boer concluded that prediction studies of college performance need to continue to consider factors within the college environment that interact with traditional predictors of academic success.

Several aspects of De Boer's study (1981) are pertinent to this study. First, effort is a significant predictor of academic outcomes. Second, there may be some differences between the high school and college environment which would affect the generalizability of research findings from one level to the other. Thirdly, the concept of person-environment fit supports examining characteristics of the person (background characteristics) and characteristics of the environment (quality of effort) and the possible interactions between the two. This is explored in hypotheses 7 to 12 of this study.

Some other support for the role of student effort as a predictor of academic performance came from an analysis of many multi-variate studies of personality factors as predictors by Lavin (1965). From the analysis, Lavin listed six underlying personality dimensions. One of these was "achievement motivation syndrome." In this category there were three personality variables associated with academic performance: higher achievement motivation, higher activity level and more endurance (p. 107).

Pascarella's (1985a) review of the research indicated that certain peer relationships, residential environments and student-faculty interactions were related to academic achievement. These areas will be discussed in more detail in following sections of this chapter.

Some researchers found that non-academic accomplishment was not a good predictor of academic achievement [Richards, Holland & Lutz, (1967a, 1967b); Holland & Nichols (1964)]. Richards et al. (1967b)

studied a sample of 7,208 students from 22 colleges who took the ACT College Survey in 1965 at the end of their sophomore year and who had taken the survey in the 1962-63 year as a part of their college application process. Extracurricular accomplishment as a predictor was measured via a checklist to obtain scores in the following areas: art, music, literature, dramatic arts, leadership and science. College grades were used as the dependent variable. They found a low relationship between non-classroom achievements and academic performance.

Summary This section reported studies involving several areas of involvement versus just one or two. Pace (1984) found that for everyone of four major achievement areas, one or more of the fourteen quality of effort scales made the greatest contribution toward explaining that achievement. When the variables background or status, college status, and environment, were placed in the equation, about 24-36 percent of the variance in prediction was explained. When quality of effort measures were added, Pace found that there was a 7-9 percent increase in prediction of general education and intellectual competences. Quality of effort was a better predictor than family background, social or ethnic identification, age, sex, marital status or various characteristics of the college environment. Alexander (1985) also found that quality of effort increased prediction of general

education and intellectual competencies. Pace and Alexander both used GPA as a predictor and self-reported gains as criteria.

De Boer (1981) found that students' perceptions of their reputation with respect to persistence and hard work was a predictor of first semester college GPA. He found persistence was a better predictor for men than women and suggested the difference might be explained by the concept of person-environment fit.

Other research cited indicated that certain peer relationships, residential environments, and student-faculty interactions, were related to academic achievement. Some researchers found that non-academic accomplishments were not positive predictors of academic accomplishment.

## Cocurricular activities

The first kind of involvement examined is cocurricular activities. In this study, cocurricular activities are those college activities occurring outside the classroom that have a formal relationship to the institution such as clubs, organizations, athletics, music, student government and drama. Relationships and college environments are not considered cocurricular activities. In this study, cocurricular and extracurricular are used interchangeably. Some studies in this section on curricular activities include athletics, but since there are several separate studies of athletics in the literature and because of the high

level of interest in this area today, there is a separate section for athletics.

Feldman and Newcomb (1969) found that almost none of the studies they reviewed showed negative relationships between amount or extensity of involvement in cocurricular activities and academic outcomes. Rather they found either no relationship or a positive one even in studies with controls for factors such as ability, class level, and sex. Feldman and Newcomb suggested certain activities such as religious, student government and department clubs may be more associated with academic achievement than other cocurricular activities.

Nover (1981) examined the relationship between involvement in cocurricular activities and high school performance in a sample of 293 students from a semi-rural/suburban high school in southeastern New England. Involvement was determined by students' self-reports on an activities checklist and grades were determined by self-reports. Involved students were more likely to get better grades, be on the honor roll and plan to attend college.

Also researched by Nover (1981) was the relative contribution of involvement and the demographic variables of sex, socio-economic status (SES) and grade level. Only grade level and SES were significant predictors. Using grade level, SES and involvement he looked at the average relative contribution to grade achievement using the six possible orders of entering these three variables into a regression equation. The average relative contributions were as

follows: SES-50.09%; grade level-14.07% and involvement-35.85%. The absolute contribution of these variables was not stated.

Nover's study (1981) was limited somewhat in its significance because it used volunteers rather than a random sample (all students had at least one study hall). He wrote, "There was no reason to expect that no significant differences findings on dimensions potentially critical to this study would result from this sampling procedure" (p. 10). However, he gave no information to support the representativeness of the sample and so the findings may only apply to his sample.

Otto (1975) sought the contribution of participation to educational attainment statistically controlling on background socioeconomic status, academic ability, and performance in a study of 340 seventeen year-old males surveyed in 1957 and again in 1972. The response rate was 79%. There were 14 activity variables in the study. Otto found that by incorporating extracurricular participation into the estimating equations, explained variance in educational attainment was increased by 5%.

In another study, Hanks and Eckland (1976) compared athletics with social participation and their relationships to academic achievement and educational attainment. Social participation was defined as seven cocurricular activities: publications or creative writing, dramatics or music, debate or political groups, student government, social service or religious groups, science clubs or projects and other

groups. A factor analysis revealed social participation and athletics as distinctly different forms of participation.

The data for the study were from the 1970 Explorations in Equal Opportunity (EEO) survey which was a follow-up to a 1955 survey by the Educational Testing Service which included all sophomores in 97 schools. In the 1970 survey the numbers were reduced to 42 colleges and 4,151 sophomores by using a stratified sample. A fifty percent survey response rate yielded 2,077 students for their study. Hanks and Eckland (1976) described sample and response biases as "under-representation of schools from large urban areas and an under-representation of low-ability students and school drop-outs" (p. 278). Provision was made to control SES, aptitude and educational plans in the study.

In the results of the study, social participation had relatively strong direct and indirect and positive effects on academic performance (grades) both in high school and in college for both sexes. Athletics was found neither to depress nor enhance academic achievement. Hanks and Eckland (1976, p. 292) commented that their study was significant in that it confirmed other studies but did so over a broader range of students and at different stages of the life cycle.

Abrahamowicz (1985) studied the relationship between one type of involvement, participation in student activities and organizations, and student perceptions of college, student satisfaction and overall involvement. The study used chi-square procedures to test for

differences between 151 involved and 192 uninvolved day students at the University of Toledo. Using the CSE, Abrahamowicz found involved students scored higher on 20 of 21 of the self reported gains. Broad general education was the only self-reported gain where uninvolved students scored higher than involved students.

Other support for cocurricular activities was found in other studies (Astin, 1985; Beasley & Sease, 1974; McBride, 1980; Shaw, 1981; Harvanich & Golsan, 1986). Beasley and Sease found that participation in cocurricular activities (student government, music, speech, science, math, art or writing organizations) predicted Black student grade point average. McBride (1980) surveyed teachers in a school year, in a Michigan public school district that restored cocurricular activities after dropping them the year before. He found that significantly more teachers reported that grades had improved than reported that grades had not improved. Shaw (1981) found a positive relationship between participation and grade point average. For both subject-related participation and non-subject related participation, participators had higher grades than non-participators. However, there was no evidence that Shaw controlled for differences in academic ability. Astin (1985) found that participation in honors programs positively affected undergraduate grades.

The purpose of a study conducted by Shucker (1987) was to determine whether participation in certain extracurricular activities, intercollegiate athletics, campus employment, fraternities/sororities,

intramurals and student government had a relationship to persistence of freshmen into their sophomore year and to their predicted and earned grade point averages. This was an ex post facto study of the 1985 entering class at Furman University. Of the class of 600, only those who persisted as sophomores or who voluntarily withdrew after the freshman year were included in the study (N=567). The correlation between involvement for both predicted and earned GPA was slightly negative (r = -.11 and r = -.10, respectively). For non persisters the relationship of involvement and GPA was r = -.38. In his literature review, Shucker cited seven studies which led him to the conclusion that involvement may negatively affect GPA.

Forrest (1982) did not find a relationship between cocurricular activities and institutional score gains in a sample of 44 diverse institutions. Score gains were computed as the difference between actual scores of sophomores or seniors on the ACT's COMP and the estimated freshman COMP score of these same students. Forrest examined the relationship between various institutional program features and score gains and persistence rates, looking for features upon which effective and not so effective institutions differed. For example, he found that institutions with the highest retention had higher score gains than institutions with the lowest retention. Institutions with the most comprehensive programs of orientation and advising had higher score gains than institutions with the least comprehensive programs of orientation and advising. Forrest did not

find differences in scores gains when comparing institutions with a large number and variety of non-classroom activities and institutions with a small number and variety of activities.

Summary Most of the research demonstrated a positive relationship between cocurricular activities and cognitive outcomes. Nover (1981) found SES to be a stronger predictor than involvement, and Otto (1975) found that extracurricular participation increased prediction of educational attainment by 5 percent.

Using the CSE, Abrahamowicz (1985) found broad general education was the only self-reported gain where uninvolved students scored higher than involved students. Shucker (1987) found a correlation between involvement and sophomore GPA was -.10 for persistors to the sophomore year and -.38 for nonpersistors.

## Student-faculty interaction

This section begins with a summary of Pascarella's (1985a) and Feldman and Newcomb's (1969) reviews of the literature pertinent to this study. This is followed by studies examining the varied kind of student-faculty interaction grouped under "general interaction" and "differentiated interaction".

In Pascarella's review of influences on learning and cognitive development (1985a, p. 43), he found that the frequency and quality of

student-faculty interactions tended to be significantly and positively associated with academic outcomes. There were a few exceptions (Bean and Kuh, 1984) and not all types of interaction were equally beneficial. Those interactions relating to career and intellectual concerns were the most salient. Structured interventions to promote faculty-student interaction did not exert a strong direct influence on achievement. Pascarella indicated that perhaps the influence of these interventions was indirect and mediated by the increased student-faculty interaction which they appeared to facilitate. On the whole, Pascarella's review indicated positive academic outcomes were associated with student-faculty interaction.

Feldman and Newcomb (1969) reviewed studies primarily dealing with affective outcomes. They found that campus-wide impacts were most frequently found in environments where there was a homogeneity of values in the faculty and student body and where there was an opportunity for varied interaction between faculty and students.

General interaction Several studies (general interaction) used just one variable to define student-faculty interaction. A second group of studies (differentiated interaction) compared outcomes for two or more kinds of interaction such as discussing careers and discussing intellectual matters, or discussing personal matters and discussing intellectual matters. Differentiated interaction in discussed in the next part of this section.

Several researchers found that faculty interaction outside the classroom contributed to academic achievement or intellectual growth (Pascarella & Terenzini, 1978; Endo & Harpel 1981; Pascarella et al., 1978; Tinto, 1987). Chickering (1978), in developing a conceptual model of college impacts, suggested that student-faculty interaction has a direct impact on the development of intellectual and general competence.

One of the most frequently cited studies was one by Centra and Rock (1971). Their study was conducted in 27 liberal arts colleges and contained 1064 randomly selected seniors for whom SAT and GRE scores were available.

Their analysis compared institutions whose seniors differed on actual as compared to predicted achievement on the Graduate Record Exams, and then identified environmental features of the colleges which differed. A standardized instrument, the Questionnaire on Student and College Characteristics, was used to measure predictors, including faculty-student interaction, and GRE Social Science, Natural Science and Humanities Area Tests were used to measure achievement. Centra and Rock (1971) found that students at colleges with high scores on student-faculty interaction more often overachieved on GRE Humanities and Natural Science Area Tests whereas students from colleges with low scores on student-faculty interaction underachieved on all three GRE tests.

According to Moos (1976) the social environment of a college is important when predicting academic performance. "Colleges that emphasize relationship dimensions (faculty-student interaction, peer cohesion) have a positive impact on students" (p. 414).

Wilson, Goff and their colleagues (1975) found that students who grew most on intellectual and personal development were those who made special efforts to expand their self awareness. More than other students, they became involved in intellectual, artistic and political activities and sought out faculty members to discuss such matters.

A study by Green (1986) conducted on 14 community college campuses (N = 1,938) in Kentucky investigated the relationship between input variables (personality and major), the process variable (student-faculty interaction) and output variables (gains from college and satisfaction with college). The study used the CSE to measure student-faculty interaction and gains.

Regression analysis revealed that for person-social gains, student-faculty interaction was the most important predictor ($R^2$ = .09). Student-faculty interaction was the second most important predictor of vocational gains ($R^2$ = .038). Achieving gains in areas of intellectual skills, understanding science and technology, and general education, however, were more dependent on student effort in learning course material, using the library, or participating in art, music and theatre activities than on student faculty interaction (Green, 1986, p. 66).

Bean and Kuh (1984) developed a nonrecursive theoretical model to examine the degree of reciprocity between student-faculty contact and academic performance. GPA and faculty contact did not strongly affect one another. They felt the failure to show an effect may have been due to including only freshmen and sophomores from a large university in the study.

Differentiated interaction Pascarella and Terenzini (1978) studied a random sample of 1,008 students from Syracuse University and found that frequency of student-faculty interaction related to intellectual or coursework matters had the strongest positive relation to academic performance and intellectual development. Interactions related to career concerns had the most positive association with self-perceived personal growth.

Pascarella and Terenzini controlled the many pre-enrollment variables. The outcome, academic performance, was measured by freshman year cumulative grade point average. Intellectual and personal development was based on a measure of student self-reported progress.

Of six measures of informal contact with faculty, only the two mentioned above were related significantly to educational outcomes. The increase in explained variance due to student-faculty relationship was .09 for academic performance, .1051 for intellectual development and .1172 for personal development.

Endo and Harpel (1981) found "friendly" interactions to have more impact on intellectual growth than "formal" interactions after four years. Neither kind of interaction was related to academic performance. Friendly interaction was characterized as meaningful relationships where faculty express a personal and broad concern for the emotional and intellectual development of the student. Formal interaction was more perfunctory in nature including academic and vocational advising.

Summary Nearly all studies in this section indicated that student-faculty interaction is related to academic performance and intellectual growth. Interactions related to coursework or where faculty members show broad concern for the emotional and intellectual development of students appeared to be the most salient.

In a study using the CSE on 14 community colleges, Green (1986) found that student-faculty interaction was the most important predictor of social gains. However, achieving gains in areas of intellectual skills and general education was more dependent on CSE scales related to learning course material, using the library, or participating in art, music and theatre activities than on student-faculty interaction.

Residence programs

This section begins with a summary of the literature reviews by Pascarella (1985a) and Feldman and Newcomb (1969) and is followed by studies of the effects of grouping students by ability, of assigning students to study floors, and of assigning students by class. It concludes with a study of the environments of high-achieving and low achieving fraternities.

In his review of the literature, Pascarella (1985a) found that positive academic outcomes result from residential living when high-aptitude students live with, or in close proximity to, other high-aptitude students; and, in residence facilities where there is a strong social press for study, academic activities and academic competence. Pascarella found that results were mixed for low-academic aptitude students living with high aptitude students. Some studies indicated a positive effect while others indicated a negative effect.

Pascarella (1985a) also found the results to be mixed for homogeneous grouping of students in residence units by personality or academic major. He cited two studies where similarity of roommate personality and residence unit academic major had its most significant influence for lower-ability students, particularly when rooming with higher-ability students. On the whole Pascarella's review indicated that effects of residence living depended on certain interventions, and for some interventions, the results were mixed.

Feldman and Newcomb (1969, p. 222) stated that while most observers of undergraduate education felt that college impacts were mediated, enhanced or counteracted by peer influence, studies presented no clear evidence of consistent differences among several kinds of residential arrangements. However, Feldman and Newcomb (1969, p. 22) said, "Greeks have only rarely been found to be significantly more ... intellectual ... than other students on campus." Feldman and Newcomb's review (1969) did not find residential arrangements or programs that were effective in producing academic achievement.

Two studies were conducted by DeCoster (1966, 1968) spanning a three year period. He studied the impacts on achievement of different concentrations of high ability students in residence halls. First he used a 25% concentration of high ability students, then a 50% concentration and finally a 100% concentration. High ability students were randomly assigned to experimental and control groups. The dependent variable was the difference between predicted and actual GPA.

No significant difference was found for the experimental group with a 25% concentration of high ability students. High ability students in the experimental group did significantly better than high ability students in the control group when they composed 50% or 100% of the living unit.

In the study with a 50% high ability concentration, DeCoster (1966) found roommates of the high ability students had lower academic performance than did students living without the presence of high ability students. In the study with a homogeneous population of high ability students (DeCoster, 1968), men did better than those in the control group, but not significantly so. Most of the variance leading to a significant difference was explained by the homogeneously grouped high ability women.

The effects of a structured study environment for average-ability students were reported in a two-year study by Blimling and Hample (1979). In the first year of the study 14 floors were available to volunteers and in the second year, 40 floors. Thirty-five control group floors containing 1500 students were randomly selected. Initial student quality differences between groups were controlled by using previous GPA, sex and ACT score as co-variates.

In their research, study floors included five components: labeling of the units; designation of quiet hours; commitment of volunteers; enforcement of quiet hours; and possibility of exclusion. Blimling and Hample (1979) found that students on study floors increased their GPAs about .05 for the quarter and about .02 or .03 for their cumulative GPA. In the second year when there were more volunteers the GPA increases were not statistically significant.

For students living on a study floor for six quarters, Blimling and Hample (1979) found that GPAs were increased by as much as .20 for

the current quarter. Some of this may have been attributed to a less than adequate control of initial quality differences between groups according to the researchers. Many of the students in the study program for two years came in as freshmen. Consequently, previous college GPA was not available as a covariate.

A study without any particular interventions was conducted by Hunter (1977). the purpose of the study was to determine whether academic achievement of sophomores living in university halls differed significantly from the academic achievement of sophomores living off campus and whether there were differences in achievement on the basis of sex or age. Subjects were sophomores at 6 of the 16 constituent universities of the university of North Carolina - 2,852 lived on campus and 1,693 lived off campus. An analysis of covariance was used to determine differences on the basis of residence for men and women and for ages under twenty-one, twenty-one and over twenty-one, using first and second semester grades as the dependent variables. SAT score was used as a covariant.

Hunter's (1977) findings were mixed. While no differences were found in the total population, mixed differences were found in three of the six institutions. Two institutions found differences in achievement favoring on-campus and one institution found differences favoring off campus living. Of differences in three institutions on the basis of age, one favored "under twenty-one", one favored "twenty-one" and the other favored "over twenty-one". Results for males and

females were also mixed. Hunter (1977) provided no interpretation for his findings. His (1977) findings were very mixed and yielded no useful findings.

Environmental influences on fraternity achievement were studied by Winston and his colleagues (1980). They selected the three highest and the three lowest ranking fraternities on fall quarter GPA from a group of 26 fraternities. Environments of the six fraternities were measured with the 10 scales of Form R of the University Residence Environment Scale (URES) developed by Moos and Gerst. There were no initial differences between fraternities on the basis of SAT scores.

The two groups of fraternities were found to be different on three scales: Independence, Academic Achievement and Intellectuality. These scales explained 15%, 44% and 6% of the variance of academic achievement, respectively. Academic Achievement was defined as "the extent to which classroom and other academic accomplishments and concerns are evident in the house." Intellectuality was defined as "the amount of emphasis placed on cultural, artistic, and scholarly intellectual activities, as distinguished from strictly classroom, grade-producing activities" (p. 449).

Feldman and Newcomb (1969, p. 213) cited research by Beal and Williams (1968) which studied three types of residential communities-freshman living units, upper-division living units, and living units in which freshmen and upperclassmen were mixed- in order to

assess educational and adjustment effects. Beal and Williams found, for both men and women, the type of living assignment appeared to have few or no significant effects on academic performance.

Summary Studies in this section indicated that residence programs can have a positive impact on academic performance. A positive impact seemed to depend on specific interventions such as high aptitude students living with, or in close proximity to, other high-aptitude students. Positive impacts also occurred in environments where there was a strong social press for study, academic activities and academic competence.

## Peer interaction

Pascarella's (1985a) review of the literature on peer relations yielded support for a relationship with academic learning as did Feldman and Newcomb's (1969) review. Pascarella wrote (1985a, p. 28), "The idea that an individual's social or interpersonal milieu can substantially affect individual behavior is a concept with firm theoretical grounding and empirical support in social psychology." A concept called "progressive conformity" suggests that a student who is a member of a group that places a high value on studying hard will also tend to value studying hard. In this way, the peer group may indirectly influence academic achievement.

Pascarella (1985a, p. 28) said that "reasonably abundant" evidence from the study of adolescent subcultures in high school supports the notion of "progressive conformity". "The results of this body of evidence generally suggest that an individual's academic behavior is influenced not only by ability, motivation, aspiration and the home environment, but also by the social pressures applied by other participants in the school setting" (1985a, p. 28). Pascarella suggested that "substantial evidence" indicated that a similar peer-culture influence operated at the post-secondary level.

Feldman and Newcomb (1969, p. 242) cited research which demonstrated that under certain conditions peer group supported and facilitated the academic-intellectual goals of the college. They cited one finding of studies by Wallace (1964, 1965, 1966, 1967) that showed the influence of peers. On the whole, freshmen in a small, coeducational, liberal arts, Midwestern college with a high academic reputation, placed greater emphasis on the importance of grades and had less desire to go to graduate school than did students (sophomores, juniors and seniors) already at the college. During the first several months of the year, the trend was for the importance placed by freshman on grades to decrease and the importance placed on going to graduate school to increase. It appeared that this influence was due to influence of the non-freshmen.

Other studies reported earlier indicated that values held by a peer group influenced academic achievement whether it was volunteer study

floors (Blimling & Hample, 1979) or fraternities that emphasized academic achievement (Winston et al., 1980). Astin (1968) identified peer relations as a form of environmental stimuli present within residence halls that influenced the personal and intellectual development of students. He noted that new types of peer relationships frequently originate when students become members of clubs, fraternities or sororities. He (1985) also found that being academically involved was strongly related to satisfaction with all aspects of college except friendship with other students. Some evidence was found that there is an inverse relationship between peer relationship and academic achievement. Others suggested that the impact depended on the nature of the relationship. If friendships had an academic orientation, grades were positively influenced.

Reitzes and Mutran (1980) tested a model to examine social psychological variables which motivate college student plans and performances using a non-representative sample of 396 college students in a large midwestern university. The model contained the independent variables of family background, high school grades, sex, and the perceived importance of significant others; the intervening variables of overall praise from significant others, self esteem, and college student identity; and the dependent variables of educational expectations and academic performance. The categories of significant others were: parents, college friends and high school intimates (lover, fiancee or spouse). They found significant others, including college

friends aided " . . . in the socialization process, exerting both direct and indirect effect on academic performance and educational plans" (1980, p.31). The effects of significant others were varied with certain significant others encouraging achievement, others discouraging or hindering college performance and future educational plans. High school intimates had a positive influence on academic performance while the perceived importance of parents was negatively related to academic performance.

Summary Research and theory cited in this section indicated that peer interaction is related to academic performance. However, the direction of the impact seemed to depend on the academic orientation of the peers.

## Athletics

Ballantine (1981) conducted a survey of the literature on the relationship between athletic participation and academic achievement. Over fifty studies were included. He found the research mixed with more studies indicating a positive correlation between athletic participation and academic achievement. This finding was confirmed in a five-year review of Higher Education Abstracts by McLaughlin (1986).

In their review of research on extracurricular activities Holland and Andre (1987) also found most studies indicated that high school male athletes receive somewhat higher GPAs than nonathletes. They found when standardized achievement or aptitude tests were considered, males whose only extracurricular activities were athletics tended to have lower scores than nonathletes.

Rehberg and Schafer (1968) stated that there are five intervening factors between athletic participation and academic achievement:

> 1) association with highly achievement [oriented] peers; 2) transfer of achievement value from sports to classroom environment; 3) an increased self-esteem which creates a higher level of aspiration in other domains; 4) pressure applied internally and externally to present a consistent image in all areas as a successful individual; and 5) more scholastic and career guidance from a significant adult (cited in Ballantine, 1981, p. 2).

A study of all the athletes from the Fall of 1970 through the Spring of 1980 (N=2088) was conducted in a major university by Purdy, Eitzen and Hufnagel (1982) to assess the degree to which college athletes were disadvantaged educationally by their sports participation. They compared male and female college athletes to the general student population on cumulate GPA, ACT and SAT scores, high school GPA and high school rank. Purdy et al. found achievement by athletes was lower than by non-athletes, and achievement by athletes in revenue producing sports was lower than

achievement by athletes in non-revenue producing sports. Educational achievement of athletes was lower for men than women and for blacks than whites.

Five different ways in which athletics interfered with the academic objectives and climate of high school were stated by Schafer and Armer:

1. An excessive amount of resources, personnel, and facilities of the high school is diverted from more fruitful activities.

2. Although sports may get many parents and other adults apparently interested in school affairs, this interest is not in education itself but in a marginal activity--and therefore it may actually distract from any real educational involvement on their part.

3. Pep rallies, trips, attending games, floats, displays, and all the other paraphernalia combine to draw students away from their studies.

4. Many potentially good students become discouraged about trying for academic excellence because the big rewards of popularity and status go to the athletes and cheerleaders. Rather than being rewarded the serious student may actually be ridiculed as a "square" and a "grind."

5. Sports demand so much time, energy, and concentration from the athletes and gives them so much prestige compared to their studies that their schoolwork must inevitably suffer. (1968, p. 21)

In a frequently quoted study, Spady (1970) looked at the effect of peer status and extracurricular activities on goals and achievement. He surveyed 297 senior boys from two West Coast high schools and surveyed them four years later. Spady received a 76% return response and was able to reconstruct data for another 12% from information from parents, peers and school records. Three categories of extracurricular activities were included: varsity sports, student offices and service organizations although the greatest attention was given to athletics.

Peer status maintenance was found to be related to educational aspirations. However, family SES and academic potential, not peer status, accounted for more differences in educational attainments.

In examining the possible effects of athletics, service, a combination of athletics and service, or neither of these on college attainments, Spady found that athletes involved in service had higher attainment than students involved in neither. On the other hand, athletes without service or leadership had a lower attainment than students involved in neither. Spady concluded that the extracurricular key to both success orientation and later attainment for these students was solidly in service and leadership roles rather than in sports.

According to Spady, recognition from activities stimulated a desire for further status and recognition after high school. The system had a reverse effect when activities such as athletics raised expectations but did not provide skills and orientations necessary for achievement. If

students gained high status without any regard for learning, they were not being prepared for college according to Spady.

Feltz and Weiss (1984) replicated and extended research by Landers, Feltz, Obermeier, and Brouse (1978) and by Spady (1970) to determine the academic orientation among female high school students (most research on athletics involved males) differing in extracurricular involvement including athletic involvement. The data was collected in the spring 1982 from 934 girls, of which 489 took the ACT. The girls were from two medium-city and two small-city high schools. The girls were placed in one of four groups: athletes-only, service-only, athlete-service (involved in both) and neither (involved in neither athletics or service activities), based on listings of extracurricular activities from their high school yearbook. The groups were compared on composite and English American College Test (ACT) scores by a one way analysis of covariance with SES and extent of involvement as covariates. (The extent of involvement was determined by totaling the number of seasons of involvement for each activity and/or sport). The analysis of variance revealed a nonsignificant main effect of participation category. Mean ACT scores for each category showed athletic-service ranked highest, followed by service only, neither, and athlete-only groups. While athletes only had the lowest score, this could not be attributed to the effect of being in that group alone. Instead both covariates were significant, SES and extent of involvement.

Feltz and Weiss (1984) concluded that extent of involvement and SES were major predictors of ACT, more so than the participation category itself. While the female athlete-only was the lowest category, they found that none of the groups scores were significantly different than state or national averages. Feltz and Weiss judged these results for females to refute the notion that athletic participation without other forms of extracurricular activity is detrimental to athlete's educational attainment.

The findings were compared to findings by Purdy et al. (1982) in which achievement was lower for athletes than non-athletes, but significantly higher for female athletes than male athletes. Feltz and Weiss (1984) speculated that athletic participation may have a greater influence on academic achievement for males than females since coaches of females may not stress continuous athletic involvement as much as coaches of males.

One of the most significant points made by Feltz and Weiss (1984) was that the variable time or extent of activity involvement may influence educational attainment more than mere participation in the activity itself. Pace's College Student Experiences questionnaire used in the present study is very useful for determining extent of participation. It will be useful for providing more insight into the effect of athletic involvement, in general, and the effect of sex and SES on academic outcomes.

Summary Reviews of studies of athletic involvement found mixed results with more studies indicating a positive correlation between athletic involvement and academic achievement. Five intervening factors between athletic participation and academic achievement were listed, which were purported to have a positive affect on achievement. Also listed were five ways in which athletics was thought to interfere with academic objectives and climate of high school.

Some studies indicated differences in achievement on the basis of gender (Purdy et al., 1982) or kind of involvement (Spady, 1970). In a ten year study at a major university, Purdy et al. (1982) found achievement by athletes was lower than by non athletes, and educational achievement of athletes was lower for men than women and blacks than whites. Spady (1970) examined the possible effects of athletics, service, a combination of athletics and service, or neither of these on college attainment. He found that athletes involved in service had the highest attainment, and the athletics only group had the lowest. He concluded that if students gained high status without regard for learning, they were not being prepared for college.

In a study similar to Spady's, but with females, Feltz and Weiss (1984) found that extent of involvement and SES were predictors. The kind of involvement was not a predictor.

## Involvement and Time

Time spent studying was a predictor of learning (Astin, 1985; Pace, 1979; Keith, 1982; Wagstaff & Mahoudi, 1976; Leinhardt, 1980; Feldman & Newcomb, 1969). Astin (1985, p. 143) wrote that the extent to which students were able to develop their talents in college was a direct function of the amount of time and effort they devoted to activities designed to produce gains.

In a review of studies of time, Frederich and Walberg (1980) found that time predicts learning outcomes at modest levels. Bloom (1976) reviewed 15 studies involving some measures of time on task and found the mean correlation between time and achievement or achievement gain was .49. He concluded that time-on-task explained about 20% of the variation in achievement or gain for individuals.

A model of school learning was developed by Carroll (1963). An implication of his model is that the degree of learning, other things being equal, is a function of the amount of time the student actively engages in learning. He describes his model:

$$\text{Degree of learning} = f\left(\frac{\text{time actually spent}}{\text{time needed}}\right)$$

> The numerator of this fraction will be equal to the smallest of the following three quantities: 1) opportunity--the time allowed for learning, 2) perseverance--the amount of time the learner is willing to engage active-

> ly in learning, and 3) aptitude--the amount of time needed to learn, increased by whatever amount necessary in view of poor quality of instruction and lack of ability to understand less than optimal instruction. This last quantity (time needed to learn after adjustment for quality of instruction and ability to understand instruction) is also the denominator of the fraction. (p. 730)

Time and quality of effort as they were related to student self-reported educational gains were reported by Pace (1984). Two variables were used to measure time, length of time in college and hours per week spent on activities related to school work.

The outcomes were grades, gains in intellectual skill and gains in education. Freshmen who had high quality of effort had greater gains in intellectual skills and general education than juniors and seniors who had low quality of effort. Also, students who spent a lot of time at a low quality of effort did not do as well as students who spent less time at a high quality of effort. Pace concluded that time as defined by years in college or hours spent on academic work was not nearly as good in predicting as quality of effort.

Summary This research indicated that time spent on learning was directly related to academic performance. Pace's research found that quality of effort is an even better predictor of academic performance than time.

## Student Background Variables

### Introduction

Several student background variables were identified as being related to educational outcomes. These included ability, gender, socio-economic status (SES), race, age and educational aspirations (Pascarella, 1985a; Lincoln et al., 1983; Farley & Gordon, 1981; Wolfle, 1980a; Astin 1977; Cooley & Lohnes, 1976). First reviews by Pascarella and Astin are presented, then each of the six background variables is discussed briefly.

Pascarella (1985a) suggested that certain variables are worth considering in terms of their moderating the influence of college on learning and cognitive development. Variables suggested were race, gender, age, SES, level of secondary school preparation, personality traits, and educational/occupational aspiration.

Astin (1971) has conducted extensive research to determine the predictors of academic success. In 1965, 38,681 students entering 55 institutions completed a four-page survey with 14 demographic items, 13 educational and vocational plan items, 21 self-ratings, and 57 other items (achievements, hobbies, daily activities). In the Fall of 1966 institutions were asked to supply freshman GPAs, whether the student returned and aptitude scores (ACT, SAT) for these students.

In his study, Astin (1971, p. 9, 11) found that women tend to do better than men in college even when high school grades and aptitude test scores were taken into account. He found the sex differences were substantial among brighter students and virtually nonexistent among the less able.

In the 1971 study, Astin (1971) determined whether background characteristics, high school achievements, future plans, and personality characteristics predicted achievement after controlling for high school grades, aptitude test scores, and selectivity of college. College selectivity raised the multiple correlation by .02 for men and .03 for women. Thirteen personal characteristics accounted for an additional increase in the multiple correlation of .05 for men and .03 for women. Astin said (1971), p. 20), "Generally speaking students will do slightly better than predicted from their high school grade and test scores if they demonstrate good study habits in high school and if they regard themselves as being highly able academically and highly motivated for achievement." On the whole though, the contribution of background characteristics added little compared to high school grades and aptitude test scores.

Finally, Astin (1971, p. 14) examined how the student's race, religion and socioeconomic background affected his academic achievement. Correlations were examined before and after controlling for high school grades, academic aptitude, and college selectivity. White students obtained higher grades than Black students, but the

differences were entirely attributable to differences in ability and past achievement and not to any effects of race. Astin also found that students whose parents are highly educated obtained better-than-average freshman GPAs. These differences were attributed only in part to the somewhat greater ability of these students. He suggested that this may have reflected a greater continuous pressure for high achievement from the highly educated parents.

Background variables

Astin and Pascarella's research indicates several variables are related to academic performance. Research on each of these variables follows.

Ability According to Astin (1977, p. 219), "highly able students are much more likely than their less able peers to get involved academically, to participate in honors programs, to get high grades, to complete college, to graduate with honors, and to go on to graduate or professional school. They are also more likely to achieve in science and creative writing..." Dressel found (1978, p. 141) that the correlation of high school grades, ranks and test scores with first term college grade averages ranged from .4 to .55. Lavin (1965) noted that by using the category of high school rank, GPA and standardized test scores one was able to explain about 35-45 percent of the variation in college academic performance.

Gender Astin (1977, p. 215) found gender was related to the development of competency and achievement during college, even after other entering characteristics are controlled

> "Women earn higher grades than men.... Women are more likely to acquire general cultural knowledge and skills in foreign language, music, typing and homemaking. Men are more likely to achieve in athletics to publish original writings, to acquire technical and scientific skills, to improve their knowledge of sports, and to improve their swimming and general physical fitness."

Baird found evidence that the grades of women are more predictable and tend to be higher than those of academically equally able men.

SES Another factor found to be related to educational outcomes was SES. Cooley and Lohnes (1976, p. 157) found correlations of .50, .54 and .48 between SES and achievement in grades 6, 9 and 12, respectively. Wolfle (1980b) found father's occupation to be a predictor of verbal skills. In Lavin's (1965) review, three factors emerged as basic correlates of academic performance: SES, ability and sex. He found students of higher SES performed at higher levels than students of lower SES and that females had higher levels of achievement than males. Feltz and Weiss (1984) found that SES and Extent of involvement were each major predictors of ACT scores. Nover (1981) tested the relative

contribution of sex, SES, and grade level to high school grade achievement. Only SES and grade level were significant predictors.

Race Race was a fourth factor related to educational outcomes (Astin, 1977; Lincoln et al., 1983; Beasley & Sease, 1974). Astin noted that there was a difference in the ways black and white students changed during the college years. In particular, he found that blacks were less likely to become involved academically and to graduate with honors.

Nettles, Thoeny and Gosman (1986, p. 293) compared predictors of college performance for Black and White students. Their sample included 4,094 students (55.1 percent return rate) and 706 faculty (78 percent return rate) from 30 colleges located in the southern and eastern regions of the United States. Both samples were stratified by race such that 50 percent of the students were black and 50 percent were white; 30 percent of the faculty sample was black and 70 percent was white. The criterion variable was GPA and predictor variables included a variety of student, faculty and institutional characteristics.

Nettles et al. (1986) used two types of multiple regression analyses to illustrate the significant predictors of student performance. The first regression was a full model with all variables entered into the equation concurrently. Only predictors that contributed significantly (.05) were used in the second regression. Setwise and stepwise inclusion techniques were combined to isolate interaction terms that

added significantly (.05) to the reduced model obtained through the first regression procedure.

Findings by Nettles et al. (1986, p. 304) indicated the significant predictors of GPAs were equally effective predictors for black and white students. However, they found four variables had differential predictive validity for blacks and whites: SAT scores, student satisfaction, peer relationships, and interfering problems. They also found significant racial differences on several significant predictors helped to explain social differences in college performance. The most important were type of high school attended, high school preparation, major/minority status in college, where students live while attending college, academic integration, feelings that the university is racially discriminatory, satisfaction with the university, interfering problems, and study habits.

Age Another factor related to educational outcomes was age (Farley & Gordon, 1981; Wolfle, 1980a; Astin, 1977). Farley and Gordon (1981) found age as one of seven constructs related to school learning and Wolfle (1980a) found that age was positively related to vocabulary skills. In Astin's study (1977, p. 218) younger students were more likely to get involved in athletics and student government, whereas older students were more likely to interact with faculty, to get involved academically, and to participate in honors programs. Older students got better grades and were more likely to graduate with honors than younger students of comparable background and ability.

Educational aspiration Educational aspiration was also related to educational outcomes (Pascarella, 1985a; Astin, 1977; Cooley & Lohnes, 1976). Cooley and Lohnes found correlations between desires and plans, and achievement of .48, .51 and .49 for 6th, 9th and 12th graders, respectively. According to Astin, "Students with high educational aspirations. . .are more likely to participate in honors programs, to achieve in academic and extracurricular activities and to graduate" (1977 p. 219).

Walberg & Weinstein (1982) probed a psychological theory of educational productivity. They related social studies achievement and attitude test scores of 2,001 17 year-old high school students (from a National Assessment of Educational progress sample) to each other and to indicators of constructs that prior research had shown were associated with learning outcomes. The productivity theory incorporates nine constructs that are consistently correlated with learning outcomes. These are:

> 1) student age and development, 2) ability and achievement, and 3) motivation; the 4) quality and 5) quantity of instruction; the social psychological environments of the 6) home, 7) peer group, and 8) classroom; and 9) exposure to mass media. (Walberg & Weinstein, 1982, p. 285)

In eight linear and log-linear ordinary least squares regression, several production factors were significant: SES, home environment,

traditional instruction, time and amount of study, and white were positively related to achievement; being female and watching greater amounts of television were negatively associated with achievement. The researchers cautioned against assumptions of casualty and indicated more stringent analyses were needed.

Summary Ability, gender, SES, race, age and educational aspiration were shown to be related to educational outcomes. Consequently, they are considered in the research design in chapter 3 as control variables in order to determine the unique contribution of involvement to cognitive outcomes.

## Involvement and Student Background Interactions

Astin (1985) and Pascarella (1985a) both cite the need for research examining possible differing effects for different students for a given form of involvement. Other researchers also assert it is unlikely that all students will benefit equally from the same institution, program or instructional emphasis (Pascarella, 1985a; Feldman & Newcomb, 1969). Baird (1976, p. 13) has suggested that biographical variables can be useful as moderators. According to Baird, "Moderator regression analysis is based on

the idea that a given variable may predict a certain criterion better for certain subgroups than others."

Only a few studies have examined the interaction between involvement and student background. Several possible interactions are reviewed in this section.

Gender

In a review of the literature relating extracurricular participation and involvement, Holland and Andre (1987) found evidence of differing effects of athletics for males and females. While GPAs of male athletes tended to be higher than for non-athletes, GPAs for women athletes tended not to differ from non-athletes.

In the ten year study of all the athletes of a major university (N=2088), Purdy, Eitzen and Hufnagel (1982) compared four groups: male athletes, female athletes, male non athletes and female non athletes. In contrast to conclusions by Holland and Andre (1987) they found that male athletes had the lowest GPAs of the four groups compared. They found that female athletes had significantly higher (.01) GPAs than male athletes and higher GPAs than males and females from the general student population even though the women athletes had lower incoming ACT scores.

In their study reported earlier in the cocurricular activities section, Hanks and Eckland (1976) found that aptitude and grades were about

equally important as participation in extracurricular activities in the prediction of educational attainment for college males. In contrast, participation in cocurricular activities emerged as the strongest predictor of attainment in the female college model. De Boer (1981) found that persistence (effort) was more strongly related to academic achievement for males than females.

SES

Snyder (1969) conducted a five-year longitudinal study of a high school graduating class of 343 students and had a 54 percent response rate. He found that social participation was positively correlated with educational achievement after high school and that the relationship was greatest for students of lower (SES). High school social participation was determined by combining the degree of involvement with the prestige of the organization or actively within the school culture. Examples of the most prestigious activities included class officers, cheerleader, student council, first team football and basketball, school newspaper staff and leads in major dramatic productions. Less prestigeful included intramurals, music ensembles, pep club and subject-related clubs.

Holland and Andre's review (1987) indicated the relationship between participation and desirable outcomes seemed to be stronger for male adolescents from lower SES families and of lower ability. Wright (1966, p. 116) suggested that, "the poor,

low self-concept student when stressed by the academic situation, i.e., given an opportunity to rise out of the position into which he/she was born, will work harder to succeed the more he is threatened."

Age

Research indicated students of different ages differed on likelihood of certain kinds of involvement (Astin, 1977, p. 212) and responded differently to certain programs (Clarke, 1982). Alexander (1985) found that quality of effort in the social sphere on CSE scales Topics of Conversation and Information in Conversations was a stronger predictor of gains for younger (aged 18-22) than older (aged 23+) students. For younger students there was a significantly more positive ($r = .47$) relationship between Information in Conversations and gains in Intellectual Competencies than for older students ($r = .22$). Also, for younger students there was another significantly more positive ($r = .40$) relationship between Topics of Conversation and gains in Intellectual Competencies than for older students ($r = .16$). These findings indicated the greater importance of what Alexander calls "social effort" toward gains in intellectual competencies for younger students.

An examination of the relationship between quality of effort and gains within each age group also yielded some additional information. Only correlations which were highly significant ($p < .001$) were

reported here. For 18 to 22 year olds, the quality of effort scales (i.e., Course Learning, Topics of Conversation and Information in Conversations) were highly significantly associated with gains in Intellectual Competencies. For older undergraduates, six of the eight quality of effort scales used in the study (all except Course Learning and Information in Conversation) were highly significantly correlated with gains in General Education Objectives. Alexander (1985) pointed out that academic and social effort seemed to be related more closely to gain in Intellectual Competencies for younger students and to gains in General Education for older students.

Summary From this review of involvement and background interactions, research indicated additional hypotheses for this study. First, involvement in athletics is related to higher cognitive gain for women than for men. Next, involvement in cocurricular activities or athletics or faculty-student interaction or residence programs results in relatively greater cognitive gains for low SES students than for high SES students. Finally, peer interaction is related to greater cognitive outcomes for younger than older students.

## Summary

This chapter has reviewed: the consequences of involvement; involvement and cognitive outcomes; areas of involvement; student

background variables; and interaction between student background variables and involvement. Some of the benefits of involvement included success in college and success in life (Willingham, 1985; Astin 1985, 1977; ACT, 1974).

Involvement was related to cognitive outcomes (Pace, 1984; Nover, 1981; Hanks & Eckland, 1976). Five areas of involvement were reviewed: cocurricular programs, student-faculty interaction, residential programs, peer interaction and athletics. All five were related to cognitive outcomes, but the findings were the most consistent for student-faculty interaction, residential programs and cocurricular activities. Effects of peer interaction seemed to depend on the importance of academics to the peers. Effects of involvement in athletics were not as positively related to cognitive outcomes as other areas.

Six student background variables were shown to be related to cognitive outcomes: ability, sex, SES, race, age, and education aspirations. These are considered in the research design in Chapter 3.

Finally, Astin (1985) and Pascarella (1985) cited the need to look at possible differing effects for different students of a given kind of involvement. This literature review has shown possible differing effects for males and females of involvement in athletics, that lower SES students may benefit more from involvement than higher SES students and that younger students may benefit more from peer interaction than older students. Six hypotheses of differing effects for different students are included in the research design in Chapter 3.

# METHOD

The purpose of this research is to demonstrate that quality of effort contributes to cognitive outcomes by using standardized instruments to measure these variables. Another purpose of this research is to show that different forms of quality of effort are related to different cognitive outcomes for different students.

The College Student Experiences questionnaire was completed by graduating students at 3 four-year and 1 two-year institution (N = 88) who were participating in a longitudinal study measuring cognitive growth using the ACT College Outcome Measures Program (COMP). Regression analysis was used to test the contribution of five involvement variables (cocurricular activities, student-faculty interaction, residence programs, peer interaction and athletics) to cognitive change. Tests for interaction effects between these involvement variables and 6 background variables were included in the analysis.

## Research Design

A correlational research design using multiple regression was employed in this study to test the 12 hypotheses:

Hypothesis 1: Quality of effort is a predictor of cognitive outcomes.

Hypothesis 2: Quality of effort in cocurricular activities is a predictor of cognitive outcomes.

Hypothesis 3: Quality of effort in student faculty interaction is a predictor of cognitive outcomes.

Hypothesis 4: Quality of effort in residence programs is a predictor of cognitive outcomes.

Hypothesis 5: Quality of effort in peer interaction is a predictor of cognitive outcomes.

Hypothesis 6: Quality of effort in athletics is a predictor of cognitive outcomes.

Hypothesis 7: Quality of effort in athletics results in relatively greater cognitive outcomes for females than males.

Hypothesis 8: Quality of effort in cocurricular activities results in relatively greater cognitive outcomes for lower SES than higher SES students.

Hypothesis 9: Quality of effort in student-faculty interaction activities results in relatively greater cognitive outcomes for lower SES than higher SES students.

Hypothesis 10: Quality of effort in residence programs results in relatively greater cognitive outcomes for lower SES than higher SES students.

Hypothesis 11: Quality of effort in athletics results in relatively greater cognitive outcomes for lower SES than higher SES students.

Hypothesis 12: Quality of effort in peer interaction results in relatively greater cognitive outcomes for younger than older students.

The variables included in this study and how they were measured are shown in Table 1.

Table 1. Research variables and their measures

| Variable | Measure |
|---|---|
| Background | |
| Ability | COMP Objective Test |
| Sex | CSE[a] |
| Race | |
| SES | |
| Age | |
| Educational aspiration | |
| Quality Of Effort | CSE scales |
| Cocurricular activities | Clubs and organizations |
| Student-faculty interaction | Experiences with faculty |
| Residence programs | Dormitory or fraternity/ sorority |
| Peer interaction | Information in conversations |
| Athletics | Athletic and recreation facilities |
| Interaction Variables | |
| Athletics and sex | |
| Athletics and SES | |
| Cocurricular and SES | |
| Residential programs and SES | |
| Student-faculty interaction and SES | |
| Age and peer interaction | |
| Dependent | |
| Cognitive outcomes | COMP Objective Test |

[a]Sex, race, SES, age and educational aspiration were each measured by a CSE Background Information Item (see pg. 113).

Multiple regression was used placing both "control" (student background variables) and involvement variables in the same equation. Placing control variables in the regression equation allowed their weights to emerge in the analysis and permitted the calculation of interaction product terms (Frederick & Walberg, 1980, p. 191). The student was the unit of analysis.

First, background variables were entered into the prediction equation to determine their contribution to the explained variance of COMP. (The freshman COMP score was entered at this time.) Next, to determine if involvement contributed any additional explained variance of COMP, the five involvement variables were entered into the prediction equation. A significant increase in explained variance of COMP would support the first hypothesis and possibly other hypotheses 2-6.

Finally, to determine if any interaction effects contributed any additional explained variance of COMP, interaction variables were entered into the equation. A significant increase in explained variance of COMP would support one of the hypotheses related to an interaction effect. In addition to testing the hypotheses, all independent variables were placed in a step-wise regression analysis to determine the best prediction equation for cognitive change.

The following statistical hypothesis and F-test was used to test the hypotheses.

$X_1$ to $X_6$ = 6 student background variables

$X_7$ to $X_{11}$ = 5 quality of effort scales

$H_0 : R^2_{Full} - R^2_{Rest.} = 0$ or $B_7 = B_8 \ldots = B_{11} = 0$

$H_A : R^2_{Full} - R^2_{Rest.} \neq 0$ or $B_7 \neq B_8$ or...$B_{11} \neq 0$

The full model:

$$Y = B_0 + \sum_{i=1}^{11} B_i X_i + \text{interactions}$$

The restricted model:

$$Y = B + \sum_{i=1}^{6} B_i X_i + \text{interactions}$$

F-test

$$F = \frac{(\text{Full model } R^2 - \text{restricted model } R^2)}{(1 - \text{full model } R^2)} \times \frac{(N-K_1-1)}{(K_1-K_2)}$$

Where $K_1 = 11$

$K_2 = 6$

## Sample

Officials were contacted at the American College Testing Program at Iowa City to find institutions that were using the COMP to do a longitudinal assessment of cognitive outcomes. Ten colleges were suggested and invited to participate in this study. All expressed interest, and four agreed to participate. Most that declined felt their students were to the point of being over tested. All of those who agreed to participate expressed concern about graduating students' participation in their upcoming COMP testing. A brief description of each participating institution is shown in Table 2.

Table 2. Description of institutions participating in the study

| Location | Classification[a] | Enrollment | Selectivity | Mean ACT/SAT | Living on Campus % | Minority % |
|---|---|---|---|---|---|---|
| Missouri | Four-year private college | 1,400 | Selective | 20 | 80 | 9 |
| Tennessee | Four-year public university | 4,023 | Liberal | Not required | 65 | 19.7 |
| Virginia | Four-year public university | 15,230 | Traditional | 500V 520M | 10 | 11.7 |
| Alabama | Two-year community college | 1,179 | Open Admissions | Not Required | 0 | NA |

Note. Information furnished by the institutions.
[a]All institutions are coeducational.

Students were the unit of analysis in this study. From the four institutions, 88 students participated in the study. Information from three of the institutions indicated that of approximately 860 who took the COMP as freshmen, 182 took the COMP as sophomores or seniors. Of the 182, sixty-eight took the CSE. Caution in the interpretation of this data is needed since this was not a random sample.

Nevertheless, student background data in this study and from a norm group used by Pace (1987, p. 92-93) were similar (see Table 3). All of the percentages from this study fell within the ranges of percentages in the Pace norm group except the categories of students ages 23-27, neither parent a college graduate, and students aspiring to an advanced degree. The students in this study were somewhat representative of students taking the CSE. Pace (1987, p. 88) judged any biases in his norm as not particularly serious. Consequently, this sample of students was considered to be somewhat representative of the standardized test taking population of college and university students.

## Research Procedures

The invitation to institutions to participate in this study was made by telephone in February, 1988. Each institution contacted was

Table 3. Student backgroud information compared to CSE norm group

| Characteristic | This Study Frequency | This Study Percent | CSE Norm Group[a] Percent |
|---|---|---|---|
| Age | | | |
| 22 or younger | 64 | 75.3 | 77-83[b] |
| 23-27 | 21 | 24.7 | 10-12 |
| Information missing | 1 | 1.2 | |
| Sex | | | |
| Male | 35 | 40.7 | 35-45 |
| Female | 50 | 58.1 | 55-65 |
| Information missing | 1 | 1.2 | |
| SES (college graduates) | | | |
| Neither parent | 45 | 52.3 | 42-51 |
| Both parents | 20 | 23.3 | 21-29 |
| Either parent only | 20 | 23.3 | 27-30 |
| Information missing | 1 | 1.2 | |
| Educational Aspiration | | | |
| Advanced degree | 60 | 69.8 | 62-67 |
| No advanced degree | 25 | 29.1 | 33-38 |
| Missing | 1 | 1.2 | |
| Race | | | |
| Caucasian | 78 | 90.7 | 83-90 |
| Minority | 7 | 8.1 | 8-16 |
| Information missing | 1 | 1.2 | |

Note. The data in the right hand column is adapted from CSEO: Test manual & norms: College Student Experiences questionnaire (p. 92-93) by C. R. Pace, 1987, Los Angeles: UCLA Center for Study and Evaluation. Copyright 1987 by C. Robert Pace. Adapted by permission.

[a]The norm group is composed of 25,606 students from 74 colleges and universities.

[b]The range is for the categories of institutions: general liberal arts, comprehensive colleges and universities, and doctoral granting institutions. Selective liberal arts colleges were not included since selective institutions are not included in this study.

conducting a longitudinal study using COMP. Each had administered the COMP to freshman who were then in their final year.

Following the invitation to participate, each institution received the first letter (see Appendix B) which included a brief description of the study, benefits of participating, a copy of the CSE, and expectations of the researcher. These expectations included release of the following scores for each student: COMP pre-test, COMP post-test and CSE scores. Participating institutions also agreed to order and to assume the costs of using the CSE (institutional fee = $174.00; questionnaire = $0.40; and scoring = $1.00).

A second letter (see Appendix C) was sent about a month later. Institutions were supplied with a test cover sheet (see Appendix A) and reminded to order the CSE if they hadn't done so. A third letter was sent in April (see Appendix D) with information about the format of the test results desired by the researcher and a reminder about the need to give ACT and UCLA permission to release scores to the researcher. A final letter (Appendix E) was sent in August, 1988 requesting information about the institution, sample, and sample selection.

Institutions administered the CSE in the last quarter of the 1987-88 year. Administration of the CSE varied by institution. Three institutions indicated the CSE was administered through the mail. All three institutions had two follow-up mailings.

Buckley Amendment privacy rights were safeguarded by the use of the student social security number. For students without a social security number, a college identification number was used. Each student used this number for identification on the CSE and the COMP. The researcher then linked student responses on the two instruments by the use of this number.

After completion of the 1987-88 academic year the researcher contacted participating institutions by telephone to inquire of their progress and to encourage them to send in the CSE for scoring. One institution was contacted and agreed to do additional summer follow-up to increase CSE participation rate.

ACT was contacted to see if any testing irregularities were reported for the COMP administrations. None were.

## Measures

As stated earlier, a major feature of this study was the use of standardized instruments to measure both the independent variables and the dependent variable. Quality of effort was measured by the College Student Experiences questionnaire developed by Robert Pace (1983) and cognitive outcomes were measured by the COMP developed by the American College Testing Service.

College Student Experiences questionnaire (CSE)

The College Student Experiences questionnaire (1983) measures quality of effort with fourteen activity scales. Five scales were used in this study. The scales determine students' use of the major resources that the college provides for learning and personal growth. The scales assess involvement in activities and objectively observable behavior. Seven scales relate to use of facilities: classroom, library, cultural, student union, residential, and athletic and recreational. The other seven scales relate to opportunities for personal and interpersonal experiences: experience with faculty, clubs and organizations, experiences in writing, personal experiences, student acquaintances, topics of conversation and information in conversations.

Each scale (see Table 4) is composed of a list of activities ranging from easy to harder to do. Six to ten activities compose each scale. For example, in the "clubs and organizations" scale, activities range from an awareness of events and organizations to attending events, discussing programs and working in organizations (Pace, 1984, p. 12).

Table 4. CSE items per scale

| Scale | Items |
|---|---|
| Library Experiences | 10 |
| Experiences with Faculty | 10 |
| Course Learning | 10 |
| Student Union | 10 |
| Art, Music, Theater | 12 |
| Athletic and Recreation Facilities | 10 |
| Clubs and Organizations | 10 |
| Personal Experiences | 10 |
| Experience in Writing | 10 |
| Student Acquaintances | 10 |
| Science/Technology | 12 |
| Dormitory or Fraternity/Sorority | 10 |
| Topics in Conversation | 12 |
| Information in Conversations | 6 |

In responding to items students are asked how frequently they've engaged in each of the activities. Possible responses are "never", "occasionally", "often", or "very often". The score for a category is gained by giving one point for "never", two points for "occasionally", three points for "often", and four points for "very often". Scores for each of the fourteen activity scales range from 10 (Responding "never" to all ten activities) to 40 (responding "very often" to all ten activities).

Reliability and validity information was provided by Pace (1984, pp. 26-33). For the fourteen scales he found inter-item correlations to range from .25 to .47, item-scale correlations to range from .48 to .67 and internal consistency to range from .79 to .90. These results were

based on 3,000 cases from 3 doctoral granting universities, 3 comprehensive universities and 5 liberal arts colleges.

Construct validity was shown as the activity scales yielded expected results for various status variables such as year in college, residence (on or off campus) and enrollment (full-time versus part-time). For example, for the status variable "enrollment", part-time students scored 19.6 on the "personal experiences" scale and full-time students scored 21.8 (a difference of 1.0 was statistically significant).

In a more recent study based upon a 10% random sample of 25,606 undergraduates from 74 colleges and universities, Pace (1987, pp. 58-59) reported additional information regarding the psychometric properties of the CSE. He stated that on every scale the standard deviation indicated a relatively good dispersion or variability in the results and that all scales gave evidence of normality except the art-music-theatre scale. Of 663 intercorrelations, one was above .80 and 53 were below .20. Pace (1987, p. 59) explained 20 of the low intercorrelations were between various topics of conversation which were deliberately written to cover a wide range of topics. Inter-item correlations generally ranged from .30 to .70. Internal consistency correlations ranged from .82 to .92. Pace (1987, p. 88) reported the percent of women, freshmen and seniors was higher than it should have been in his study, but this did not present any particularly serious bias.

Further support for the concurrent validity of the Quality of Effort scales and background items and for the factorial validity of several subscales and items within the CSE was found by Michael, Nadson and Michael (1983). Their sample included 127 students at a major university enrolled in five career education classes taught by different instructors. The researchers found their subjects representative of the total university population of undergraduate students on demographic comparisons.

Independent variables in their study included four background information items and 12 Quality of Effort scales from the CSE (all but Dormitory or Fraternity/Sorority and Science Lab Activities). Dependent variables included self-reported grades and five composite measures of the 18 self-reported gains on the CSE. These five included Vocational Training, Intellectual Capacity (gains 15, 17 and 18), General Education (gains 3-7), Personal/Interpersonal Understanding (gains 8-12), and Understanding Science (gains 13-16). These composites were derived by the authors on the basis of logical considerations of item content and face validity.

The following outcomes concerning correlation coefficients of individual dependent with single independent variables were found (Michael et al., 1983, p. 502):

> Of the 144 possible coefficients between input and output variables, which varied between -.29 and .50, 60 were statistically significant at or beyond the .05 level; 39, at or beyond the .01 level . . .

> Relative to the 12 QE scales, 56 of 108 possible coefficients were statistically significant at or beyond the .05 level; 37, at or beyond the .01 level.
>
> The four independent variables registering 6 or more statistically reliable ($p < .05$) concurrent validity coefficients with the 9 dependent variables were QE - Experiences with Faculty, QE - Art, Music and Theatre, QE - Student Acquaintances, and QE - Information in Conversations.

Stepwise multiple regression was used to determine the relationship of three criterion variables to optimally weighted subsets of QE measures (Michael et al., 1983). For Grades Earned to Date, the only QE accepted was Classroom Learning with a coefficient of .342. For Intellectual Capacity, QE - Information in Conversations, QE - Student Acquaintances, and QE - Library Experiences entered the multiple regression equation with corresponding beta weights of .218, .224 and .146. For the third criterion, General Education, QE - Information in Conversations, QE - Experiences in Writing, and QE - Art, Music and Theatre entered the multiple regression equation with corresponding beta weights of .246, .276 and .205. In the last two regression equations, QE - Information in Conversations entered both first with initial beta weights of .437 and .498, respectively.

Finally, Michael et al. (1983, p. 506) performed a factor analysis to examine construct validity and found that it "tended to provide dimensions that were basically consistent with logical groupings of scales or items within sections of the CSE." Their earlier findings led

them to conclude that the QE scales displayed moderate concurrent validity that was not greatly lower than that realized for short-term predictive validity of standardized scholastic aptitude tests.

Michael et al. (1983) suggested it was possible that response sets of social desirability or a generalized level of personal satisfaction might have been operating. They recommended a number of cross validation studies to substantiate what appeared to be a promising degree of validity of the CSE.

Several other writers critiqued the College Student Experiences questionnaire. Pascarella (1985a, p. 24) wrote that the questionnaire "is a potentially important new conceptualization in measuring those aspects of an institution which foster learning and knowledge recognition." In the Ninth Mental Measurements Yearbook, Robert Brown (1985) wrote, "The process used to develop the questionnaire was psychometrically sound and the arguments for its validity well documented." The hierarchial arrangement of activities within a scale and the assumption that participation in a high activity is qualitatively different than participation in a low activity make, according to Brown (p. 365), "the instrument and the research related to it a valuable addition for theorists and practitioners attempting to understand student development."

John Miller (1985, p. 367) questioned the construct validity of College Student Experiences. He questioned the hypothetical relevance of responses to the construct "quality of effort". Miller (1985) also

stated that the homogeneity of the scales may be substantially heightened because of the questionnaire's physical features. "The items of each scale are located together, share a common label, and are ordered according to a transparent logic regarding similarity of content and difficulty of the activities they describe" (p. 367). (While there is some merit to this claim, the specificity of the scale items mitigates against effects due to the physical characteristics mentioned by Miller).

Miller questioned the construct validity of CSE while Brown said the validity was "well documented". In regard to construct validity, it is significant that Pace developed the construct, quality of effort, and operationalized it in objective behavioral terms. Also, in a study where students who differed on hours spent on school related activities took the CSE, those who spent 40 and 30 hours received a significantly higher CSE score than those who spent 20 hours (Pace, 1984, p. 32). On these bases, the construct validity of the CSE was judged adequate for this study.

The validity of self reports is an issue in survey research (Alexander, 1985). While there may be some bias in self-reports (Borg & Gall, 1983), Dressel (1978) writes that the accuracy of self reports is increased when individuals are asked to report actual experiences rather than perceptions. Baird's review (1976, p. 4) of the research of the validity of self reports states they "seem to be accurate when they deal with matters that are fairly recent, relevant to the

person's present interests and concerns, verifiable ..." Items in the quality of effort scales of the CSE meet the requirements stated by Dressel and Baird.

Pace (1984, pp. 35-38) addressed the issue of the validity of student responses. He wrote that accuracy of answers depended on the clarity of questions, on whether students had a good base of experience for answering questions, on whether the form on which answers were given was appropriate and on whether the respondents regarded the questions as worthy of a thoughtful response. He cited a number of indications that these considerations were met: students indicated they had little trouble responding to the items; items were quite specific so students would know whether they had done them; no more than two percent of students left an item blank; and several students commented to test administrators that they liked the questionnaire and had enjoyed filling it out.

In the CSE, students indicated how frequently they engaged in activities by responding "never", "occasionally", "often", and "very often". To study the meaning of these responses, Pace repeated seven items in the 1979 edition of the CSE and students were asked to indicate the number of times they had engaged in that activity. The options were "never", "once or twice during the year", "about three to six times during the year", "about once a week", and "more than once a week." Research by Pace and Friedlander (1982) found that the

meaning of the response categories was mainly related to the content of the item and only slightly related to college.

Summary Research in this section has shown the psychometric properties of the CSE to be adequate for this research. Inter-item correlations ranged from .30 to .70, item scale from .48 to .67 and internal consistency from .82 to .92. Research and rationale by Pace and Michael et al. established satisfactory concurrent and construct validity for the CSE.

College Outcome Measures Program (COMP)

The outcomes assessed by COMP were described by Forrest and Steele (1982, p. 3) as the student learning outcomes expected of the general education components of the post secondary curricula and the outcomes relevant to effective functioning in a variety of adult roles. The focus of the assessment was on cognitive characteristics. The total score on the Comp Objective Test was used to measure the one dependent variable in this study, cognitive outcomes. (Each students' COMP total score as an incoming student was used as a control of ability in the research design.) The total score was composed of the results from six subtests. The subtest areas are defined below:

**Effective functioning within social institutions** is defined as the ability to communicate about social institutions, solve social problems, and clarify social values.

**Effective use of science and technology** is defined as the ability to communicate about science and technology, solve scientific and technological problems, and clarify scientific and technological values.

**Effective use of the arts** is defined as the ability to communicate about the arts, solve artistic problems, and clarify artistic values.

**Effective communicating** is defined as the ability to communicate about social, scientific, and artistic topics.

**Effective problem solving** is defined as the ability to solve social scientific and artistic problems.

**Effective clarification of values** is defined as the ability to clarify social, scientific, and artistic values. (Steele, 1982, pp. 9-10)

The Objective Examination is a series of fifteen simulation activities based on realistic stimulus materials drawn from the adult population. Stimulus materials include film excerpts, a taped discussion, a taped newscast, an advertisement, art prints, photographs, recordings of music, graphs and tables, stories, and magazine and newspaper articles. The test poses questions in a unique multiple choice format. For each item there are two correct and two incorrect alternatives which are scored on a scale from -2 to +2. This

procedure discourages and corrects for guessing, according to Forrest and Steele (1982).

All fifteen activities in the Objective Exam can be administered to groups and require about two hours of testing time. A total score and a score for each of the six subtests is reported by ACT.

Composite COMP psychometric properties The Objective Exam was developed as a proxy for the longer (about four hours) Composite Exam. Much of the validity for the Objective Test depends on how well its content is correlated to the Composite Test. Consequently, research on the psychometric properties of the Composite Test follow.

The validity for the Composite Exam was reported by Forrest and Steele (1982) for two areas: Relevance to adult society and relevance to general education. The research support for validity consisted of several small studies.

Many of the research studies reported by Forrest and Steele (1982) for relevance to adult society were composed of correlations between supervisors ratings and adult workers' scores on the COMP. Several of these are summarized in Table 5.

Table 5. ACT research-correlations between supervisor ratings and adult workers' COMP scores

| Worker Category | N | Multiple R | Correlation Between Rater and Subtest |
|---|---|---|---|
| Bank employees | 27 | .629 | Supervisor ratings and Clarifying Values, Reading and Speaking |
| Bank employees | 46 | .469 | Supervisor ratings and Functioning within Social Institutions and Computing |
| Practice Teachers | 22 | .569 | Supervising teachers and Solving Problems, Writing and Clarifying Values |
| Nebraska graduates | 28 | .569 | Info from initial stages of entry to adult work and Functioning within Social Institutions |

Note. Data summarized by the writer from "Increasing student competence and persistence. A report from the college measures project of the American college testing program" by A. Forrest, 1982, Iowa City, IA: ACT Center for the Advancement of Educational Practices.

The second area of validity research related to the area of relevance to general education. Here, Forrest and Steele reported a variety of studies. In one study (1982, p. 44), scores of college seniors (N=30) on the Undergraduate Assessment Program (UAP) Area Tests were correlated with their scores on COMP with correlations ranging from .54 to .59 on relevant subtests. Since the

UAP area tests were specifically designed to "provide a measure of student's knowledge and grasp of basic concepts in broad areas of the liberal arts," Forrest and Steele suggested that the COMP measured content in these areas also.

In another analysis, Composite Test results were compared for each of the four college years. Results indicated measurable differences with the greatest difference occurring by the end of the sophomore year, the period of greatest involvement in general education programs. That the test yielded expected results did not prove an effect, but did "provide one more piece in a variety of validity evidence," according to Forrest and Steele (1982, p. 42).

In another analysis a correlation of .21 was found between senior college grade point averages and total Composite Examination scores. From this, Forrest and Steele (1982, p. 42) maintained that the COMP measured content different than that measured by the GPA. In a third analysis, the interrelations of the six subtests were found to range from .55 to .77 in a study involving about 2,000 students at 40 institutions. Forrest and Steele (1982, p. 45) stated that this provides some evidence of construct validity.

In summarizing the evidence for validity, Forrest and Steele (1982, p. 46) wrote, "It is the accumulated body of evidence from a series of studies--addressing a particular use and all pointing in a similar direction--that finally validates an assessment procedure for that use." They noted that ACT has built into COMP a non-statistical type of

validity by, "The continual review, critique and significant input elicited from content experts, general education faculty members at a diverse range of institutions and agencies of higher education" (1982, p. 47).

More evidence for the reliability of the Composite Test was provided by Forrest and Steele (1982, pp. 47-49). Equivalent forms analysis with N=147 from five institutions and N=95 from one institution yielded correlations of .86 and .85, respectively. Test-retest reliability for Form II and Form III with N=759 in 18 institutions and N=1,190 in 16 institutions was .93 and .90, respectively.

Some other analyses not directly related to reliability and validity are now discussed. First, an analysis of the range of Composite Test scores indicated that it has an ample floor and ceiling to assess a wide range of proficiency levels including experienced adults (Forrest & Steele, 1982, p. 40). In a study where over half of the sample of 445 freshmen at 14 institutions and 313 seniors at 14 institutions were over traditional college age, no significant differences were found on the basis of age and another study found no significant sex differences on COMP scores (1982, p. 42).

Another analysis measured the relationship between the ACT score and the Composite Test score. A correlation of .81 was found with freshmen COMP scores and .67 with senior COMP scores (Forrest & Steele, 1982, p. 44).

A major study of 3,318 in 44 institutions (Forrest, 1982) used the Composite or Objective Test to identify features that distin-

guished highly effective programs from less effective ones. The study used the ACT or SAT to estimate the COMP score of freshmen. Gain scores were computed by subtracting estimated freshmen COMP scores from actual senior (or sophomore) COMP scores.

A typical gain score was 7.0. Institutions with gain scores of less than 3.0 were judged by Forrest (1982, p. 22) to have no significant impact on student growth and institutions with gain scores of 11 or more were judged to have a great impact on student growth.

Forrest (1982) reported several comparisons which the writer has summarized in Table 6.

The information in Table 6 did not prove that the differing institutions' features caused the difference in score gain. Nevertheless, the features identified above were the most likely to produce the score gains, according to Forrest (1982).

Perhaps one of the most serious limitations of COMP is that its test content has little relationship to the academic disciplines or broad areas taught in college. This makes it somewhat unique, but may limit its value in measuring outcomes of what colleges teach (Pace, 1985).

Objective COMP psychometric properties The remaining part of this section on the COMP relates to research using the Objective Test. When "COMP" is used now, it will refer to the Objective Test.

Table 6. ACT research-institutional differences by COMP score gain

| COMP[a] Gain | Institutional Characteristics |
|---|---|
| 10.4 | Institutions with above average persistence to graduation |
| 5.9 | Institutions with below average persistence to graduation rates |
| 8.3 | Institutions with above average freshmen to sophomore persistence |
| 5.8 | Institutions with below average freshmen to sophomore persistence |
| 9.5 | Group with most comprehensive program for orientation and advising |
| 6.2 | Group with least comprehensive program for orientation and advising |
| 11.6 | Group with student-oriented goals and proficiency exams |
| 5.9 | Group with neither |
| 8.9 | Group with large general education component and even distribution |
| 3.8 | Group with small general education component and uneven distribution |
| 8.8 | Group with formal remedial and off-campus instruction |
| 4.6 | Groups with neither |

Note. Data summarized by the writer from "Increasing student competence and persistence. A report from the college measures project of the American college testing program" by A. Forrest, 1982, Iowa City, IA: ACT Center for the Advancement of Educational Practices.

[a]Average estimated institutional score gain.

Steele (1988) reported a correlation coefficient of .87 between the Objective Test and the Composite Test and reliability estimates for individuals on the Objective Test of .84 for the total score and .63 to .68 for the six subtests. Steele also found a correlation coefficient between ACT Assessment Composite score and freshman COMP scores of .70 and a correlation with senior COMP scores of .60.

Banta, Lambert, Pike, Schmidhammer and Schneider (1987) provided evidence bearing on the reliability and validity of estimated score gain on the COMP using 1637 freshman who took the COMP in 1984 and 1985 at the University of Tennessee Knoxville (UTK). This represented about half the full-time freshman at UTK which had the most extensive data base on the COMP in the country at that time. ACT supplied a concordance table for estimating freshman COMP total scores from ACT scores. Banta et al. (1987) compared actual freshmen scores with estimated freshmen scores from the concordance table and found that the average estimated score was 6 points higher than the actual score. From this they concluded that the estimated college gain (Senior COMP total - estimated freshman COMP total) was in error by 60 per cent.

This study does not use estimated COMP gains and so these findings by Banta et al. (1987) do not apply to the research methods of this study. However, other findings by Banta et al. (1987) do relate to methods of this study.

Banta et al. (1987) found that because of a low ceiling, freshmen with ACT scores of 28 or above routinely scored 200 or more of a possible 240 points on the Objective Exam. Consequently, these students had little chance to make large score gains as seniors. They also found that score gain correlated negatively with ability and with variables ordinary associated with educational outcomes. Factors found to be associated with the greatest mean gain for both years included in the study were (1977, p. 15):

- High school grade point average less than 3.00 (B average)
- Father's education less than college graduate (Highest gain associated with less than high school education)
- Non-participation in Honors English sections
- Non-participation in Honors Math sections
- Taking no more than two math courses
- Taking either one or no social science course or five or more such courses.

What Banta et al. (1987) called into question was the validity of the estimated score gain. They said (1987, p. 18), "No institution can have a clear idea of the amount of student growth its general education program may be promoting until it tests its own incoming students, then administers an equivalent form of the same test to graduates". That is done in this study and, consequently, eliminates the problems associated with use of estimated gains cited by Banta et al.

Even with the use of actual score gains there may still be some validity and reliability problems with the COMP. Banta et al. (1987, p. 19) noted that actual score gain is a change score based on two measures of imperfect reliability. Also, freshman who take the COMP have some practice that influences their performance when they take the test as seniors. With actual score gains there would still be the problem of a low ceiling. Nevertheless, Banta et al. (1987) felt that the use of actual score gain would definitely be an improvement over estimated score gain in terms of its technical qualities.

A study to examine the relationship of selected variables (ACT score, age, race, gender, type of degree and program/major) to successful performance of urban community college students on the COMP was conducted by Kitabchi (1985) at Shelby State Community College. This college was described as nontraditional on the basis of age, race and other demographics. The average age of those completing degree requirements was 31 and many were classified as first generation college students. The college had a predominantly black female student body. All students who completed any type of degree program were required to take the COMP as seniors. In 1982 and 1983, the years of the study, COMP scores were available for 696 students.

Kitabchi (1985, p. 9) used stepwise multiple regression and found all variables except gender to be significant predictors of COMP total score accounting for about 40 percent of predicted variance. However,

the ACT score accounted for 35 percent of the variance. The remaining significant predictors in order of magnitude were: race, age, program/major, and degree type.

McConatha and others (1986) sought to determine the validity of the COMP with older students who had gained knowledge from experiential learning situations compared to the validity with students who entered college directly from high school. In the last quarter of the senior year a total of 863 students were tested, 129 of whom were 25 years of age or older.

The total COMP scores and subscores were compared for the two groups as well as their entering ACT scores and grade point averages using analysis of variance (McConatha et al., 1986). The relationship between total COMP scores, incoming ACT scores, and grade point averages were also determined using a Pearson correlation method. Results showed that older students scored higher than younger on COMP total score and the six subscores. No significant relationships were found as a result of the analysis of effects of sex, race and marital status. The relationship between COMP total score and GPA was $r = .31$ and the correlation between COMP total score (senior) and ACT was .55. The researchers findings of a significant difference on the basis of age on the COMP was in conflict with findings of Forrest and Steele (1982).

The usefulness of the COMP was assessed based on a study of 96 University of Minnesota graduating seniors in 1979 (Schomberg, Hendel

and Bassett, 1981). The students completed the COMP Objective Test and a 19-item perceived benefits questionnaire, and provided information on such things as gender, major, grades in college, educational aspiration, satisfaction with the University and satisfaction with their gains in skills measured on the COMP.

Schomberg et al. (1981) found that COMP scores were related to self-reported academic achievement and motivation. This was contrary to reports by Forrest and Steele (1982) that COMP measures college abilities not reflected by GPA. They also found that COMP scores were unrelated to seniors' satisfaction with their skills and knowledge in areas covered by COMP. These findings were consistent with those of Dumont and Troelstrup (1981) who reported that Tennessee Technological University student scores on a self-report of perceived benefits were independent of COMP scores. Finally the 96 seniors felt that the content of COMP was somewhat superficial and did not allow them to demonstrate the expertise. Schomberg et al. (1981) concluded that the COMP alone does not appear to be a wholly adequate measure of outcomes specific to a particular college or university.

Johnson (1986) examined the relationship between scores on the subtests of COMP and on the Core Battery of the National Teacher Examinations (NTE), the ACT, and gender, age, race and GPA. A random sample of 719 students who had taken all subtests of the COMP between April 1983 and October 1985, a random sample of

489 students who had taken only the Speaking and Writing subtests of the COMP, and students in either of the two preceding groups who had taken the NTE were the subjects in this study. Canonical correlation and canonical redundancy procedures test the hypotheses. Most of the subjects were white females planning to major in elementary education. The average age was 24.4 years.

Only 10 per cent of the variability of COMP subtests was explained by ACT composite scores, race and age. These findings differed from those of Forrest and Steele (1982) who found moderate to high intercorrelations between ACT composite scores and COMP scores. The COMP total score along with age and race accounted for fifty-six percent of the variability of the NTE. While Forrest and Steele found insignificant correlations between subtests of the COMP and age, Johnson (1986) found significant correlations between age and subtests of the COMP and NTE. No significant correlation was found between COMP subtests and GPA.

Ward and Pringle (1981) checked on several aspects of the use of the COMP Objective Test with 99 nontraditional graduates from their institutions. A norm reference group supplied by ACT was used for comparison of scores obtained by traditional seniors. They found the COMP to have equally high reliability for traditional and nontraditional students. Cronbach's alpha was .87 for Total Score, .68 for Functioning in Social Institutions, .72 for Using Science and

Technology, .63 for using the Arts, .72 for Communicating, .71 for Solving Problems and .58 for Clarifying Values.

According to Ward and Pringle (1981), after each testing session an informal session was held during which examinees were debriefed and had the opportunity to share opinions of the exam. Ward and Pringle (1981) report that time and again the nontraditional students described the COMP Objective Test to be fair and relevant, and appropriate for measuring their competencies. They concluded that the COMP test seemed to be a good instrument for demonstrating the quality of the product of nontraditional post-secondary programs.

Summary This review of studies has shown a number of characteristics and properties of the COMP. The COMP has adequate test-retest reliability (.84). Subtest intercorrelations ranged from .55 to .77. Some evidence indicated a relationship between scores on the COMP and success in society. COMP scores were moderately related to other test scores such as the ACT (.70 to freshman COMP and .60 to senior COMP scores) and only slightly (.21-.31) related to academic achievement. There appeared to be a ceiling effect on the COMP for students with an ACT score above 28. Research findings were mixed for COMP outcomes on the basis of age. In general, the COMP was found to be useful for research on outcomes associated with general education.

In particular, the COMP was judged to be adequate for this study. Of special interest was its relationship to success in society since cocurricular activities have been shown to be related to success in society. The reliability of the COMP is adequate. The apparent ceiling effect would not be a serious problem in this study since none of the institutions were highly selective. Any possible differences due to age would not be a serious problem since most of the students were traditionally aged. Finally, its applicability to both sophomores and seniors and its interesting and appealing format added to its selection as the measure of the independent variable in this study.

Student background characteristics

There were six student characteristics reviewed in chapter 2 that were found to be related to cognitive outcomes: ability, sex, SES, race, age and education aspiration. Consequently, these were used in the regression equation to predict cognitive outcomes. Each of the six were a part of an interaction analysis to determine whether there was an interaction effect between quality of effort and student characteristic as related to cognitive outcomes. The six student characteristics and how they were measured follows:

Ability: Freshmen COMP score

Sex: Item in background information on the CSE

Social-economic status:

Answer to the following background information item on the CSE:
Did either of your parents graduate from college?
_____ No
_____ Yes, both parents
_____ Yes, father only
_____ Yes, mother only

Race: item in background information on the CSE

Educational aspirations: Answer to the following background information
item on the CSE:
When, or if, you graduate from college, do you expect to enroll for a more advanced degree?

Age: Answer to the following background information item on the CSE:
Age
_____ 22 or younger
_____ 23 to 27
_____ 28 or older

## Difficulty of Getting Research Participants

Getting students to participate in research activities was found to be difficult by Schomberg et al. (1981) and by Ward and Pringle (1981). Schomberg et al. (1981) expected about one-third of the students invited would participate in their research based on their past

experiences in soliciting volunteers. Upon completion of the COMP they offered a one-dollar coupon to students which could be redeemed at a local ice cream parlor. Two issues of COMP Notes were mailed to students to provide background on the COMP and to create in students the feeling that they were participating in a special study of national scope. Testing occurred in one of seven 2 1/2 hour sessions of the students choice. Ward and Pringle (1981) found it difficult to secure non-traditional volunteers to take the exam. Only 99 out of 1,116 persons contacted actually took the exam.

# FINDINGS

The primary purpose of this study was to explore the relationship between quality of effort and cognitive outcomes using standardized measures. A secondary purpose was to determine if certain kinds of involvement were related to different cognitive outcomes for different students.

This longitudinal study involved 88 students from three four-year and one two-year campus in the Midwestern, Southern, and Eastern part of the United States. Each student took the Objective Test of the College Outcomes Measures Program (COMP) as an entering student as a measure of cognitive outcomes. Two or four years later these same students took the COMP and the College Student Experience Questionnaire (CSE) which measured quality of effort in five areas: cocurricular activities, student faculty interaction, residence programs, peer interaction, and athletics.

## Statistical Procedures

A correlational research design using multiple regression was employed to test the 12 hypotheses. Both "enter" and "step-wise" multiple regression procedures were used. Multiple regression provided for testing several variables to see which were statistically

significant predictors of cognitive outcomes. The enter regression procedure tested the ability of each of three groups of variables to predict cognitive outcomes. First, six background variables (ability, sex, race, SES, age and educational aspiration) were entered into the equation. Next, the four quality of effort variables (cocurricular activities, student-faculty interaction, peer interaction and athletics were entered into the regression equation. Lastly, five background/quality of effort interaction variables (athletics and sex, athletics and SES, cocurricular activities and SES, student-faculty interaction and SES, and age and peer interaction) were entered into the equation.

## Other Statistical Considerations

Four students were dropped from the regression analysis. From conventions noted in an ACT concordance table (Appendix F), two students were dropped because their freshman COMP scores were more than 20 points below what was predicted from their ACT score. Another student was dropped because his initial COMP score was 130. Based on the review of the literature which indicated a "ceiling effect" for the COMP, a student with an ACT of 31 was also dropped.

Forty-one of the remaining 84 students did not live in fraternities, sororities or college housing. This resulted in 41 missing cases, leaving only 43 cases for the regression analysis. Consequently, the residence programs quality of effort variable and the residence

program and SES interaction variable were not included in the regression analyses. Analysis of variance of freshman COMP and soph/senior COMP scores for on-campus and off-campus students yielded no significant differences. Off-campus students scored 4.6 points higher than on-campus students as freshmen and .8 points lower as sophomores or seniors.

In order to include SES (which had three groups) in the regression analysis, SES was computed into two variables, SES1 and SES2. Each of the two variables was assigned values 0 and 1. For SES1, the value 1 was associated with the SES group, neither parent a college grad. For SES2, the value 1 was associated with the SES group, both parents college grads. Finally, the SES group, either parent a college grad, was represented when SES1 and SES2 both had the value of 0.

Finally, in order to determine the appropriateness of using only the Objective COMP total score to measure cognitive outcomes, a factor analysis of the COMP scores was performed. Since only one factor had an eigen value greater than 1 (3.8) it was judged suitable to use the COMP total score as the measure of cognitive outcomes (see Appendix G).

## Research Hypotheses Findings

As mentioned earlier the enter procedure of multiple regression was used to test whether quality of effort predicted the COMP total score. A criteria of .10 was used for entry of variables into the regression equation. After the first block of background variables was entered, three variables were significant predictors: freshman Comp ($p < .001$), SES1 ($p < .01$) and institution ($p < .01$). Multiple R was equal to .739.

To test the first six hypotheses, the second block of variables (quality of effort) was entered. The block did not significantly add to the predictability of the COMP total score. Consequently, hypotheses 1, 2, 3, 5 and 6 were not accepted. As indicated earlier, hypotheses 4, related to residence programs, was not tested.

Hypothesis 1: Quality of effort is a predictor of cognitive outcomes. (not accepted)

Hypothesis 2: Quality of effort in cocurricular activities is a predictor of cognitive outcomes. (not accepted)

Hypothesis 3: Quality of effort in student faculty interaction is a predictor of cognitive outcomes. (not accepted)

Hypothesis 4: Quality of effort in residence programs is a predictor of cognitive outcomes. (not tested)

Hypothesis 5: Quality of effort in peer interaction is a predictor of cognitive outcomes. (not accepted)

Hypothesis 6: Quality of effort in athletic is a predictor of cognitive outcomes. (not accepted)

Lastly, to test hypotheses 7-12, the third block of variables (background and quality of effort interaction) was entered. This block did not significantly add to the predictability of the COMP total score. However, the final listing of the variables in the equation included two more individually significant predictors, time ($p < .09$) and interaction of athletics and SES ($p < .09$).

Consequently, of all the hypotheses, only hypothesis 11 was accepted from the regression analysis using the enter procedure. As indicated earlier, hypothesis 10 relating to residence programs was not tested.

Next, the stepwise procedure of multiple regression was used to test which variables, individually, and in what order, would enter the regression equation to predict the COMP score. The variables entered in the following order with the level of significance as indicated in parenthesis: freshman COMP ($p < .001$), interaction of cocurricular activities and SES ($p < .001$), institution ($p < .01$), and interaction of athletics and gender ($p < .10$).

The regression analyses using "enter" and "stepwise" procedures revealed three significant interactions between quality of effort and student background variables: interaction of athletics and SES, interaction of cocurricular activities and SES, and interaction of

athletics and gender. These were examined further to determine the nature of each interaction.

The reader must be cautioned that the accuracy of these analyses was limited because of disproportionate numbers of students in SES and sex groups. This resulted in a confounding of the variance due to main effects such as SES and interaction effects such as interaction between athletics and SES and cocurricular activities and SES. Also, because of the small samples, outfliers may have confounded the findings. Consequently, these three significant interaction variables must be recognized with caution.

The plot command with the regression subcommand was used to analyze each of the three interaction variables. For the interaction analysis of athletics and SES, a significant correlation of -.574 ($p < .01$) was found between athletics and COMP for the SES group, Both parents - college grads. No significant correlations with COMP were found for the SES groups Neither parent-college grad and Either parent-college grad. As involvement in athletics increased, COMP decreased significantly for only the Both parents-college grads SES group (see Figures 1 and 2).

For the interaction analysis of Cocurricular Activities and SES, a significant correlation of -.229 ($p < .07$) was found between Cocurricular Activities and COMP for the SES group, Neither parent-college grad. No significant correlations with COMP were

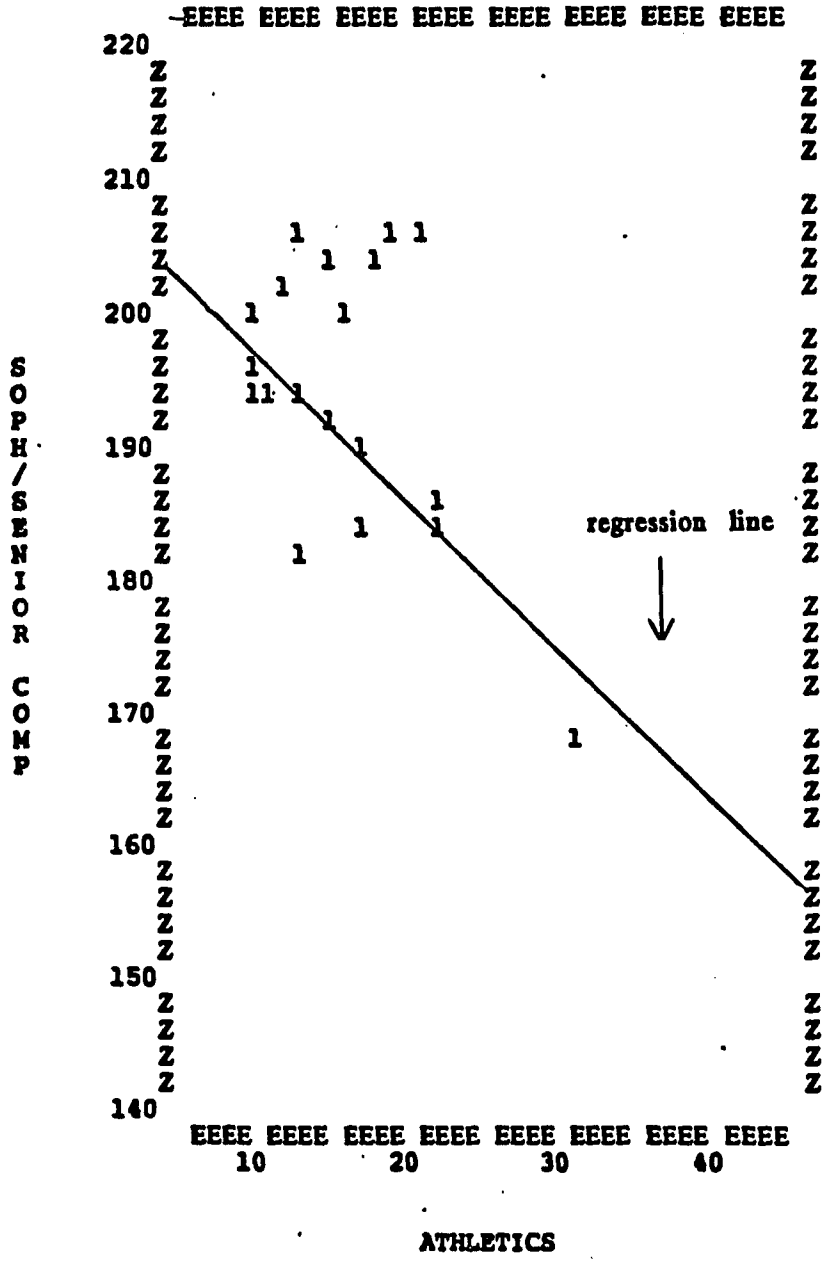
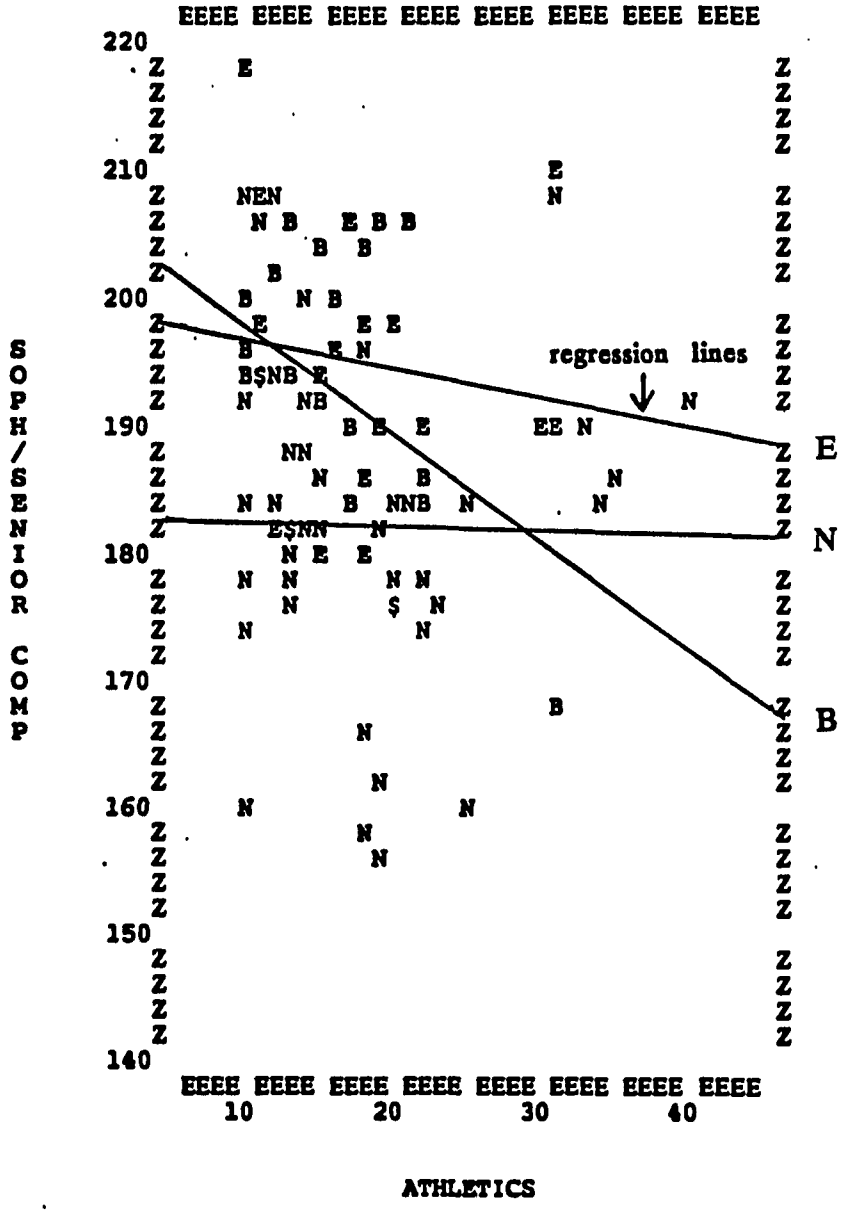



Figure 1. Correlation of athletics and COMP for the SES group, both parents college graduates




N-Neither.
B-Both.
E-Either.
$-Multiple Occurrence

Figure 2. Interaction of athletics and SES (parents who are college graduates)

found for the other two SES groups. As cocurricular involvement increased, COMP decreased significantly for only the Neither parent-college grad group (see Figures 3 and 4).

For the interaction analysis of athletics and gender, a significant correlation of -.270 ($p < .06$) was found between athletics and COMP for females. No significant relationship between athletics and COMP was found for males. For females, as athletic involvement increased, COMP decreased (see Figures 5 and 6).

The results of the interaction analyses yielded support for the following conclusions:

> For higher SES students, as involvement in athletics increases, cognitive outcomes decrease.
>
> For lower SES students, as involvement in cocurricular activities increases, cognitive outcomes decrease.
>
> For women, as involvement in athletics increases, cognitive outcomes decrease.

Consequently, hypothesis 7, 8, 9 and 12 were not accepted. Support was found for hypothesis 11. Hypotheses 10 was not tested. Support was found for the converse of hypotheses 7 and 8.

Hypothesis 7: Quality of effort in athletics will be related to greater cognitive outcomes for females than males. (not accepted)

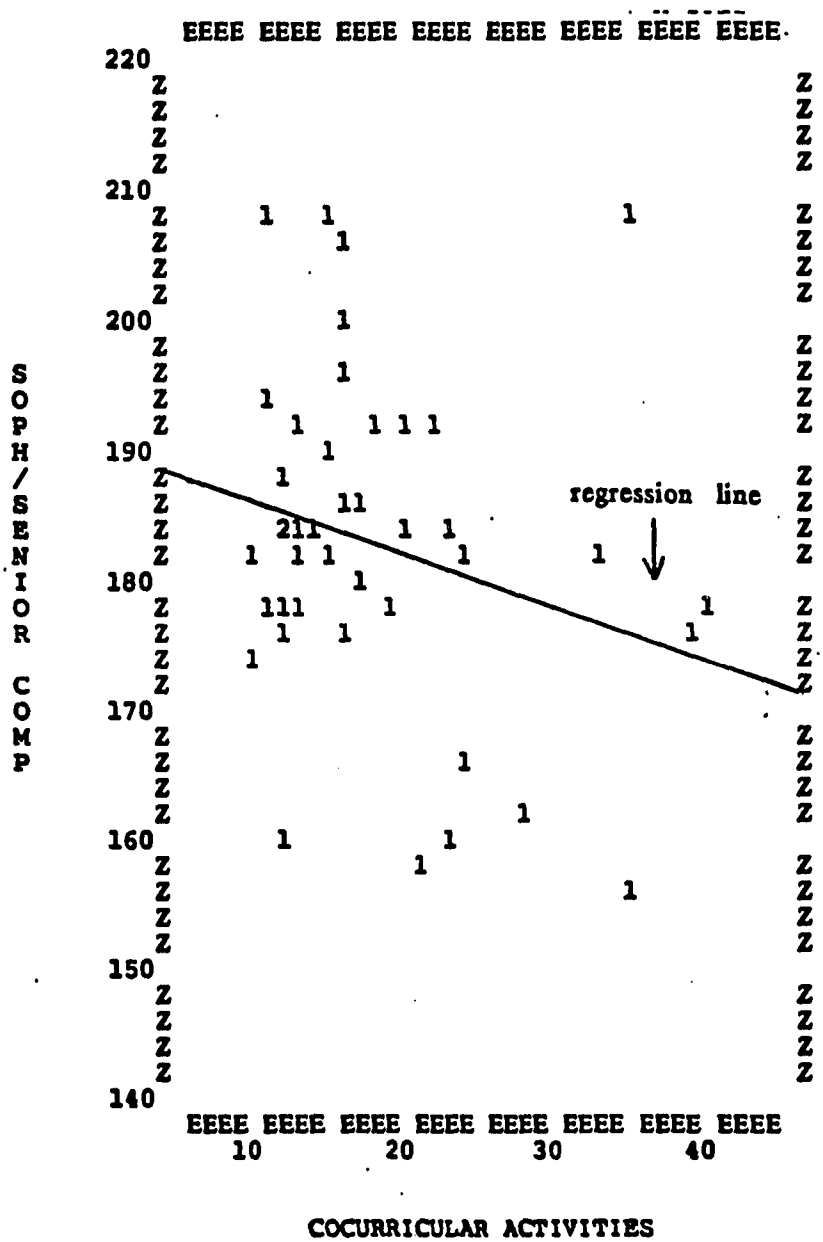
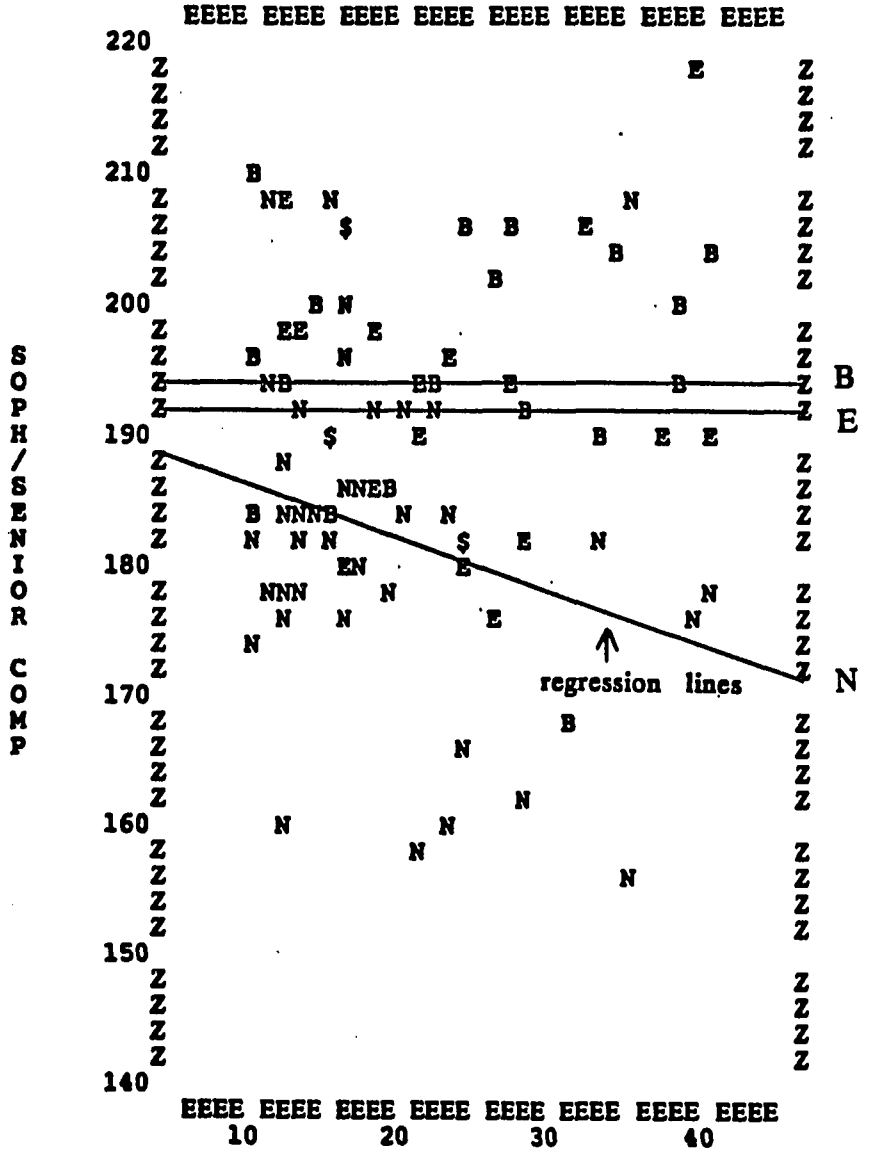



Figure 3. Correlation of cocurricular activities and COMP for the SES group, neither parent a college graduate




N-Neither.
**B-Both.**
E-Either.
$-Multiple Occurrence

Figure 4. Interaction of cocurricular activities and SES (parents who are college graduates)

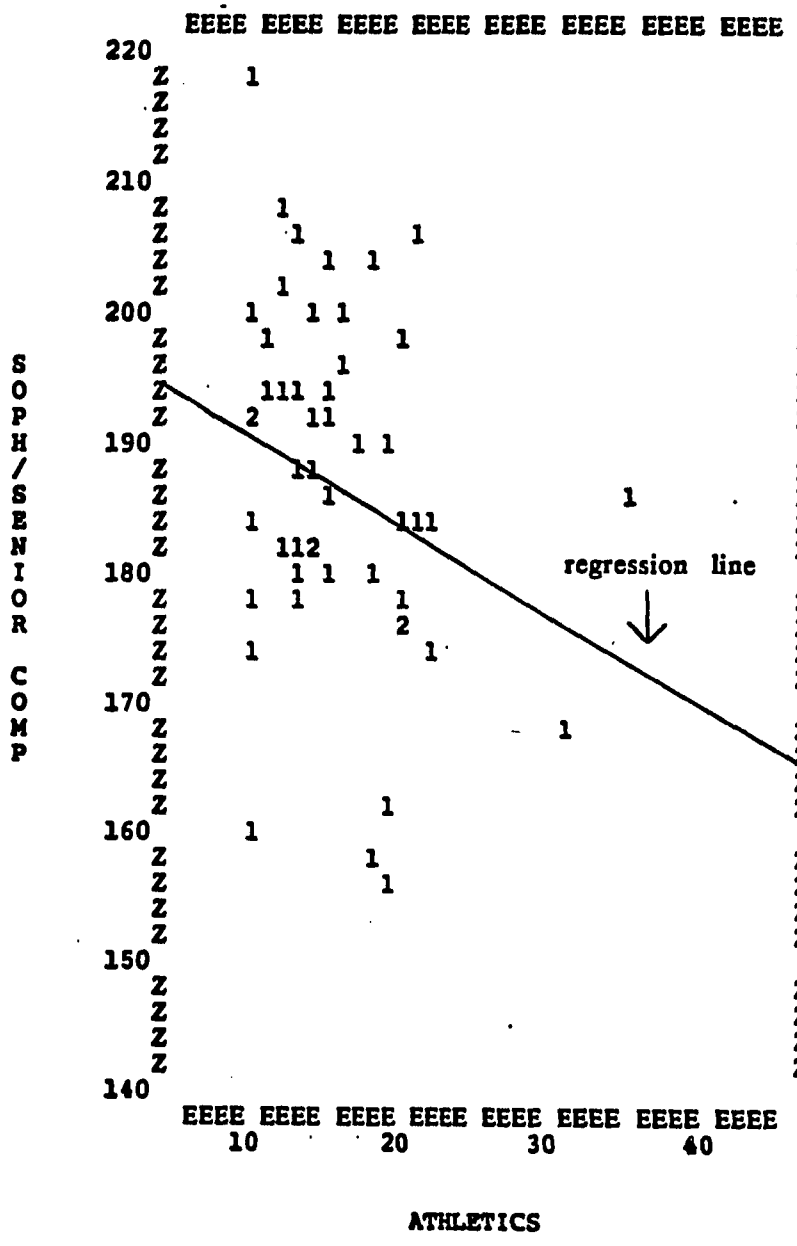
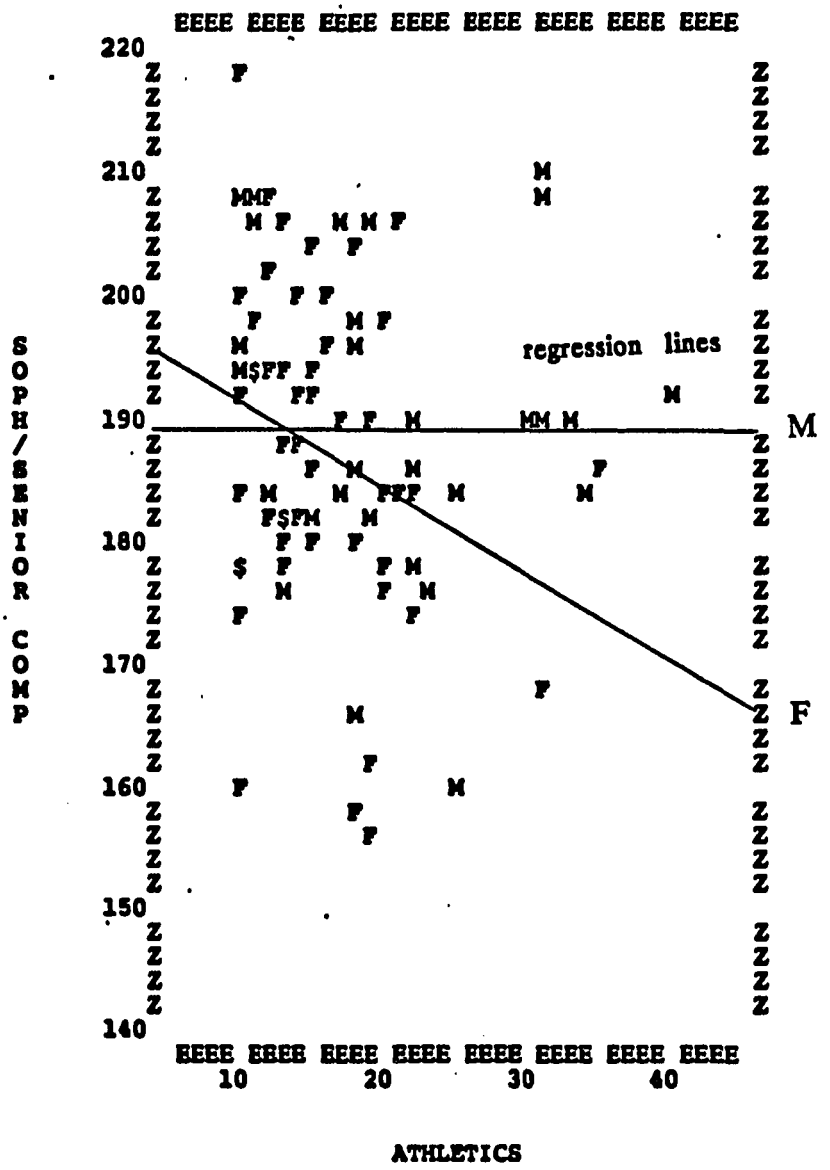



Figure 5. Correlation of athletics and COMP for females




M-Male
F-Female
$-Multiple occurrence

Figure 6. Interaction of athletics and gender

Hypothesis 8: Quality of effort in cocurricular activities results in relatively greater cognitive outcomes for lower SES than higher SES students. (not accepted)

Hypothesis 9: Quality of effort in student-faculty interaction results in relatively greater cognitive outcomes for lower SES than higher SES students. (not accepted)

Hypothesis 10: Quality of effort in residence programs results in relatively greater cognitive outcomes for lower SES than higher SES students. (not tested)

Hypothesis 11: Quality of effort in athletics results in relative greater cognitive outcomes for lower SES than higher SES students. (accepted)

Hypothesis 12: Quality of effort in peer interaction will be related to greater cognitive interactions for younger than older students. (not accepted)

## Other Findings

In this section, findings not directly related to the acceptance or rejection of the hypotheses are reported. The findings reported are: significant predictors of COMP, significant correlations between variables in the study, and means and differences in means for primary variables.

Other predictors of COMP

While quality of effort and certain interactions between quality of effort and student background variables were the predictors of main interest in this study, there were other significant predictors of COMP revealed in the multiple regression analyses. These were Freshman COMP, SES, Time and Institution.

The variable, freshman COMP, was the strongest predictor ($p < .001$) of COMP with an $R = .622$ and $R^2 = .387$ ($p < .001$). This R and $R^2$ compares with $R = .60$ and $R^2 = .36$ as reported by ACT (Steele, 1988). With both the enter and the stepwise multiple regression procedures, Freshman COMP always was the strongest predictor.

Another significant predictor of the COMP was Institution with an $r = .449$ ($p < .001$). A one way analyses of variance (ANOVA) of freshman COMP scores revealed no significant differences between institutions, while a one way ANOVA of COMP scores found a significant difference between institutions. The Scheffe procedure indicated institution 3 and institution 2 had significantly higher COMP scores than both institution 0 and institutions 1 ($p < .05$) (see Appendix I).

A cross tabulation of institution by SES revealed 84 percent of the students whose parents had not graduated from college attended institution 0 and 1. None of the 18 students at institution 0 were from families where both parents graduated from college (see

Appendix J). It appeared that institutional comparisons were confounded by student SES differences between institutions.

The soph/senior COMP differences between institutions must be interpreted cautiously as the number of students from each institution was not equal (N = 18, 37, 15 and 16) and there was an unequal distribution of SES. It was not possible to draw conclusions about the reasons for differential COMP gains.

Other regression analyses

Regression analyses were performed using different sub samples, varying numbers of variables, and different variables (see Appendix K). Analyses were performed using the four-year colleges only, using only students with ACT scores, and using only students from four-year colleges who had ACT scores. The analyses with the entire sample (N = 82) using 8 variables were the main analyses in this study. Those results have been reported earlier. Findings shown in Appendix K must be interpreted with caution because of small sample size.

Several observations can be made from Appendix K. First, there were several significant interactions involving SES. These may be due to the confounding of the variance associated with SES. Secondly, ACT was a significant predictor of soph/senior COMP, and frequently was a stronger predictor than freshman COMP. A third observation, athletics was a predictor in several of the analyses individually or in interactions with SES and gender. Finally, $R^2$ ranged from .51 to .72

for these analyses. Again, these findings must be interpreted with caution.

A few other analyses were performed. To determine if the involvement variables would collectively contribute to the prediction of any of the COMP subtests, six multiple regression analyses were performed. As a block, the involvement variables, athletics, student-faculty interaction, cocurricular activities, and peer interaction, were significant predictors of the Problem Solving COMP subtest.

To determine whether any of the other CSE scale variables were significant predictors of COMP, all fourteen scales were summed and then entered into a regression analysis. Also, each of the fourteen was included in the same stepwise regression analysis. None of the fourteen was a significant predictor in either analysis. When the 14 CSE involvement variables were used alone in a regression analyses, the Art, Music and Theatre scale, and the Information in Conversation scale were predictors of COMP.

Significant correlations

Significant correlations contributed toward understanding the relationships between variables of interest. Primary variables of interest discussed here include freshman COMP, soph/senior COMP, SES, interaction of cocurricular activities and SES, interaction of athletics and SES, and interaction of athletics and sex.

The relationship between ACT composite score and freshman COMP and soph/senior COMP was of interest. The literature review cited a number of studies where ACT was correlated with freshman or senior COMP (Steele, 1988; McConatha et al., 1986; Forrest & Steele, 1982). Data in this study (Table 7) indicated that the correlation between ACT and freshman COMP and soph/senior COMP was .783 and .739, respectively. The correlation between freshman COMP and soph/senior COMP was .718.

Table 7. Correlations between ACT and COMP

| Test | ACT | Freshman COMP | Soph/Senior COMP |
|---|---|---|---|
| ACT | 1.000 | .786 | .734 |
| Freshman COMP | .786 | 1.000 | .699 |
| Soph/Senior COMP | .734 | .699 | 1.000 |

The correlation matrix involving the variables in this study revealed several significant correlations. Only significant correlations with soph/senior COMP, freshman COMP or one of the significant

predictors are cited. Correlations between variables of interest in this study can be found in Appendix H.

For several variables the correlation with soph/senior COMP was stronger than with freshman COMP. For example, the correlation for SES1 with freshman COMP was -.173 and with soph/senior COMP was -.444. The correlation for Institution with freshman COMP was .162 and with soph/senior COMP was .432.

SES and interaction variables including SES were significantly correlated with many variables and with each other (see Appendix H). As cited earlier the effects of SES and of interactions with SES may be confounded in this study.

Means and differences in means for primary variables

Table 8 contains information available from the SPSSx procedure Frequencies. Information shown for ACT, freshman COMP, soph/senior COMP and quality of effort includes mean, standard deviation, minimum score and maximum score.

As shown in Table 8, the freshman COMP mean of 188.0 was 13 points higher than the soph/senior COMP mean of 175.1. Institutional gains of 11 or more were described as highly significant by Forrest (1982, p. 22). As a whole, students in this study made significant gains.

Since SES, gender, and interactions with SES and gender, were significant predictors of COMP in several analyses, mean differences of

their categories were computed as shown in Table 9 and Table 10. Table 9 indicates that all test scores for the "neither parent a college grad" were lower than the two other SES categories. This category had a COMP gain of 10 while the "both parents college grads" and "either parent a college grad" categories had COMP gains of 17 and 16 respectively. Male and female test scores are shown in Table 10. While all three female test scores were less than the male test

Table 8. Means and standard deviations for primary variables

| Area | Statistic | | | |
|---|---|---|---|---|
| | Mean | Standard Deviation | Minimum | Maximum |
| ACT | 20.9 | 5.0 | 10.0 | 30.0 |
| Freshmen COMP | 175.5 | 15.5 | 145.0 | 207.0 |
| COMP | 188.1 | 13.3 | 155.0 | 217.0 |
| Cocurricular Activities | 20.8 | 9.0 | 10.0 | 40.0 |
| Student-Faculty Interaction | 22.2 | 6.6 | 10.0 | 40.0 |
| Peer Interaction | 14.7 | 3.3 | 8.0 | 24.0 |
| Athletics | 17.2 | 7.0 | 10.0 | 40.0 |

scores, the ACT was the only test where male scores were significantly higher.

Information regarding student background for the variables of age, gender, SES, race and education aspiration can be found Table 3. Information regarding means and and standard deviations of COMP subtests can be found in Appendix L.

Table 9. Mean differences in test scores by category of SES

| | Parents who are college graduates | | |
|---|---|---|---|
| Test | Neither | Both | Either |
| ACT | 19.0 | 21.0 | 22.6 |
| Freshman COMP | 172 | 178 | 178 |
| Soph/senior COMP | 182 | 195 | 194 |

Table 10. Mean differences in test scores by gender

| Test | Gender | |
|---|---|---|
| | Male | Female |
| ACT | 22.2 | 19.8 |
| Freshman COMP | 177 | 174 |
| Soph/senior COMP | 189 | 187 |

# SUMMARY AND DISCUSSION

## Summary

National concern about the quality of higher education and the demand, in some quarters, for assessment of outcomes requires a search for ways to measure and improve outcomes in higher education. Traditional indices of institutional quality and methods of measurement are inadequate.

Recent research indicated increasing student involvement in learning improved learning outcomes, but further research questions were raised. What kinds of involvement contribute to outcomes? Do different kinds of involvement lead to different outcomes for different students? These questions were addressed in this study which used standardized measures of both involvement and cognitive outcomes.

This study included 88 students from three four-year campuses and one-two year campus in the Midwestern, Southern and Eastern part of the United States. Each student took the Objective Test of the College Outcomes Measures Program (COMP) as a measure of cognitive outcomes as an entering student. Two or four years later these same students took the COMP and the College Student Experiences questionnaire (CSE) which was used to measure involvement (quality of effort) in five areas: cocurricular activities, student-faculty interaction, residence programs, peer interaction, and

athletics.

The SPSSx enter procedure of multiple regression was used to determine the ability of quality of effort and interaction of quality of effort and student background to increase prediction of cognitive outcomes after student background information was entered. Student background information included: ability (freshman COMP), gender, race, SES, age, and educational aspiration.

There were several findings in the study. Primary findings related directly to three of the hypotheses. One of twelve hypotheses was supported: Quality of effort in athletics results in relatively greater cognitive outcomes for lower SES than higher SES students. Two findings supported the converse of two hypotheses. These findings were: As quality of effort in cocurricular activities increased for lower SES students, cognitive outcomes decreased; and as quality of effort in athletics increased for women, cognitive outcomes decreased.

SES, institution and amount of time studying were significant predictors of COMP. Cocurricular activities, student faculty interaction, and peer interaction were not significant predictors. Athletics was a negative predictor of cognitive outcomes in some analyses.

## Interpretation of Findings

This interpretation discusses four areas of findings. These areas are: quality of effort, student background, involvement and student background interactions, and other findings.

This research did not give much support to the hypothesis that involvement is related to cognitive outcomes. In the main analyses, none of the four quality of effort variables added significantly (positively or negatively) to the prediction of cognitive outcomes beyond the contribution already made by student background variables. Neither did any of the other seven CSE quality of effort scales that were not included in the design of this study. Three involvement/ student background variables did add significantly to the prediction of cognitive outcomes.

While several studies (Alexander, 1985; Pascarella, 1985a; Pace, 1984; Pascarella & Terenzini, 1978; Hanks & Eckland, 1976) have found a significant relationship between involvement and cognitive outcomes; others have not (Bean and Kuh, 1984; Shucker, 1987; Forrest, 1982; Richards et al., 1967b). Some studies (Green, 1986; Abrahamowicz, 1985) which used the CSE found a relationship between quality of effort and self-reported gains, but did not control for student ability.

Findings of this study differ with the extensive research by Pace (1984) who used the CSE, but used GPA as a control of ability and

self-reported gains as measure of outcomes. From his studies he found quality of effort increased prediction of gains in both intellectual skills and general education, literature and the arts by approximately ten per cent each. This study did not show the predictive power of quality of effort that Pace found.

Some researchers (Bean and Kuh, 1984; Astin, 1971) have found or cited research which indicates that after controlling with grades and aptitude test scores, few other variables can be shown to predict academic performance. In Astin's 1965 study of 38,681 students from 55 institutions, he found that 13 personality characteristics increased the multiple correlation predicting college achievement by only .05 for men and .03 for women after controlling for high school grades, aptitude test scores, and college selectivity.

Dressel (1978) has speculated about the consequences of some approaches to improving environments. He wrote (1978, p. 184) "Perhaps . . . some efforts at environmental enrichment (for example, through extensive residence hall programs, faculty-student interactions of various types, or social and recreational programs) weaken rather than reinforce the education of students." Astin (1985, p. 156) has asked, "Does one form of involvement (in extracurricular activities, for example) enhance or diminish the effects of another form (such as academic work)?" Questions raised by Dressel and Astin, research by others, and this study indicate that some forms of involvement may

not contribute to educational gains.

In this study, two student background variables were significant predictors of COMP: the freshman COMP score and SES. Many studies including several cited in this study (Anderson, 1988; Feltz and Weiss, 1984; Cooley and Lohnes, 1976; Lavin, 1965) have demonstrated a strong, persistent, significant relationship between SES and academic outcomes.

Findings regarding the impact of parent education, the measure of SES in this study, were related to prior research. Astin (1971) found higher achievement by students of highly educated parents was only partially explained by differences in ability. He suggested that this may have reflected a greater continuous pressure for high achievement from the highly educated parents. Spady (1970) wrote that family encouragement was important as support for college achievement when other sources of support (peers, status) were gone. This research and research by others (Anderson, 1988; Astin, 1970) indicated the influence of parent education went beyond controls for ability.

As in this study, Feltz and Weiss (1984) found the influence of SES on outcomes to be stronger than involvement category. They did not find a significant difference in outcomes by participation category (athletics only, service only, athletics and service, neither athletics nor service), but did find SES to be a significant covariate. On the other hand, findings of this study differ from another of Feltz and Weiss's

findings. They found extent of involvement to be related to ACT scores. This study did not find increased involvement in any of the four areas studied related to positive, significant cognitive outcomes.

In this study, the relative predictive ability of background variables and quality of effort differs from findings by Pace (1984) and Alexander (1985) who also used the CSE. Both used CSE self-reports to measure outcomes and GPA as a background variable. They found quality of effort to be a better or as good a predictor of outcomes as background variables. Pace (1984) found quality of effort and student background increased prediction of general education gains by 7 percent and 4 percent, respectively (N=2299). In a 1979 study, he found quality of effort and student background increased prediction of general education gains by 13 percent and 2 percent, respectively (N=3006). In this research using the COMP, quality of effort and SES (parent education) increased prediction of general education by 0 percent and 12 percent, respectively. In Pace's research quality of efforts' contribution to prediction dropped from 13 to 7 percent from 1979 to 1983, and student background's contribution increased from 2 to 4 percent. Clearly, parent education was a much stronger predictor in this research than in research by Pace, although there was less difference between the contribution of student background and quality of effort in 1983 than in 1979.

The freshman COMP score was the most significant predictor in this study ($R = .622$ and $R^2 = .387$). This R and $R^2$ compared with $R = .60$ and $R^2 = .36$ as reported by ACT (Steele, 1988). The predictive ability of freshman COMP for this sample was very similar to the predictive ability cited from ACT research.

Three student background/involvement variables were predictors in this study in one of two regression analyses. First, as involvement in athletics increased for higher SES students, cognitive outcomes decreased. Such a decrease was not found for lower SES students. The relative advantage of participation in athletics for lower SES students found in this study supported previous research. Research by Snyder (1969) and the review by Holland and Andre (1987) indicated that the relationship between involvement and educational outcomes was the strongest for lower SES students. Rehberg and Schafer (1968) cited ways that lower SES students gain aspirations above the level associated with their SES group. Hanks and Eckland (1976) suggested that athletics may mediate the effect of SES and academic aptitude on educational attainment.

A second background/involvement interaction variable in this study was SES and cocurricular activities. For lower SES students, as involvement in cocurricular activities increased, cognitive outcomes decreased. The advantage of involvement for low SES students was not supported by the data from involvement in cocurricular activities

nor by the research literature on cocurricular activities. The only area where such an advantage was found in the literature and in this study was for athletic involvement.

The final significant involvement interaction variable was athletics and gender. That is, as involvement in athletics increased for females, cognitive outcomes decreased. The data indicating that as involvement in athletics for females increases, cognitive outcomes decreases differs from Purdy, Eitzen and Hufnagel's (1982) ten year study at one major institution and differs with findings in Holland and Andre's review (1987). Purdy et al. found that male athletes had lower GPAs than female athletes. Holland and Andre's review indicated no studies where female athletes' academic achievement was lower than males.

In conclusion, little support was found in this study for the hypothesis that involvement increases cognitive outcomes. On the other hand, neither was support found for Coleman's (1961) "spend and drain" theory that concentrating on out-of-class activities expends one's energy so that academic success is not possible.

## Limitations

Several factors limit the usefulness of this study: a low response rate, a confounding of variance related to SES, and a measure of involvement limited to the current college year. Lesser limitations

include: a level of $p < .10$ rather than .05 for rejecting predictors of cognitive outcomes, the COMP's "ceiling effect", and some possible sources of test score variation.

The most significant limitation of this study is the low participation response rate. At three of the institutions, of approximately 860 who took the COMP as freshman, 182 took the COMP as sophomores or seniors. Of that number, 68 took the CSE. Also, four out of ten colleges contacted participated, increasing possible sample bias further. The low response rate reduces the generalizability of the findings and limits adequate testing of some of the hypotheses because of small sample size. However, this sample is similar to the national college test-taking population. Background information for this study is quite similar to the norm group of 25,000 who took the CSE from 1983-1986 (Pace, 1987).

Another serious limitation was the inability to adequately separate the variance into main effects and interaction effects for SES because of unequal numbers in the SES categories. Consequently, the two findings of significant interactions with athletics and cocurricular activities may be faulty.

A third limitation of this study is that measures of involvement in the CSE are limited to the current college year. This may have limited the validity of the findings due to insufficient measure of involvement.

The first of the lesser limitations was the use of .10 as a criterion for rejecting predictors of cognitive outcomes. Consequently, there are 10 chances out of 100 that a variable may have been wrongly accepted as a predictor.

A second lesser potential limitation is the ceiling effect of the COMP. The ACT's "conventions" (see Appendix E) were followed to address this potential limitation.

Finally, a few sources of test score variation listed by Goslin (1963, pp. 151-152) may have affected the findings: interest of the individual in the test; anxiety connected with the testing situation; the perceived importance of the test, the confidence of the individual in his/her ability to handle the test items, and the effect of the tester.

## Implications

This study has made a contribution to research in higher education through design, method and findings. The study has a longitudinal, pre-post test design and uses standardized instruments to measure the ability of student involvement (CSE) to predict cognitive outcomes (COMP). The CSE and COMP are widely used, but research has not been conducted which uses both instruments in the same study. The use of the COMP rather than self reports provides the opportunity to test the predictive ability of the CSE quality of effort scales with a more valid and reliable measure.

The findings in this study are significant as they show little relationship between involvement in out-of-class activities and general education outcomes. These differ from findings by researchers who have used GPA as a control of ability and student self-reported gains to measure outcomes. The study raises a question about the relationship between SES (parent education) and involvement and cognitive outcomes. Does involvement in other areas apart from athletics result in relatively more positive cognitive outcomes for lower than higher SES students?

The lack of support for most of the hypotheses raises other questions. Does this mean that student involvement is not a predictor of outcomes or does it mean that some aspect of the study is faulty? Or, does it mean it is only involvement which compliments rather than competes with the academic purposes of the institution that contributes to general education outcomes? Further research is needed to answer these questions.

## Needs for Further Study

Further research using standardized measures is needed to more adequately explore involvement's contribution to cognitive outcomes. Research design improvements are needed to determine the roles of parent education, athletics, the interaction of parent education and

athletics, residence patterns and institution type in the prediction of cognitive outcomes. Research is also needed to determine involvement's impact on more specific areas of cognitive outcomes. Finally, more use of causal modeling is needed to determine the indirect impacts of certain background and environmental variables.

Design improvements include using a larger sample size, a more comprehensive measure of SES, and more background measures of ability. A larger sample size would allow for more variables in the research design. Involvement in residence programs was not included in this research design because the sample was too small. With small sample size, this study has indicated that ACT contributes to the prediction of soph/senior COMP even when frosh COMP is also a predictor. Research has shown that GPA is a predictor of academic outcomes (Pace, 1984; Astin, 1971). Its inclusion may also increase the prediction of soph/senior COMP.

Further research is needed to confirm the strong predictive role of parent education found in this study. Research could also use a more comprehensive measure of SES to explore further the predictive power of SES.

Additional research is needed to determine the interaction between parent education, or a more comprehensive measure of SES, and kinds of involvement. Nearly all kinds of involvement had significant interactions with parent education in one or more analyses

in this study.

Further research is still needed to determine the relationship between athletics and cognitive outcomes. This research and research by others (Holland and Andre, 1987; Feltz and Weiss, 1984; Purdy et al., 1982) indicate that the effect of involvement in athletics may vary by gender and by SES.

Some other needs for further research include studying involvement by type of institution, studying involvement's relation to more specific kinds of cognitive outcomes, and using causal modeling to predict outcomes. This study has indicated differences in cognitive outcomes between institutions. In his research, Pace (1987) cites outcomes norms for four different types of institutions. Multi-institutional studies are needed to explore involvement's contribution to cognitive outcomes by type of institution.

The involvement variables in this study predicted the COMP subtest score, Solving Problems. Similar studies with a larger sample and using more specific areas of cognitive outcomes could add to the understanding of involvement's relationship to cognitive outcomes.

Finally, causal modeling is needed to develop a more comprehensive understanding of how certain variables impact cognitive modeling. Pascarella (1985a, p. 48) suggests that a number of environmental variables that do not directly influence cognitive outcomes may have important indirect effects through their influence

on student involvement. Causal modeling would allow for the assessment of both direct and indirect effects of variables on cognitive outcomes.

Some current unpublished research warrants attention by researchers in future studies of involvement. Included in such research is a study of out of classroom experiences as they contribute to quality of education, being sponsored by the Lilly Foundation and being conducted by George D. Kuh of the University of Indiana.

# BIBLIOGRAPHY

Abrahamowicz, D. (1985). Student activities participation and its relationship to student perceptions of college experiences and student satisfaction with college. Dissertation Abstracts International, 47, 429. (University Microfilms No. 86-07487).

Ainsworth, C., & Maynard, D. (1976). The impact of roommate personality on achievement: an exploratory study and model of analysis. Research in Higher Education, 4, 291-301.

Alexander, E. T. (1985). Student age, quality of effort, and estimated gains from the college experience (Doctoral dissertation, The Pennsylvania State University, 1985). Dissertation Abstracts International, 46, 1842A.

American College Testing Program. (1974). Varieties of accomplishment after college: Perspectives on the meaning of academic talent. Iowa City, IA: Author.

Anastasi, A., Meode, M. J., & Schneiders, A. A. (1960). The validation of a biographical inventory as a predictor of college success. New York: College Examination Board.

Anderson, K. L. (1988). The impact of colleges and the involvement of male and female students. Sociology of Education, 61, 160-177.

Astin, A. W. (1968). The college environment. Washington, D.C.: American Council on Education.

Astin, A. W. (1970). The methodology of research on college impact, part one. Sociology of Education, 43, 3, 223-254.

Astin, A. W. (1971). Predicting academic performance in college. New York: The Free Press.

Astin, A. W. (1977). Four critical years: Effects of college on beliefs, attitudes, and knowledge. San Francisco: Jossey-Bass.

Astin, A. W. (1985). Achieving educational excellence. San Francisco: Jossey-Bass.

Baird, L. L. (1976). Using self-reports to predict student performance. New York: College Entrance Examination Board.

Ballantine, R. J. (1981). What research says about the correlation between athletic participation and academic achievement. (ERIC Documentation Reproduction Service No. ED 233 9941).

Banta, T. W., Lambert, E. W., Pike, G. R., Schmidhammer, J. L., & Schneider, J. A. (1987, April). Estimated student score gain on the ACT comp exam: Valid tool for institutional assessment? A paper presented at the Annual Meeting of the American Educational Research Association, Washington, D.C. (ERIC Document Reproduction Service No. ED 281 892).

Beal, P. E., & Williams, D. A. (1968). An experiment with mixed-class housing assignments at the University of Oregon. Student Housing Research (ACUHO Research and Information Committee), February, 1-2. Columbus, Ohio: Association of College and University Housing Officers.

Bean, J. P., & Kuh, G. D. (1984). The reciprocity between student-faculty informal contact and academic performance of university undergraduate students. Research in Higher Education, 21, 461-477.

Beasley, S. R., & Sease, W. A. (1974). Using biographical data as a predictor of academic success for black university students. Journal of College Student Personnel, 15, 201-206.

Berman, W. F. (1978). Student activities development. NASPA Journal, 16, 52-54.

Biggs, D. A., & Barnett, R. (1981). Moral judgement of college students. Research in Higher Education, 14, 91-101.

Blimling, G. S., & Hample, D. (1979). Structuring the peer environment in residence halls to increase academic performance in average ability students. Journal of College Student Personnel, 20, 310-16.

Bloom, B. S. (1974). Time and learning. American Psychologist, 29, 682-688.

Bloom, B. S. (1976). Human characteristics and school learning. New York: McGraw-Hill.

Borg, W. R., & Gall, M. D. (1983). Educational Research. New York: Longman.

Brenner, V. J. (1982/1983). Quality of effort and perceptions of attainment as affected by variables in the education of the adult undergraduate student. (Doctoral Dissertation, Oregon State University, 1982). Dissertation Abstracts International, 43, 3229A.

Brown, R. D. (1985). Review of College Student Experiences. In J. Mitchell, Jr., (Ed.), The ninth mental measurements yearbook (Vol. 1, pp. 365-366). Lincoln, NE: The University of Nebraska Press.

Carr, J. A. (1986). Non classroom learning: A review of the literature. In P.S. Brevik (Ed.), Programs for learning outside the classroom (New Directions for Higher Education No. 56) (pp. 89-96). San Francisco: Jossey-Bass.

Carroll, J. B. (1963). A model of school learning. Teachers College Record, 64, 723-733.

Centra, J. A., & Rock, D. (1971). College environments and student academic achievement. American Educational Research Journal, 8, 623-634.

Chickering, A. W. (1978). Education and identity. San Francisco: Jossey-Bass Publishers.

Chronicle two-year college databook: For 1986-87 school year. (1987). Morovia, New York. Chronicle Publications.

Chronicle four-year college databook: For 1986-87 school year. (1987). Moravia, New York. Chronicle Publications.

Clarke, J. H. (1982). The effectiveness of remediation among high risk college freshmen of different ages. (ERIC Document Reproduction Service No. ED 227727).

College Outcomes Measures Program. Composite Exam. Iowa City, IA: American Testing Service.

College Student Experiences. (1983). (2nd edition). Los Angeles: UCLA, Center for the Study of Evaluation.

Coleman, J. S. (1961). The adolescent society. New York: Free Press.

Cooley W. W., & Lohnes P. R. (1976). Evaluation research in education. New York: John Wiley & Sons.

DeBoer, G. E. (1981). The direct and indirect contributions of a series of intellective and non-intellective student attributes to the prediction of high school and college achievement: A path analytic model. Educational and Psychological Measurement, 41, 487-494.

Debruin, J. E. (1982). A perspective on motivating students. Review of Education, 8, 87-93.

DeCoster, D. (1966). Housing Assignment for high ability students. Journal of College Student Personnel, 7, 19-22.

DeCoster, D. (1968). Effects of homogeneous housing assignment for high ability students. Journal of College Student Personnel, 9, 75-78.

Downey R. G. (1978). Differences between entering freshmen from different size high school. Journal of College Student Personnel, 19, 353-8.

Dressel, P. L. (1978). Handbook of academic evaluation. San Francisco: Jossey-Bass Publishers.

Dumont, R. G., & Troelstrup, R. L. (1981). Measures and predictors of educational growth with four years of college. Research in Higher Education, 14, 31-47.

Education Commission of the States. (1986). Transforming the state role in undergraduate education: Time for a different view. Text reported in Transforming the state role in undergraduate education. Chronicle of Higher Education, 32 (1), 13-18.

Endo, J. J., & Harpel R. L. (1981). The effect of student-faculty interaction on students educational outcomes. Association for Institutional Research Annual Forum, Minneapolis, MN. (ERIC Document Reproduction Service No. ED 205 086).

Endo, J. L., & Harpel, R. L. (1982). The effect of student-faculty interaction on student's educational outcomes. Research in High Education, 16, 115-138.

Entwistle, N. (1975). How students learn: Implication for teaching in higher education. In N. Entwistle & D. Hounsell (Eds.), How students learn (pp. 14-23). Lancaster, UK: University of Lancaster Institute for Research and Development in Post-Compulsory Education.

Ewell, P. T. (Ed.). (1985). Editor Notes. In P.T. Ewell (Ed.), Assessing educational outcomes. (New Directions for Institutional Research No. 47) (pp. 1-5). San Francisco: Jossey-Bass.

Farley, F. H., & Gordon, N. J. (Eds.). (1981). Psychology and education. Berkeley: McCutchan Publishing Corporation.

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

Feltz, D. L., & Weiss, M. R. (1984). The impact of girls' interscholastic sport participation on academic orientation. Research Quarterly for Exercise and Sport, 55, 332-339.

Forrest, A. (1982). Increasing student competence and persistence. A report of the college outcome measures project of the American college testing program. Iowa City, IA: ACT National Center for the Advancement of Educational Practices.

Forrest, A. B., & Steele, J. M. (1982). Defining and measuring general education knowledge and skills. Iowa City, IA: American College Testing Program.

Frederick W. C., & Walberg, H. J. (1980). Learning as a function of time. Journal of Educational Research, 73, 183-194.

Fuhrman, B. S., & Grasha, A. F. (1983). A practical handbook for college teachers. Boston: Little, Brow and Company.

Gade, E., & Peterson L. (1980). A comparison of working and non working high school students on school performance, socio-economic status, and self esteem. Vocational Guidance Quarterly, 29, 65-69.

Gholson, R. (1985). Student achievement and cocurricular activity participation. NASSP Bulletin, 69, 17-20.

Goldman, R. D., & Slaughter, R. E. (1976). Why college grade point average is difficult to predict. Journal of Educational Psychology, 68, 9-14.

Goslin, David A. (1963). The search for ability: Standardized testing in social perspective. New York: Russell Sage Foundation.

Green, G. M. (1986). The quality of student interaction with faculty: A community college perspective. (Doctoral Dissertation, The University of Kentucky, 1986). Dissertation Abstracts International, 47, 4300.

Grossman, R. J. (1988). The great debate over institutional accountability. The College Board Review, 147, 4-6, 38-42.

Haertel, G. D., Walberg, H. J., & Weinstein, T. (1983). Psychological models of educational performance: A theoretical synthesis of constructs. Review of Educational Research, 53, 75-91.

Hanks, M. P., & Eckland B. K. (1976). Athletics and social participation in the educational process. Sociology of Education, 49, 271-294.

Hanson, G. R. (1978). Evaluating program effectiveness. (New Direction for Student Services No. 1). San Francisco: Jossey-Bass.

Harvancik, M. J., & Golsan, G. (1986). Academic success and participation in high school extracurricular activities--Is there a relationship? Paper presented at the annual convention of the American Psychology Association, Washington, D.C. (ERIC Document Reproduction Service No. ED 273 887).

Hedgpeth, W. D. (1981). A comparison among students' extracurricular involvement, school attendance, grade point average and other selected variables as measured in four urban high schools in Texas. Dissertation Abstracts International, 42, 2400. (University Microfilms No. AD 681-27383).

Heller, S. (1988). General-education reform should stress how students learn, report says. The Chronicle of Higher Education, 34 (13), A11, A14.

Hinkle, D. E., Wiersma, W. & Jurs, S. G. (1979). Applied statistics for the social science. Chicago: Rand McNally College Publishing Company.

Holland, A., & Andre T. (1987). Participation in extracurricular activities in secondary school: What is known, what needs to be known? Review of Educational Research, 57, 437-466.

Holland, J. L., & Nichols, R. C. (1964). Prediction of academic and extracurricular achievement in college. Journal of Educational Psychology, 55, 55-65.

Holland, J. L., & Richards, J. M. (1965). Academic and non academic accomplishment: Correlated or uncorrelated? Journal of Educational Psychology, 56, 165-174.

Hood, A. B. (1984). Student development: Does participation affect growth? ACU-I Bulletin, 52, 16-19.

Hunter, J. C. (1977). A comparison of the academic achievement of sophomores living in university residence halls with that of sophomores living off campus in selected state universities in North Carolina. (Doctoral dissertation, Duke University, 1977). Dissertation Abstracts International 38, 40604A.

Joekel, R. G. (1985). Students activities and academic eligibility requirements. NASSP Bulletin, 69, 3-9.

Johnson, J. T. (1986). A cononical correlational analysis of the College Outcomes Measures Program and other variables used for admission and certification in teacher education programs in Mississippi. Dissertation Abstracts International, 47, 3005. (University Microfilms No. 86-26453).

Kaufman, M. A. (1987). An investigation of the influences of college students' goals on quality of effort and growth during the freshman year. (Doctoral Dissertation, Virginia Polytechnic Institute and State University, 1987). Dissertation Abstracts International, 48, 387.

Keith, T. Z. (1982). Time spent on homework and high school grades: A large sample path analysis. Journal of Educational Psychology, 74, 248-253.

Kitabchi, G. (1985, March). Multivariate analyses of urban community college student performance on the ACT college outcomes measures program test. A paper presented at the Annual Meeting of the American Educational Research Association, Chicago, IL. (ERIC Document Reproduction Service No. ED 261 091).

Kolb, D. A. (1984). Experimental learning. Englewood Cliffs, NJ: Prentice Hall.

Kuh, G. D., Bean, J. P., Bradley, R. K., Coomes, M. D., & Hunter, D. E. (1986). Changes in research on college students published in selected journals between 1969 and 1983. The Review of Higher Education, 9, 177-192.

Lall, G. R., & Lall B. M. (1983). Ways children learn. Springfield, IL: Charles C. Thomas.

Landers, D. M., Feltz, D. L., Obermeier, G. E., & Brouse, T. R. (1978). Socialization via interscholastic athletics: Its effects on educational attainment. Research Quarterly, 49, 475-483.

Lavin, D. E. (1965). The prediction of academic performance. New York, NY: Russell Sage Foundation.

Lehman, A. E. (Ed.). (1986a). Peterson's annual guide to undergraduate study: Two-year colleges 1987. Princeton, NJ: Peterson's Guides.

Lehman, A. E. (Ed.). (1986b). Peterson's guide to colleges in the midwest. Princeton, NJ: Peterson's Guides.

Leinhardt, G. (1980). Modeling and measuring educational treatment in evaluation. Review of Educational Research, 50, 393-420.

Lewin, K. (1936). Principles of topological psychology. New York: McGraw-Hill.

Lincoln, Y. S. & others. (1983). Expectancy theory as a predictor of grade point averages, satisfaction and participation in the college environment. Paper presented at annual meeting of the American Association for the Study of Higher Education, Washington, DC. (ERIC Document Reproduction Service No. ED 232 608).

Lindquist, J. (1981). Quality education is lifelong development for each. In T. M. Stauffer (Ed.), Quality-higher educations principal challenge (pp. 14-23). Washington, DC: American Council on Education.

Marano, R. (1985). Student activities. NASSP Bulletin, 69, 1-2.

McBride, A. (1980). The perceived effects of discontinued extraclass activities on public schools. Dissertation Abstracts International, 41, 5.

McConatha, J. T., & others. (1986, November). Competency based exams and older students. A paper presented at the Annual Meeting of the Mid-South Educational Research Association, Memphis, TN. (ERIC Document Reproduction Service No. ED 287 885).

McLaughlin, B. (1986). Advising college athletes in the 1980s: A higher education abstracts review. NACADA Journal, 6, 31-38.

Merante, J. A. (1983). Predicting student success in college: What does research say. NASSP Bulletin, 67 (460), 41-46.

Meyer, R. E. (1984). Are there seven kinds of intelligence? Review of Education, 10, 3-4.

Michael, J. J., Nadson, J. S., & Michael, W. B. (1983). Student background and quality of effort correlates of reported grades, opinions about college, and perceptions of magnitudes of cognitive and affective attainment by students in a public university. Educational and Psychological Measurement, 43, 495-507.

Miller, J. K. (1985). Review of College Student Experiences. In J. Mitchell Jr., (Ed.), The ninth mental measurements yearbook (Vol. 1, pp. 366-367). Lincoln, NE: The University of Nebraska Press.

Miller, T. K., & Jones, J. D. (1981). Out-of-class activities in Chickering, A.W. & Associates. The Modern American College. San Francisco: Jossey-Bass Publishers.

Mines, R. A. (1985). Measurement issues in evaluating student development programs. Journal of College Student Personnel, 26, 101-106.

Mitchell, J. V. (Ed.). (1985). The ninth mental measurements yearbook (Vol. 1). Lincoln, NE: The University of Nebraska Press.

Moos, R. H. (1976). The human context: environmental determinants of behavior. New York: John Wiley and Sons.

Moos, R. H. and Gerst, M. S. (1974). University residence environmental scale manual. Palo Alto, California: Consulting Psychologists Press.

Morrell, S., & Morrell, R. (1986). Learning through student activities. In P.S. Brevik (Ed.), Managing programs for learning outside the classroom, (New Directions for Higher Education No. 56) (pp. 77-88). San Francisco: Jossey-Bass.

National Institute of Education. Study Group on the Conditions of Excellence in American Higher Education. (1984, October). Involvement in learning: Realizing the potential of American higher education. Washington, DC: Government Printing Office.

Nettles, M., Thoeny, A. R., & Gosman, E. (1985). A comparative analysis of the predictors of black and white students' academic achievement in college: a case for expanding admissions policies to include quality of the college experience. A paper presented at the Annual Meeting of the American Association for the Study of Higher Education. (ERIC Document Reproduction Service No. ED 259 625).

Nettles, M. T., Thoeny, A. R., & Gosman, E. J. (1986). Comparative and predictive analyses of black and white students' college and achievement and experiences. Journal of High Education, 57, 289-318.

Northwest Junior College. (1987). Bulletin-handbook 1987-1989. Northwest Junior College, Phil Campbell, Alabama.

Norusis, M. J. (1988). SPSS-X introductory statistics guide. Chicago: SPSS, Inc.

Nover, Michael L. (1981). Student involvement and the psychological experience of high school. Paper presented to the Annual Convention of the American Psychological Association. (ERIC Document Reproduction Service No. ED 210 613).

Otto, L. B. (1975). Extracurricular activities in the educational attainment process. Rural Sociology, 40, 162-174.

Pace, C. R. (1979). Measuring outcomes of college. San Francisco: Jossey-Bass.

Pace, C. R. (1983). College Student Experiences (2nd ed). Los Angeles: UCLA Center for the Study of Education.

Pace, C. R. (1984). Measuring the quality of college student experiences: an account of the development and use of the College Student Experiences questionnaire. Los Angeles: UCLA Center for the Study of Evaluation.

Pace, C. R. (1985). Perspectives and problems in student outcomes research. In Peter T. Ewell (Ed.), Assessing Educational Outcomes Re-

search. (New Directions for Institutional Research No. 47) (pp. 7-18). San Francisco: Jossey-Bass.

Pace, C. R. (1987). CSEQ: Test manual & norms: College Student Experiences questionnaire. Los Angeles: UCLA Center for Study and Evaluation.

Pace, C. R., & Friedlander, J. (1982). The meaning of response categories: How often is "occasionally", "often", and "very often"? Research in Higher Education, 17, 269-281.

Palmer, S. E. (1988). Accreditors told to seek evidence that colleges train students well. The Chronicale of Higher Education, 34 (12), A14.

Parkerson, J. A., Lomox, R. G., Schiller, D. P., & Walborg, H. J. (1984). Exploring casual models of educational achievement. Journal of Education Psychology, 76, 638-646.

Pascarella, E. T. (1985a). College environmental influences on learning and cognitive development: A critical review and synthesis. In J.C. Smart (Ed.), Higher Education: Handbook of Theory and Research (Vol. 1, pp. 1-61). New York: Agathon.

Pascarella, E. T. (1985b). Students affective development within the college environment. Journal of Higher Education, 56, 640-663.

Pascarella, E. T., & Terenzini P. T. (1978). Student-faculty informal relationship and freshmen educational outcomes. Journal of Educational Research, 71, 183-189.

Pascarella, E. T., Terenzini, P. T., & Hibel, J. (1978). Student-faculty interactional settings and their relationship to predicted academic performance. Journal of Higher Education, 49, 450-63.

Pascarella, E. T., Duby, P. B., & Iverson, B. K. (1982). A test and reconceptualization of a theoretical model of college withdrawal in a commuter setting. Sociology of Education, 56, 88-100.

Pavik, F. L. (1968). The relationship of non-academic high school variables to college achievement and participation in selected extracurricular activities. (Doctoral Dissertation, The University of North Dakota, 1968). Dissertation Abstracts International, 29, 2968A.

Perry, W. G. (1968). Forms of intellectual and ethical development in the college years--A scheme. New York: Holt, Reinhart and Winston, Inc.

Purdy, D. A., Eitzen, D. S., & Hufnagel, R. (1982). Are athletes also students: The educational attainment of college athletes. Social Problems, 29, 439-448.

Ratcliff, J. L. (1987, September 30). The effect of differential coursework on student learning: Progress report - Development of a cluster analytic model. Ames, IA: Iowa State University, College of Education.

Rehberg, Richard A., & Schafer, W. E. (1968). Participation in interscholastic athletics and college expectation. American Journal of Sociology, 73, 732-740.

Reitzes, D. C., & Mutran, E. (1980). Significant others and self conceptions: Factors influencing educational expectations and academic performance. Sociology of Education, 53, 21-32.

Richards, J., Jr., Holland, J. L., & Lutz, S. W. (1967a). Assessment of student accomplishment in college. The Journal of College Student Personnel, 8, 360-365.

Richards, J., Jr., Holland, J. L., & Lutz, S. W. (1967b). Prediction of student accomplishment in college. Journal of Educational Psychology, 58, 343-355.

Riker, H. C. (1981). Residential learning. In A.W. Chickering & Associates, The modern American college (pp. 672-688). San Francisco: Jossey-Bass Publishers.

Rock, D. A., Centro, J. A., & Linn, R. L. (1970). Relationships between college characteristics and student achievement. American Educational Research Journal, 7, 109-121.

Salem, P. W., & Williams, M. L. (1981). Student network factors and classroom performance. Paper presented at the Annual Meeting of the International Communication Association. (ERIC Document Reproduction Service No. ED 206 013).

Schafer, W. E., & Armer, M. (1968). Athletes are not inferior students. Transaction, 6, 21-26, 61-62.

Schneider, F. W., & Green, J. E. (1977). Need for affiliation and sex as moderators of the relationship between need for achievement and academic performance. Journal of School Psychology, 15, 269-276.

Schomberg, S. F., Hendel, D. D., & Bassett, C. L. (1981, May). Using the college outcomes measurement project to measure college outcomes. Paper presented at the Annual Forum of the Association for Institutional Research, Minneapolis, MN. (ERIC Document Reproduction Service No. ED 205 121)

Scott, E. S., & Damco, S. B. (1982). Predictors of interracial contact for high school and university students. Paper presented at the Annual Meeting of the American Research Association, New York.

Shaw, S. M. (1981). The relationship between participation in student activities and scholastic achievement in four selected Mississippi high schools. Dissertation Abstracts International, 42, 2960A.

Shucker, H. B. (1987). A study of student involvement in certain extracurricular activities and its relationship to retention and grade point averages of freshmen at a church-related college. Dissertation Abstract International, 48, 2001. (University Microfilms No. 87-24873).

Snyder, E. E. (1969). A longitudinal analysis of the relationship between high school student values, social participation, and educational-occupational achievement. Sociology of Education, 42, 261-270.

Solomon, L. C. (Ed.). (1981). A multidimensional approach to quality. In T.M. Stauffer, T. M. (Ed.), Quality-higher education's principal challenge. Washington, DC: American Council of Education.

Solomon, L. C., & Taubman P. J. (Eds.). (1983). Does college matter? New York: Academic Press.

Sowa, C. J., & Gressard, C. F. (1983). Athletic participation: Its relationship to student development. Journal of College Student Personnel, 24, 234-239.

Spady, W. G. (1970). Lament for the letterman: Effects of peer status and extracurricular activities on goals and achievement. American Journal of Sociology, 75, 680-702.

Stage, F. K., & Richardson, R. C. (1985). Motivation within the Tinto model of college withdrawal. Paper presented at the Annual Meeting of the Association for the Study of Higher Education, Chicago.

Steele, J. M. (1988, May). Using measures of student outcomes and growth to improve college programs. Paper presented at the 1988 National Forum of the Association for Institutional Research, Phoenix, AZ.

Stroughn, C., Jr., & Stroughn, B. L. (Eds.). (1985). Lovejoy's college guide (17th ed.). New York: Monarch Press.

Stuaffer, T. M. (Ed.). (1981). Quality-higher educations principal challenge. Washington, DC: American Council of Education.

Time for results: The governors' 1991 report on education. Text reported in The governors' report on education: Text of the section on college quality. (1986). Chronicle of Higher Education, 33 (1), 79-84.

Tinto, V. (1987). Leaving college: Rethinking the causes and cares of student attrition. Chicago: The University of Chicago Press.

Wagstaff, R., & Mahmoudi, H. (1976). Relation of study behaviors and employment to academic performance. Psychological Reports, 38, 380-382.

Walberg, H. J. & Weinstein, T. (1982). The production of achievement and attitude in high school social studies. Journal of Education Research, 75, 285-293.

Waldo, M. (1986). Academic achievement and retention as related to students' personal and social adjustments in university residence halls. The Journal of College and University Student Housing, 16, 19-23.

Ward, E. F., & Pringle, R. A. (1981). The ACT college outcome measurement project: A new tool for summative evaluation of non traditional post secondary programs? Washington, D.C.: U.S. Office of Education (ERIC Document Reproduction Service No. ED 217 072).

Warren, J. R. (Ed.). (1983). Meeting the new demand for standards (pp. 1-7). New Directions for Higher Education: Editors notes. San Francisco: Jossey-Bass.

Webb, E. M. (1987). Retention and excellence through student involvement: A leadership role for student affairs. NASPA Journal, 24, 4, 6-11.

Whitley, J. (1980). Rethinking college responsibilities and value. In E. Greenberg, K. M. O'Donnell, & W. Berquist (Eds.), Extracurricular influences on the moral development of college students. (New Directions for Higher Education No. 31) (pp. 45-49). San Francisco: Jossey-Bass.

Willingham, W. W. (1985). Success in college: The role of personnel qualities and academic ability. New York: College Board Publications.

Wilson, R. C., Goff, J. G., Dienst, E. R. & Barry, J. L. (1975). College professors and their impact on students. New York: Wiley & Sons.

Winston, R., Jr., Hutson, G. S., & McCaffrey, S. S. (1980). Environmental influences on fraternity achievement. Journal of College Student Personnel, 21, 449-455.

Wolfle, L. M. (1980a). Strategies of path analysis. American Research Journal, 17, 183-209.

Wolfle, L. M. (1980b). The enduring effects of education on verbal skills. Sociology of Education, 53, 104-114.

Wolter, A. (1986). Gender and campus race differences in black student academic performance, racial attitudes and college satisfaction. Atlanta: Southern Education Foundation.

Wright, J. J. (1966). The effect of perceived stress on academic achievement when family income level and self-concept are taken into account. Journal of College Student Personnel, 7, 113-117.

# ACKNOWLEDGMENTS

This dissertation is dedicated to my wife, Sue, and my son and daughter, Chris and Sarah. During these last few years, we've had less time for family relationships and I appreciate their understanding, love, and support very much.

Others have helped make this doctoral work possible. I am grateful to Arndt Braaten and Bill Hamm for giving me their permission and support to undertake the doctoral program. I am especially grateful to Keith Kramer, my colleague who has willingly covered the dean of students office at times I've been away from the campus.

Dr. Larry Ebbers, my major professor, has always been a source of needed assistance, support, and encouragement for which I'm deeply grateful. I'm thankful for committee members, Dr. Brent Bruton, Dr. William Miller, Dr. Anton Netusil and Dr. Dan Robinson who were willing to give helpful assistance when needed.

Finally, I'd like to thank others who've been helpful in one way or another: Cathy Strate, Ardyth Brederson and Maxine Pint. Without everyone's help, support, and understanding this dissertation would not have been possible,

# APPENDIX A: COVER LETTER-ADMINISTRATION FOR THE COLLEGE STUDENT EXPERIENCES QUESTIONNAIRE

## COVER LETTER

## ADMINISTRATION OF THE

## COLLEGE STUDENT EXPERIENCES QUESTIONNAIRE

Thank you for completing the College Student Experiences questionnaire. Your responses are for research purposes and your identity will be confidential. Your social security number will be used to match information from this questionnaire with other research of which you have been a part.

On the bottom of the back page enter your social security number in the space under "OTHER ID# . . . (If you have no social security number, use your school identification number).

Next, fill in the grid in the lower left hand corner corresponding to the number above it.

Now turn to the front of the questionnaire, read the directions, open and begin.

# APPENDIX B: INITIAL LETTER TO PARTICIPATING INSTITUTIONS

February 29, 1988

Dr. Paul Anonymous
Director of Institutional Research
Humanities 322
University of Everywhere
Anyplace, USA

Dear Dr. Anonymous:

Thank you for your positive response to my request for your participation in the study I'm conducting to determine the relationship between student involvement (quality of effort) and cognitive outcomes. As we've discussed, quality of effort is measured by the College Student Experiences Questionnaire and cognitive outcomes by score gains on the ACT COMP.

From participating in this study, you will have the following benefits:

1) A measure of "quality of effort" in 14 areas for your participants.
2) Student assessment of the degree of emphasis placed on 8 aspects of the college environment. (not a part of my study)
3) Student self-reported gains in several cognitive and affective areas. (not a part of my study)
4) The rest of my study.

From the University of Everywhere, I would expect the following scores for each student: COMP pre-test, COMP post-test and results on the CSE. The costs for the CSE which you have agreed to assume are:

| | |
|---|---|
| Institutional participation | 175.00 |
| Questionnaire | .40 |
| Scoring per questionnaire | 1.00 |
| New User Norms (recommended by Pace) | 12.00 |

Additional information included in this mailing is:

1) The College Student Experience Questionnaire
2) An order form
3) A brief description of the study

After we talked today, I had a conversation with Robert Pace. The new edition of the CSE has a grid on the back that will allow for entry of a nine digit number. (You may have to ask for this edition.) This would accommodate the matching of scores using a social security number.

Dr. Pace indicated that you would receive a tape and complete print-out of all data with means and standard deviations. I would get "my" data from you. The simplest would probably be sending me the tape or, if you chose, you could have all the data sent to me.

From our conversation, I understand you will probably administer the CSE around the beginning of April. Your estimate is that about 100 students are likely to complete the COMP and the CSE. I trust this letter will be helpful. Please contact me with any questions at 515-582-8160. I look forward to working with you!

Sincerely,

Roger Hadley

# APPENDIX C: SECOND LETTER TO PARTICIPATING INSTITUTIONS

March 17, 1988

Dr. Paul Anonymous
Director of Institutional Research
Humanities 322
University of Everywhere
Anyplace, USA

Dear Dr. Anonymous:

Once again, I'm very pleased to have your participation in the study exploring the relationship between student development and cognitive outcomes. I very much appreciate your effort to get the best possible response.

Enclosed is an administration instruction sheet to be used with the College Student Experiences questionnaire. By now you've probably ordered the CSE. If not, you can do this quickly by phone by calling (213) 825-4170 or (213) 206-1502.

Please contact me regarding any questions you may have (515) 582-8160. Thank you.

Sincerely,

Roger Hadley

# APPENDIX D: THIRD LETTER TO PARTICIPATING INSTITUTIONS

April 26, 1988

Dr. Paul Anonymous
Director of Institutional Research
Humanities 322
University of Everywhere
Anyplace, USA

Dear Dr. Anonymous:

Once again I appreciate your participation in the study to determine the relationship between "student effort" and "cognitive outcomes." I hope it is going well for you.

The preference I have for data and data format is listed here.

1) Data - freshman COMP, graduating COMP and College Student Experiences(CSE) scores for each student, preferably identified by social security number.
2) Format - preferably tape. Both ACT (Joe Steele 319-337-1121) and C. Robert Pace (213) 825-4170 or 213-206-1502) for the CSE can supply results on tape.
3) Please send the tapes to:
   Dean Roger Hadley
   Waldorf College
   Forest City, Iowa 50436

You will need to send a release to ACT or C. Robert Pace if you ask them to send tapes directly to me.

Joe Steele at ACT has offered to assist if you need help with furnishing the COMP data. Please call me if I can be of assistance in any way (515) 582-8160).

Thank you.

Sincerely,

Roger Hadley

# APPENDIX E: FOURTH LETTER TO PARTICIPATING INSTITUTIONS

August 8, 1988

Dr. Paul Anonymous
Director of Institutional Research
Humanities 322
University of Everywhere
Anyplace, USA

Dear Dr. Anonymous:

Once again I express my appreciation for your participation in the study of involvement as a predictor of cognitive outcomes. I have especially appreciated your efforts to get as high a student participation rate as possible. I apologize for telling you to send the CSE questionnaires directly to UCLA. I didn't realize they used a scoring service. (Scoring service address was included in the mailing from UCLA).

I now would like to kindly request information that will help describe your institutional setting, sample and sample selection. Institutions are not being compared and neither institution nor students will be named in the study.

I appreciate this assistance during your busy schedule. Please answer these questions in the easiest way possible. If you have a brochure that answers most of question 6, just include it and add any comments to complete your response. If you don't know the answer to a question, say so, approximate if you can. Call me (515) 582-8160) if I can clarify anything. Please return your responses in the enclosed envelope.

1) How many students were in the population from which the initial COMP sample was selected? How many were in the sample?
2) How was the sample selected (random, stratified, other)? Do you have any information which indicates how representative the sample was of the population from which it was drawn?
3) How many took the COMP as freshmen?

4) How many of those who took the COMP as freshmen were in college when the COMP was administered last spring? How many of those took the COMP? The CSE?

5) How was the CSE administered (typical test administration via the mail?). Did you do any follow-up(s)? If so, one? Two?

6) Could you please describe your institution and setting (enrollment in 87-88, racial composition, age distribution, percent living on campus, selectivity, size of community, etc.)

I have returned to Forest City and the work at Waldorf College after a month on the campus of Iowa State University. I look forward to getting the data from all participating institutions. You should get CSE results directly from UCLA. My analysis will probably be completed in late fall.

Best wishes in the upcoming college year!

Sincerely,

Roger Hadley

# APPENDIX F: 1987 REVISED CONCORDANCE TABLE OF ACT COMPOSITE SCORES AND OBJECTIVE TEST

1987 Revised Concordance Table
of ACT Composite Scores and COMP Objective Test
Total Score Equivalent
(Based on 20,794 Entering Freshmen)

Note: It is appropriate to use this table only for estimating the COMP Mean Total Score that a sample of Sophomores or Seniors might have obtained had they taken the COMP Objective Test of Composite Examination instead of ACT Assessment as High School Seniors or entering college Freshmen. This table is not appropriate to use to estimate individual student growth.

| ACT Composite Scores | Equivalent COMP Total Scores |
|---|---|
| 4 | 126 |
| 5 | 129 |
| 6 | 131 |
| 7 | 134 |
| 8 | 137 |
| 9 | 141 |
| 10 | 145 |
| 11 | 147 |
| 12 | 151 |
| 13 | 154 |
| 14 | 157 |
| 15 | 160 |
| 16 | 163 |
| 17 | 166 |
| 18 | 169 |
| 19 | 172 |
| 20 | 175 |
| 21 | 178 |
| 22 | 181 |
| 23 | 184 |
| 24 | 187 |
| 25 | 190 |
| 26 | 194 |
| 27 | 197 |

| | |
|---|---|
| 28 | 201 |
| 29 | 205 |
| 30 | 209 |
| 31 | 213 |
| 32 | 218 |
| 33 | 221 |
| 34 | 226 |

-- Conventions: First exclude all cases age 24 or older with ACT scores.
-- Pre- or Post-Test scores of 130 or below are viewed as invalid.
-- Post- or Pre-Test scores 20 points or more below ACT prediction are viewed as invalid.
-- In longitudinal studies where students completed the Objective Test on entry, Post-Test scores showing losses of -10 or greater are viewed as invalid.
-- Gain scores of greater than 40 points are viewed as invalid. For the latter cases, one could remove the gain and substitute gain based on the ACT estimated Pre-Test.

# APPENDIX G: FACTOR ANALYSIS OF SOPH/SENIOR COMP SCORES

Factor analysis of soph/senior COMP scores

**Initial Statistics**

| Variable | Communality | Factor | Eigenvalue | Pct of Var | Cum Pct |
|---|---|---|---|---|---|
| POSTFSI | 1.00000 | 1 | 3.79340 | 63.2 | 63.2 |
| POSTST | 1.00000 | 2 | .68275 | 11.4 | 74.6 |
| POSTA | 1.00000 | 3 | .55362 | 9.2 | 83.8 |
| POSTCOMM | 1.00000 | 4 | .49807 | 8.3 | 92.1 |
| POSTPS | 1.00000 | 5 | .44526 | 7.4 | 99.6 |
| POSTCV | 1.00000 | 6 | .02690 | .4 | 100.0 |

PC[a] extracted 5 factors

**Factor Matrix**

| Variable | Factor 1 | Factor 2 | Factor 3 | Factor 4 | Factor 5 |
|---|---|---|---|---|---|
| POSTFSI | .75110 | -.57708 | .18376 | .24564 | .06390 |
| POSTST | .79284 | .40032 | -.33692 | .14847 | .26537 |
| POSTA | .81727 | .10261 | .08987 | -.42428 | -.36006 |
| POSTCOMM | .83055 | -.13968 | .04933 | -.36250 | .38985 |
| POSTPS | .82913 | -.15283 | -.41070 | .17018 | -.29218 |
| POSTCV | .74527 | .36890 | .47661 | .27442 | -.06128 |

**Final Statistics**

| Variable | Communality | Factor | Eigenvalue | Pct of Var | Cum Pct |
|---|---|---|---|---|---|
| POSTFSI | .99537 | 1 | 3.79340 | 63.2 | 63.2 |
| POSTST | .99483 | 2 | .68275 | 11.4 | 74.6 |
| POSTA | .99620 | 3 | .55362 | 9.2 | 83.8 |
| POSTCOMM | .99516 | 4 | .49807 | 8.3 | 92.1 |
| POSTPS | .99381 | 5 | .44526 | 7.4 | 99.6 |
| POSTCV | .99773 | | | | |

[a]PC is the principal component analysis.

# APPENDIX H: CORRELATION MATRIX FOR VARIABLES OF INTEREST

Correlation matrix for variables of interest

| | Variables | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Fresh | Cocurr | | Soph/Sr | Interactions | | |
| Variables | Age | Sex | SES1 | SES2 | Inst | Time | COMP | Act. | Athletics | COMP | Athsex | Athses1 | Clubses1 |
| Age | 1.000 | -.110 | .273 | -.242 | -.303 | -.177 | -.271 | -.261 | -.109 | -.206 | -.189 | .101 | .074 |
| | .999 | .166 | .007 | .015 | .003 | .058 | .007 | .010 | .169 | .033 | .046 | .187 | .257 |
| Sex | -.110 | 1.000 | -.061 | .059 | -.133 | .115 | -.082 | .105 | -.238 | -.089 | .527 | -.189 | -.083 |
| | .166 | .999 | .294 | .302 | .121 | .154 | .234 | .178 | .017 | .215 | .000 | .047 | .231 |
| SES1 | .273 | -.061 | 1.000 | -.607 | -.487 | -.120 | -.152 | -.282 | .092 | -.433 | -.004 | .846 | .849 |
| | .007 | .294 | .999 | .000 | .000 | .144 | .090 | .006 | .209 | .000 | .487 | .000 | .000 |
| SES2 | -.242 | .059 | -.607 | 1.000 | .548 | .244 | .131 | .175 | -.142 | .306 | -.014 | -.513 | -.515 |
| | .015 | .121 | .000 | .000 | .999 | .041 | .055 | .385 | .252 | .000 | .078 | .001 | .000 |
| Inst | -.303 | -.133 | -.487 | .548 | 1.000 | .195 | .180 | .033 | -.076 | .449 | -.160 | -.348 | -.420 |
| | .003 | .121 | .000 | .000 | .999 | .041 | .055 | .385 | .252 | .000 | .078 | .001 | .000 |
| Time | -.177 | .115 | -.120 | .244 | .195 | 1.000 | -.073 | .070 | -.086 | -.100 | .036 | -.105 | -.050 |
| | .058 | .154 | .144 | .014 | .041 | .999 | .259 | .268 | .223 | .188 | .377 | .177 | .328 |
| Fresh COMP | -.271 | -.082 | -.152 | .131 | .180 | -.073 | 1.000 | .052 | -.140 | .605 | -.178 | -.172 | -.160 |
| | .007 | .234 | .090 | .123 | .055 | .259 | .999 | .324 | .107 | .000 | .057 | .063 | .078 |
| Cocurr. Act. | -.261 | .105 | -.282 | .175 | .033 | .070 | .052 | 1.000 | .239 | .043 | .238 | -.131 | .099 |
| | .010 | .178 | .006 | .061 | .385 | .268 | .324 | .999 | .016 | .351 | .017 | .124 | .192 |
| Athletics | -.109 | -.238 | .092 | -.142 | -.076 | -.086 | -.140 | .239 | 1.000 | -.200 | .653 | .501 | .211 |
| | .169 | .017 | .209 | .105 | .252 | .223 | .107 | .016 | .999 | .037 | .000 | .000 | .030 |
| Soph/Sr | -.206 | -.089 | -.433 | .306 | .449 | -.100 | .605 | .043 | -.200 | 1.000 | -.253 | .367 | .429 |
| COMP | .033 | .215 | .000 | .003 | .000 | .188 | .000 | .351 | .037 | .999 | .012 | .000 | .000 |
| Athsex | -.189 | .527 | -.004 | -.014 | -.160 | .036 | -.178 | .238 | .653 | -.253 | 1.000 | .245 | .079 |
| | .046 | .000 | .487 | .451 | .078 | .377 | .057 | .017 | .000 | .012 | .999 | .014 | .242 |
| Athses1 | .101 | -.189 | .846 | -.513 | -.348 | -.105 | -.172 | -.131 | .501 | -.367 | .245 | 1.000 | .807 |
| | .187 | .047 | .000 | .000 | .001 | .177 | .063 | .124 | .000 | .000 | .014 | .999 | .000 |
| Clubses1 | .074 | -.083 | .849 | -.515 | -.420 | -.050 | -.160 | .099 | .211 | -.452 | .079 | .807 | 1.000 |
| | .257 | .231 | .000 | .000 | .000 | .328 | .078 | .192 | .030 | .000 | .242 | .000 | .999 |

Note. In each pair of numbers in the grid, the upper number is the correlation and the lower number is the 1 tailed level of significance.

# APPENDIX I: MEAN DIFFERENCES IN TEST SCORES BY INSTITUTION

Mean differences in test scores by institutions

| Test | Institution 0 | 1 | 2 | 3 |
|---|---|---|---|---|
| ACT | 17.8 | 20.1 | 22.2 | 23.0 |
| Freshman COMP | 176 | 169 | 181 | 181 |
| Soph/senior COMP | 180 | 184 | 198 | 195 |

# APPENDIX J: CROSS TABULATION OF SES BY INSTITUTION

Cross tabulation of SES by institution

| SES[a] | Institution 0 | 1 | 2 | 3 |
|---|---|---|---|---|
| Neither | 16 | 21 | 3 | 4 |
| Both | 0 | 2 | 9 | 9 |
| Either | 2 | 11 | 3 | 3 |

[a]SES is indicated by parents who are college graduates

# APPENDIX K: REGRESSION ANALYSES

| Sample | N | Findings | | | | | |
|---|---|---|---|---|---|---|---|
| | | Stepwise[a] | | | Enter | | |
| | | Number of Regression Variables | Order of Entry | $R^2$ | Significant Block(s) | Significant Variables | $R^2$ |
| All | 82 | 16 | COMP, CLUBSES1, INST, ATHSEX | 54 | Background | COMP, TIME, INST, SES1, ATHSES1,FACSES1 | 64 |
| | | 8 | COMP, CLUBSSES1 | 51 | Background Interaction | COMP. SES1, CLUBSES1, ATHSES1 | 58 |
| 4 year | 66 | 8 | COMP, CLUBSES1, ATHSEX | 52 | All | COMP, SEX, CLUBSES1, ATHSES1 | 60 |
| All with ACT | 66 | 10 | ACT, ATH, SES1, COMP, FACSES1 | 67 | All | ACT, COMP, FACSES1, SES1, CLUBSES1, SEX | 72 |
| | | 6 | ACT, COMP, ATH, SES1, FACSES1 | 68 | All | ACT, SES1, ATH, COMP, FACSES1 | 70 |
| | | 5 | ACT, ATH, SES1, COMP, FACSES1[b] | 70 | | | |
| 4 year with ACT | 56 | 5 | COMP, SES1, ATH, ACT | 62 | | | |

Note: SES1 = Neither parent a college graduate; CLUBS - Cocurricular activities; FAC - Faculty-student interaction; ATH = Athletics; INST = Institution; CLUBSES1 = Interaction of cocurricular activities and SES1.

[a]The criteria for entry for stepwise and enter procedures was $p < .10$.

[b]The interaction of athletics and sex was a predictor when substituted for athletics.

# APPENDIX L: MEANS AND STANDARD DEVIATIONS FOR COMP SUBTESTS

Means and standard deviations for COMP subtests

| Subtest | Statistic | | | |
|---|---|---|---|---|
| | Mean | Standard Deviation | Minimum | Maximum |
| Freshman Testing | | | | |
| Functioning in Social Institutions | 58.5 | 5.5 | 46 | 70 |
| Use of Science and Technology | 59.2 | 6.5 | 46 | 74 |
| Use of Arts | 57.3 | 6.3 | 42 | 71 |
| Communicating | 47.9 | 5.7 | 35 | 66 |
| Problem Solving | 72.3 | 7.1 | 54 | 88 |
| Clarification of Values | 55.0 | 6.0 | 41 | 71 |
| Soph/Senior Testing | | | | |
| Functioning in Social Institutions | 61.9 | 5.8 | 46 | 75 |
| Use of Science and Technology | 64.7 | 5.6 | 46 | 78 |
| Use of Arts | 61.3 | 5.5 | 48 | 75 |
| Communicating | 53.0 | 6.5 | 37 | 69 |
| Problem Solving | 77.0 | 6.2 | 61 | 88 |
| Clarification of Values | 58.4 | 5.0 | 46 | 75 |