THE EFFECTS OF INDIVIDUALLY PRESCRIBED INSTRUC-

TION ON ACHIEVEMENT, SELF-CONCEPT AND STUDY

ORIENTATION AMONG ENGINEERING STUDENTS

ENROLLED IN ENGLISH COMPOSITION

AT OKLAHOMA STATE UNIVERSITY

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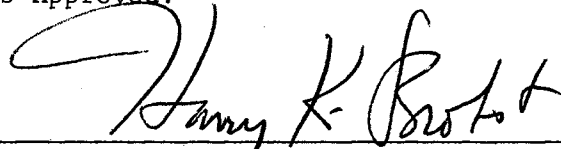Southern Baptist Theological Seminary
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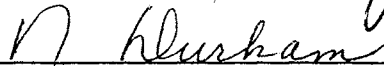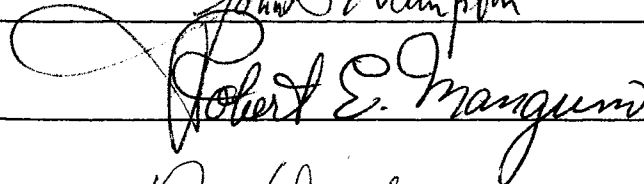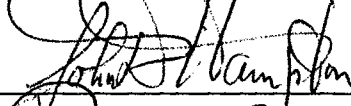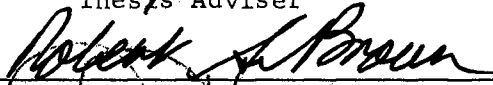DOCTOR OF EDUCATION
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PREFACE

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To those I love, my wife and daughters; my parents, Mr. and Mrs. Milburn E. Minars; and my parents-in-law, Mr. and Mrs. Ralph E. Barby, I dedicate this effort with the hope that they are as grateful as I for the privilege of doing it. My dedication of work to their honor is with the desire to have fulfilled the true meaning of Philippians 4:13 and to the glory of the true Lord of Life.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

Academic attrition among college students has been viewed with

alarm by both educators and laymen. Attrition from college has not

only prevented students from completing their educational programs, but

it has tended to reduce the enrollment in professional schools. Many

of the professional schools in our nation have suffered serious declines

in enrollment and in the number of degrees granted (OSU, 1971). Such

professional schools fall short of providing enough graduates to meet

the demands of our society. Schools of engineering are among those pro-

fessional schools experiencing a decline in enrollment as a result of

the mortality of students and at a time when increased enrollment is

needed to meet the demand for trained engineers.

Three major studies (McNelly, 1938; Iffert, 1958; Summerskill,

1962) seem to indicate that the attrition rate has remained rather

constant for the past several decades. The earliest of these studies

of student mortality was published in 1938. McNelly's study reports

that approximately 45 per cent of the entering freshmen never achieve

a baccalaureate degree. In this study, the dismissal for failure in

academic work was cited as the principal known cause for student attri-

tion. This factor accounted for 18.4 per cent of the withdrawals.

One of the most comprehensive investigations of student attrition

in higher education was reported by Iffert (1957) in a United States

government report. This nationwide survey of approximately 14,000 undergraduate students in 147 colleges revealed that 40 per cent of the freshmen entering college never graduate.

The third major study of attrition from college was made by Summerskill (1962). A review of 35 different studies that cited attrition rates for classes entering colleges and universities during a forty year period was reported in this study. Median values were computed for the aggregate of these studies with the following results: median loss in four years--50 per cent; median per cent graduated in four years--37 per cent (Summerskill, 1962). Summerskill concluded that the rate of dropping out of college has not changed appreciably in the past forty years.

These studies seem to suggest that American colleges and universities, on the average, lose approximately half of their students in the four years following their initial enrollment. Thistlewaite (1963) found the greatest proportion of withdrawals to occur during the first two years of college. Elton and Rose (1967) report that while attrition from school is experienced among students in every major field of study, the largest loss seems to appear among those students enrolled in the schools of engineering. This study suggests that while many students may transfer from engineering into another major because of a change in interest, most students withdraw because of academic failure in their pre-professional courses during the first two years of their program (Elton and Rose, 1967).

The academic attrition rate among engineering students is a serious problem, demanding the attention of educators in the schools of engineering. During the past several years, researchers have

investigated factors that seemed to be related to academic achievement or failure among students in engineering (Stein, 1963; Greenfield, 1964; Bradshaw, 1965; Dickason, 1969; Lindeman, 1970). These studies investigated the relationships of both intellectual and non-intellectual variables with academic achievement. Dickason (1969) concludes that values for academic variables as predictors of success in college have been rather stable for the past 50 years. Correlations between academic or intellectual predictors and grade point averages have consistently approximated .50 (Dickason, 1969). Investigators of the relationships of non-intellectual variables and academic success (Bradshaw, 1965; Dickason, 1969; and Lindeman, 1970) have found this to be an area of great promise for educators concerned with efforts to improve the academic success of students enrolled in engineering.

Some educators have expressed an interest in lowering the attrition rate through means of changing or improving the instructional methods used within the curriculum of the schools. Such modifications are viewed with a hope of increasing the level of achievement among students and thereby lowering the percentage of students withdrawing for reasons of academic failure. Such an interest has been expressed within the College of Engineering at Oklahoma State University (OSU, 1971). This concern results from an observation that while the more academically capable students are often attracted to a major in engineering, 50 to 75 per cent may never finish their sophomore year. A mis-match of talent and interest may well account for a great portion of the withdrawals, but it may also be found that weaknesses within the instructional program may directly contribute to the attrition of students from a major in engineering (OSU, 1971).

In seeking to strengthen the instructional program in the pre-
professional courses for engineering students, with an objective of
lowering attrition, the College of Engineering at Oklahoma State Uni-
versity has initiated a program which introduces a different model of
instruction into these pre-professional courses. The present study is
designed to describe this instructional model and its effects upon the
learning experiences of students beginning their educational programs
in engineering.

Statement of the Problem

The College of Engineering at Oklahoma State University sees a
definite need to devise and implement an instructional program for en-
tering freshman engineering students that will provide increased academ-
ic success along with optimum learning efficiency (OSU, 1971). There
is also the expressed need to design a model of instruction which
allows a student the opportunity to begin a course at his own level of
competence and to proceed in the course at his own rate of learning.
Such an approach seeks to individualize instruction for these students.
It also seeks to provide the opportunity for students to master the
content of the course so that they may experience a higher level of
academic achievement.

The model of instruction designed and introduced by the College of
Engineering, in cooperation with the College of Arts and Science, at
Oklahoma State University, is an adaptation and modification of Individ-
ually Prescribed Instruction (IPI), as described by Scanlon (1966) and
Keller (1968), and aspects of Mastery Learning, which concept was in-
troduced by Carroll and transformed into a working model by Bloom

(Block, 1971). This model of instruction being introduced is a type of IPI with aspects of Mastery Learning. The model has been designated the "Pre-Professional Individually Prescribed Instruction Curriculum" and is called the PIPI program. PIPI seeks to provide entering freshman engineering students equal opportunity to be admitted to the professional school of engineering with optimum learning efficiency and a maximized probability of academic success (OSU, 1971).

Efforts to individualize instruction have a long history, with attempts to formally design models that individualize instruction dating back to the late 1880's, as noted by McLoughlin (1972), Scanlon (1965) and Mitzel (1970). Interest in individualization surged about 18 years ago when Skinner (Mitzel, 1970) advocated an educational technology built around the use of teaching machines and, later, the use of programed textbooks. Such endeavors have led to the development of innovative techniques and models aimed at the individualization of instruction. If these models are to have proper utility they need to be evaluated as to their effects upon the learning experiences of students.

This present study is concerned with the problem of a lack of information concerning the nature, procedures and effects of the PIPI model of instruction which has been introduced by the College of Engineering at Oklahoma State University. Before the model can have applicability, more information is needed about PIPI and its relationships among students. The need for more descriptive information of the PIPI model and its relationships with achievement, self-concept and study orientation has prompted the present investigation.

Purposes of the Study

The primary purpose of this study is to provide descriptive infor-
mation concerning the PIPI instructional model. This approach to
instruction was developed during 1971 for use during the 1971-72 aca-
demic year; therefore, there is a lack of information concerning the
model.

The investigation is also concerned with the purpose of describing
the relationships of PIPI with (1) achievement among students enrolled
in one course, English 1113, Freshman English Composition, which used
the PIPI model during the fall of 1971; (2) the adjustment of students
in study orientation; and (3) the self-concept of students.

Research Questions

The investigator has been concerned with questions related to the
theoretical expectations of the PIPI model of instruction. Designers
of IPI and Mastery Learning, after which PIPI has been patterned, view
these attempts to individualize instruction as providing the environ-
ment in which a student may experience an (1) increased level of aca-
demic achievement; (2) improvement of study orientation; and (3) a more
positive self-concept. PIPI has been designed with similar expectations
and objectives. In seeking information concerning the PIPI model of
instruction and its effects in achieving these expectations and objec-
tives, the following research questions were formulated:

1. Do students enrolled in sections of English 1113, Freshman
English Composition, using different models of instruction, acquire an
acceptable level of competence in writing skills, indicated by a score

of 15 or above on a 500 word essay written as the final examination in the course, and do significant relationships exist between the writing skill developed and other criterion measures?

2. Do students enrolled in sections of English 1113, Freshman English Composition, using different models of instruction, reach a superior level of achievement, indicated by the receipt of a grade of A or B for the course, and do significant relationships exist between the grade received and other criterion measures?

3. Do students enrolled in sections of English 1113, Freshman English Composition, using different models of instruction, manifest a change in study orientation, determined by the scores obtained from a pre- and post-administration of the Brown-Holtzman Survey of Study Habits and Attitudes (SSHA), and do significant relationships exist between the scores on the sub-scales of the SSHA and other criterion measures?

4. Do students enrolled in sections of English 1113, Freshman English Composition, using different models of instruction, display a positive self-concept, indicated by scores on the sub-scales of the Tennessee Self-Concept Scale (TSCS), and do significant relationships exist between the scores on the sub-scales of the TSCS and other criterion measures?

These four research questions have guided the study in seeking information that would describe the PIPI model and its relationships with achievement, self-concept and study orientation.

Assumptions

The following assumptions are made in approaching the problem and

the research questions in the study:

1. It is assumed that through the process of randomization, a representative sample has been selected from among the population of freshman students entering the College of Engineering during the fall of 1971. Kerlinger (1964) describes the technique of randomization as a means of seeking to equalize or control variables in educational research.

2. It is assumed that the criterion measures considered in the study are functions of the PIPI instructional model and that each are sufficiently distinct from each other so as to provide measures of differing factors. The review of the literature seems to indicate that the various criterion measures are distinct and have a relationship with an individualized instructional model.

3. It is assumed that the PIPI model of instruction is different from the non-PIPI, lecture-discussion model of instruction. Descriptions of IPI by Keller (1968) and of Mastery Learning by Bloom (Block, 1971), after which PIPI is fashioned, seems to indicate that PIPI is distinct from a lecture-discussion approach.

4. It is assumed that by using the process of random assignment of students to groups that interest and ability in English composition between the two groups have been equalized. Kerlinger (1964) describes the process of random assignment as the means of equalizing groups on a variable which cannot be controlled by other means.

<div align="center">Limitations</div>

The following limitations are noted in the study:

1. The findings of the study can be generalized only to freshman

engineering students enrolled for the fall semester of 1971 at Oklahoma

State University, and who have a score of 16 or above on the ACT English

Usage sub-test and a high school English grade of C or above.

2. The reliability of the findings will be dependent upon the

reliability of the measurement instruments and the test administration.

3. Selection and assignment of instructors to the sections of the

course observed was beyond the control of the investigator, therefore,

it cannot be assumed that they are typical of all instructors of sec-

tions of English 1113. The findings of the study, consequently, are

limited to those sections of the course considered in the study.

Significance of the Study

Many new methods and models of instruction are being used in the

colleges and universities throughout the nation. These newer models of

instruction are replacing the more "traditional" approaches or are be-

ing used as supplements to these older models. If these instructional

models are to have utility, they need to be described and evaluated.

The PIPI model of instruction is a recently introduced approach to

instruction. This study is significant in providing information con-

cerning this model of instruction. It is important that PIPI be eval-

uated and its effects described, if it is to have any utility for

extended use. This study will provide descriptive information about

the PIPI model that will be helpful to others when added to the liter-

ature. The present investigation may initiate and formulate designs

for further study of the problem and questions considered in this study.

The findings of this investigation should provide helpful informa-

tion to those involved in the counseling and guidance of students.

The information obtained for the measures of self-concept and study

orientation should offer assistance to those seeking to provide means

of developing study habits and attitudes and in improving the self-

concept of students. Results of the study may initiate programs which

would assist students in these areas of developmental need.

The present study is designed as an initial descriptive study of

the PIPI model of instruction. Since other studies may develop from

this study, the present investigation has significance in providing

some descriptive information concerning PIPI. This information may

lead others to consider the possibilities of the PIPI model as an

alternative or supplement to other models of instruction.

Definition of Terms

For clarification of terms and concepts used in the study, the

following definitions are given:

1. Group I--PIPI Group: A group of 44 freshman engineering stu-

dents who were randomly assigned to section 131 of English 1113,

Freshman English Composition, during the fall semester of the 1971-72

academic year at Oklahoma State University. Section 131 of the course

utilized the PIPI model of instruction during the semester.

2. Group II--Non-PIPI Group: A group of 44 freshman engineering

students who were randomly assigned to either section 11, 21 or 31 of

English 1113, Freshman English Composition, during the fall semester of

the 1971-72 academic year at Oklahoma State University. Sections 11,

21 and 31 of the course used a group-based, non-PIPI instructional

approach, which was a lecture-discussion model.

3. PIPI Model: A model of instruction, patterned after the IPI

and Mastery Learning models, developed by the College of Engineering, in cooperation with the College of Arts and Science at Oklahoma State University. The PIPI model utilizes the concepts of self-pacing, mastery learning, assessment of entering competency levels, formative evaluations, individualized assignment of instructional units, and a grading system based upon individual assessment of mastery rather than on a comparative basis with others in the class. These concepts are described by Keller (1968), Lendvall (1969) and Block (1971).

4. Non-PIPI Model: The instructional approach used in sections 11, 21 and 31 of English 1113 during the fall semester of 1971. The lecture-discussion model was used in these sections. This instructional approach consisted of a presentation of an instructional unit by means of a lecture prepared by the instructor or some designated person, to be followed by general class discussion. The sections using this model were instructor directed, group oriented, uniform in requirements and assignments for students, unaware of entering competency levels, paced by the instructor, and grading was on a comparative basis.

5. English 1113, Freshman English Composition: A course in the curriculum at Oklahoma State University, offered as a beginning course in English composition for freshman students. The course is designed to facilitate the practice of the fundamentals of expository writing with an emphasis on the structure and development of writing as well as on the mechanics of written English.

6. Academic Achievement: The development of skills, or the acquisition of knowledge as a result of a learning experience. In this study this measure has been defined as the skills gained in writing during a course in English composition and measured by scores obtained

from a 500 word essay written as the final examination for the course. A preset score of 15 or above on the essay was established as the acceptable levels of competence in writing skills.

7. Academic Performance: The achievement of students in a course as measured by the course grade received at the end of the semester. The grade of A or B was established as the superior level of achievement for this study.

8. Study Orientation: The ability of a student to adapt to or adjust to a learning situation by adopting study habits and attitudes which are conducive to study adjustment. The measure of study orientation was defined in this study by the scores obtained on the Brown-Holtzman Survey of Study Habits and Attitudes (SSHA).

9. Self-Concept: The way a person views himself. It is a person's fullest description of himself of which he is capable at any given time. In this study, self-concept is defined by scores obtained on the Tennessee Self-Concept Scale (TSCS).

<div align="center">Summary and Preview</div>

Chapter I has provided the statement of the problem, purposes of the study, research questions to be answered and significance of the study. Also in this chapter, assumptions were stated, limitations were listed and terms defined.

In the following chapters there will be a presentation of the review of the literature, a description of the design and methodology employed in the study, and a presentation and discussion of the findings; and recommendations and implications for future studies.

CHAPTER II

REVIEW OF THE LITERATURE

Studies concerned with the prediction of academic performance have
been rather extensive within recent years (Lavin, 1965). These studies
have been concerned with the effects and relationships of both intel-
lectual and non-intellectual variables and achievement. Most of the
investigations seem to generally agree that these various factors are
important in determining the extent to which a student will achieve
academic success in his educational programs.

Another area, which Lavin (1965) suggests as meriting study, is
the relationship of the educational environment, including the instruc-
tional approach, and academic achievement. The present study has been
designed to examine an instructional model and its effects upon achieve-
ment, self-concept and study orientation.

Selected studies from the literature pertinent to the purposes of
this investigation are discussed and summarized in this chapter. The
studies reported herein are concerned with the relationships of individ-
ualized instruction and academic achievement and self-concept. Studies
concerned with the correlation of study orientation and achievement
will also be presented.

Individualization of Instruction

The past two decades have seen an increased concern for the im-
provement of academic performance among students within our schools
(Howes, 1970; Holtzman, 1970). This increased concern is viewed as
resulting from a conflux of a variety of forces impending upon our edu-
cational system, among which are the launching of Sputnik in the late
1950's and the student unrest era of the 1970's (Howes, 1970).

The age of Sputnik saw a demand for a curriculum which stressed
technological and scientific achievement. This emphasis gave the 1960's
characteristics described by Howes (1970) as the age of exploration and
discovery. The student protest period saw the youth calling for rele-
vance and individualization in education.

The impact of these two forces, along with others (civil rights
legislation, economic prosperity, increased youth population, etc.),
has resulted in an increased national concern for improving our schools
(Holtzman, 1970). Holtzman lists three phases through which education-
al reform has occurred. The first is the reasonable successful develop-
ment of a system of universal education. Second, there has been a
concern for equality in educational opportunity. The third, and what
is apparently the current phase, is a concern for quality in education.

The concern for quality education, according to Howes (1970),
seems to bring together the characteristics of the age of Sputnik, with
its emphasis on exploration and discovery, and the call of youth for
relevancy and individualization. Much attention, among educators con-
cerned with quality education, has been directed toward this latter
emphasis on individualizing education. Keuseber feels that the

individualization of instruction is one of the most important direc-

tions for innovation and reform in American education today (Howes,

1970). The past decade has seen a bounty of journal articles, books

and projects stressing this concern for individualizing education (Doll,

1964; Bruner, 1966; Henry, 1962; Baker, 1970; Howes, 1970; Flanagan,

1970). The National Society for the study of Education noted the in-

creasing importance of and interest in the individualization of instruc-

tion by publishing its Sixty-first Yearbook on Individualizing

Instruction (1962). The Association for Supervision and Curriculum

Development followed with a 1964 yearbook entitled, Individualizing

Instruction. Two major research centers, (American Institute for

Research and the Learning Branch and Development Center of the Univer-

sity of Pittsburgh), have been established to seek means for implement-

ing the concern for the individualization of instruction.

While most of the articles and books tend to suggest that this

emphasis on individualizing instruction is new, McLoughlin (1972) re-

minds us that every educator from Plato to the present has commented

on the implications of individualized education. A survey of the

history of instruction, suggests McLoughlin (1972), leads one to dis-

cover that formal learning began very much as an individual affair,

that is, the students came to school to receive instruction individual-

ly from the teacher. Scanlon (1965) and McLoughlin (1972) agree in

saying we often forget that the ungraded school, with which our public

school system began, was individualized with students progressing at

their own rate through the materials. The one-room school provided the

environment in which students proceeded on an individual basis rather

than as intact groups. As the enrollment of the schools increased with

the growth of population, it was necessary to provide instruction in grade-level groups, thus diminishing the place of individualized instruction (1965).

Systematized plans for individualizing instruction date back as far as 1888 with the work of Preston Search and the efforts of Burke in 1911 (McLoughlin, 1972). These early designs led to the development of "laboratory approaches to education" as the Winnetka Plan, the St. Louis Plan, the Dalton Plan, etc. (McLoughlin, 1972). Shane (1972) identified 35 such attempts to individualize instruction.

Whereas Brubacher and Rudy (1968) described Mark Hopkins' concept of individualized instruction as consisting of the teacher on one end of a log and the student on the other end, the modern approach utilizes technological innovations which have led to the development of several instructional methods aimed at the individualization of instruction. Among these innovations are programed instruction, computer-assisted instruction, teaching machines, television instruction, audio-visual instruction, mastery learning and individually prescribed instruction.

The concern of this study is the PIPI model of instruction, which was adapted from the concepts of IPI and Mastery Learning. The literature has been surveyed to present a description of IPI and its effects on achievement and self-concept.

Individually Prescribed Instruction

Individually Prescribed Instruction, as described by Keller (1968), Lewry (1969) and Scanlon (1965), is an approach to instruction which involves the following six aspects: (1) a detailed sequence of behavioral objectives in a content area which guides the student in his

study of the materials to be learned; (2) a set of learning materials prepared for the student and prescribed for him as he masters the sequence of objectives; (3) a diagnostic procedure for determining the student's competency level in the content area so as to determine his entry point into the sequence of learning objectives; (4) a procedure of self-study whereby the student works independently of others if he so desires, or he may attend discussion groups when planned, or work with others in small groups; (5) an emphasis on self pacing whereby the student determines the rate at which he will work and complete the objectives in his assignment rather than being dependent upon the instructor to set his pace; and (6) a procedure for assessing mastery of the objectives by use of tests, the results of which guide the instructor in assigning new materials for study.

Scanlon (1969) argues that experimentation with IPI has demonstrated that it can produce desirable results. Evaluations of IPI suggest that it can save time, reduce retardation of the students and become a motivating factor (Scanlon, 1969). Henderson (Scanlon, 1969) states that individualized instruction promotes a development of self-reliance which allows the student to deal more effectively with the materials he is studying. Lindvall and Bolvin (Lange, 1967) say that learning is an experience that is ultimately personal and individual, therefore, an individualized model of instruction should offer promise of success in academic achievement and students should experience an improvement of their self-concept. Studies related to these two assumptions are presented in the following two sections.

IPI as Related to Achievement

Several studies are reported in the literature concerned with the relationships of individually prescribed instruction and achievement. While a few of the studies seem to indicate significant differences in the effects of IPI on achievement when compared with more traditional methods, most seem to point to non-significance, as reported below. Kerlinger (1964) suggests that most studies comparing teaching methods reveal findings which are non-significant, as seems to be true of IPI. Harris (1940), in reviewing the literature in search of factors related to academic achievement, agrees with Kerlinger, by stating that investigations of the relative efficacy of various teaching methods show no significant difference. Studies by Humphrey (1968), Fehrle (1970), Meade and Guffin (1969), and Lewry (1969) indicate that while students in a course using an IPI approach may score somewhat higher in some content areas, as noted by scores on an achievement test at the end of the course, there were no significant differences between these scores and those obtained by students enrolled in classes using a non-IPI approach. These studies do indicate a trend which seems to be in favor of the IPI model.

Bailes and Castro (1969) report the results of a two year evaluation of IPI among eight schools, comparing IPI students and non-IPI students on the criterion of achievement in the courses. They found measured achievement for the IPI students to be less than that of the non-IPI students, although the differences were not significant.

A study designed to measure the effects of IPI on the cognitive achievement of 4th and 5th grade students in two schools in Illinois is

reported by Lewry (1969). She randomly selected 141 IPI students who had been exposed to this method of instruction for a period of two years and matched them with 198 non-IPI students on geographic and socioeconomic factors. The <u>Iowa</u> <u>Test</u> of <u>Basic</u> <u>Skills</u> (ITBS), the mathematics sub-test of the <u>Iowa</u> <u>Test</u> of <u>Education</u> <u>Development</u> (ITED), a written essay and two IPI tests were administered to the students. An analysis of variance of the data revealed no significant difference between the groups studied. She did conclude that IPI students did achieve equally well in the course as compared with the non-IPI students, suggesting that IPI may be as effective as the more traditional classroom procedures. Results of studies by Fehrle (1970), Meade and Guffin (1969) and Humphrey (1968) seem to agree with Lewry's findings.

Walker (1971) compared two groups of 8th grade students to determine the effectiveness, efficiency and teacher-learner role as effected by an individualized approach to teaching spelling and a group-based method. Findings indicate no significant difference in the achievement of the two groups when a pre- and post-test in the subject area were administered to the students. He did find that the teachers seem to favor the IPI model.

Hatfield (1971) designed a study to determine the effectiveness of an individualized approach to learning in a small secondary school as it might effect the attitude and achievement of students. The <u>Iowa</u> <u>Test</u> of <u>Basic</u> <u>Skills</u> and the <u>Iowa</u> <u>Test</u> of <u>Educational</u> <u>Development</u> were given to the two groups. Findings indicated no significant difference in the achievement level of the students in the two groups on the tests.

A study by Brown (1970) of students who were upper classmen at Colorado State University, compared a group of 36 students in a class

using an individualized approach with a group of 32 students in a class

using a group-based, lecture-discussion model, and reports no signifi-

cant difference in the performance of the two groups of students.

Davisson (1969) studied the effectiveness of an individually pre-

scribed instructional approach in modifying the reading, spelling and

visual motor skills of children in elementary school who had specific

learning disabilities. His findings indicate a significant difference

in favor of the IPI model in improving spelling and visual motor skills,

but the difference in reading was not significant.

These studies seem to indicate that there is no significant differ-

ence in the effectiveness of IPI in improving the achievement level of

students when compared with the more traditional group-based methods of

instruction. Such findings tend to suggest that IPI does not improve

learning beyond that expected of other methods. Bloom (1971) argues

that one cannot reach conclusions as to the superiority of a particular

instructional strategy over another, but rather research is needed in

determining if one method may be better suited for one person while

another student would profit most from another instructional approach.

IPI as Related to Self-Concept

Several studies seem to point to the significant relationship be-

tween self-concept and achievement. Wylie (1961) summarizes a number

of studies examining the relationships of successful and unsuccessful

academic achievement and self-concept; concluding there is a high

positive correlation between these two variables. Torshen (Block,

1971) summarizes studies investigating the relationships of self-concept

and achievement, indicating the correlation coefficient is in the range

of +.25 when total self-concept is considered, and at about +.50 when considering academic self-concept.

Both Keuseber (Howes, 1970) and Bloom (Block, 1971) argues that one of the major results or consequences of an individualized approach to instruction is the enhancement of a student's self-concept. Keuseber (Howes, 1970) says that to develop ego strength, a student needs to experience self-discovery, self-understanding, self-determination and self-fulfillment. An individualized approach offers the opportunity for this to happen. Bloom (Block, 1971) feels that an instructional model which encourages students to achieve mastery of a subject and recognize their achievement, provides the environment in which students may acquire more positive self-concepts.

Researchers have directed much attention to the study of self-concept. Lavin (1965), after reviewing the literature of factors related to the prediction of academic achievement, contended that one of the most apparent themes in the published studies was the concern with the self-concept and achievement.

Stevens (1956), in examining the relationship of self-concept and academic achievement among a group of college students, found those having a greater understanding of their intellectual abilities had a more positive attitude toward themselves and a higher level of achievement. Shaw, Edison and Bell (1960) obtained similar results when observing male students.

Combs (1964) explored the difference in perception of self and its relationships to achievement among achievers and underachievers. He concluded that the underachievers perceived themselves as being less adequate, less acceptable and lacking in effective approaches to

problem solving. There was a high positive relationship between self-perception and achievement. Studies by Swazze (1966), Campbell (1965), Caplin (1966) and Reiss (1967) concur with Comb's findings.

Several studies have been concerned with the effects and relationships of IPI and self-concept. Bynum (1970) designed a study to determine the relationship of two teaching methods and self-concept. One method of instruction was teacher dominated while the other was an individualized approach. Forming two groups of 8th grade students in a social science class, one group in an individualized instructional class and the other in a more "traditional" teacher directed, group-based class, he compared them on achievement scores and their responses to a modified Q sort for self-concept. Results from an analysis of covariance indicate no significant difference in self-concept enhancement, achievement or interaction of the two variables between the two groups.

Rupp (1970) examined the effects of an individualized model on self-concept among college students. Results of his study show an improvement in self-concept for those students in the individualized approach, while there was no change in the "traditional" program.

Brookover, Paterson and Thomas (1962) studied the relationship of self-image and achievement among junior high students in classes using different instructional methods. Findings of the study seem to indicate positive and significant relationships between general self-concept and achievement. It was also found that specific self-concept of ability was related to specific areas of academic achievement.

Humphrey (1968) examined the self-concept of ability of students in IPI classes and non-IPI classes. She failed to confirm that IPI

students had stronger self-concept of ability scores.

As these studies seem to indicate, there has been conflicting findings as to the relationship of self-concept and achievement. This may result from the many different operational definitions employed, as suggested by Kubiniec (1970). The trend, however does seem to be in favor of the significant relationship of self-concept and achievement. Jones and Grieneeks (1970) infer that the self-concept "appears to be the most accurate predictor of academic achievement" as a result of their study of self-concept and achievement among 877 college sopho-mores at the University of Texas.

Study Orientation as Related to Achievement

The relevance of study habits and attitudes is an area that has concerned researchers as they seek to examine the variables related to academic achievement. The Brown-Holtzman Survey of Study Habits and Attitudes (SSHA) has been the major instrument used in these studies. Brown and Holtzman (1954) initiated a study to determine the extent to which study habits and attitudes were related to achievement among high school students and to evaluate the stability of these during the transition to college. They concluded that study habits and attitudes play an important role in academic achievement. These habits and at-titudes seem to be rather stable for students as they enter college.

Anderson and Kuntz (1959) evaluated the SSHA in its effectiveness in identifying successful and unsuccessful students in achievement. The two groups were found not to differ significantly from each other, but were significantly different from the general population. DeSena (1964) concluded that the SSHA did differentiate between students in

college who were successful and those who were unsuccessful. Freshman
students at Cornell University in the falls of 1955 and 1956 were the
subjects of a study by Ahmann, Smith and Glock (1958). This study was
concerned with the usefulness of the SSHA in predicting first semester
grade point averages. Their findings indicate a non-significant corre-
lation between grade point average and scores on the SSHA.

Lum's study (1960) made use of the SSHA in comparing underachiev-
ers and overachievers. Equating three groups of female students on
scholastic aptitude and other variables, scores on the SSHA were com-
pared. Among her conclusions was the finding that overachievers
differed significantly from the normal and the underachiever groups.
A study at the University of Arkansas by Diener (1964) reported that
overachievers had better study habits. Brown and DuBois (1964) found
a significant correlation between grade point averages and scores on
the SSHA.

Brown and Holtzman (1968) evaluated the study habits and attitudes
of high school students and found validity coefficients consisting of
correlations between total SSHA scores and grade point averages ranged
from .32 to .66, with an average of .49 when examining scores for
10,888 students. Correlations between scholastic aptitude and grades
were only slightly higher, ranging from .19 to .83, averaging .57.

These studies indicate that a positive relationship exists between
study habits and attitudes and academic achievement. These variables
are reported to be important in determining the prospects of academic
success for students.

Summary

The literature indicates that students seem to perform equally
well under differing instructional models. There is some suggestion
that individualized instruction has some efficiency in its relationship
with academic achievement. The literature seems to be somewhat limited
in research evaluating the relationships and effects of IPI and achieve-
ment, self-concept and study orientation.

Studies of the relationships of self-concept and academic achieve-
ment, and the assumed consequence of the enhancement of self-concept
in individualized instructional models offer some conflicting results.
The general trend seems to favor the importance of the relationship of
self-concept in improving achievement and that the self-concept is im-
proved positively by an individualized approach to learning.

Research of the effects of study habits and attitudes as related
to achievement seems to indicate positive correlations between these
two variables. Further study is needed in determining the effects of
an individualized model of instruction on the development of these
important factors.

The review of the literature seems to lend support to the need
for the present study which seeks to evaluate the PIPI model of in-
struction, which is a type of individually prescribed instruction, by
describing the procedures in the model and its relationships with
achievement, self-concept and study orientation.

CHAPTER III

DESIGN AND METHODOLOGY

The purpose of this study is to describe the PIPI instructional

model and its relationships with achievement in English composition,

self-concept, and study orientation among freshman engineering students

enrolled in English 1113, Freshman English Composition, at Oklahoma

State University during the fall semester of the 1971-72 academic year.

In this chapter the procedure for selecting and assigning students,

instruments used in collecting data and methods of describing the data

will be presented.

Subjects

Subjects for the study were drawn from a population of entering

freshman engineering students being processed, during the summer of

1971, for enrollment in the fall semester of the 1971-72 academic year

at Oklahoma State University. A total of 248 students with a declared

major in engineering were processed for enrollment during June and

July, 1971. Subjects for the study were randomly selected from among

these entering freshman engineering students.

The subjects selected were formed into two groups. Group I con-

sisted of 44 students who were randomly assigned to take English 1113,

Freshman English Composition, in section 131 which used the PIPI model

of instruction during the fall semester of 1971. Group II consisted of

44 students who were randomly assigned to take English 1113, Freshman

English Composition, in either section 11, 21 or 31 which used a non-

PIPI, lecture-discussion model of instruction during the fall semester

of 1971.

These 88 subjects represent approximately 35 per cent of the enter-

ing freshman class in the College of Engineering at Oklahoma State

University during the fall semester of the 1971-72 academic year.

Method of Selecting Subjects

Selection of subjects for the study was made each afternoon, during

June and July, 1971, following each morning session of the freshman

orientation clinics attended by all freshmen entering Oklahoma State

University in the fall of 1971. A list of those students attending

each of the several clinics was made available. Names of those stu-

dents planning to enroll in the College of Engineering was obtained

from this list. Those students with a reported high school English

grade below C and a recorded ACT English usage score less than 16 were

eliminated from the list (Note: To enroll in English 1113, a student

must have an ACT English usage score above 15 or a high school English

grade of C or above). Those names remaining on the list were numbered

consecutively. A pre-established sample size of approximately 90 sub-

jects was determined prior to beginning the selection procedures.

Approximately 16 of these stubject were to be selected each week, or

4 per day. This represents a selection of approximately 2 per cent of

the enrollment each day. A table of random numbers (Popham, 1967) was

used in selecting an even number of subjects each day. A total of 96

subjects were selected during the summer. Six of these subjects

changed from a major in engineering after their selection and were
dropped from the study. Two other subjects failed to report for the
pre-administration of the SSHA, so were dropped from the sample. The
88 remaining subjects were randomly assigned to either Group I or Group
II.

Method of Assignment to Groups

Each day, following their selection for the study, the names of
the subjects selected were placed on separate slips of paper and depos-
ited into a box. A blind draw was made of two names at a time from the
box. Following each draw, a coin toss was made for assigning one of
the pair of names drawn to Group I and the other to Group II. This
procedure was followed each day until all subjects selected on a par-
ticular day had been assigned to either Group I or Group II.

During the afternoon sessions of the freshman orientation clinics,
following the selection and assignment of subjects, all engineering
students reported for testing. During this period of testing, the
Brown-Holtzman Survey of Study Habits and Attitudes (SSHA) was admin-
istered to the students. As subjects assigned to Group I (PIPI Group)
completed the SSHA, they were handed a note informing them of their
selection to enroll in courses using the PIPI instructional model. The
note also provided information concerning the nature of the PIPI pro-
gram and a request that they attend an information session on the PIPI
project. (See Appendix A) During the discussion session, the subjects
were provided an opportunity to seek additional information concerning
the PIPI model of instruction.

Advisors in the College of Engineering assisted the subjects in

the enrollment procedures during the morning of the second day of the
clinics, enrolling the students in their assigned sections of English
1113.

Data Gathering Devices Employed
in the Investigation

Most of the data gathered in the investigation was a means of
standardized psychometric instruments. The exceptions were data ob-
tained from an instructor constructed essay examination and the semes-
ter grades received for the course. The various standardized
instruments utilized were selected because research outcomes available
suggested they were designed to provide the information needed for the
study.

The psychometric instruments used are as follows:

1. The American College Testing Program Examination (ACT)

The ACT is a standardized test designed for high school seniors
and junior college students preparing to enter a four-year college.
Five scores are yielded by the test: English Usage (80 items): a
measure of an understanding and use of the basic elements in correct
and effective writing; Mathematics Usage (40 items): a measure of a
person's mathematical reasoning ability; Social Studies Readings (52
items): a measure of one's evaluative reasoning; Natural Science Read-
ings (52 items): a measure of one's problem solving ability; and a
Total or Composite score which represents a composite mean of the four
subtest scores.

The ACT Technical Report (1965) indicates that the test was de-
signed as an instrument which measures as directly as possible those

abilities or skills needed by students to do college level work. The test-retest reliability of the ACT is reported as ranging from .67 to .84 over a two year period. Predictive validity is reported as in the range of .37 to .50 (ACT, 1965).

For the purpose of this study only two of the five scores yielded by the ACT were used. These are the English Usage score and the Composite score. The English Usage score is reported as having a predictive validity of .498 when correlation values were determined for the relationship it has with overall GPA and grade in the first semester of college English (ACT, 1965). Predictive values for the Composite score and first semester grade point average is reported as ranging from .44 to .64 (Bradshaw, 1965).

The English Usage subtest is described as a measure of a person's educational development in the use of the basic elements of correct and effective writing; punctuation, capitalization, diction, phraseology, and organization of ideas.

The test consists of several written exercises containing a number of errors or inappropriate expressions. The student is to identify the errors, classify the improper English usage and select the most correct substitutes. Approximately 25 per cent of the items are concerned with the correctness of punctuation, capitalization and grammar while 75 per cent of the items are concerned with the appropriateness of words and phrases, paragraphing, word order, effectiveness of various constructions, diction, style, organization of ideas and general facility with the English language (ACT, 1965).

Since the test was constructed to parallel rather closely the tasks the students encounter in actual writing situations, as well as

the objectives of English 1113, the course in which subjects in this study were enrolled, this subtest of the ACT seems to be an appropriate measure of the student's academic ability in English usage as he enters a course in Freshman English Composition.

The Composite score is described as a single score on the ACT which represents a person's scholastic aptitude level. This score is the mean of the four subtest scores on the test, which are described as measures of a person's educational development. The test developers, when reporting the predictive values for the correlation of the Composite score and first semester grade point average in the range of .44 to .64, view the Composite score as the best single score on the test for predicting freshman success in college (ACT, 1965).

  2. The Tennessee Self-Concept Scale (TSCS)

The TSCS was developed by the Tennessee Department of Mental Health originally as a research instrument that might contribute to the criteion problem in mental health. A scale was needed that would have wide applicability, be well standardized and be multi-dimensional in its descriptions of self-concept (Fitts, 1965).

The TSCS is composed of 100 self descriptive statements which the subject uses to portray his own picture of himself. The instrument is designed to yield an individual's own personal opinion of himself. The scale identifies eight aspects of the self and give quantitative scores in each area. A total score and a self-criticism score are also obtained on the scale (Fitts, 1965). These various scores are described as follows:

The Total Positive score is a measure of self-esteem, the internal frame of reference within which a person describes himself. This score

is a composite of three subscores:

a. The Identity score which describes the individual as he sees himself. It is derived from the "What am I?" items on the scale.

b. The Self Satisfaction score describes how the individual feels about the self he perceives. In general, the score reflects self satisfaction or self acceptance.

c. The Behavior score measures the individual's perception of his own behavior or the way he functions. This score is derived from items pertaining to "This is how I act." or "This is what I do."

Five scores represent an external frame of reference within which the subject describes himself. These five scores, when totaled, equal the Total Positive score obtained when the three internal referenced scores were sumed. These five scores are as follows:

a. The Physical Self score represents the individual's view of his body, his state of health, his physical appearance, skills and sexuality.

b. The Moral-Ethical Self score describes how the individual feels about his moral worth, relationship to God, feelings of being a "good" or "bad" person, and satisfaction with one's religion or lack of it.

c. The Personal Self score reflects the individual's sense of personal worth, his feeling of adequacy as a person and his evaluation of his personality apart from his body or his relationships with others.

d. The Family Self score describes the individual's feelings of adequacy, worth, and value as a family member.

e. The Social Self score represents the person's sense of adequacy and worth in his social interaction with other people in general.

The Self Criticism score is derived from a person's responses to 10 items which are described as mildly derogatory statements which most persons admit as being true for them. High scores usually indicate a normal healthy openness and capacity for self-criticism. Low scores indicate defensiveness and suggest that the Positive scores are probably artifically elevated. Scores above the 99th percentile indicate that the individual may be lacking in defenses (Fitts, 1965).

According to the Manual (Fitts, 1965), the standardization group, from which the norms were developed; was a broad, general sample of 626 persons from various sections of the nation. They ranged in age from 12 to 68, representing all social, economic and intellectual levels from the 6th grade through the Ph.D. degree.

The TSCS is rather recent in its development, but a few correlational studies have been made. Test-retest data among 60 college students, over a two-week period, reported reliability coefficients ranging in the high 80's and low 90's. When correlation coefficients were computed for the TSCS and the Minnesota Multiphasic Personality Inventory (MMPI), they ranged from -.64 to -.35 for the various scales. Coefficients for the TSCS and the Edwards Personal Preference Schedule (EPPS) ranged from -.43 to +.25 (Fitts, 1965).

3. Brown-Holtzman Survey of Study Habits and Attitudes (SSHA)

The SSHA is a 100 item self-rating inventory designed to measure a student's scholastic motivation in terms of his behavior and attitudes. Each item of the inventory is answered by a response on a five point continuum of "rarely" to "almost always." The inventory yields separate study habits and study attitudes scores, as well as a total study orientation score. Each of the two subscores are composed of

Delay Avoidance and a Work Methods scores. The Study Attitudes score is composed of Teacher Approval and Education Acceptance scores. These various scores are described in the Manual (1967) as follows:

a. The Delay Avoidance score is a measure of a person's promptness in completing academic assignments, lack of procrastination, and freedom from wasteful delay and distraction.

b. The Work Methods score is a measure of an individual's use of effective study procedures, efficiency in doing academic assignments, and how-to-study skills.

c. The Study Habits score is a composite of Delay Avoidance and Work Methods, providing a measure of academic behavior.

d. The Teacher Approval score is a measure of one's opinion of his teachers and of their classroom behavior and methods.

e. The Education Acceptance score represents a person's approval of educational objectives, practices and requirements he experiences.

f. The Study Attitudes score is a composite of Teacher Approval and Education Acceptance, providing a measure of a person's scholastic beliefs.

g. The Study Orientation score is a composite of Study Habits and Study Attitudes, yielding an overall measure of an individual's study adjustment.

Reliability coefficients for the SSHA are provided through a study of 465 freshman students at Southwest Texas State College in the fall of 1960. Reliability coefficients attained for the four basic SSHA subscales range from .87 to .89. Reliability studies were also conducted in 1960 with 144 freshmen using a test-retest procedure over a four-week interval between the two administrations. The reliability

coefficients ranged from .99 to .93 on the sub-scales of the inventory.
A test-retest study of 51 freshmen over a 14 week period revealed reliability coefficients ranging from .83 to .88 (Brown-Holtzman, 1967).

Validation studies conducted in a number of colleges used one semester grade point average as a criterion. Correlation between SSHA scores and grade point averages reported for 1,750 men and 1,118 women in ten colleges varied from .27 to .66 for men and .26 to .65 for the women. The average validity coefficients across the ten colleges were .42 and .45 for men and women respectively (Brown-Holtzman, 1967).

Other devices employed in collecting data are as follows:

1. Essay Examination

A 500 word essay was written by the subjects as the final examination for the course. Topics for the essay were prepared by the instructors of the sections of English 1113 in which the subjects were enrolled. Each instructor was requested to submit a list of topics that could be used in the examination. From these lists of topics, the investigator selected five topics which would compose the final examination. Neither instructors nor students were informed of the five topics selected.

All subjects met in a large classroom for the examination which was administered by the investigator. The examination which was printed, (See Appendix B) was handed to each subject, with the instructions that dictionaries, books and notes were prohibited. The subjects were given one hour and fifty minutes in which to write.

Each subject was assigned an identification number for his essay. After collecting the finished essays, a table of random numbers (Popham, 1967) was used to assign essays to three instructors for

scoring. An equal number of essays was assigned to each instructor, half of which were written by subjects in Group I and half by subjects in Group II.

The essays were evaluated by the instructors and assigned a score ranging from 1 to 5 in each of the following areas: (1) Mechanics: Grammar, spelling, punctuation and word choice; (2) Structure: The organization (arrangement) of the parts of an essay into a recognizable pattern; (3) Development: The specific facts, illustrations, and explanations which support the general statements in the essay; (4) Impression: The overall, general impression made by the essay; and (5) Total score: A composite or summation of the four subscores.

The rating scale ranged as follows: 1: Poor; 2: Fair; 3: Adequate or average; 4: Superior; and 5: Excellent. The total score could range from a minimum of 4 to a maximum of 20.

2. Course Grade

The course grade for English 1113 received by each subject was obtained from the records in the Office of the Registrar. These grades were determined by each instructor for the subjects enrolled in the section of the course where each taught. Grades were based on performance in the course for the semester and ranged from A to F in letter grades or 4 to 1 for numerical grades. The values for the letter grades are as follows. A = 4; B = 3; C = 2; D = 1; F = 0. A grade of I which has no numerical value was given if the subject had not completed all assigned work by the end of the semester. The subject was given an extended period of time in which to complete his work and have the I changed to the appropriate grade for his records.

Procedures Followed in the Study

After all subjects had been selected, assigned and enrolled in sections of English 1113, they progressed in their respective sections of the course under the supervision of their instructor according to the model of instruction being used in that section. The PIPI model was used in section 131, while a non-PIPI, lecture-discussion model was used in section 11, 21 and 31.

Course content and objectives were closely identical in nature for the four sections. Instructors identified six instructional units which were similar for each section. These six units are as follows: (1) Dictionary, Grammar, Spelling and Punctuation; (2) Information Gathering; (3) Reading and Discussing for Ideas; (4) Structure of Messages; (5) Development of Messages; and (6) The Five Hundred Word Essay.

In December, 1971, two weeks prior to the end of the semester, the Tennessee Self-Concept Scale (TSCS) and the Brown-Holtzman Survey of Study Habits and Attitudes (SSHS) were administered to all freshman engineering students. These students met in groups of thirty during a five day period. During the final week of the semester, all students enrolled in sections 131, 11, 21 and 31 of English 1113, met in a large classroom for the final examination in the course. As the final examination, the students wrote a 500 word essay as described above.

Reporting the Findings of the Study

The present investigation has been designed as a descriptive study of the PIPI model of instruction and its relationship with achievement,

self-concept and study orientation among freshman engineering students

enrolled in English composition. Descriptive data, including the mean,

standard deviation and coefficients of correlation for the various cri-

terion measures, gathered from subjects in Group I and Group II, will

be presented in the following chapter. These statistics were obtained

from the Biomedical Computer Program, BMDO3D, used by the University

Computer Center at Oklahoma State University. A test of significance,

employing a t-test for related measures, as described by Bruning and

Kintz (1968) was used to compute t-values for the change in scores on

the Brown-Holtzman Survey of Study Habits and Attitudes (SSHA) which

was administered as a pre- and post-test.

The present study is an initial investigation of the PIPI model of

instruction and seeks only to describe this model and its effects on

the achievement, self-concept and study orientation among freshman

engineering students enrolled in a course in English composition. No

attempt is being made in this study to make statistical comparisons of

the different models of instructions observed in the sections of the

course.

CHAPTER IV

DESCRIPTION OF THE PIPI MODEL AND ITS RELATIONSHIPS

Introduction

This study has been concerned with a description of the Pre-
Professional Individually Prescribed Instructional (PIPI) model intro-
duced into the curriculum of the College of Engineering at Oklahoma
State University, and its relationships with achievement, self-concept
and study orientation among freshman engineering students enrolled in
English 1113, Freshman English Composition, during the fall semester of
1971.

The results of this investigation are reported under two major
divisions as follows: (1) a description of the PIPI model of instruc-
tion, and (2) a description of the results of the criterion measures
obtained in seeking answers to the research questions.

The PIPI Model

The Pre-Professional Individually Prescribed Instruction (PIPI)
model, used in section 131 of English 113 during the fall semester of
1971, evolved from a program for instructional improvement at Oklahoma
State University in 1970 when the concept of individually prescribed
instruction was introduced to the faculty through a series of workshops,
institutes and seminars. From this initial presentation, the faculty

of the College of Engineering, in cooperation with the College of Arts

and Science, commenced a concerted effort to implement a program of

individually prescribed instruction by developing the PIPI model to be

introduced into the curriculum as a pilot project for entering freshman

engineering students during the fall semester of 1971.

The primary objectives of this proposed program are listed by the

faculty as follows: (OSU, 1971).

1. Create a composite, pre-professional, integrated curriculum
equivalent to 40 semester credit hours for the subject areas
of mathematics, physics, chemistry and communications.

2. Create self-paced, individualized instructional materials
that will assure that 90 per cent of the students will
obtain 90 per cent or better achievement levels.

3. Optimize the utilization of media as a self-study aid.

These objectives were to be implemented by the following plan

which would characterize the PIPI model (OSU, 1971).

1. A pre-measure of entering competencies followed by individ-
ually prescribed instruction based on the entering competency
levels.

2. Opportunity for a student to move through the curriculum at
his own rate with individualized, multi-media assisted
instruction.

3. Provisions for diagnostic assessment when the student desired
to demonstrate competency on each of the sequences of instruc-
tional units. The results of these assessment measures guides
the instructor in the prescription of new or remedial instruc-
tional units based on the student's performance.

4. Provisions for enabling the immediate use and reinforcement
of the newly learned tasks.

5. A goal designed to assure that 90 per cent of the instruc-
tional tasks can be achieved by 90 per cent of the students.

The program developed consisted of a curriculum equivalent to 40

semester credit hours including 16 hours in mathematics, 8 hours in

physics, 8 hours in chemistry, and 8 hours in written, graphical, oral

and computer communications. PIPI is designed as an instructional model which seeks to integrate and streamline the teaching and learning experiences in these courses (OSU, 1971).

PIPI is described as an instructional model which blends three educational concepts: individually prescribed instruction, integrated curriculum and mastery learning (OSU, 1971). These three features are described by the developers of PIPI as follows:

Individually Prescribed Instruction (IPI) aspects of the model are noted as that which first identifies the skills that are to be mastered in a course in order that a student may gain competency in the area. After identification, these skills are described in terms of behavioral objectives and tasks which serve as criterion measures of the achievement of the desired skills. The objectives and tasks are sequenced in a logical learning order called a hierarchy. The instructional units are designed in such a way that each unit that is mastered by the student provides the needed skills to move to the sequential unit.

A second aspect of IPI which is found in the PIPI model is the procedure for assessing the entering competency level of students as they begin a course. The results of this assessment determine the instructional unit or instructional objective with which the student begins his work in the course. This feature of the model allows a student to work within a subject area at his own competency level without regard to the entry point of other students in the course.

A third aspect of the PIPI model which comes from IPI is the provisions for self-pacing of learning rather than having the rate determined by the instructor or the progress of members of an intact group. In PIPI students are allowed to determine their own rate at which they

work on instructional units or objectives without regard to what other

students may be doing. Each student is able to work independently of

others in the class, joining a minimum number of group discussions on

a voluntary basis. Class attendance is not required of the students

except as attendance in group discussion may be viewed by the student

as assisting him in achieving a skill within the instructional unit

upon which he is working.

A fourth feature of PIPI which incorporates aspects of IPI is the

provision for personal, individualized contact between the instructor

and each student. The PIPI model provides the opportunity for the

instructor to assist each student individually with his work through

the procedures of assessment of mastery of instructional objectives.

This aspect of the model gives the instructor the means by which he can

guide the student into new units or prescribe remedial work which will

enable the student to master the unit or acquire the skill.

A final feature of the PIPI model which is a characteristic of

IPI is the provision of individualized instructional materials which

are available for each student in the program. This printed package

of instructional materials allows the student to work independently of

others and at his own rate. The material gives him complete informa-

tion and directions for achieving the prescribed task or objective to

be mastered.

An Integrated Curriculum is noted as a key feature of PIPI. There

was a concerted effort to coordinate the various instructional units

within each subject area so that they are integrated into a unified

hierarchy so that, for example, an objective in one content area serves

as a prerequisite for attempting an objective in another area. Since

the model resulted from the efforts of members of the faculty of various departments within the College of Arts and Science, they endeavored to blend the instructional objectives within each subject area into an integrated format so skills acquired in one course could be utilized in another course at the appropriate time. Those who designed the model look on PIPI as a real effort to integrate the curriculum (OSU, 1971).

The third concept the developers incorporated into the PIPI model is aspects of Mastery Learning. Mastery Learning operates on the assumption that most properly motivated students, if given a reasonable amount of time, can learn at the mastery level. This concept implies that many students earning C's and D's at the end of the semester could receive A's and B's instead if they had been given the time and opportunity to do so.

Although efforts to formulate a model of mastery learning dates back to the early 1900's, a useful model was not found until Carroll's model was introduced (Block, 1971). Carroll in defining aptitudes as measuring the amount of time needed to learn a skill to a given level under ideal conditions of instruction, proposed that, if students are given sufficient time, and they use this time properly, all students can attain the level of mastery of that skill. PIPI incorporates this concept in its being designed to allow students the necessary time to master a given objective or skill before moving to the next objective. In PIPI, students are given the opportunity to reach the A and B level of achievement if they utilize their time properly. Students are aware of the requirements of the course at the beginning of the semester, and may plan their use of time so that they may complete all the objectives

and receive an A or B for the course. Time and its proper use, therefore, becomes a distinct feature of the PIPI model and the determination of achievement levels.

Features of the PIPI model which characterize it as an individually prescribed instructional approach with aspects of mastery learning are as follows:

1. Mastery of tasks or skills is defined in terms of the achievement of well defined behavioral objectives for the students.

2. Instructional materials are organized into well defined units which are sequential in nature.

3. Complete mastery of each unit is required before the student proceeds to the next sequence of objectives.

4. Both formative and summative evaluation procedures are built into the model for assessing the student's mastery of the learning objectives.

5. Provisions for prescribing new units or remedial work are determined from the results of assessment procedures to assure mastery of an objective before moving to another.

6. Self-pacing procedures allow the students sufficient time to complete the prescribed objectives and thereby reach the higher levels of achievement.

The PIPI model of instruction, in incorporating these characteristics, was devised and implemented as an effort to provide entering freshman engineering students with a possible means of increasing their academic success through an individualized instructional model.

Procedures in English 1113

The PIPI model was observed in a section of English 1113, Freshman English Composition, during the fall semester of 1971. In describing the functioning of the PIPI model in a course, the nature of English 1113 will first be defined, followed by a description of the procedures used in section 131, which used the PIPI model. A description of the procedures used in sections 11, 21 and 31, which used a non-PIPI approach, will follow. In describing the procedures used in all sections observed, the PIPI model can be viewed as differing from the instructional approach used in many college classrooms.

English 1113. English 1113 is a three hour course in the curriculum at Oklahoma State University and is offered as a beginning course in English Composition for freshman students. The course is designed to facilitate the practice of the fundamentals of expository writing with an emphasis on the structure and development of writing as well as on the mechanics of written English.

The sections of the course observed in this study were designed to consider the following nine instructional units: (1) Goal Setting; (2) Nature of Communications; (3) Communications Barriers; (4) Dictionary, Grammar, Spelling and Punctuation; (5) Information Gathering; (6) Reading and Discussing for Ideas; (7) Structure of Messages; (8) Development of Messages; and (9) The Five-Hundred Word Essay. These instructional units were used in sections of English 1113 to which subjects were assigned. The instructors identified six units, 4, 5, 6, 7, 8 and 9 as being identical in all sections.

Procedures in Section 131. Section 131 of the course utilized the

PIPI model of instruction. Students assigned to this section met in a large classroom, on the first class day of the fall semester to receive instructions and information concerning the procedures in the course. They were also handed the printed instructional materials which would be used during the semester. Plans were made for the administration of an assessment instrument for determining each student's entering competency level in English usage.

During the first week of the semester, the students were given the assessment instrument. After the competency level in English usage had been determined for a student, the instructor prescribed the entry level into the sequence of instructional units for each student. Upon receiving his assignment, each student proceeded to work independently on his assigned task, at his own rate until he completed a unit and was ready to take an assessment test to determine his degree of mastery of the materials. If the test results indicated to the instructor that the student had reached an acceptable level of competency in the instructional unit, a new unit was assigned to the student. If, however, the student did not display mastery of the unit, the instructor assigned him remedial work and/or offered assistance that would help in reaching the desired level of mastery. Beginning at his point of entry into the sequence, each student continued to work on the nine instructional units until all nine had been completed. Upon the completion of all nine units successfully, the student was informed that he had finished the course and was free of all other responsibilities except for taking the final examination.

Except for discussion groups which were arranged to assist the students with their units, no scheduled class meetings were planned for

the section. Attendance at the discussion groups was on a voluntary basis. Assisting in the planning and participating in at least one discussion group during the semester was one of the options open to the students for obtaining a grade of A, as will be discussed in a section on grading. A resource center was provided for the students where they could meet each day during a scheduled period of time with the instructors or his assistants. At the resource center, students could receive individualized assistance from the instructor and/or be given assessment instruments to determine their level of mastery of the unit upon which they were working. Attendance in the resource center was not required, except as students had to visit the center for the purpose of taking the assessment tests.

Procedures in Sections 11, 21 and 31. Sections 11, 21 and 31 were designed to use a non-PIPI instructional approach. The three instructors of the sections identified their approach as being a lecture-discussion model of instruction. The instructors presented the topics in the instructional units by using the lecture method. This presentation was followed by a general class discussion of the topic and assignment of individual work which provided practice in the area discussed. Each of the sections met for three one-hour class sessions during the fifteen weeks of the semester, for a total of approximately 45 class meetings. Attendance was required, and students were responsible for all materials and information presented during their absence.

Examinations were administered periodically during the semester, were primarily summative in nature, and were designed to determine how much the students had attained from the lectures and discussions. Scores on these tests, along with the evaluations of the assigned

written work, were averaged to determine the course grade.

Description of Class Size and Instructor Characteristics. One instructor and four assistants were assigned to section 131 of English 1113 during the fall semester of 1971. One instructor was assigned to each of the three sections, 11, 21 and 31. The number of students enrolled in each of the four sections and characteristics of the instructors are shown in Table I. Table I shows that there were 27 students enrolled in each of the three sections of the course in which subjects in Group II were assigned, for a total of 81 students in sections 11, 21 and 31. A total of 128 students were enrolled in section 131.

The instructor for section 131 was 30 years of age, while the average age of the three instructors in sections 11, 21 and 31 was 36 years, with ages ranging from 24 to 45. The instructor for the PIPI group had five years of teaching experience, while the average was four years and four months for the three instructors in the non-PIPI sections of the course. The teaching experience for these instructors ranged from one year to seven years. The instructors for sections 11, 21 and 31 averaged having completed 52 hours of graduate work beyond the bachelor's degree, with a range of from 33 hours to 63 hours completed on the doctorate, while the instructor for section 131 had completed 73 hours of graduate work in his doctoral program.

The instructor for section 131 had four assistants, two of whom were undergraduates majoring in English, while two others were beginning the first semester of graduate work in English.

TABLE I

DESCRIPTION OF CLASS SIZE AND
INSTRUCTOR CHARACTERISTICS

Section	Class Size	Age	Years of Teaching	Graduate Hours Completed
131	128	30	5	73
11	27	24	1	33
21	27	41	5	59
31	27	45	7	63

Description of the Grading System. Designed within the PIPI model

were provisions for each student to have the opportunity to reach the

A or B level of achievement in the course. Since grading was based

upon individual effort and performance in completing the instructional

units rather than upon a comparison with other students' work, all stu-

dents in section 131 had the choice of receiving either an A or a B for

the course. To receive a B for the course, the student was required

to complete all nine instructional units designed for the course. To

receive an A the student was required to complete one of four addition-

al options. These options were as follows: (1) Keep a log of ideas

gathered from discussions and/or readings that could be used in writing

an essay; (2) maintain correspondence with a friend, exchanging at

least four letters; (3) Participate in at least one discussion group,

assisting with the planning and presentation; (4) Write to one's rep-

resentative in government concerning some critical, current issues.

Failure to complete all nine units during the semester resulted in a grade of F for the course. If the student completed all nine units, but the instructor evaluated the work as being below the acceptable level for a B, a grade of C was given. Although the D grade was within the range of grades, no standard for determining a D grade nor expectation of any student's receiving a grade of D were provided for in section 131.

If a student failed to complete his nine units by the end of the semester, he was assigned a grade of I and given the opportunity to finish his work during a ten week extension period following the end of the semester. If the units were completed during this period the student had the grade of I changed to the appropriate grade of A, B or C.

Grades received by students in section 11, 21 and 31 were determined by each instructor at the end of the semester. These grades resulted from averaging the accumulated scores from the various examinations given and the written assignments completed during the semester. Numerical scores were given for the various tests and assignments. The possible range of scores were from 0 to 100 with grades assigned to the following numerical ranges: A...93-100; B...85-92; C...72-84; D...70-76; F...below 70; I...Incomplete work.

Description of the Results of the
Criterion Measures

The investigation has been concerned with the problem of describing the relationships of the PIPI model of instruction with achievement in Freshman English Composition, self-concept and study orientation

among freshman engineering students enrolled at Oklahoma State Uni-
versity during the fall semester of 1971. In describing these relation-
ships, four research questions were formulated to determine if the PIPI
model provided the instructional environment in which students could
achieve an acceptable level of competence in writing skills, reach an
expected superior level of achievement, improve in study habits and
attitudes and display a positive self-concept.

The results of the data collected, in attempting to find answers
to the research questions, are presented in this chapter. Descriptive
data, including the mean, standard deviation and coefficients of cor-
relation for the various criterion measures, gathered for Group I and
Group II, will be presented for each of the research questions. These
statistics were obtained from the Biomedical Computer Program, BMDO3D,
used by the University Computer Center at Oklahoma State University. A
test of significance, employing a t-test for related measures, as
described by Bruning and Kintz (1968) was used in computing t-values
for the change in scores on the SSHA for research Question 3.

Research Question 1

Question 1 asked: Do students enrolled in sections of English
1113, Freshman English Composition, using different models of instruc-
tion, acquire an acceptable level of competence in writing skills,
indicated by a score of 15 or above on a 500 word essay written as the
final examination in the course, and do significant relationships exist
between the writing skills and other criterion measures?

The distribution of essay scores for Group I and Group II are shown
in Table II and Figures 1 and 2. Table II indicates that 59.09 per cent

TABLE II

DISTRIBUTION OF ESSAY SCORES

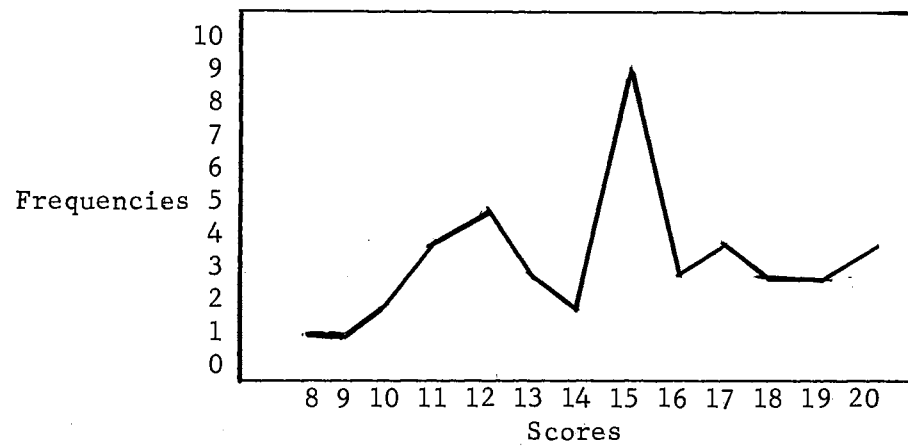| Score	Group I Frequencies	Percentage	Group II Frequencies	Percentage
20	4	9.09	2	4.55
19	3	6.82	9	20.45
18	3	6.82	3	6.82
17	4	9.09	1	2.27
16	3	6.82	6	13.64
15	9	20.45	3	6.82
14	2	4.55	6	13.64
13	3	6.82	5	11.35
12	5	11.35	6	13.64
11	4	9.09	2	4.55
10	2	4.55	0	0.00
9	1	2.27	1	2.27
8	1	2.27	0	0.00
Total Group	44	100.00	44	100.0

Maximum score = 20; Minimum score = 4

Figure 1. Distribution of Essay Scores for
Group I
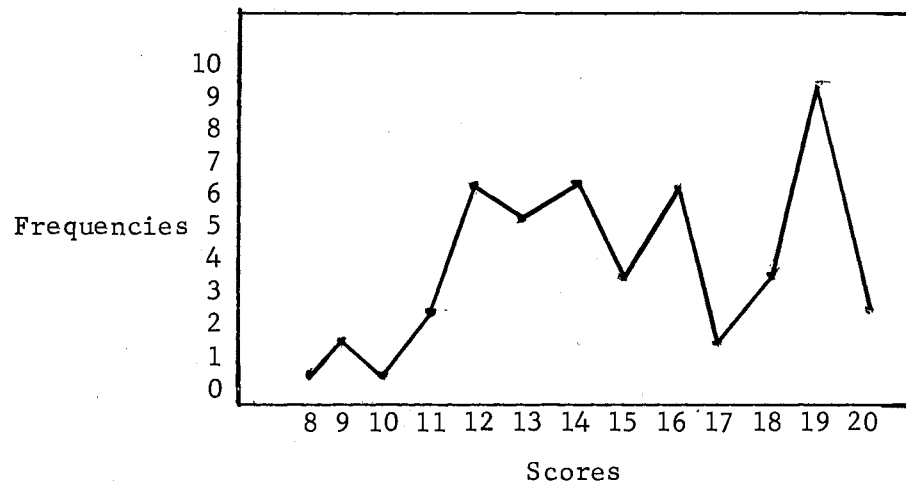
Figure 2. Distribution of Essay Scores for
Group II

of the students in Group I received a score of 15 or above on the essay examination, while 55.55 per cent of the students in Group II reached this level. The score of 15 or above was established as the acceptable level of competence in writing skills on the essay examinations. The mode for Group I was 15, while the mode for Group II was 19. The median for both distributions was 15.

The curve for the distribution for Group I, as shown in Figure 1, could best be described as a straight line except for the score of 15 which is the mode of this distribution. The curve for the distribution of Group II is shown in Figure 2.

The mean, standard deviation and coefficients of correlation between the essay scores and other criterion measures for Group I and Group II are shown in Table III. The mean for Group I was 14.750, with a s.d. of 3.264. It will be noted in Table II that 59.09 per cent of the students in Group I scored above the mean of their distribution. The mean for Group II was 15.341, with a s.d. of 2.949. Table II indicates that approximately 47.73 per cent of the students in Group II scored above the mean of their distribution.

TABLE III

DESCRIPTIVE STATISTICS ON ESSAY SCORES

	$\bar{X}$	a.d.	ACT Eng. r	ACT Com. r	Stu.Or. r	Tot.Pos. r	Sem.Gra r
Group I	14.750	3.264	-0.112	0.015	0.172	0.063	0.135
Group II	15.341	2.949	0.107	-0.106	-0.084	-0.059	0.249

Significance value for r @ 42 df: $r_{.05} = .297$; $r_{.01} = .384$

Coefficients of correlation indicating the relationships between the essay examination scores and ACT English Usage scores, ACT Composite scores, SSHA Study Orientation scores and TSCS Total Positive scores are shown in Table III. The .05 level of significance was not reached by any of these values.

Research Question 2

Question 2 asked: Do students enrolled in sections of English 1113, Freshman English Composition, using different models of instruction, reach a superior level of achievement, indicated by the receipt of a grade of A or B for the course, and do significant relationships exist between the grade received and other criterion measures?

The distribution of grades for Group I is shown in Table IV and Figure 3. Table IV indicates that 63.7 per cent of the students in Group I failed to complete the nine instructional units by the end of the semester and consequently, received a grade of I on their records. Each of the 28 students who had not finished their work at the end of the semester was given an additional ten weeks in which to complete the units. Eight of these students were able to complete the work, along with the option, and had the I changed to an A as the final grade for the course. Twelve students finished the units and received a B as the final grade. One student finished the units, but his work was evaluated as less than satisfactory by the instructor who gave the student a C as the final grade. Seven students failed to complete the units within the time period and received a final grade of F. Table IV indicates that 79.4 per cent of the students in Group I received a grade of A or B for the course, while 18.3 per cent received a grade

below a C as the final grade.

Figure 3 indicates a distribution in the shape of a U curve for grades received at the end of the semester, with a majority of students receiving a grade of I. The curve for the distribution of grades received as the final grade appears as a positive, accelerated curve with a majority of students scoring at the upper levels of the distribution.

TABLE IV

DISTRIBUTION OF GRADES FOR GROUP I

Grade	End of the Semester		Final Course Grade	
	Number	Percentage	Number	Percentage
A	13	29.5	21	47.6
B	2	4.5	14	31.8
C	0	0.0	1	2.3
D	0	0.0	0	0.0
F	1	2.3	8	18.3
I	28	63.7	0	0.0
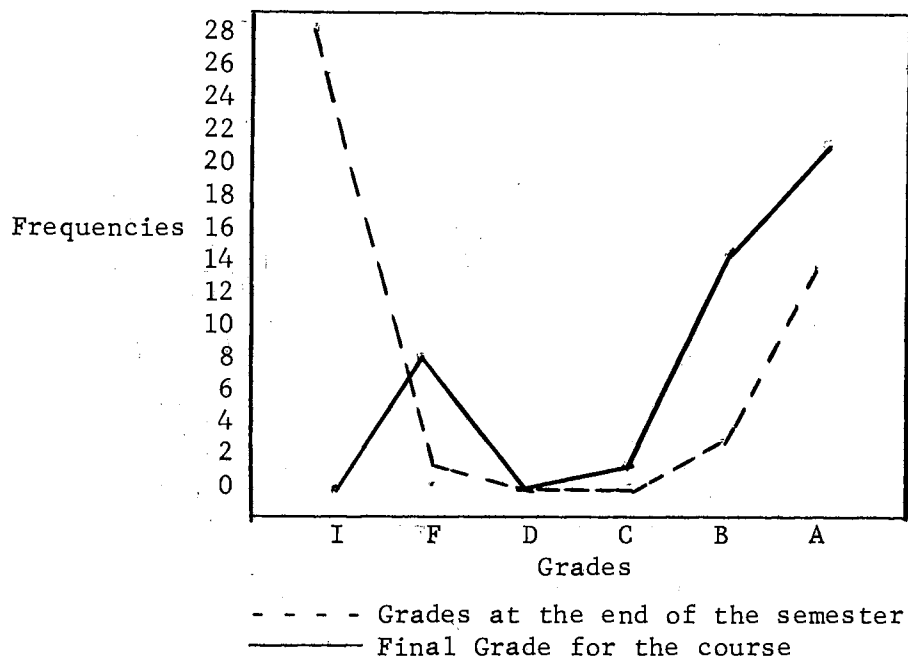
Figure 3. Distribution of Grades for Group I

Table V and Figure 4 show the distribution of grades for Group II. Table V indicates that only one student failed to complete all the required work at the end of the semester and received a grade of I. No student received a grade of F for the course, while two students received a grade of D. A grade of A or B was received by 70.5 per cent of the students in Group II, while 25 per cent received a C, with 4.5 per cent receiving a grade below C as the final grade for the course. Figure 4 shows the curve of the distribution of grades for Group II. The curve approaches normality with indications of negative skewness.

TABLE V

DISTRIBUTION OF GRADES FOR GROUP II

Grade	End of Semester		Final Grade of Course	
	Number	Percentage	Number	Percentage
A	8	18.2	8	18.2
B	23	52.3	23	52.3
C	10	22.7	11	25.0
D	2	4.5	2	4.5
F	0	0.0	0	0.0
I	1	2.3	0	0.0

——— Final Grade for the course
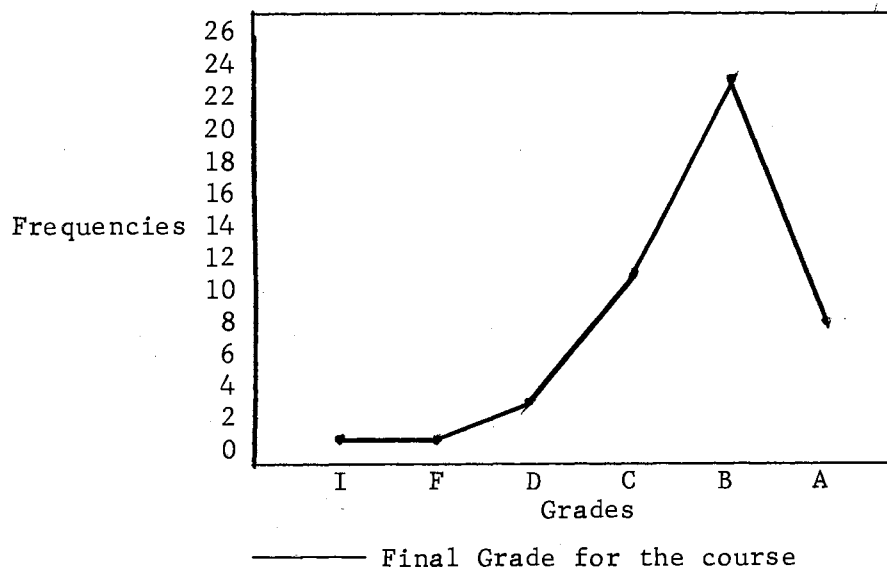
Figure 4. Distribution of Final Grades for
Group II

The mean, standard deviation and coefficients of correlation be-
tween the final grade and other criterion measures for Group I and
Group II are shown in Table VI. The mean for Group I is 2.932, with
a s.d. of 1.485, while the mean for Group II is 2.909 with a s.d. of
.772. The only significant coefficient of correlation is for the re-
lationship between the final grade and Study Orientation for Group II,
which reached beyond the .05 level.

TABLE VI

DESCRIPTIVE STATISTICS ON SEMESTER GRADE

	$\bar{X}$	s.d.	ACT Eng. r	ACT Com. r	Stu.Or. r	Tot.Pos. r	Essay r
Group I	2.932	1.485	0.137	-0.030	0.205	0.093	0.135
Group II	2.909	0.772	-0.102	0.039	0.360*	0.067	0.107

Significance values for r @ 42 df: $r_{.05}$ = .297; $r_{.01}$ = .384

* Significant beyond the .05 level

Research Question 3

Question 3 asked: Do students enrolled in sections of English
1113, Freshman English Composition, using different models of instruc-
tion, manifest a change in study orientation, as determined by the
scores obtained from a pre- and post-administrations of the Brown-
Holtzman Survey of Study Habits and Attitudes (SSHA), and do

significant relationships exist between the scores on the sub-scales
of the SSHA and other criterion measures?

Table VII shows the mean, standard deviation, change in the mean,
t-value and p for each of the sub-scales of the SSHA, which was given
as pre- and post-tests to the students in Group I. The scores on all
scales decreased on the post-test. The Study Orientation score, which
is a composite score, decreased from 110.454 to 100.727 for the Group.
This change had a t-value of 2.745 which is significant beyond the .01
level. The largest change was on the Study Habits sub-score which
decreased 5.257 in the mean and had a t-value of 3.381, which was sig-
nificant beyond the .01 level. Most of the change in Study Habits was
contributed by the 3.863 decrease in the Delay Avoidance sub-scale.
The Delay Avoidance sub-scale, along with the Work Methods sub-scale
compose the Study Habits sub-score. The decrease in Delay Avoidance
had a t-value of 3.502 which is significant beyond the .01 level and
approaches the .001 level. The Education Acceptance sub-scale score
also shows a decrease which is significant beyond the .01 level.

Table VII shows the coefficients of correlation of the relation-
ships between the sub-scales of the SSHA and the other criterion
measures considered in the study. Significant r's at the .05 level of
significance were reached for the relationship of Delay Avoidance and
final grade, r = .340; Study Habits and ACT Composite score, r = .363;
and Study Orientation and ACT Composite score, r = .338. Significant
r's at the .01 level were obtained for the relationship of Work Methods
and ACT Composite score, r = .521; and Work Methods and TSCS Total
Positive score, r = .414.

TABLE VII

DESCRIPTIVE STATISTICS AND t-VALUES FOR SUB-SCORES
ON SSHA FOR GROUP I

Scales	Pre-Test		Post-Test		Change	t	p
	$\bar{X}$	s.d.	$\bar{X}$	s.d.			
Delay Avoidance	24.954	9.829	21.091	8.391	-3.863	3.50	.01**
Work Methods	27.023	8.604	25.977	9.217	-1.046	1.08	>.10 ns
Study Habits	52.098	17.223	46.841	15.601	-5.257	3.381	.01**
Teacher Approval	28.159	9.243	27.318	8.912	-0.841	.74	>.10 ns
Education Acceptance	29.364	7.895	26.568	7.813	-2.796	2.87	.01**
Study Attitudes	57.477	16.130	53.886	15.221	-3.591	1.86	>.10 ns
Study Orientation	110.454	31.301	100.727	27.989	-9.727	2.745	.01**

Significant t-values @ 43 df: $t_{.05} = 2.016$;

$t_{.01} = 2.693$;

$t_{.001} = 3.528$

**Beyond the .01 level

TABLE VIII

COEFFICIENTS OF CORRELATION BETWEEN SUB-SCALES OF SSHA
AND ACT, GRADE, ESSAY AND TSCS FOR GROUP I

Scales	ACT Eng. r	ACT Com. r	Grade r	Essay r	Tot.Pos. r
Delay Avoidance	-0.059	0.052	0.340*	0.215	0.046
Work Methods	0.265	0.521**	0.155	0.125	0.414**
Study Habits	0.143	0.363*	0.250	0.165	0.269
Teacher Approval	0.092	0.227	0.151	0.061	0.130
Education Acceptance	0.029	0.225	0.064	0.214	0.285
Study Attitude	0.069	0.249	0.121	0.146	0.223
Study Orientation	0.117	0.338*	0.205	0.172	0.271

Significance values for r @ 42 df: $r_{.05} = .297$; $r_{.01} = .384$

*Significant beyond the .05 level
**Significant beyond the .01 level

Table IX shows the mean, standard deviation, change in the mean,
t-value and p for each of the sub-scales on the SSHA which was admin-
istered as pre- and post-tests to students in Group II. As for Group
I, all the scores on the post-test decreased. The largest change in
score for Group II was the Work Methods sub-scale which decreased
2.909. The t-value for this change was 2.85, which was significant
beyond the .01 level. The change in Study Habits and Study Orientation
was significant at the .01 level, while Study Attitudes change reached
the .05 level.

TABLE IX

DESCRIPTIVE STATISTICS AND t-VALUES FOR SUB-SCORES
ON SSHA FOR GROUP II

| Scales | Pre-Test | | Post-Test | | Change | t | p |
	$\bar{X}$	s.d.	$\bar{X}$	s.d.			
Delay Avoidance	22.773	10.156	20.545	9.581	-2.228	1.93	>.10 ns
Work Methods	28.386	8.207	25.477	8.481	-2.909	2.85	.01**
Study Habits	51.159	17.299	46.250	16.972	-4.909	2.97	.01**
Teacher Approval	29.159	7.726	27.682	8.556	-1.477	1.59	>.10 ns
Education Acceptance	28.295	7.859	26.977	8.022	-1.318	1.50	>.10 ns
Study Attitudes	57.432	14.244	54.227	14.296	-3.205	2.17	.05*
Study Orientation	108.591	29.857	100.477	28.657	-8.114	2.92	.01**

Significant t-values @ 43 df: $t_{.05}$ = 2.016;

$t_{.01}$ = 2.693;

$t_{.001}$ = 3.528

*Beyond the .05 level
**Beyond the .01 level

Table X shows the coefficients of correlation for the relation-
ship between the scores on the sub-scales of the SSHA and ACT English
Usage, ACT Composite score, Grade, Essay and TSCS Total Positive score
for Group II. Coefficients significant at the .05 level are shown for

the following relationships: Delay Avoidance and Grade, r = .375;

Delay Avoidance and Total Positive score, r = .323; Work Methods and

Grade, r = .380; Work Methods and Total Positive score, r = .340;

Study Habits and ACT English Usage, r = .303; Study Habits and Total

Positive score, r = .360; Education Acceptance and ACT English Usage,

r = .326; Education Acceptance and Grade, r = .304; Education Accept

tance and Total Positive score; r = .306; Study Attitudes and ACT

English Usage, r = .318; Study Orientation and ACT English Usage, r =

.338; Study Orientation and Grade, r = .360; and Study Orientation and

Total Positive score, r = .351. The .01 level was reached by the

coefficient for the relationship of Study Habits and Grade, r = .385.

TABLE X

COEFFICIENTS OF CORRELATION BETWEEN SUB-SCALES OF SSHA,
AND ACT, GRADE, ESSAY AND TSCS FOR GROUP II

Scales	ACT Eng. r	ACT Com. r	Grade r	Essay r	Tot.Pos. r
Delay Avoidance	-0.259	-0.211	0.375*	-0.188	0.323*
Work Methods	-0.255	-0.159	0.380*	0.069	0.340*
Study Habits	-0.303*	-0.204	0.385**	-0.038	0.360*
Teacher Approval	-0.166	-0.188	0.164	0.070	0.131
Education Acceptance	-0.326*	-0.175	0.304*	-0.165	0.306*
Study Attitudes	-0.318*	-0.201	0.265	-0.124	0.277
Study Orientation	-0.338*	-0.221	0.360*	-0.084	0.351*

Significance value for r @ 42 df: $r_{.05}$ = .297; $r_{.01}$ = .384
*Beyond the .05 level
**Beyond the .01 level

Research Question 4

Question 4 asked: Do students enrolled in sections of English 1113, Freshman English Composition, using different models of instruction, display a positive self-concept, as indicated by scores on the sub-scales of the Tennessee Self-Concept Scale (TSCS), and do significant relationships exist between the scores on the sub-scales of the TSCS and other criterion measures?

Table XI shows the mean and standard deviation for each of the sub-scales and the Total Positive score on the TSCS for Group I and Group II. The table indicates that Group I had a slightly higher mean score on each of the scales than Group II, except for the Self Criticism score.

Table XII shows the coefficients of correlation for the relationships between the scores on the sub-scales of the TSCS and ACT English Usage scores, ACT Composite scores, Grade, Essay and Study Orientation of the SSHA. Four coefficients were significant as follows: Family Self and Study Orientation, $r = .345$; Self Satisfaction and ACT English Usage, $r = .322$; Behavior and Study Orientation, $r = .363$; and Self Criticism and Essay, $r = .341$. Each of these coefficients reached the .05 level.

Coefficients of correlation for the relationships between the scores on the sub-scales of the TSCS and ACT English Usage, ACT Composite scores, Grade, Essay and Study Orientation of the SSHA are shown in Table XIII. Six coefficients reached the .05 level of significance as follows: Moral-Ethical Self and Study Orientation, $r = .347$; Social Self and Study Orientation, $r = .334$; Self Satisfaction and Study

TABLE XI

DESCRIPTIVE STATISTICS OF TSCS

Scales	Group I		Group II	
	$\bar{X}$	s.d.	$\bar{X}$	s.d.
Physical Self	69.432	8.835	67.023	9.277
Moral-Ethical Self	67.668	7.714	65.841	8.380
Personal Self	66.523	7.777	64.227	6.850
Family Self	70.250	7.260	67.045	9.211
Social Self	66.682	8.031	65.068	8.590
Identity	124.568	10.680	120.045	13.389
Self Satisfaction	103.886	14.735	101.159	14.530
Behavior	111.545	10.624	108.000	11.283
Total Positive	340.000	32.483	329.204	33.673
Self Criticism	33.250	4.951	33.364	5.366

TABLE XII

COEFFICIENTS OF CORRELATION BETWEEN SCORES OF SUB-SCALES
OF TSCS AND ACT, GRADE, ESSAY AND SSHA FOR GROUP I

Scales	ACT Eng. r	ACT Com. r	Grade r	Essay r	Stu.Or. r
Physical Self	0.263	0.210	0.059	0.232	0.129
Moral-Ethical Self	-0.042	-0.028	0.025	-0.091	0.192
Personal Self	0.213	0.191	0.055	0.051	0.242
Family Self	0.065	0.149	0.152	0.004	0.345*
Social Self	0.222	0.099	0.092	0.031	0.218
Identity	0.095	0.028	0.095	0.134	0.194
Self Satisfaction	0.322*	0.265	0.071	0.014	0.196
Behavior	0.020	0.079	0.089	0.037	0.363*
Total Positive	0.184	0.155	0.093	0.063	0.271
Self Criticism	0.202	0.239	0.005	0.341*	-0.131

Significant values for r @ 42 df: $r_{.05}$ = .395; $r_{.01}$ = .384

*Significant beyond the .05 level

TABLE XIII

COEFFICIENTS OF CORRELATION BETWEEN SCORES OF SUB-SCALES
OF TSCS AND ACT, GRADE, ESSAY AND SSHA FOR GROUP II

Scales	ACT Eng. r	ACT Com. r	Grade r	Essay r	Stu.Or. r
Physical Self	-0.119	-0.108	0.124	-0.005	0.224
Moral-Ethical Self	-0.181	-0.204	0.231	0.013	0.347*
Personal Self	-0.184	-0.057	-0.052	-0.046	0.267
Family Self	0.069	0.179	-0.182	-0.145	0.235
Social Self	-0.138	-0.102	0.057	-0.056	0.334*
Identity	-0.129	-0.051	-0.027	0.026	0.206
Self Satisfaction	-0.052	-0.037	0.136	-0.070	0.340*
Behavior	-0.173	-0.098	0.056	-0.118	0.367*
Total Positive	-0.132	-0.069	0.067	-0.059	0.352*
Self Criticism	-0.003	-0.045	-0.211	-0.034	-0.365*

Significance values for r @ 42 df: $r_{.05}$ = .297; $r_{.01}$ = .384

*Beyond the .05 level

Orientation, r = .340; Behavior and Study Orientation, r = .367; Total

Positive and Study Orientation, r = .352; and Self Criticism and Study

Orientation, r = -0.365.

Summary

A detailed presentation of a description of the PIPI model of in-
struction and its relationships with achievement, self-concept and

study orientation among freshman engineering students has been given

in this chapter. The findings were presented in answering four re-

search questions which were formulated to describe these relationships.

The findings of the study are as follows:

1. Writing Skills: In answering question 1, the findings indi-

cated that 59.09 per cent of the students in Group I reached the

acceptable level of competence in writing skills as indicated by ob-

taining a score of 15 or above on a 500 word essay written as the final

examination in the course, while 55.55 per cent of the students in the

non-PIPI group reached this level. The mean (14.750) for Group I was

lower than the mean (15.341) for Group II. No significant relation-

ships existed between the essay scores and other criterion measures

considered in the study.

2. Semester Grade: Results of the study showed that a higher

percentage (79.4 per cent) of the students in the PIPI section received

a semester grade of A or B for the course than did students in Group

II (70.5 per cent). More students (18.3 per cent) in Group I failed

the course and received a semester grade of F than in Group II (0 per

cent). The relationship of semester grade and Study Orientation on the

SSHA was significant beyond the .05 level.

3. Study Orientation: Data for question 3 indicated that, where-
as both Group I and Group II decreased in scores on the SSHA when it
was administered as a post-test, the change in scores for Group II ap-
peared to be more uniform. The change in scores for the PIPI group was
chiefly in two areas, Delay Avoidance and Education Acceptance. The
decrease in these scores on the post-test was significant beyond the
.01 level, with the change in Delay Avoidance approaching the .001
level of significance. The change in the Work Methods score for Group
II was significant at the .01 level. More significant relationships
(14) were found to exist between the sub-scales of the SSHA and the
other criterion measures considered in the study for Group II than for
Group I (5).

4. Self-Concept: Findings for question 4, which was concerned
with the self-concept of students, indicated that students in the PIPI
group had a higher mean on each of the sub-scales of the TSCS, except
for the Self-Criticism score, than did Group II. There were six sig-
nificant relationships found to exist between Study Orientation and
various sub-scales of the TSCS for Group II, while four existed for
Group I.

CHAPTER V ·

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

General Summary of the Study

The purpose of this study was to describe the Pre-Professional
Individually Prescribed Instruction Curriculum (PIPI) recently intro-
duced into the curriculum for entering freshman engineering students by
the College of Engineering in cooperation with the College of Arts and
Science at Oklahoma State University. The investigation was also con-
cerned with a description of the relationships between the PIPI model
and achievement, self-concept and study orientation among these
students.

The PIPI model of instruction evolved from the efforts of the fac-
ulty at Oklahoma State University to seek means for improving the in-
struction in classrooms. The College of Engineering faculty, feeling
that weaknesses within the instructional program may have some direct
influence upon the academic success or failure of students, initiated a
project in 1970 which resulted in the introduction of the PIPI model.
These educators hoped to provide an instructional environment which
would increase the level of academic achievement, thus lowering the
attrition rate among engineering students resulting from academic fail-
ure, as well as maximizing learning efficiency. The PIPI model was in-
troduced into the curriculum for entering freshman engineering students

as a pilot project in the fall semester of 1971.

The investigation took place during the fall semester of 1971-72 academic year at Oklahoma State University. Two groups of freshman engineering students were selected from among 248 students entering the College of Engineering. Group I consisted of 44 students who were assigned to a section of English 1113, Freshman English Composition, using the PIPI model of instruction. Group II consisted of 44 students who were assigned to sections of the course using a non-PIPI, lecture-discussion model of instruction.

ACT English Usage and Composite scores were gathered for the students during the summer of 1971. The Brown-Holtzman Survey of Study Habits and Attitudes (SSHA) was administered as a pre-test during sessions of freshman orientation clinics during June and July, 1971. Scores from a 500 word essay written as the final examination in the course, the Tennessee Self-Concept Scale (TSCS), the Brown-Holtzman Survey of Study Habits and Attitudes (SSHA), administered as a post-test, and semester grades were obtained at the end of the semester.

Group means, standard deviations and coefficients of correlation were computed for the various criterion measures. A test of significance employing a t-test for related measures, as described by Bruning and Kintz (1968), was used to describe the change in scores on the pre- and post-administrations of the SSHA. Four research questions, seeking a description of the relationships between the PIPI model and achievement, self-concept and study orientation, were formulated to guide the investigator in the study. The present study has been an exploration of the PIPI model of instruction, therefore all findings have been considered as descriptions of the model and its relationships without

attempting to draw conclusions as to the merits of the model.

Conclusions

Subject to the limitations of the study, the following conclusions are suggested:

1. <u>Writing Skills</u>: On the basis of the information gathered from an evaluation of the 500 word essay written as the final examination for the course, it can be concluded that students in the section of English 1113 using the PIPI model were able to acquire acceptable writing skills during the semester. This level of competence in writing an essay is comparable to the skill developed by students in the non-PIPI sections of the course.

2. <u>Semester Grade</u>: Based upon the findings of the study, it is concluded that more students in the PIPI group reached a superior level of achievement as indicated by the semester grade of A or B than did in the non-PIPI group, but more students in the non-PIPI group passed the course. While more students in the PIPI group were achieving the A or B level, eight students were failing the course.

3. <u>Study Orientation</u>: It is concluded from findings of the study that students in the PIPI section of the course experienced a deterioration in the study habit of promptness in completing academic assignment, lack of procrastination and freedom from wasteful delay and distractions. They also showed a change in their study attitude of approving the educational objectives, practices and requirements of their programs. The non-PIPI group experienced a decrease in their study habit involving the use of effective study procedures, efficiency in performing academic assignments and use of how-to-study skills.

4. <u>Self-Concept</u>: Findings of the study concerned with the question of self-concept imply that students in the PIPI group had a more positive self-concept than did the students in the non-PIPI group. On the basis of the present information it cannot be concluded that this is indeed true. It can be concluded, however that the various sub-scales of the <u>TSCS</u> have a greater number of significant relationships with the criterion measures for Group II than for the PIPI group. This area of the study needs further investigation before conclusions can be reached.

Recommendations

Basic to the improvement of an instructional model are its continual evaluation and change. The following suggestions are presented by the investigator in the interest of further improvement of the PIPI model and its evaluation.

1. Further studies should be conducted at Oklahoma State University in the PIPI English course to gather additional information which could be used to better validate the present study. The present study investigated the PIPI model in its initial semester. Further studies should be made to determine if the findings of this present study remain stable after the model has been used during succeeding semesters. Experience in using the PIPI model may result in findings different from those reported in this study.

Further studies of the PIPI model of instruction should also be made in determining the relationships of the model among students in other subject areas and at different levels in their academic programs. The present study was limited to one course, Freshman English

Composition, and to freshman engineering students. The model should be evaluated among students at other academic levels and in other courses.

2. A follow-up study of students involved in this initial study should be made. One of the objectives of the PIPI model is to provide pre-professional foundations that will maximize achievement in the professional areas of the engineering program. The students in the present study should be followed throughout their careers at Oklahoma State University to determine if the long term effects of the PIPI model results in higher achievement in the professional courses. Another concern among those developing the PIPI model was the objective of providing an environment which increased academic achievement, thus lowering attrition among engineering students resulting from academic failure. A follow-up study of these students to determine the attrition rate among freshmen entering the College of Engineering during 1971 would be an important study.

3. The findings for question 2 showing that 63 per cent of the students in the PIPI section were unable to complete the requirements of the course within the semester, suggest the need to make an evaluation of the course content and number of units to determine if too much is demanded of students in the course. Consideration of devising means for encouraging students to set a faster pace for themselves in completing the units may be needed. Care should be taken, however that the individualized approach and self-pacing not be eliminated.

Since so many students received a semester grade of F for the course because they failed to complete the required nine units, consideration needs to be given to a system of grading that provides for a grade between the F and B for students with superior quality work but

fail to complete all the units required to reach the B grade level.

4. Data provided for question 3 indicated that the students in the PIPI group experienced a significant decrease in Study Orientation, especially in Delay Avoidance and Education Acceptance, during the semester. On the basis of these findings, it is recommended that a concerted effort to provide both counseling and instruction aimed at the development of study skills, study habits and study attitudes be considered as a supplement to the PIPI procedures. The demands of an independent, individualized, self-paced instructional environment may expect skills, habits and attitudes of students that are not fully developed when they enter their college programs. A counseling and instructional program assisting students in the development of these may better equip them for their experience with PIPI. It is also recommended that an orientation program, introducing the PIPI approach, be developed for all students enrolling in PIPI sections. This program would provide the opportunity to better prepare the students for the expectations and procedures of the PIPI model of instruction.

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77

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APPENDIX A

Preprofessional Curricula Program

Student Information

You have been selected to attend a program of instruction designed for Math, Physics, Chemistry and Engineering freshmen. This program is called "Preprofessional Individually Prescribed Instruction Curriculum (PIPI)". PIPI consists of a 40 hour equivalent curriculum which intergrates and relates freshman and sophomore level math, physics, chemistry and written, oral, graphical and computer communication. In the PIPI program, a student is pretested and is prescribed instruction that matches his competency level. Once in the curriculum, a student can move at his own pace. If he accomplishes the course objectives in half of a semester, he is given credit and finishes early. If he takes a little longer than a semester, he is not penalized--what is important is that he finishes the objectives. PIPI makes more use of the media (films, tapes, etc.) and less of the classroom lecture. Most of the time spent with the instructor in PIPI is on a person to person basis. PIPI is so designed that a high percentage of the students will accomplish most of the course objectives. If you have further questions, return to this room at 5:00 p.m. or ask your adviser when you meet him.

APPENDIX B

Final Examination

English 1113

During the next one hour and fifty minutes, write an essay which
represents your best ability to express an idea in standard written
English. Your essay should be four to five hundred words long.

Choose one of the following topics as the subject of your essay.

1. "All the News that's Fit to Print" is the motto of The New York
Times. In your estimation, what is and what is not fit to print?

2. There is a lot of discussion these days about the rights of the
individual and the rights of groups. Discuss a particular instance
of discrimination or violation of rights.

3. TV or not TV--that is the question. Discuss one particular tele-
vision commercial which you consider particularly effective. Also
discuss one which you consider particularly ineffective. Discuss the
effect of both instances.

4. A youth group has asked you to speak to them about marijuana. The
group is particularly interested in the question of the legalization
of the use of marijuana. The members of the group have pointed out the
fact that cigarettes and liquor can both be harmful and they are legal.
They want an essay version of your speech for their monthly publication.
Write that essay version of your speech.

5. Select one particular phase of ecological concern and write a cause
and effect type essay on the subject.

VITA

Edward J. Minars

Candidate for the Degree of

Doctor of Education

Thesis: THE EFFECTS OF INDIVIDUALLY PRESCRIBED INSTRUCTION ON ACHIEVE-
MENT, SELF-CONCEPT AND STUDY ORIENTATION AMONG ENGINEERING
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Education: Attended public school in Anderson, Missouri, gradu-
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Oklahoma State University, Stillwater, Oklahoma, 1948-50,
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Professional Experience: Served as pastor of the Prarie Grove
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