

THE UNIVERSITY OF OKLAHOMA
GRADUATE COLLEGE

A COMPARISON OF THE EFFECT OF INSTRUCTIONAL OBJECTIVES
ON THE ACHIEVEMENT OF COMMUNITY COLLEGE STUDENTS
WHO STUDY ELEMENTARY MICROECONOMICS
UNDER TWO MODES OF INSTRUCTION

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CHAPTER I

THE PROBLEM

Introduction

Since World War II, the interest and the attention of economists, educators, businessmen, and labor have been focused on the expansion and improvement of economic education in a nationwide effort to combat economic illiteracy in the United States. The American Economic Association has assumed a strong leadership role in the economic education movement and has sought to combine the analytical tools and expertise of the economist with the motivation and the methodology of the educator to increase economic understanding of American citizens. The accomplishment of this educational goal is vital to the survival of a free enterprise society.

Since 1890, the Association has pursued this goal through a dedicated network of committees, conferences, and reports. Each committee assignment, each conference program, each report summary has

signified a positive response to a resounding need for the improvement of instruction in economic education.

In 1944, the American Economic Association created a committee to study and report on possible improvements in undergraduate teaching of economics. The committee's report, completed in 1950, contained the following indictment: "A specter is haunting teachers of economics, the specter of bad teaching."¹

Since that study was made, the constantly recurring echo each year has been that economics is being poorly taught. The predominant method of instruction in economics was then, is now, and will continue to be the lecture method until the higher education reward system encourages teaching accomplishment and methodological experimentation in the college classroom. The higher education reward system appears to be based on research expertise, not on teaching accomplishment.

In 1960, the American Economic Association and the Committee for Economic Development appointed six economists and two educators to form The National Task Force on Economic Education. Their charge was to study and describe the minimum understanding of economics essential for good citizenship. In September 1961, their hallmark report, "Economic Education in the Schools," substantiated the suspicion that the economic illiteracy of American citizens was indeed a reality. Furthermore, little evidence existed that our educational institutions at

¹Ernest O. Melby, "Economic Education Is a Must," Journal of Educational Sociology 23 (March 1950): 378.

any level were making reasonable progress in solving the problem of economic illiteracy or improving the economic curriculum.²

During the decade of the sixties, the Joint Council on Economic Education responded to the need for improved instruction in economics by launching two curriculum projects aimed at improving economic instruction in the public schools in grades K through 12. Implementation of these programs invited cooperation and articulation between the college economist and the public school teacher. The first program to be initiated was the Developmental Economic Education Program (DEEP), which encouraged social studies teachers to integrate economic concepts into their curriculum. The second program was the Business-Economics Curriculum Project (B-ECP), which assisted business education teachers in integrating economic concepts into their course offerings. The emphasis of these two programs focused on the need to establish goals, to identify economic concepts, to prepare educational materials, and to select a variety of instructional strategies.

In a 1965 monograph entitled, The Economist as Teacher, Leamer posed a series of obvious but discomfiting questions that stressed the prevailing lack of instructional planning and underlined the continuing need for goal identification and varied methodology. He taunted:

Economists generally have been too complacent about and too indifferent to their roles as teachers . . . Are not the best teachers distinguished from the poor by the purposefulness of

²National Task Force on Economic Education, Economic Education in the Schools (New York: Committee for Economic Development, 1961), pp. 8-11.

their teaching? Do they not know where they are going and then choose subject matter, methods of instruction, and examination questions with these ends in view.³

In 1973, the Committee on Economic Education, sponsored by the American Economic Association, turned their attention to the development of a working model for a teacher-training component to be included in graduate programs in economics.⁴ Planning sessions have suggested that emphasis be placed on the following needs: (1) some understanding of the learning process as a basis for teaching; (2) careful analysis of course content and course planning, coupled with behavioral goals for students; (3) teaching techniques (lectures, discussion, case studies, problem-solving, programmed learning, games, computer-aided instruction, and visual aids); (4) construction of examinations and evaluation techniques; and (5) research on the effectiveness of education in economics. The proposal prepared by this Committee once more recognized the need for improving the economic instruction in higher education through the diversification of teaching techniques and research to evaluate the contribution of various pedagogic methods to economic understanding.

During the past few years, a majority of professional association meetings and group sessions pertaining to the teaching of economics has devoted at least one session or paper to research or evaluation in economic education. Professional organizations (namely, the

³Laurence E. Leamer, The Economist as Teacher, Monograph C-13 (Cincinnati: South-Western Publishing Company, 1965), p. 40.

⁴G. L. Bach, "An Agenda for Improving the Teaching of Economics," The American Economic Review 63 (May 1972): 304-8.

American Economic Association, the Southern Economic Association, the National Council for the Social Studies, the North Central Business Education Association, the National Business Education Association, and the American Vocational Association) are recognizing educator endeavors to expand and improve instructional methodology in economics.⁵

The foregoing discussion has established that a major concern of economists, educators, and professional groups is the improvement of instruction in undergraduate economics courses. Several research studies have been conducted to determine the impact of a variety of instructional modes and media, such as the traditional lecture-discussion approach, problem-solving activities, case studies, games, programmed texts, behavioral objectives, and personalized systems of instruction. However, no studies were found that were designed to discover whether behaviorally stated objectives are more effective in terms of student achievement when used in conjunction with one, rather than another, instructional method.

Statement of Purpose

The purpose of this study was to investigate the effect of the use of instructional objectives, written in observable behavioral terms, on the achievement of community college students who study elementary microeconomics under two modes of instruction. The two instructional methods are programmed instruction and conventional instruction. This investigation was designed to discover whether

⁵Darrell R. Lewis and Charles C. Orvis, Research in Economic Education (New York: Joint Council on Economic Education, 1971), p. 8.

specific instructional objectives contribute more effectively to student achievement in elementary microeconomics when used in conjunction with one, rather than the other, of the two instructional methods listed above.

Statement of Problem

The effect of behaviorally stated instructional objectives on the achievement of community college students who study elementary microeconomics under two different instructional methods was investigated in this study. This research question was posed: What is the relationship between the use of instructional objectives and the achievement of students who study microeconomics utilizing programmed instruction or conventional classroom instruction?

Specifically, the problems investigated were:

1. Is the use of instructional objectives in the study of elementary microeconomics related to student achievement as measured by a standardized national test and a non-standardized teacher-made test?
2. Is the kind of instructional method used in the study of elementary microeconomics related to student achievement as measured by a standardized national test and a non-standardized teacher-made test?
3. Is the use of instructional objectives in the study of elementary microeconomics more effective in terms of student achievement, as measured by a non-standardized teacher-made test and a standardized national test, when used in conjunction with programmed instruction or conventional classroom instruction?

These questions were restated as specific hypotheses in the section that follows.

Hypotheses To Be Tested

In order to accomplish the purposes of this study, the following hypotheses were formulated:

Hypothesis 1: Students in elementary microeconomics who receive the treatment of instructional objectives stated in behavioral terms will achieve a higher post-test mean on the Revised Test of Understanding in College Economics than students in elementary microeconomics who do not receive the treatment of instructional objectives stated in behavioral terms.

Hypothesis 2: Students in elementary microeconomics who are taught by conventional instruction will achieve a higher post-test mean on the Revised Test of Understanding in College Economics than students in elementary microeconomics who are taught by programmed instruction.

Hypothesis 3: In the study of elementary microeconomics, the treatment of receiving instructional objectives does interact significantly with the two instructional methods, programmed instruction or conventional instruction, as measured by student achievement on the Revised Test of Understanding in College Economics.

If Hypothesis 3 is supported, then Hypothesis 1 and Hypothesis 2 will be tested as simple main effects; otherwise, they will be tested as main effects.

If Hypothesis 1 is supported as a main effect, the following hypotheses will be tested:

Hypothesis 1a: Students in elementary microeconomics who are taught by programmed instruction and receive the treatment of instructional objectives will achieve a higher post-test mean on the Revised Test of Understanding in College Economics than students in elementary microeconomics who are taught by programmed instruction and do not receive the treatment of instructional objectives.

Hypothesis 1b: Students in elementary microeconomics who are taught by conventional instruction and receive the treatment of instructional objectives will achieve a higher post-test mean on the Revised Test of Understanding in College Economics than students in elementary microeconomics who are taught by conventional instruction and do not receive the treatment of instructional objectives.

If Hypothesis 2 is supported as a main effect, the following hypotheses will be tested:

Hypothesis 2a: Students in elementary microeconomics who are taught by programmed instruction and receive the treatment of instructional objectives will achieve a higher post-test mean on the Revised Test of Understanding in College Economics than students in elementary microeconomics who are taught by conventional instruction and receive the treatment of instructional objectives.

Hypothesis 2b: Students in elementary microeconomics who are taught by conventional instruction and do not receive the treatment of instructional objectives will achieve a higher post-test mean on the Revised Test of Understanding in College Economics than students in

elementary microeconomics who are taught by programmed instruction and do not receive the treatment of instructional objectives.

Hypothesis 4: Students in elementary microeconomics who receive the treatment of instructional objectives stated in behavioral terms will achieve a higher post-test mean on the teacher-made test than students in elementary microeconomics who do not receive the treatment of instructional objectives stated in behavioral terms.

Hypothesis 5: Students in elementary microeconomics who are taught by conventional instruction will achieve a higher post-test mean on the teacher-made test than students in elementary microeconomics who are taught by programmed instruction.

Hypothesis 6: In the study of elementary microeconomics, the treatment of receiving instructional objectives does interact significantly with the two instructional methods, programmed instruction or conventional instruction, as measured by student achievement on the teacher-made test.

If Hypothesis 6 is supported, then Hypothesis 4 and Hypothesis 5 will be tested as simple main effects; otherwise, they will be tested as main effects.

If Hypothesis 4 is supported as a main effect, the following hypotheses will be tested:

Hypothesis 4a: Students in elementary microeconomics who are taught by programmed instruction and receive the treatment of instructional objectives will achieve a higher post-test mean on the teacher-made test than students in elementary microeconomics who are taught by

programmed instruction and do not receive the treatment of instructional objectives.

Hypothesis 4b: Students in elementary microeconomics who are taught by conventional instruction and receive the treatment of instructional objectives will achieve a higher post-test mean on the teacher-made test than students in elementary microeconomics who are taught by conventional instruction and do not receive the treatment of instructional objectives.

If Hypothesis 5 is supported as a main effect, the following hypotheses will be tested:

Hypothesis 5a: Students in elementary microeconomics who are taught by programmed instruction and receive the treatment of instructional objectives will achieve a higher post-test mean on the teacher-made test than students in elementary microeconomics who are taught by conventional instruction and receive the treatment of instructional objectives.

Hypothesis 5b: Students in elementary microeconomics who are taught by conventional instruction and do not receive the treatment of instructional objectives will achieve a higher post-test mean on the teacher-made test than students in elementary microeconomics who are taught by programmed instruction and do not receive the treatment of instructional objectives.

Sources of Data

Information was gathered from a variety of sources. Books, periodicals, doctoral dissertations, and abstracts pertaining to

instructional objectives and methodology in economic education were perused. Books explaining educational research and statistics were examined. Data from student information sheets were tallied and recorded. To measure achievement in economic understanding, the Revised Test of Understanding in College Economics was administered to the community college students who enrolled in elementary microeconomics during the 1982 spring semester. In addition, a teacher-made test containing items drawn from the list of instructional objectives was administered to measure achievement in economic understanding. The statistical procedure used to analyze the data collected was analysis of covariance. The Statistical Analysis System (SAS) computer programs at the Merrick Computer Center on the University of Oklahoma Norman campus were used to perform the statistical computations.

Procedures of the Study

The procedural path of this study consisted of the following steps:

1. Identified the problem to be studied. (See page 6 of this study.)
2. Reviewed the pertinent literature. The literature is summarized in Chapter II.
3. Obtained permission from the college administration to involve students, classes, and instructor in this research study.
4. Selected a research design. A 2 x 2 factorial design was selected, utilizing a post-test control group design. The exercise of the control required of a true experiment becomes difficult when the

experiment is conducted in the real world of the classroom. Campbell and Stanley have coined the term "quasi-experimental design" to describe the situation where the researcher has control over the scheduling of data collection procedures but must accept naturally assembled groups rather than exercise random sampling procedures.⁶

5. Selected an appropriate statistical technique for analyzing the data. Analysis of covariance was used to test for significant differences among the means of the four intact groups. GPA scores, representing prior academic knowledge, were used as the covariate.

6. Selected a nationally recognized evaluation instrument to measure the achievement in economic understanding of community college students studying elementary microeconomics. The test instrument selected was the Revised Test of Understanding in College Economics (TUCE), a standardized test prepared by the Joint Council on Economic Education in 1981. Micro Forms A and B were combined to serve as the post-test.

7. Prepared a teacher-made test to serve as a post-test evaluation instrument. The test items were drafted from the list of instructional objectives that comprised the experimental treatment in this study.

8. Designed student permission forms and student information sheets that were completed by the students at the beginning and end of the 1982 spring semester.

⁶Donald T. Campbell and Julian C. Stanley, Experimental and Quasi-Experimental Designs for Research on Teaching (Chicago, Illinois: Rand McNally and Company, 1963), p. 34.

9. Reviewed and refined the instructional objectives comprising the "treatment" applied to the two experimental groups.

10. Designated the experimental and control groups. The designation of the two programmed instruction classes and the two conventional instruction classes, as well as the experimental class and the control class within each pair of classes, was done by random assignment, i.e., the drawing of lots.

11. Administered the two post-tests (the national standardized test and the teacher-made test) to the students in the four economics classes at the end of the 1982 spring semester.

12. Collected, coded, and submitted the data to the computer for statistical analysis.

13. Prepared the research report.

Limitations of the Study

The major limitations of this research study are listed below:

1. The population of this experiment was limited to the students who enrolled in economics courses in a large state-supported, two-year college in the Southwest. Specifically, the sample drawn from this population was limited to the students enrolled in the four sections of elementary microeconomics taught by this researcher and scheduled at Oscar Rose Junior College during the 1982 spring semester. This sample appeared to be typical of the population of the college.

2. The students who enrolled in the four sections of elementary microeconomics were selected by accidental sampling procedures,

and these four sections were assigned to the instructor by college administrative scheduling techniques. The accidental sampling was accompanied by the random assignment of each section to an instructional mode, as well as to an experimental treatment or control category.

3. Research precepts urge that classroom activities be supervised by instructors other than the researcher in order to counteract the subtle influence on experimental activities of any biases, conscious or unconscious, that the researcher may have. However, institutional considerations required the researcher to serve as instructor and teach the four sections of elementary microeconomics. To control this factor, other instructors visited the four classes on an unannounced basis to evaluate the consistency of the teaching performance and the personal attitude of the researcher in the role of instructor.

Assumptions of the Study

Various assumptions were made about the students, the testing instrument, and the teaching methods used in this study. The most important of these assumptions were the following:

1. The sample of students in the four sections of elementary microeconomics under study are generally representative of a random sample of students enrolled in economics courses in a large state-supported, two-year college in the Southwest.

2. The instructional objectives that were used in this study adequately reflected the economic understanding measured by the

Revised Test of Understanding in College Economics, Micro Forms A and B.

3. The behaviorally stated instructional objectives and the treatment applied to the experimental sections in this research study, provided an effective variance from the teaching procedures employed in the control sections representing the two instructional modes.

4. The effect of other factors (such as textbooks, class time, and class size) on the two control and two experimental classes was negligible.

Definitions of Terms

Terminology used in this study is defined as follows:

Programmed Instruction is a student-centered/student-paced instructional method that incorporates many procedures, materials, and media, such as a linear programmed textbook, problem-solving activities, graph construction, case studies, student reports, overhead transparencies, filmstrips, films, audio tapes, videotapes, supplementary readings, magazines, newspapers, and a regularly scheduled class period. The class period is used, according to student choice, for individual study or small group interaction or one-to-one interaction between student and instructor.

PROGX is the abbreviation that represents the experimental section taught by programmed instruction and subjected to the treatment of behaviorally stated instructional objectives.

PROGC is the abbreviation that represents the control section taught by programmed instruction and not exposed to the treatment of behaviorally stated instructional objectives.

Conventional Instruction is a teacher-centered/teacher-paced instructional method that embodies, during a regularly scheduled class period, many procedures, materials, and media, such as lecture, discussion, demonstration, small-group dynamics, problem-solving activities, graph construction, case studies, student reports, overhead transparencies, filmstrips, films, audio tapes, videotapes, supplementary readings, magazines, and newspapers.

CONVX is the abbreviation that represents the experimental section taught by conventional instruction and subjected to the treatment of behaviorally stated instructional objectives.

CONVC is the abbreviation that represents the control section taught by conventional instruction and not exposed to the treatment of behaviorally stated instructional objectives.

Economic Education is that part of formal education with the primary goal to raise the level of economic literacy of society. In general, the term refers to the education in economics from kindergarten through twelfth grade and through the two principles courses in college, as well as pre-professional general education in economics. In addition, economic education is concerned with providing minimal economic understanding for good citizenship.⁷

Community College is a two-year institution of higher education that serves a diverse population by providing a comprehensive program that encompasses six main functions: (1) preparation for

⁷Dennis Lee Nelson, "The Effect of Specifically Stated Instructional Objectives on the Achievement of Collegiate Undergraduate Economics Students," (Ph.D. dissertation, University of Minnesota, 1970), p. 15.

advanced study, (2) occupational training, (3) general education, (4) guidance and counseling, (5) developmental education, and (6) community service.⁸ The terms "junior college" and "community college" are used interchangeably in this report.

Instructional Objectives (also termed "behavioral objectives") are specific statements, constructed according to the blueprint created by Gagne and Magers, that communicate the intent of instruction in behavioral terms from the student point of view so that the student understands what he is expected to learn and what he does to demonstrate that learning. The instructional (or behavioral) objectives will contain the following particulars: the concept to be learned, the observable behavior to demonstrate the learning, the test conditions, and the performance standard or criterion required for proficiency.

Economic Understanding is the knowledge of and the ability to apply economic concepts and patterns of economic logic/reasoning. Economic understanding provides the foundation for an analytical approach to and the comprehension of public economic issues.⁹

TUCE Test is the Revised Test of Understanding in College Economics, Micro Forms A and B, published by the Joint Council on Economic Education in 1980. The test scores were used to measure student achievement in economic understanding.

⁸Leland L. Medsker and Dale Tillery, Breaking the Access Barriers (New York: McGraw-Hill Book Company, 1971), p. 53.

⁹James Arthur Phillips, "The Effect of Instructional Objectives Treatment on Economics Achievement Scores for Students in Selected Community Colleges," (Ph.D. dissertation, University of Southern California, 1971), p. 8.

Organization of the Report

The report of this research problem consists of five chapters, a bibliography, and appendices. Chapter I introduces the research problem for this study and presents the hypotheses tested.

Chapter II is a survey of the relevant research pertinent to the problem.

Chapter III contains a detailed description of the procedures employed in this experiment.

In Chapter IV the data collected for this study are presented and analyzed with reference to the hypotheses tested.

The summary, conclusions, and recommendations, based upon the analysis and interpretation of the data, are presented in Chapter V.

CHAPTER II

REVIEW OF LITERATURE

The primary objective of Chapter II is to place the present study in perspective within the context of research concerning economic education on the collegiate level through a review of relevant literature. Several studies and articles, which established a rationale for this study and emphasized the need for improvement in the teaching of economics, have already been documented in the introduction to Chapter I.

The literature reviewed in this chapter was selected on the basis of its pertinence to the teaching of elementary economics at the junior-college level. The discussion is organized under the following categories: the preparation of goals and objectives in elementary economics at the college level, the implementation of instructional or behavioral objectives in elementary economics at the college level, and the utilization of programmed instruction in elementary economics at the college level.

Preparation of Goals and Objectives in Elementary Economics at the College Level

Over the years, educators have been expressing their goals in general terms. A primary precept stresses that "anything worth

spending time to teach is worth analyzing for its goals of instruction."¹ For them, this format allowed considerable academic freedom in developing educational programs and planning instructional activities. Van Metre has charged:

. . . many teaching economists, both in course development and in experiment design, do not adequately define their teaching goals, and do not select the components of the learning system on the basis of sound criteria. Specifically, literature in economic education indicates that seldom are teaching methods and learning evaluation instruments selected on the basis of the learning outcomes desired.²

The rationale of goals and objectives within the college is rooted in the premise that the fundamental reason for any educational enterprise is to enable people to change behavior--to learn. Therefore, in this section on the preparation of goals and objectives, the discussion will examine the theory and the mechanics involved in writing behavioral objectives for students of introductory economics.

In 1956, Bloom and Krathwohl established models for generating instructional objectives expressed in behavioral terms. To create the models, they applied the scientific method of classification to educational objectives and constructed a taxonomy of educational objectives. Their taxonomy for the cognitive domain does more than classify objectives by common characteristics; the common characteristics are arranged in hierarchal order. The hierarchy of six major classes in the cognitive domain include (1.00) Knowledge, (2.00)

¹Ernest R. Hilgard and Gordon H. Bower, Theories of Learning (New York: Appleton-Century-Crofts, 1966), p. 544.

²Dale Van Metre, "A Learning Theory for Economics Instructional Development," The Journal of Economic Education 7 (Spring 1976): 96.

Comprehension, (3.00) Application, (4.00) Analysis, (5.00) Synthesis, and (6.00) Evaluation.³ Each category is not a distinct stepping stone to a greater difficulty level but rather a flow of ideas from the simple to the complex and from the concrete to the abstract.⁴ The Bloom hierarchy clarifies educational goals and provides a tool for the analysis of instructional objectives.

There are many advocates of the behavioral and performance objective movement; among them are McAshan, Plowman, and Mager. McAshan purported that the primary reasons for emphasis upon stating instructional objectives in behavioral terms are:

1. to aid in curriculum planning,
2. to promote increased pupil achievement, and
3. to improve the techniques and skills of program evaluation.⁵

Plowman testified as to the worth of behavioral objectives:

Teachers who are most effective in improving the behaviors of pupils are adept at assessing each pupil's uniqueness, preparing assignments and programs for individual learners, setting the stage for learning, and monitoring improvement in individual performance. Behavioral objectives can be instrumental in producing this kind of effective teaching.⁶

Mager proposed that objectives should describe the terminal behavior of the learner well enough to preclude misinterpretation and proffered

³Benjamin S. Bloom, ed., Taxonomy of Educational Objectives, Handbook I: Cognitive Domain (New York: David McKay Company, Inc., 1956), p. 18.

⁴George Kavina et al., "Behavioral Objectives: Cognitive Domain and Affective Domain," Paper handout at the National Science Foundation Workshop, Tucson, Arizona, March 1968, p. 1. (Typewritten.)

⁵H. H. McAshan, Writing Behavioral Objectives (New York: Harper and Row, 1970), p. 4.

⁶Paul D. Plowman, Behavioral Objectives (Chicago: Science Research Associates, Inc., 1971), p. xxiii.

the following guide to writing behavioral objectives:

First, identify the terminal behavior by name; specify the kind of behavior that will be accepted as evidence that the learner has achieved the objective.

Second, define the desired behavior further by describing the important conditions under which the behavior will be expected to occur.

Third, specify the criteria of acceptable performance by describing how well the learner must perform to be considered acceptable.⁷

A meaningfully stated objective, then, is one that succeeds in communicating intent. Unfortunately, there are many "loaded"⁸ words, words open to a wide range of interpretation. While attempting to help students use higher-level thought processes, the teacher may sometimes be at a loss for "unloaded" words that elicit the desired processes. To assist teachers in writing behavioral objectives that are susceptible to fewer misinterpretations, the Washington State Board for Vocational Education developed a list of verbs reflecting behaviors representative of each level of the six major classes of Bloom's taxonomy.⁹

For two decades economists have been discussing, without agreement, what concepts should be taught in the beginning principles course. In a Federal Reserve monograph, the principles course for economics is reviewed from diverse vantage points. Favorite key concepts are identified anew, with splinters of consensus. Once more the

⁷Robert F. Mager, Preparing Instructional Objectives (Palo Alto, California: Fearon Publishers, 1962), p. 12.

⁸Ibid.

⁹George Letchworth et al., "Everything You Wanted To Know about Behavioral Objectives But Were Afraid to Ask," Classroom handout at the College of Education, the University of Oklahoma, Norman, Oklahoma, p. 58. (Typewritten.)

long-standing plea for the recognition and the acceptance of an indispensable core of economic concepts is invoked. In one of the monograph articles, Bach submitted a skeletal support of twenty concepts.¹⁰ In addition, Bach argued that instructional goals should be expressed in behavioral terms according to Bloom's Taxonomy and should focus specifically on student behavior and student learning rather than on detailed economic subject matter.¹¹

Van Metre explained the learning theory supporting the utilization of behavioral objectives with a reminder to economists that:

. . . the focal point of a course and the first component of course development is the list of behavioral objectives. The objectives are to be listed in the sequence most easily learned by the students, and each objective is to be written to embody one type of learning outcome. These objectives are to be used by the students as a guide while learning and preparing for tests because they indicate what is expected of a successful learner.¹²

The literature reviewed in the section on the preparation of goals and objectives indicated that wider use of behavioral objectives has value for both the student and the instructor. The student benefits because the objectives serve as an efficient study guide and delineate exactly what performance is expected of the student. The instructor also benefits from the preparation of the behavioral objectives.

In order to write behavioral objectives, the instructor must identify precisely the concepts to be learned, discern the types of

¹⁰G. L. Bach, "What Should a Principles Course in Economics Be?" in Goals and Objectives of the Introductory College-Level Course in Economics, ed. Allen F. Larson and Andrew Nappi (Minneapolis: Federal Reserve Bank, 1976), p. 17.

¹¹Ibid., p. 16.

¹²Van Metre, "Learning Theory," p. 99.

learning involved, and select the most appropriate teaching methods and evaluation procedures to be used. These planning activities increase the effectiveness of the instructor during classroom time, as well as improve the study habits of the student.

Implementation of Instructional Objectives
in Elementary Economics
at the College Level

Six research studies were found that tested the relationship between student utilization of instructional objectives and student achievement in economics. Only the Tiemann and Nelson studies found a significant differential effect on the achievement of students who used instructional objectives while studying principles of economics. The six research studies are reviewed in chronological order.

In 1966, Tiemann¹³ conducted an experimental study to determine the effect upon student achievement in a televised college economics course in which students are provided general objectives or specific performance objectives. One hundred eighty-nine students enrolled in the Principles of Economics course for non-commerce majors served as the research sample. The students in two large television classes were randomly assigned to an experimental or control group. Each of the two experimental groups viewed programmed versions of televised lectures; one group was assigned specific instructional objectives and the other, general objectives. Each of the two control

¹³Philip W. Tiemann, "Outcomes in a Televised College Economics Course with Variable Student Knowledge of Objectives" (Ph.D. dissertation, University of Illinois, 1967), pp. 38-39.

groups viewed conventional televised lectures; one group was assigned specific instructional objectives and the other, general objectives.

All of the televised instruction had undergone at least one revision, and most lessons had been revised several times. Eight lectures were revised according to the guidelines established as principles of programmed instruction and served as one set of instructional lectures during the treatment period. The treatment period included the fourth week through the eighth week of instruction. During this time, the eight programmed revisions were telecast by means of closed-circuit television.¹⁴

Learning was measured with two post-tests criterion-referenced to the instructional objectives of the four-week treatment period. An immediate post-test of 50 multiple-choice items was administered as an hourly midterm examination upon conclusion of the treatment period. A delayed post-test consisting of 25 of these items was included as an integral part of the final examination at the end of the semester.¹⁵

Analysis of covariance on pretest attainment was used to evaluate the main effects of the objective variable and lecture variable. The type of objective, general or specific, did not appear to account for variance in the immediate post-test scores. Similar analysis of covariance on the delayed post-test disclosed a main effect associating favorable performance with provision of specific objectives to the student ($t=2.04$; $p<.05$).¹⁶ The type of lecture to which students were exposed appeared to exhibit an inverse effect. Analysis of the immediate post-test performance by covariance on pretest attainment

¹⁴Ibid., pp. 53-54.

¹⁵Ibid., p. 42.

¹⁶Ibid., p. 106.

resulted in more favorable scores on students viewing the programmed televised lectures ($t=1.71$; $p<.05$). The method of instruction, programmed or conventional televised lecture, was not associated with delayed post-test results.¹⁷

The Tiemann study appeared to provide a basis for considering the impact of specific instructional objectives on student achievement. A recommendation made by Tiemann suggested that future research should:

. . . structure the contingencies for use of objectives, provide criterion-referenced instruments for a series of learning measures, and vary the level of specificity of objectives provided to students according to those functions the objectives are to fulfill.¹⁸

At the University of Minnesota, Nelson administered a research study in an introductory college course in microeconomics to determine whether providing students with specific objectives during each week of instruction would improve student performance. Prior to the design of the experiment, Nelson posed an accusing assumption:

College professors resist change, especially as change relates to methods of teaching. The lecture method, with slight modifications, has been and will remain the *modus operandi* in college teaching. In a pragmatic way, this assumption has a bearing on the research. If improvement in the teaching of economics is to result, the lecture must be considered as the "accepted and practiced" framework within which it will take place. The experimental approach of this research is based on the traditional lecture method with a simple modification.¹⁹

The research sample consisted of 117 freshmen. Two professors taught the classes, one being the researcher. Each professor taught

¹⁷Ibid., p. 110.

¹⁸Ibid., p. 118.

¹⁹Nelson, "Specifically Stated Instructional Objectives," p. 14.

an experimental group supplementing lecture with instructional objectives and a control group using the lecture method.²⁰ The broad, general areas of content, as indicated by the course syllabus, were classified within nine specific areas, one area for each week of instruction. General objectives were written for each of the nine specific areas. The general objectives for each week of instruction then provided the framework within which the specific objectives were prepared. "A Guide to Working with the Specific Objectives"²¹ was also prepared and distributed to the students in each of the experimental groups.

The Test of Understanding in College Economics (TUCE), Part II, and the University of Minnesota Department of Economics Test were administered to measure achievement through pretest and post-test applications. Analysis of covariance was performed between the pre-tests and post-tests of both examinations. The research experiment proved that treatment of specific instructional objectives had a significant differential effect on the achievement of students ($F=83.7872$; $p=.0000$). However, the specific instructional objectives did not prove to have any differential impact on achievement when related to high, medium, or low student aptitude or ability ($F=.2076$; $p=.8129$).²²

For future research, Nelson recommended:

. . . a study into the development and design of procedures which would have the possibility of acceptance by any professor seriously contemplating an attempt at improvement in his teaching.
 . . . An assessment of change in the attitude of the professor

²⁰Ibid., p. 28.

²¹Ibid., pp. 93-94.

²²Ibid., p. 63.

regarding what he considered relevant and necessary content in his course might be attempted.²³

In 1970, Phillips conducted an empirical study to determine whether instructional objectives treatment is more effective than standard instruction. Phillips' research design and treatment of instructional objectives involved three community colleges in Southern California with 204 economics students. In each college a control group was taught by the traditional lecture method; the experimental group received copies of instructional objectives as a supplement to the lecture method. Both groups in each of the three colleges received a pretest and post-test, using the Test of Economic Understanding (TEU), Form B.²⁴

Phillips' development of objectives proceeded on several levels: the establishment of global-overall goals, the identification of content-topic areas, and the formulation of specific instructional objectives stated in behavioral terms. Each instructional objective was referenced directly to the content-topic area by a numbering system indexed to the concept to be learned. However, in final form, the instructional objectives were written as the identification of correct choices on a multiple-choice exam.²⁵

To evaluate the effect of instructional objectives on learning, comparisons were made between post-test results of control and experimental groups using z scores obtained via a one-tail test of

²³Ibid., p. 87.

²⁴Phillips, "Instructional Objectives Treatment," pp. 37-38.

²⁵Ibid., p. 115.

Differences of Means. A z score of +1.65 was necessary for the .05 level of significance prescribed. The overall difference (z score= +1.54; $p=.06$) between the control and the experimental groups on the post-test was not sufficient to reject the null hypothesis. Therefore, this study did not support the theorem that instructional objectives contributed to learning improvement.²⁶ However, Phillips asserted that the post-test scores had been compromised and were inconclusive because the participating instructors weighted post-test results differently when computing semester grades. GPA pressure is too real and relevant to students to ignore its effect on research results. The college scoring highest on the post-test was the one in which the instructor considered the post-test score as the final examination grade, while the college scoring lowest was the one in which the instructor used the post-test simply as a review for the finals, with no grade credit. Phillips deemed the findings weakened by these contaminating factors and urged that similar experiments be pursued in the future.²⁷ Phillips suggested that:

An especially valuable contribution could be made by not only detailing the specific economic concepts . . . but also by "reordering" in terms of the taxonomy of objectives suggested by Bloom. With such a list experimental effects could then be measured not only in terms of specific economic understanding, but also according to "learning hierarchy" from Knowledge to Evaluation level.²⁸

In 1976, Casper conducted an empirical study of the effect of behavioral objectives in two sections of microeconomics at Kent State University. Both groups were taught by the researcher. Aside from

²⁶Ibid., pp. 44, 77.

²⁷Ibid., pp. 61-62, 79. .

²⁸Ibid., p. 80.

the explicit use of behavioral objectives by the experimental group, both the control group and the experimental group were taught using identical formats of instruction.²⁹ The basic hypothesis, behavioral objectives enhance student learning, was tested using the gap-closing model, which uses the ratio of a student's actual improvement to potential improvement on pretest and post-test as the dependent variable. Student learning was measured using the standardized exam, the Test of Understanding in College Economics, Part II. A stepwise multiple regression was performed on the adjusted post-test score. The use of instructional objectives did not produce a statistically significant difference in the performance of the experimental students. The difference in performance produced a t-test score of 1.94 with a probability level greater than 0.05 and accounted for 0.254 of the variance.³⁰

Casper noted that the results of the regression were surprising:

. . . the number of quizzes and problem sets completed--a proxy for student attendance--enters with a negative sign as does whether or not a student had high school economics, class, study time, and pre-TUCE score. The signs of the last variables entered might be interpreted as insignificant but it is difficult to explain the negative signs for the first two.³¹

These results suggest that the hypothesis about the benefits of behavioral objectives should be "strongly rejected."³²

²⁹Cheryl A. Casper, "Construction and Use of Behavioral Objectives in Principles of Economics," Kent State University, Kent, Ohio, 1977, p. 6. (Typewritten.)

³⁰Ibid., pp. 9-12.

³¹Ibid., p. 12.

³²Ibid.

Casper indicated that demonstrating the statistical superiority of behavioral objectives is difficult and suggested that the regression model using TUCE scores as the dependent variable may have been inappropriate. Casper speculated that the TUCE questions were a poor and misrepresentative sample of total course objectives and proposed that the final course grade may be a more reliable dependent variable.³³

However, 82 percent of the students surveyed rated behavioral objectives as either helpful or useful. On that basis, Casper suggested that the positive student reaction to behavioral objectives warranted further testing of the effect of behavioral objectives on student achievement in economics.³⁴

In 1976, Zeman investigated the effectiveness of behavioral objectives on the achievement of two freshman classes in Microeconomic Principles at Robert Morris College. The students in these two economics classes received four units of instruction, each unit consisting of five analytical topics. Two of these instructional units were taught by lecture-discussion and two were taught by the use of behavioral objectives. One class used behavioral objectives during the instruction of the first and third units; the other class used the objectives with the second and fourth units. For each instructional unit, students received a written outline of the concepts to be learned. Each concept was supported by a descriptive statement of the expected learning outcome; each outcome was succeeded by a list of

³³Ibid.

³⁴Ibid., p. 16.

detailed behavioral objectives. The behavioral objectives were distributed to students at the beginning of each unit, along with detailed instructions on their use, and were facilitated through in-class assignments.³⁵

The semester examination, rather than a standard test, was used to measure student achievement as the dependent variable. Zeman did not indicate whether or not the semester examination was keyed to the stated objectives. A two-way analysis of variance performed on the two classes revealed that no significant differences existed between the achievement of students exposed to either of the two teaching approaches used. The statistical analysis yielded an F ratio of 2.88; an F ratio of 3.94 was needed for the null hypothesis to be rejected at the 0.05 probability level.³⁶

Zeman recommended that future research be directed and designed to discover any skills required by students and teachers in more effective employment of detailed behavioral objectives. Such research could aid in establishing whether the use of behavioral objectives permit a reduction in time needed by students in learning economics. In addition, research could be addressed toward tailoring behavioral objectives to the needs of individuals, whether to aid in the makeup of deficiencies for poorer students or to aid better

³⁵Allan Harris Zeman, "The Relative Effectiveness of Detailed Behavioral Objectives and Lecture-Discussion in Teaching Introductory Microeconomics" (Ph.D. dissertation, University of Pittsburgh, 1978), p. 44.

³⁶Ibid., p. 52.

prepared and motivated students in moving beyond the basic course requirements.³⁷

Phillips County Community College was the setting for the Wieder experimentation with the use of instructional objectives. The experimentation was applied to a presentation of the economics of demand and supply. The researcher taught both control and experimental groups. The control groups consisted of 52 day students and 15 night students in the spring semesters of 1975, 1976, and 1977. The experimental groups were composed of 7 day students during the 1978 summer session and 16 day students and 13 night students during the spring semester of 1979. All of the control groups received instruction on demand and supply concepts using the lecture-discussion method. The experimental groups attended classes but progressed at individual learning rates using instructional objectives. The researcher did not lecture to the experimental classes as a group; however, each student received assistance individually in learning how to work with instructional objectives and in understanding directions.³⁸

Six modules were prepared and included instructional objectives based on fifteen concepts within the demand and supply unit. As the instructional objectives were written for each module, each

³⁷Ibid., pp. 64-65.

³⁸Edward John Wieder, "A Study to Determine the Effects of Instructional Objectives in a Unit of Demand and Supply of a Principles of Economics Course" (Ed.D. dissertation, University of Arkansas, 1979), pp. 12-13.

³⁹Ibid., p. 44.

objective was coded according to Subject (Economics), Chapter (Demand and Supply), Unit, and Competency.³⁹

Student performance on the demand and supply unit of study was measured by a Hailstones and Brennon standardized test on demand and supply. Stepwise multiple regression was run on seven independent variables of treatment factor and the dependent factor of test score. The use of instructional objectives did not produce a statistically significant difference in the performance of the experimental students. The difference in performance produced an F ratio of 1.813 with a probability greater than 0.05 and accounted for .00728 of the variance. The independent variables of age, sex, and grade-point average did interact with the treatment factor and were statistically significant ($F=12.149$; $p<0.05$; $R^2=.432$) as predictors of student performance in economics.⁴⁰

As Casper did, Wieder also suggested that standardized tests may not be appropriate for different methodologies or for different instructors because the emphasis on subject matter may vary. Wieder recommended that evaluation in future research be measured using criterion-referenced instruments rather than norm-referenced instruments. Criterion-referenced measurement should be keyed to the stated instructional objectives.⁴¹

In summary, no final generalization can be made on the basis of the six research studies reviewed; the findings are not conclusive and show little or no agreement. The Tiemann and Nelson studies supported the hypothesis that instructional objectives improve student

³⁹Ibid., p. 44. ⁴⁰Ibid., pp. 25, 31-32. ⁴¹Ibid., p. 35.

learning and achievement in the study of economics. The other four studies (Phillips, Casper, Zeman, and Wieder) rejected the hypothesis that instructional objectives improve student learning and achievement in the study of economics. The patterns of writing, coding, applying, and testing the behavioral objectives were not standardized across the six studies. Determining appropriate use of the behavioral objectives would be difficult because established standards of utilization do not exist. Proponents of behavioral objectives are content to cite other examples of worthiness, such as favorable student reaction to the assistance of behavioral objectives. The need remains for carefully designed experiments evaluating the effect of behavioral objectives on student achievement in the study of economics.

Utilization of Programmed Instruction
in Elementary Economics
at the College Level

The origin of objectives stated in behavioral terms can be traced to the innovation of programmed instruction, which is based upon Skinner's theory of operant conditioning.⁴² This method is designed to bring home to the student his own responsibility for actively participating in the learning process and to provide an effective means of doing so without increasing the burden on either instructional staff or institutional budget.⁴³

⁴²Edward B. Fry, Teaching Machines and Programmed Instruction, An Introduction (New York: McGraw-Hill Book Company, Inc., 1963), p. 147.

⁴³Bernard F. Haley, Experiments in the Teaching of Basic Economics (New York: Joint Council on Economic Education, 1967), pp. 29-30.

In 1971, Phillips conducted a post-doctoral survey of community colleges to ascertain the economics courses offered and to identify the instructional strategies employed. Of the 1,023 community colleges surveyed, 120 indicated utilization of programmed instruction in economics classes. Only two of the 120 colleges coordinated programmed instruction with instructional objectives. The other 118 employed various programmed texts or workbooks as supplemental materials to traditional lecture instruction.⁴⁴

Lumsden, Attiyeh, and Bach, whose programmed textbook⁴⁵ was used in this experiment, are considered trail blazers in preparing programmed materials for the teaching of elementary economics. They are also noted for conducting post-doctoral research to measure the academic effectiveness and the economic efficiency of programmed materials in relation to student achievement in elementary economics and the allocation of student study time. In 1966, before they wrote their first programmed text, Microeconomics, A Programmed Book, Lumsden, Attiyeh, and Bach identified the content objectives as follows:

1. How the price mechanism allocates resources in a competitive market economy.
2. In what sense the price mechanism leads to an economically efficient allocation of resources.

⁴⁴James A. Phillips, "Instructional Objectives in Community College Economic Education," Cypress College, Cypress, California, 1971, pp. 4, 7. (Typewritten.)

⁴⁵Richard Attiyeh, G. L. Bach, and Keith Lumsden, Basic Economics Theory and Cases (Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1973).

3. Under what circumstances the price mechanism does not yield an efficient allocation of resources in a market economy.⁴⁶

These broad content objectives provided guidance for the authors in the preparation of the programmed materials, but specific learning behaviors to be elicited from the students using their materials were not included in their planning.

In 1961 at Vanderbilt University, Fels and Starleaf sponsored an experiment to test the usefulness of programmed instruction in teaching theoretical economic concepts. Forty-two students were divided into two roughly homogeneous groups based on test scores and grade averages. One group studied teacher-prepared programmed materials; the second group participated in classroom instruction for five class periods. An application of the t-test ($t=1.97$, $p<.01$) to the final test scores showed that the group receiving only classroom instruction gained significantly higher test scores than the programmed instruction group.⁴⁷

At the University of Michigan in 1965, Fusfeld and Jump designed an experiment to answer the following questions: (1) Can students learn as much from study with programmed materials as from study under the guidance of instructors? (2) Does the textbook make a difference when used in conjunction with programmed instruction? Six

⁴⁶Keith G. Lumsden, "Technological Change, Efficiency, and Programming in Economic Education," in New Developments in the Teaching of Economics, ed. Keith G. Lumsden (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1967), p. 31.

⁴⁷Rendigs Fels and Dennis R. Starleaf, "Controlled Experiments in Teaching Techniques," Southern Economic Journal 33 (January 1966): 353-56.

sections of economics provided the population for the study. Two experimental class sections were given programmed materials to study and also required to attend a one-hour lecture session. One of the experimental sections studied both the programmed materials and the course textbook; the other experimental section studied the programmed materials only. Four control sections were established. These students studied the course textbook and attended regularly scheduled lecture sessions. Post-tests, given one week later, showed no significant differences. Fusfeld and Jump concluded that the two methods, programmed instruction and lecture, were equally effective; however, the group using programmed materials showed considerable saving in study time.⁴⁸

At Duke University in 1969, Havrilesky designed an experiment to compare the effectiveness of conventional teaching and programmed instruction in a macroeconomics course. After ten weeks of conventional instruction, 36 sophomore students were randomly assigned to two groups. The students in the experimental group completed eleven short chapters of programmed instruction in money and banking. The students in the control group engaged in conventional study and attended three class lectures and one individual tutorial conference session with the instructor. Students who had studied the programmed materials scored 8.7 percent higher on the post-test than the students who had engaged in conventional study. The results were statistically

⁴⁸Daniel R. Fusfeld and Gregory Jump, "An Experiment with Programmed Instruction in Economics," Southern Economic Journal 33 (January 1966): 353-56.

significant ($F=6.154$, $p<0.05$). Havrilesky concluded that programmed instruction excels for core learning over equal, short periods of application.⁴⁹

Economic educators are intrigued with the effectiveness and the efficiency of educational delivery systems. In terms of efficiency in the teaching of economics, Lumsden⁵⁰ states that, if one accepts the hypothesis that certain portions of the principles course can be just as effectively taught by programmed texts as by regular instruction, then scarce professional time can be allocated to other portions of the subject. The time saved can be utilized to introduce additional economic concepts, to supplement existing materials with meaningful applications, or to give more individual attention to students.

During 1968, Attiyeh, Bach, and Lumsden⁵¹ conducted a nationwide experiment to assess the efficiency of programmed materials in teaching the core micro- and macroeconomics sections of the typical elementary economics course. The study involved 48 schools and 4,121 students. Student performance was measured by test scores on the Test of Understanding in College Economics (TUCE). To separate the effects

⁴⁹Thomas Havrilesky, "A Test of the Effectiveness of Teaching Money and Banking by Programmed Instruction," The Journal of Economic Education 2 (Spring 1971): 152-54.

⁵⁰Keith G. Lumsden, "The Effectiveness of Programmed Learning in Elementary Economics," American Economics Review 57 (May 1967): 658.

⁵¹Richard E. Attiyeh, G. L. Bach, and Keith G. Lumsden, "The Efficiency of Programmed Learning in Teaching Economics: The Results of a Nationwide Experiment," The American Economic Review 59 (May 1969): 217-23.

of the programmed materials from other variables, information was also obtained on the educational level, sex, and scholastic aptitude of students, the type, size, and quality of schools attended, and the textbook, class size, and experience of teacher for conventional sections. A regression model was applied to analyze the effect of these variables on the student test score. Each participating school established three test groups. Students in Group I studied a programmed text only and did not attend class. Students in Groups II and III were given conventional reading assignments and attended class lecture and discussion sessions. Students in Group II, however, were also required to read a programmed textbook. The following results, at the 0.05 level of significance, were reported:

1. On the average, by spending twelve hours studying a programmed learning text students learned practically as much micro- or macroeconomics as did students in seven weeks of a conventionally taught elementary course.

2. On the basis of the test question breakdowns, students who used only programmed learning materials, as compared to conventionally taught students, performed better on "applications" of theory than on simple "concept recognition."

3. Students had a generally positive attitude toward programmed learning.⁵²

Attiyeh, Bach, and Lumsden concluded that "these results have important implications for the organization and teaching of the introductory course."⁵³ These findings suggest that the basic concepts and tools of microeconomics or macroeconomics can be self-taught in about two weeks' time with programmed learning materials, thereby allowing a much larger portion of the total course time for the

⁵²Ibid., p. 217.

⁵³Ibid., p. 223.

development of skills in the application of the basic theory to relevant and current social problems.⁵⁴

The results of the Attiyeh-Bach-Lumsden national study contrasts with other experiments that show a similar superiority for conventionally taught students. Even though this reflects only one instance of conflict, Bach suggests that:

. . . one of the main advantages of programmed-learning-only in the national test may have come from the self-reliance required of students in contrast to using the classroom as a "crutch" in lieu of hard, individual study.⁵⁵

In 1968, Paden and Moyer⁵⁶ conducted an empirical study in economic education at the University of Illinois. The study was designed to compare the relative effectiveness of three methods of teaching the introductory course in economics. The three methods were televised lectures, lecture-discussion, and programmed instruction. The sample was comprised of 193 students enrolled in three class sections of Principles of Economics. In both the television and lecture-discussion sections, the students attended lectures twice each week and then spent the third hour with a graduate assistant in a quiz-discussion session. The students in the programmed learning section were also scheduled for one quiz-discussion session each week; otherwise, attendance was not required. Each student was given a pretest developed by the instructors. The Test of Economic Under-

⁵⁴Ibid.

⁵⁵G. L. Bach, "A Further Note on Programmed Learning in Economics," The Journal of Economic Education 1 (Fall 1969): 58.

⁵⁶Donald W. Paden and M. Eugene Moyer, "The Relative Effectiveness of Three Methods of Teaching Principles of Economics," The Journal of Economic Education 1 (Fall 1969): 33-45.

standing (TEU) plus 189 additional multiple-choice questions was administered to the students as a post-test. The cumulative test scores of each student on the entire group of questions were used in regression analysis. After adjustments for ability, the programmed learning group attained a mean score 1.14 points higher than the other two groups. This difference was not statistically significant. Paden and Moyer concluded that the three methods are approximately equally effective in teaching content knowledge. Nevertheless, they proposed that television and programmed learning were more efficient instructional methods than lecture and discussion with the large expenditure of teacher time in the confines of the classroom. Unlike the earlier Attiyeh-Bach-Lumsden national study, Paden and Moyer found that students using programmed materials were less likely to rate the course as "effectively taught."⁵⁷

No matter what medium, technique, or methodology is used, the responsibility for learning lies with the student, just as the responsibility for teaching rests with the instructor. Perkins observed:

. . . Eventually students tire of the programmed medium, just as they often rebel against the lecture method when it is the only teaching technique employed. Programmed learning contains no magic, nor is it the answer to individualized instruction. It is a medium--one technique--of instruction, just like filmloops, tape recorders, class discussion, or the overhead projector. There is nothing about programmed instruction that allows the teacher to forget about basic motivational principles.⁵⁸

In summary, the findings of studies comparing the results of programmed instruction over conventional instruction is mixed and

⁵⁷Ibid., p. 45.

⁵⁸W. E. Perkins, "Instructional Programs: A Strategy for Preparing." The Delta Pi Epsilon Journal 15 (August 1973): 16.

inconclusive. Both methods have their proponents. However, the results of the experiments do suggest that economics can be effectively taught in a variety of ways. Lecture is not the only respectable way to teach economics. Research studies have demonstrated that the programmed textbook is a versatile and reliable teaching tool that can be used in diverse ways--as the only text that the students read, as a supplement to a standard text, or as a tutorial device. In addition, several researchers reported a significant gain in efficiency whenever programmed instruction was used. The students may not learn more, but they learn as much in less time. Obviously, more experimentation is needed to determine how best to employ programmed instruction.

Summary

The survey of literature focused on research concerning instructional methodology applied to elementary economics at the college level. The studies reported in this chapter were limited to those most closely related to the present study. The written review of the related literature pertaining to elementary economics at the college level was organized around three major categories: the preparation of goals and objectives, the implementation of instructional objectives, and the utilization of programmed instruction.

The literature revealed many studies designed to measure the effectiveness of either instructional objectives or programmed learning. However, none were found that investigated whether or not behaviorally stated objectives were more effective in terms of student achievement when paired with one, rather than another, instructional method. That purpose is the substance of this study.

CHAPTER III

RESEARCH METHODOLOGY

The purpose of this experimental study was to investigate the effect of the use of instructional objectives, written in observable behavioral terms, on the achievement of community college students who study elementary microeconomics under two modes of instruction. The purpose of this chapter is to present a detailed description of the procedures employed in this experiment. The discussion of the procedural path followed in this study is presented under the following headings: Pre-Experimental Procedures, Experimental Procedures, and Statistical Procedures.

Pre-Experimental Procedures

The description of the pre-experimental procedures followed in this research study is presented under three subheadings. These three subheadings are Choice of Research Design, Selection of Testing Instruments, and Construction of the Instructional Objectives.

Choice of Research Design

Testing interaction between two or more independent variables requires a factorial design. A factorial design is one in which two or more independent variables are simultaneously studied to determine

their independent and interactive effects on the dependent variable. Because two independent variables (treatment and instructional method) are identifiable in the problem statement and two levels of variation exist, a 2 x 2 factorial design (see Fig. 1) was selected.

Treatment → Instructional Method ↓	Instructional Objectives	No Instructional Objectives
	CONVX	CONVC
Conventional Instruction		
Dependent Variable: Revised TUCE Scores on Post-Test		
Programmed Instruction	PROGX	PROGC

Fig. 1. Factorial design showing relationship of independent and dependent variables.

The factorial design illustrated in Fig. 1 also suggested that a two-way analysis of covariance would be the appropriate statistical technique to analyze the data collected during the study and to test the hypotheses of the study.

The exercise of the control required of a true experiment becomes difficult when the experiment is conducted in the real world of the classroom. Campbell and Stanley have coined the term "quasi-experimental design" to describe the situation in which the researcher has control over the scheduling of data collection procedures but must accept naturally assembled groups rather than exercise random

sampling procedures.¹ The 'naturally assembled' groups were the students enrolled in class sections of ECON 2303, Principles of Microeconomics, during the 1982 spring semester at Oscar Rose Junior College. Four of these sections were assigned to the researcher by administrative process. Each of the four sections was randomly assigned to a cell in the 2 x 2 factorial design illustrated in Fig. 1 and received the specified strategy indicated in the cell. The random assignment of class section to cell was accomplished by the drawing of lots by the assistant chairperson of the Business Division.

Selection of Testing Instruments

Two testing instruments were administered as post-tests to evaluate the effect of instructional objectives on the achievement of students studying under two different instructional methods. The two instruments represented a standardized national test (norm-referenced evaluation) and a non-standardized teacher-made test (criterion-referenced evaluation).

The stated objective of the national test was to attain a balanced distribution of questions that reflected standard course content categories. A major purpose of the standardized national test was to provide a comparative student performance chart for the benefit of instructors of economics. The norm-referenced test does not necessarily conform to the values and the goals of different academic institutions and different instructors because emphasis on course content may vary.

¹Campbell and Stanley, Quasi-Experimental Designs, p. 34.

Micro Forms A and B of the Revised Test of Understanding in College Economics were selected as the norm-referenced evaluation instruments to measure student achievement in this research study.

The Revised TUCE has two primary objectives:

. . . (1) to serve as a measuring instrument for controlled experiments in the teaching of introductory economics at the college level; and (2) to enable instructors of particular introductory courses to compare the performance of their students with that of students in other colleges and universities.²

The development of the Revised TUCE was a cooperative effort of the Joint Council on Economic Education and the American Economic Association. The Test Committee decided that the distribution of questions should conform reasonably close to what was considered to be the content of the typical introductory economics course. The distribution of questions by content categories on Micro Forms A and B is as follows:

<u>Content Categories</u>	<u>No. of Questions</u>
A. The Basic Economic Problem	8
B. Markets and the Price Mechanism	14
C. Costs, Revenue, Profit Maximization, and Market Structure	14
D. Market Failure, Externalities, Government Intervention, and Regulation	12
E. Income Distribution and Government Redistribution	12
Total Number of Questions	60 ³

During the 1979 spring term, 36 different schools participated in the norming of the Revised TUCE. These schools represent a broad cross section of institutions of higher education in the United

²Phillip Saunders, Revised Test of Understanding in College Economics, Interpretive Manual (New York: Joint Council on Economic Education, 1981), p. 1.

³Ibid., pp. 14-15.

States. The Kuder-Richardson Formula 20 was used to estimate the reliability coefficients. (See Table 1.)

TABLE 1
POST-TEST COMPARISONS OF STUDENT PERFORMANCES
ON EACH FORM OF THE REVISED TUCE

Test Form	N	Mean % Correct	Mean	Standard Deviation	K-R 20	SE _m
Micro Form A	1,447	55.5	16.66	4.94	.74	2.51
Micro Form B	1,364	55.0	16.50	4.78	.73	2.46

SOURCE: Phillip Saunders, Revised Test of Understanding in College Economics, Interpretive Manual (New York: Joint Council on Economic Education, 1981), P. 21.

The second post-test instrument administered was a teacher-made test. This test was criterion-referenced; fifty test items were drawn from the list of instructional objectives provided to the students in this experiment. Consequently, the test reflected the major concepts emphasized during the semester instructional process. Periodically during the semester, four unit tests were given. These tests, also, represented criterion-referenced evaluation of student learning; and the forty items on each test typified the instructional objectives that the students in the two experimental groups had received.

Construction of the Instructional Objectives

The use of behavioral objectives by the researcher predated this research study. The development of instructional objectives for economics passed through many stages over the years.

The first step in planning the preparation of objectives used in this experiment involved a careful review of the course syllabus for ECON 2303, Principles of Microeconomics, which was written by the faculty members in the economics discipline at the two-year community college. The course content outline in the syllabus indicated the broad, general areas of content that the students were expected to learn. The written objectives that the researcher had been distributing to economics students over the years were sorted and arranged under the appropriate content areas listed in the syllabus.

The second step in the preparation of the instructional objectives involved comparing the researcher's instructional objectives with the lists of behaviorally stated objectives included in the dissertations of Nelson⁴ and Phillips.⁵ Some editing of the instructional objectives resulted.

In his dissertation, Phillips submitted that future research could continue the construction of instructional objectives in economics and begin the restructure of objectives "by a 'reordering' in terms of the 'taxonomy' of objectives suggested by Bloom."⁶ In response to the Phillips' suggestion, the third step in the preparation of instructional objectives for the experiment evolved into the restructuring of the behavioral objectives and the coding of their classification on a specification chart according to the six

⁴Nelson, "Specifically Stated Instructional Objectives," pp. 94-112.

⁵Phillips, "Instructional Objectives Treatment," pp. 109-15.

⁶Ibid., p. 80.

cognitive categories identified and described by Bloom.⁷ (See Appendix A.)

During all stages of development, the instructional objectives were submitted to an economist at a large state university and to an economic educator at a large metropolitan junior college for constructive criticism and editorial assistance. Revisions in the structure of the objectives were made according to the suggestions received.

Experimental Procedures

The description of the experimental procedures followed in this research study is presented under two subheadings. These two subheadings are Subjects and Instructional Procedures.

Subjects

The subjects for this experimental study were students enrolled in four elementary microeconomics classes during the 1982 spring semester at Oscar Rose Junior College in Midwest City, Oklahoma. Eight sections of ECON 2303, Principles of Microeconomics, were incorporated into the Economics schedule for the spring semester. The other four sections of ECON 2303 were assigned to another economics faculty member and to supplemental faculty members.

The students who enrolled in the four sections of elementary microeconomics were selected by accidental sampling procedures because these sections were assigned to the researcher by administrative scheduling techniques. No attempt was made to pre-select the students into control or experimental groups. The students were accepted on

⁷Bloom, Taxonomy, p. 18.

the basis of the institution's random enrollment of students into the classes that were among those assigned to the researcher's teaching load. However, some control was exercised by the experimenter over which of these classes would receive the type of instructional strategy delineated in the research design. The accidental sampling was accompanied by the random assignment of each class section to an instructional mode, as well as to an experimental or control category. The designation of the two programmed instruction classes and the two conventional instruction classes, as well as the experimental class and the control class within each pair of classes, were accomplished by random assignment, the drawing of lots. (See Fig. 2.)

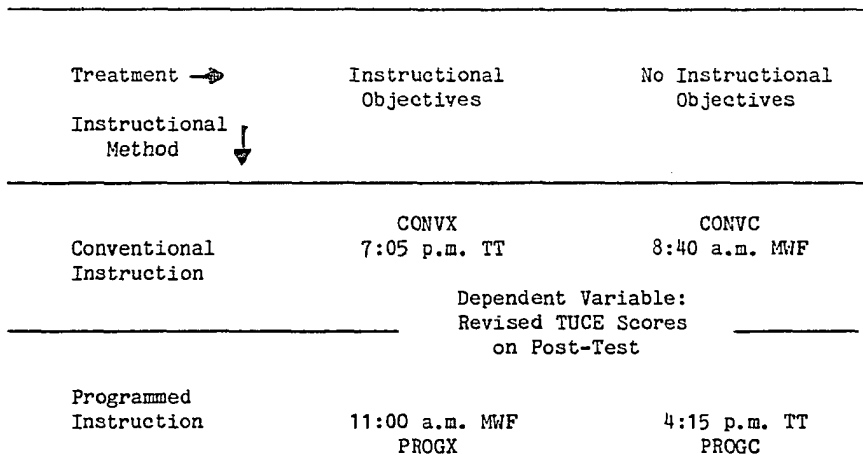


Fig. 2. Designation of the four treatment groups.

The researcher made the decision to use as subjects only those students who had completed the ECON 2303 course, who had not completed an economics course prior to the 1982 spring semester, who took the

Revised TUCE post-test, and who possessed a recorded grade-point average (GPA). Equal N's for each class section were attained based on the recommendation of Glass and Stanley:

When proportional cell frequencies can be achieved from disproportional frequencies by randomly discarding only a few observations from the total layout, then by all means one should do so. Avoiding the computational labor necessary for the analysis of disproportional designs is worth the trivial reduction in power resulting from discarding 5%, say, of the data.⁸

Table 2
CALCULATION OF SAMPLE SIZE

Instructional Method	No. of Students Enrolled	Previous Economics Course	Course Grades: W, X, I	GPA Not Recorded	Random Discard	Equal N's
Programmed Instruction:						
Experimental	31	2	5	0	2	22
Control	29	3	2	1	1	22
Conventional Instruction:						
Experimental	32	3	6	0	1	22
Control	34	1	5	0	6	22
Totals	126	9	18	1	10	88
Sample Size = 88						

The calculation of sample size with equal cell frequencies is illustrated in Table 2.

⁸Gene V. Glass and Julian C. Stanley, Statistical Methods in Education and Psychology (Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1970), pp. 439-40.

Calculation of the power of an F test provides a basis for deciding on the number of subjects that should be included in an experiment. Whenever intact groups are used in an experiment, the adequacy of the sample size for testing a statistical hypothesis must be determined. To accomplish this task, the following parameters were identified: (1) The population error variance was unknown. (2) The sample size was 88. (See Table 2.) (3) The number of treatment levels were four. (4) Twenty-two subjects participated in each of the four treatment levels. (5) The researcher wished the power of the test (1-B) to equal .80 and the probability of a type II error not to exceed .20. (6) The researcher also designated .05 as the alpha value, the probability level of a type I error. (7) Phi was calculated to be 1.7. These parameters were applied to the Tang power function table.⁹ According to the Tang table, the probability of rejecting a false null hypothesis for $n = 22$ was slightly above the .80 level. Therefore, the researcher assumed that the sample size (see Table 2) was adequate for testing.

Instructional Procedures

During the first class meeting of each section, each student was asked to fill out a student information sheet. (See Appendix B.) This sheet provided information as to whether or not the student had previously taken an economics course. Each student also signed a

⁹Roger E. Kirk, Experimental Design: Procedures for the Behavioral Sciences (Belmont, Calif.: Brooks/Cole Publishing Company, 1968), p. 542.

permission slip granting a release of academic information to the researcher. The signed permission slip enabled the researcher to comply with the requirements of the Family Education Rights and Privacy Act of 1974 (the Buckley Amendment).

All four intact groups (PROGC, PROGX, CONV, and CONVX) were taught by the same instructor, met in the same classroom, assigned the same supplementary readings, and received the same study assignments. The conventional instruction groups used Economics, by Ralph T. Byrns and Gerald W. Stone, as a textbook. The programmed instruction groups used the programmed book, Basic Economics Theory and Cases written by Richard Attiyeh, George L. Bach, and Keith Lumsden, as a textbook. However, the Byrns and Stone textbook was included among the supplementary reading assignments distributed to the students in the programmed instruction groups. The treatment administered to the two experimental groups (PROGX and CONVX) consisted of distributing study-related lists of instructional objectives to the students in both groups, plus frequent and planned references to the objectives. The instructor reinforced the objectives by directly relating them to the study assignments, to student questions and answers, and to test previews. After each of the unit tests, the relationship between test items and specific instructional objectives was pointed out and discussed with the students. The instructor frequently demonstrated to the students how to use and profit by the objectives during their study of economics. The instructional objectives used in this study have been placed in Appendix A.

The two control groups (PROGC and CONVC) did not receive any instructional objectives. The instructor endeavored to keep all other aspects of daily instruction the same; classroom activities were organized around the instructional objectives (without reference to the objectives) in a manner similar to the presentations made to the experimental groups.

During the last class period, the two-hour final exam period, Micro Forms A and B of the Revised Test of Understanding College Economics and the teacher-made test were administered as the final examination for the semester and as the post-tests for the experiment. Each student also completed a survey sheet soliciting information concerning the study procedures during the semester. (See Appendix B.)

Research precepts urge that classroom activities be supervised by instructors other than the researcher in order to counteract the subtle influence on experimental activities of any biases, conscious or unconscious, which the researcher may have. This experimenter effect is known as "errors of personality influence."¹⁰ To control this factor, an economics instructor and a humanities instructor were requested to visit the four classes on an unannounced basis to evaluate the consistency of the teaching performance for each group and the personal attitude of the researcher in the role of instructor. The two instructors were not told the nature of the treatment nor the purpose of the experiment. As a guide for classroom observations, a brief peer evaluation form was designed. (See Appendix B.)

¹⁰Larry B. Christensen, Experimental Methodology, 2nd ed. (Boston: Allyn and Bacon, Inc., 1980), p. 100.

Statistical Procedures

The planning for the statistical procedures utilized in this experiment is classified under three subheadings. These three subheadings are Choice of Statistical Technique, Compliance with the ANCOVA Assumptions, and A Posteriori Tests.

Choice of Statistical Technique

Many experiments on instructional methods are conducted in classroom situations; as a result, the experimental treatments are assigned to intact class groups rather than randomized among individual students. This concession to educational administrative requirements creates problems in obtaining valid measures of experimental error and in attaining comparable groups.

One way of handling this situation is to use covariance techniques employing background or prediction variables to match groups and assure equivalence. ANCOVA is a form of ANOVA that tests the significance of the difference between means of final experimental data by taking into account the correlation between the dependent variable and one or more covariates, and by adjusting initial mean differences in the experimental groups. The control variable used in this study was prior academic achievement of the students. Before the control variable, prior academic achievement as measured by college grade-point average, could be used as a covariate to adjust for differences among the four intact groups, a statistical test was applied to the GPA scores to assess the equivalency of prior academic achievement among the four intact groups. A one-way analysis of variance was

performed on the four intact groups, using GPA as the criterion measure, to ascertain whether the level of prior academic achievement of each of the four groups were representative of the same population. After control measures are used to generate for each subject a predicted criterion score based on his control measure scores, then differences between the predicted criterion scores are tested by analysis of variance. In this manner, the intact groups were statistically equalized on the control measure, the covariate as GPA scores.

Compliance with the ANCOVA Assumptions

The analysis of covariance (ANCOVA) statistical technique is based on the following assumptions: random sampling, normal distribution, homogeneity of variance, and homogeneity of regression. The assumptions that must be satisfied for valid statistical tests using analysis of covariance methods include all those for the analysis of variance plus one additional assumption: The regression coefficients for the regression lines in the subgroup populations must be equal. Stringent satisfaction of these assumptions is probably not required, but departure from these assumptions should not be too great.

The degree of compliance with the first assumption, random sampling, and the second assumption, normal distribution of population data, were discussed previously in this chapter under the subheading "Subjects" in the section on Experimental Procedures. No attempt was made to determine the composition of the classes; they were accepted on the basis that the institution's student enrollment procedures would "randomize" sufficiently. In addition, the four classes were

assigned to the researcher in the same administrative manner that other classes were assigned during her ten years on the campus and, therefore, are probably representative of a typical distribution.

The third assumption of the ANCOVA model is that the variance due to experimental error within each treatment population be homogeneous. The tenability of this assumption was determined by applying the F-Maximum Test for Homogeneity of Sample Variances.¹¹ The highest and the lowest sample variances of the GPA scores for the four intact groups were compared when this statistical procedure was applied.

The fourth and last assumption of the ANCOVA model is that the homogeneity of the regression slopes for the subgroups be equal. The tenability of this assumption was determined by applying the Kendall test of the hypothesis of homogeneity of within-group regression coefficients.¹² A numerically large level of significance should be used for this test in order to avoid a Type II error; the decision was made to test at the .10 level of significance.

A Posteriori Tests

Many experiments are designed to determine whether any treatment effects are present. If a significant F test occurs, then a post hoc test is computed between the various group combinations to isolate specifically where the significant difference exists. Duncan's Multiple Range Test¹³ was selected as the multiple-comparison procedure for carrying out all pairwise comparisons among means.

¹¹Kirk, Experimental Design, p. 62.

¹²Ibid., p. 469.

¹³Ibid., p. 93.

Summary

The procedures followed in this experiment were presented in detail in this chapter. The procedures and the methodology at the pre-experimental level, at the experimental level, and at the statistical testing level were clearly delineated. The next chapter again describes these procedures by reporting on the analysis of the student achievement data and the student responses to a study survey form.

CHAPTER IV

ANALYSIS OF DATA

Introduction

The purpose of this study was to investigate the effect of the use of instructional objectives, written in observable behavioral terms, on the achievement of community college students who study elementary microeconomics under two modes of instruction. The two instructional methods were programmed instruction and conventional instruction.

This investigation was designed to discover whether specific instructional objectives contribute more effectively to student achievement in elementary microeconomics when used in conjunction with one, rather than the other, of the two instructional methods listed above. The following research question was posed: What is the relationship between the use of instructional objectives and the achievement of students who study microeconomics utilizing programmed instruction or conventional classroom instruction? This research question generated the three specific questions under investigation: (1) Is the use of instructional objectives in the study of elementary microeconomics related to student achievement as measured by a standardized national test and a non-standardized teacher-made test?

(2) Is the kind of instructional method used in the study of elementary microeconomics related to student achievement as measured by a standardized national test and a non-standardized teacher-made test? (3) Is the use of instructional objectives in the study of elementary microeconomics more effective in terms of student achievement, as measured by a standardized national test or a non-standardized teacher-made test, when used in conjunction with programmed instruction or conventional classroom instruction? Hypotheses were formulated to reflect these questions.

The discussion in Chapter IV is organized under the following headings: Introduction, Preliminary Analysis of Data, Testing of Hypotheses, Additional Analysis of Data, Exploratory Analysis of the Four Unit Tests, and Summary.

Preliminary Analysis of Data

Before the three major hypotheses were tested, preliminary comparisons among the four intact groups were made to determine the compliance or violation of the four assumptions of the analysis of covariance. The four assumptions of the ANCOVA model are random sampling, normal distribution, homogeneity of variance, and homogeneity of regression.

The degree of compliance with the first assumption, random sampling, was discussed in Chapter III. No attempt was made to determine the composition of the classes; they were accepted on the basis that the institution's registration procedure would "randomize" sufficiently. The four ECON 2303 classes were assigned to the

instructor through the normal scheduling procedures at the junior college and were followed by random assignment of each class to an instructional method and to an experimental or control treatment category within each method. The conclusion of the researcher was that, because some attempt had been made to fulfill the requirements of the assumption, failure to meet the first assumption of ANCOVA completely should not invalidate the internal validity of this study.

The second assumption of the ANCOVA model is the normal distribution of population data. Kirk observed that

. . . the F distribution is relatively unaffected by lack of symmetry of treatment populations. . . In general, unless the departure from normality is so extreme that it can be readily detected by visual inspection of the data, the departure will have little effect on the probability associated with the test of significance.¹

Accordingly, the researcher judged the four intact groups tested in this experiment to be representative of other classes assigned to the instructor during her ten years' teaching experience at the same junior college. The conclusion of the researcher was that lack of analysis of symmetrical distribution of group data should not invalidate the internal validity of this study.

The third assumption of the ANCOVA model is that the variance due to experimental error within each treatment population is homogeneous. This assumption was tested by using the F-Maximum Test for Homogeneity of Sample Variances.² The highest and the lowest sample variances of the GPA scores for the four groups are inserted in the F-Maximum test stated below.

¹Kirk, Experimental Design, pp. 60-61.

²Ibid., p. 62.

$$F_{\max} = \frac{\text{largest of group variances}}{\text{smallest of group variances}} = \frac{0.5072}{0.4091} = 1.239$$

The $F_{\max}$ statistic was not significant ($.95F_{\max 4,21} = 3.426$); therefore, the researcher concluded that the sample variances of the GPA scores were statistically homogeneous. Thus, the assumption of homogeneity of variance is tenable.

The fourth assumption of the ANCOVA model, homogeneity of the regression slopes of the four intact groups, was tested. Kirk noted:

In general, tests of significance in the analysis of covariance are robust with respect to violation of the assumptions of normality and homogeneity of the residual variance. Little is known concerning the effect of violations of the assumption of homogeneity of within-group regression coefficients.³

The Kendall test of the hypothesis of homogeneity of within-group regression coefficients was computed:

$$F = \frac{S_2/(k-1)}{S_1/k(n-2)} = \frac{420.463/3}{5426.988/80} = \frac{140.154}{80.337} = 1.744$$

Kirk recommended that a numerically large level of significance should be used for this test in order to avoid a Type II error. The F statistic was not significant at the .10 level of significance ($.90F_{3,80} = 2.16$); therefore, the assumption of homogeneity of regression coefficients is tenable.

The researcher concluded that the four assumptions underlying the ANCOVA testing statistic were met and that the analysis of covariance technique was appropriate for analyzing the collected data to test the six major hypotheses of this study.

³Ibid., p. 469.

Before the control variable, prior academic achievement as measured by college grade-point average, was used as a covariate to adjust for differences among the four intact groups, a statistical test was applied to the GPA scores to assess the equivalency of prior academic achievement among the four intact groups. A one-way analysis of variance was performed on the four intact groups, using GPA as the criterion measure, to ascertain whether the level of prior academic achievement of each of the four groups was representative of the same population. The results are presented in Table 3.

TABLE 3

ONE-WAY ANALYSIS OF VARIANCE TO ASSESS THE EQUIVALENCY OF
PRIOR ACADEMIC ACHIEVEMENT OF THE FOUR INTACT GROUPS,
USING GPA AS THE CRITERION MEASURE

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Ratio	PR > F
Between Groups	2	0.1488	0.0744	0.17	0.8447
Within Groups	35	37.3986	0.4399	--	
Total	87	37.5475			

$$.95F_{2,85} = 3.113$$

On the basis of the statistical results (F ratio = 0.17, PR>F = 0.8447) presented in Table 3, the researcher concluded that the prior academic achievement of the four intact groups was statistically equivalent. Hence, GPA was appropriate to use as the covariate to adjust for differences among the four intact groups in this quasi-experimental design.

Testing of Hypotheses

The Statistical Analysis Systems (SAS) programs were employed to investigate the significance of the data collected during this research project. The six main hypotheses, stated to reflect the three specific research questions, were tested for significance at the .05 level of confidence. Two-way analysis of covariance was the statistical model used to test for differences in the group means.

Three classes of variables were utilized in this study: one control variable, one dependent variable, and two independent variables. The control variable, prior academic achievement as measured by college grade-point average, was used to statistically equalize the four intact groups. The dependent variable identified for this study was student achievement. The criterion measures for student achievement were the post-test scores obtained by each student on the Revised Test of Understanding in College Economics (TUCE), Micro Forms A and B, and the teacher-made test. The two independent variables used in this study were instructional treatment and instructional method. The instructional treatment was study with behaviorally stated objectives. The instructional methods were programmed instruction or conventional instruction.

The discussion of this section on the testing of hypotheses was organized under two subheadings: (a) Testing Hypotheses One, Two, and Three and (b) Testing Hypotheses Four, Five, and Six.

Testing Hypotheses One, Two, and Three

The analysis of the data used in testing the first three hypotheses is presented in the following format: (1) the means and

the standard deviations of the groups being tested, (2) the statistical results derived from testing the hypotheses, and (3) the statement of the three hypotheses with conclusions, (4) the statistical results derived from a posteriori testing of the four sub-hypotheses, and (5) the statement of the four sub-hypotheses with conclusions.

The following descriptive data were compiled. Group means and standard deviations were summarized for each of the four groups (PROGC, PROGX, CONVC, and CONVX) for the TUCE, Micro Forms A and B, post-test scores. The group means were adjusted for prior academic achievement. The adjusted means, the unadjusted means, and the standard deviations for each group are reported in Table 4. Data for other student characteristics are reported in Appendix C.

TABLE 4

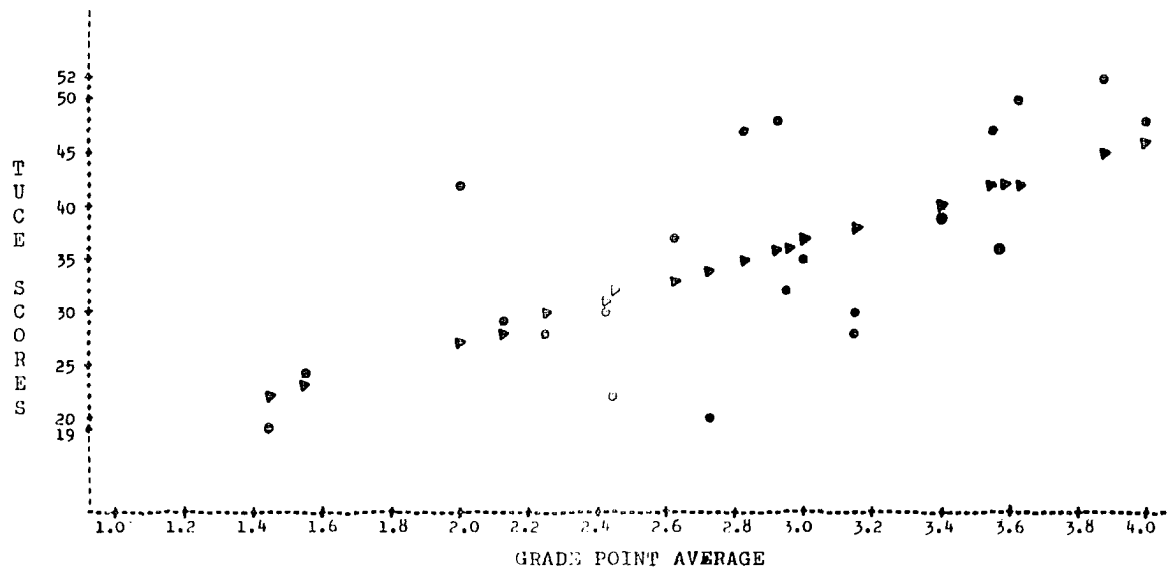
ADJUSTED MEANS, UNADJUSTED MEANS, AND STANDARD DEVIATIONS
FOR POST-TEST SCORES--TUCE, MICRO FORMS A AND B,
REPORTED BY TREATMENT AND METHOD GROUPS

Group	N	Adjusted Mean	Unadjusted Mean	Standard Deviation
PROGC	22	35.8940	35.4091	10.1684
PROGX	22	40.4795	40.0455	10.1722
CONVC	22	36.9638	37.0000	10.5830
CONVX	22	38.4354	39.3182	11.5774

To obtain information on the precision and linearity of the regression relationship of the data collected and analyzed in this

Actual and Predicted TUCE Scores for the PROGC Group

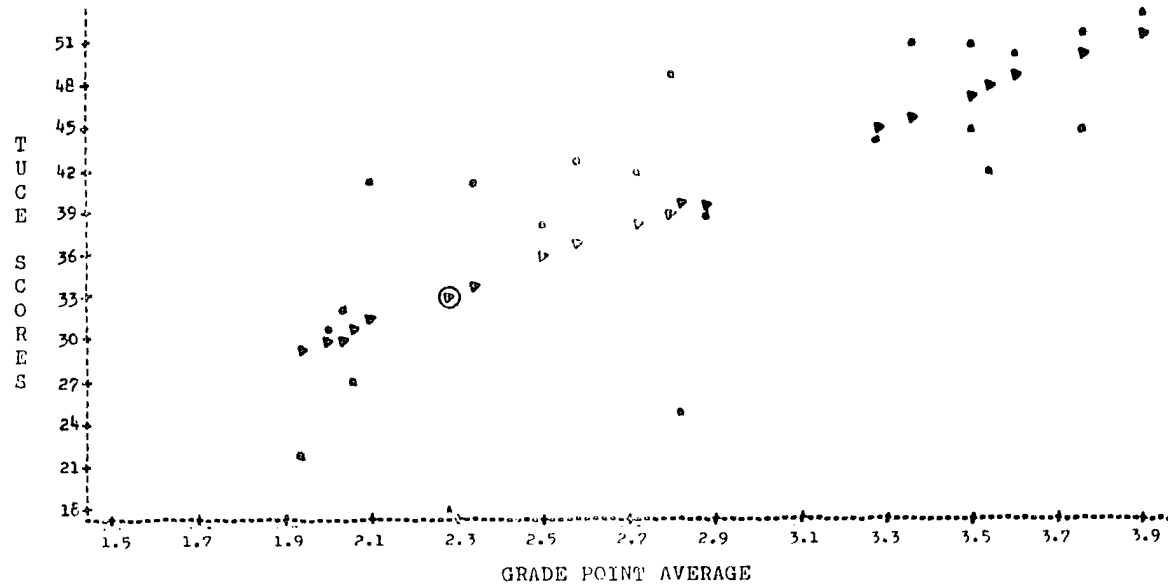
Legend: ♦ = 1 Actual TUCE Score
 ▲ = 1 Predicted TUCE Score
 ○ = 1 Duplicate Score



Graph 1

Actual and Predicted TUCE Scores for the PROGX Group

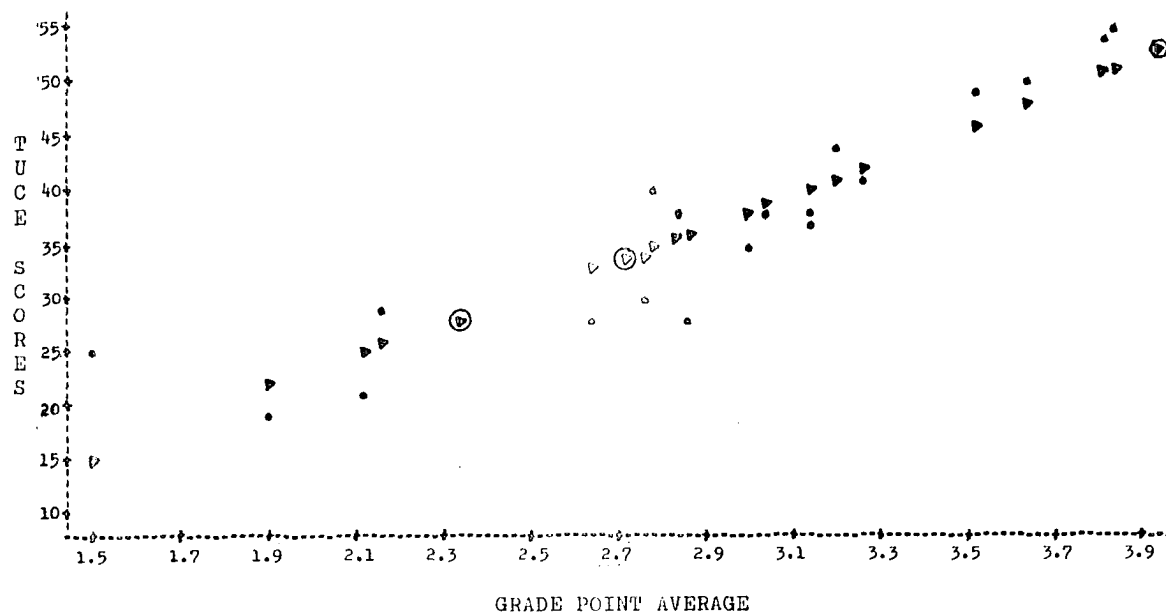
Legend: • = 1 Actual TUCE Score
 ▶ = 1 Predicted TUCE Score
 ○ = 1 Duplicate Score



Graph 2

Actual and Predicted TUCE Scores for the CONVC Group

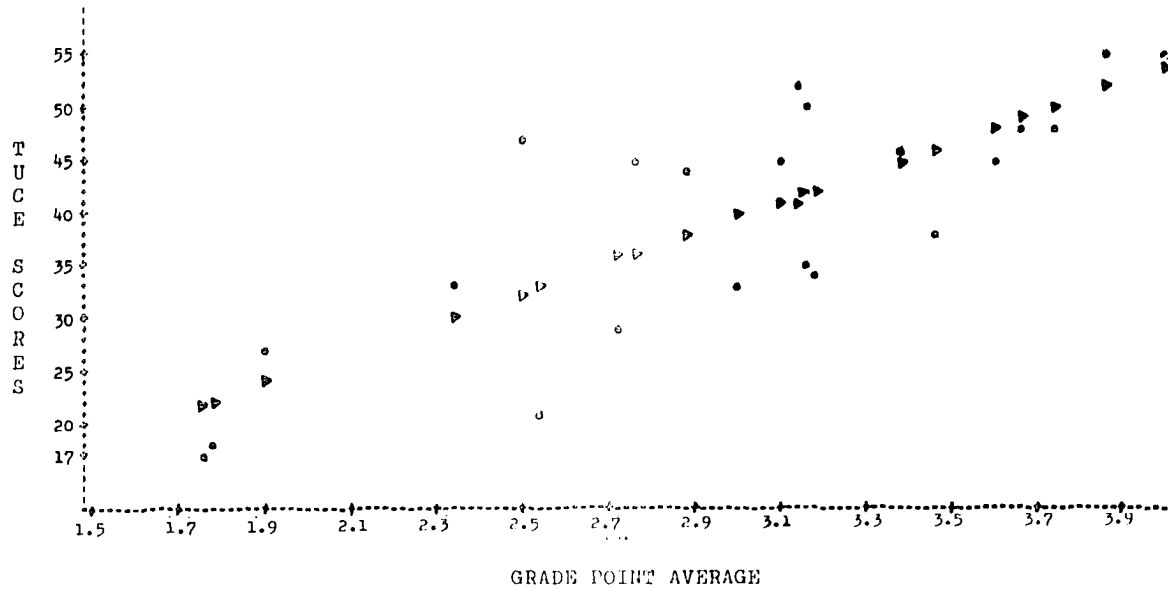
Legend: • = 1 Actual TUCE Score
 ▲ = 1 Predicted TUCE Score
 ○ = 1 Duplicate Score



Graph 3

Actual and Predicted TUCE Scores for the CONVX Group

Legend: ● = 1 Actual TUCE Score
 ▲ = 1 Predicted TUCE Score
 ○ = 1 Duplicate Score



Graph 4

study, scatter diagrams were constructed for observation. The graphs provided an indication of how well GPA fits the TUCE data as a predictor of student achievement in economics. The predicted scores as regression lines for each of the four groups are illustrated in Graphs 1, 2, 3, and 4. After observing the clustering of the actual TUCE scores along the regression line, the researcher concluded that a reasonably strong predictor relationship exists between GPA as the predictor and academic achievement in economics.

The post-test scores on the criterion measure, TUCE, Micro Forms A and B, were subjected to analysis of covariance, using the GPA scores as the covariate. The results of the analysis of covariance based on post-test TUCE scores are reported in Table 5.

TABLE 5
TWO-WAY ANALYSIS OF COVARIANCE TABLE FOR THE POST-TEST
SCORES--TUCE, MICRO FORMS A AND B

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Ratio	PR>F
Method	1	4.10227	4.10227	0.09	0.7634
Treatment	1	266.01136	266.01136	5.91*	0.0172
Interaction of Method and Treatment	1	29.55682	29.55682	0.66	0.4199
GPA	1	5777.86526	5777.86526	128.46	0.0001
Error	83	3733.18019	44.97807		
Corrected Total	87	9810.71591			

*.95F_{4,83} = 2.477 and .99F_{4,83} = 3.5525

The results of the analysis of covariance in Table 5 were examined within the perspective of the hypotheses tested to formulate the conclusions for this research study.

Hypothesis 1: Students in elementary microeconomics who receive the treatment of instructional objectives stated in behavioral terms will achieve a higher post-test mean on the Revised Test of Understanding in College Economics than students in elementary microeconomics who do not receive the treatment of instructional objectives stated in behavioral terms. The difference between the means of the treatment groups, control and experimental, is statistically significant and yields an F value of 5.91 with a PR>F value of 0.0172. ($.99F_{4,83} = 3.5525$.) This hypothesis was supported. (See Table 5.)

Hypothesis 2: Students in elementary microeconomics who are taught by conventional instruction will achieve a higher post-test mean on the Revised Test of Understanding in College Economics than students in elementary microeconomics who are taught by programmed instruction. The difference between the means of the methods groups, programmed instruction and conventional instruction, was not statistically significant; therefore, this hypothesis was rejected. (See Table 5.)

Hypothesis 3: In the study of elementary microeconomics the treatment of receiving instructional objectives does interact significantly with the two instructional methods, programmed instruction or conventional instruction, as measured by student achievement on the Revised Test of Understanding in College Economics. Inasmuch as the

interaction between the treatment groups and the method groups was not statistically significant, this hypothesis was rejected. (See Table 5.)

Sub-hypotheses for Hypotheses 1 and 2 were also identified in Chapter I. If Hypothesis 3 failed to be rejected, then Hypothesis 1 and Hypothesis 2 were to be tested as simple main effects; otherwise, they were to be tested as main effects. Hypothesis 3 was not supported; therefore, Hypothesis 1 and Hypothesis 2 were tested as main effects. (See Table 5.)

Because Hypothesis 1 was supported as a main effect (see Table 5), Hypothesis 1a and Hypothesis 1b were tested for significance at the 0.05 level. Duncan's Multiple Range Test was the a posteriori test applied to find the source of the effects and to control the Type I comparison error rate.

Hypothesis 1a: Students in elementary microeconomics who are taught by programmed instruction and receive the treatment of instructional objectives will achieve a higher post-test mean on the Revised Test of Understanding in College Economics than students in elementary microeconomics who are taught by programmed instruction and do not receive the treatment of instructional objectives.

To test Hypothesis 1a, the post-test scores on the criterion measure, TUCE, Micro Forms A and B, for the PROGC and PROGX groups, were subjected to Duncan's Multiple Range Test. The results of this a posteriori test are reported in Table 6.

TABLE 6

DUNCAN'S MULTIPLE RANGE TEST FOR THE POST-TEST SCORES--TUCE,
MICRO FORMS A AND B--FOR PROGRAMMED INSTRUCTION
EXPERIMENTAL AND CONTROL TREATMENT GROUPS

Duncan Grouping	Mean	N	Treatment
A*	40.045	22	PROGX
B*	35.409	22	PROGC
Alpha = 0.05	DF = 41	MSE = 53.3215	

*Means with different letters are significantly different.

The results of the Duncan's Multiple Range Test, Table 6, examined within the perspective of Hypothesis 1a, led to the following conclusion: Hypothesis 1a is supported. For those students studying microeconomics by the programmed instruction method, the TUCE post-test mean for the students in the experimental group with instructional objectives was significantly higher than the TUCE post-test mean for the students in the control group without instructional objectives. (See Table 6.)

Hypothesis 1b: Students in elementary microeconomics who are taught by conventional instruction and receive the treatment of instructional objectives will achieve a higher post-test mean on the Revised Test of Understanding in College Economics than students in elementary microeconomics who are taught by conventional instruction and do not receive the treatment of instructional objectives.

To test Hypothesis 1b, the post-test scores on the criterion measure, TUCE, Micro Forms A and B, for the CONV C and CONV X groups,

were subjected to Duncan's Multiple Range Test. The results of this a posteriori test are reported in Table 7.

TABLE 7

DUNCAN'S MULTIPLE RANGE TEST FOR THE POST-TEST SCORES--TUCE,
MICRO FORMS A AND B--FOR CONVENTIONAL INSTRUCTION
EXPERIMENTAL AND CONTROL TREATMENT GROUPS

Duncan Grouping	Mean	N	Treatment
A*	39.318	22	CONVX
A*	37.000	22	CONVC
Alpha = 0.05	DF = 41	MSE = 33.4316	

*Means with the same letter are not significantly different.

The results of the Duncan's Multiple Range Test, Table 7, examined within the perspective of Hypothesis 1b, led to the following conclusion: Hypothesis 1b is rejected. For those students studying microeconomics by the conventional instruction method, the TUCE post-test mean for the students in the experimental group with instructional objectives was not significantly different from the TUCE post-test mean for the students in the control group without instructional objectives. (See Table 7.)

Because Hypothesis 2 was rejected as a main effect (see Table 5), Hypothesis 2a and Hypothesis 2b did not require a posteriori testing. These two sub-hypotheses are listed below.

Hypothesis 2a: Students in elementary microeconomics who are taught by programmed instruction and receive the treatment of instructional objectives will achieve a higher post-test mean on the

Revised Test of Understanding in College Economics than students in elementary microeconomics who are taught by conventional instruction and receive the treatment of instructional objectives. This hypothesis was not tested because Hypothesis 2 was rejected as a main effect.

Hypothesis 2b: Students in elementary microeconomics who are taught by conventional instruction and do not receive the treatment of instructional objectives will achieve a higher post-test mean on the Revised Test of Understanding in College Economics than students in elementary microeconomics who are taught by programmed instruction and do not receive the treatment of instructional objectives. This hypothesis was not tested because Hypothesis 2 was rejected as a main effect.

Testing Hypotheses Four, Five, and Six

The analysis of the data collected on the criterion-referenced teacher-made exam used in testing the second group of three hypotheses is organized into five sections: (1) the means and the standard deviations of the groups being tested, (2) the statistical results derived from testing the hypotheses, (3) the statement of the three hypotheses with conclusions, (4) the statistical results derived from a posteriori testing of the four sub-hypotheses, and (5) the statement of the four sub-hypotheses with conclusions.

The following descriptive data were compiled. Group means and standard deviations were calculated for each of the four groups (PROGC, PROGX, CONVC, and CONVX) for the teacher-made exam scores on the post-test. The group means were adjusted for prior academic

achievement, using GPA as the covariate. The adjusted means, the unadjusted means, and the standard deviations for each group are reported in Table 8.

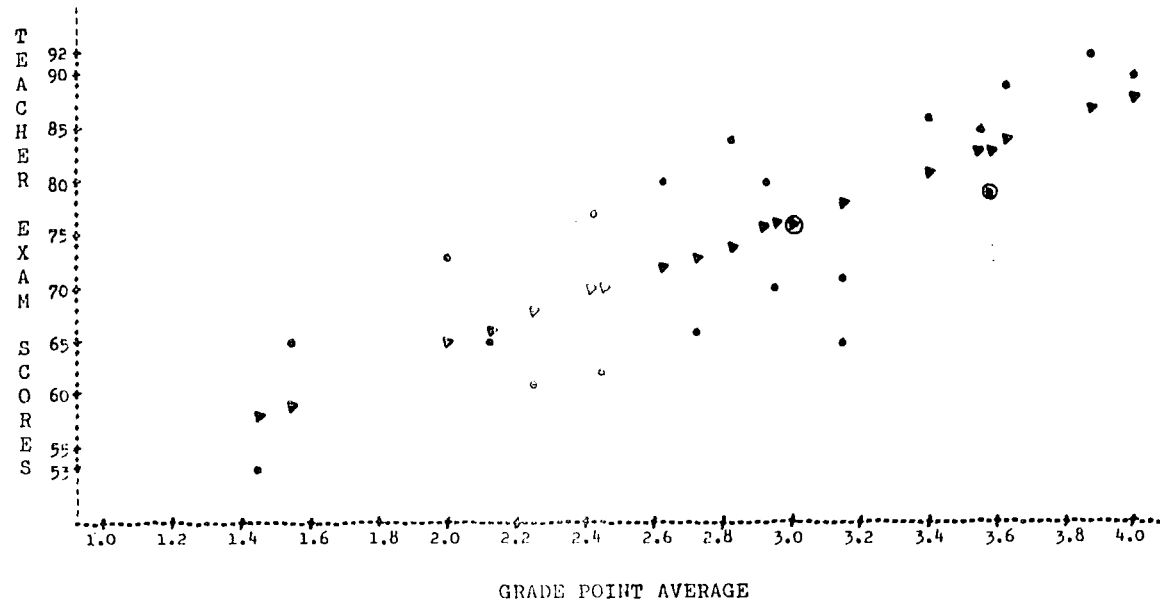
TABLE 8
ADJUSTED MEANS, UNADJUSTED MEANS, AND STANDARD DEVIATIONS
FOR POST-TEST SCORES--TEACHER-MADE EXAM, REPORTED
BY TREATMENT AND METHOD GROUPS

Group	N	Adjusted Mean	Unadjusted Mean	Standard Deviation
PROGC	22	75.1659	74.9091	10.6320
PROGX	22	78.0692	77.4091	10.4684
CONVC	22	77.6523	77.9091	10.39189
CONVX	22	78.2944	78.9545	10.1065

To obtain information on the precision and the linearity of the regression relationship of the data collected and analyzed in this study, scatter diagrams were constructed for observation. The graphs provided an indication of how well GPA fits the teacher-made exam data as a predictor of student achievement in economics. The predicted scores as regression lines for each of the four groups are illustrated in Graphs 5, 6, 7, and 8. After observing the clustering of the actual teacher-made exam scores along the regression line, the researcher concluded that a reasonably strong predictor relationship exists between GPA as the predictor and academic achievement in economics.

Actual and Predicted Teacher Exam Scores for the PROGC Group

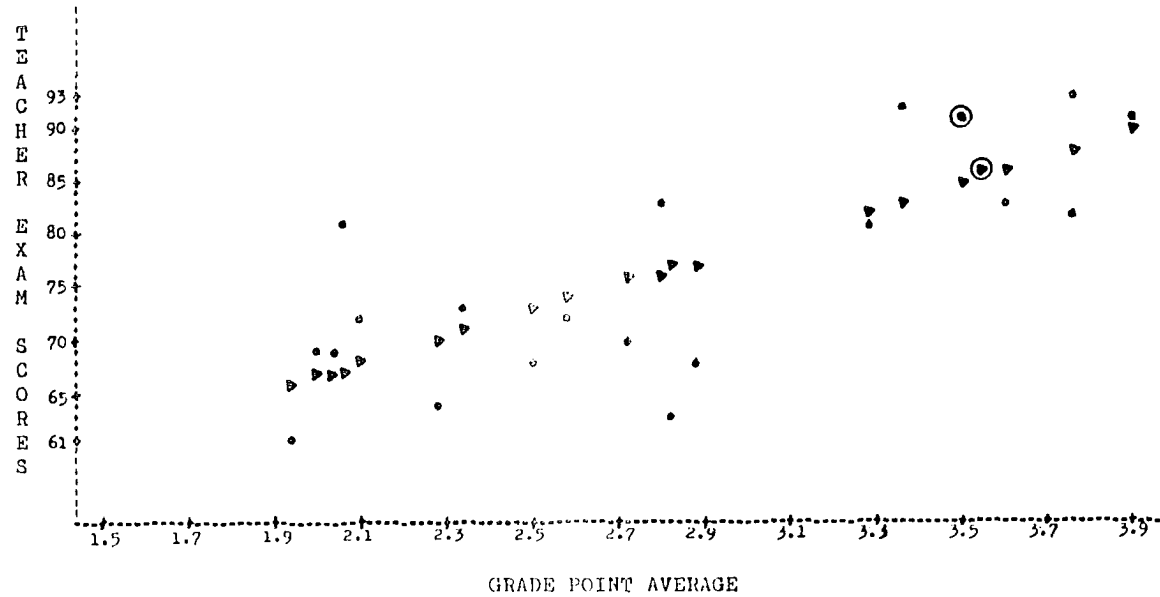
Legend: • = 1 Actual Exam Score
 ▲ = 1 Predicted Exam Score
 ○ = 1 Duplicate Score



Graph 5

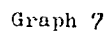
Actual and Predicted Teacher Exam Scores for the PROGK Group

Legend: • = 1 Actual Exam Score
 ▴ = 1 Predicted Exam Score
 ○ = 1 Duplicate Score



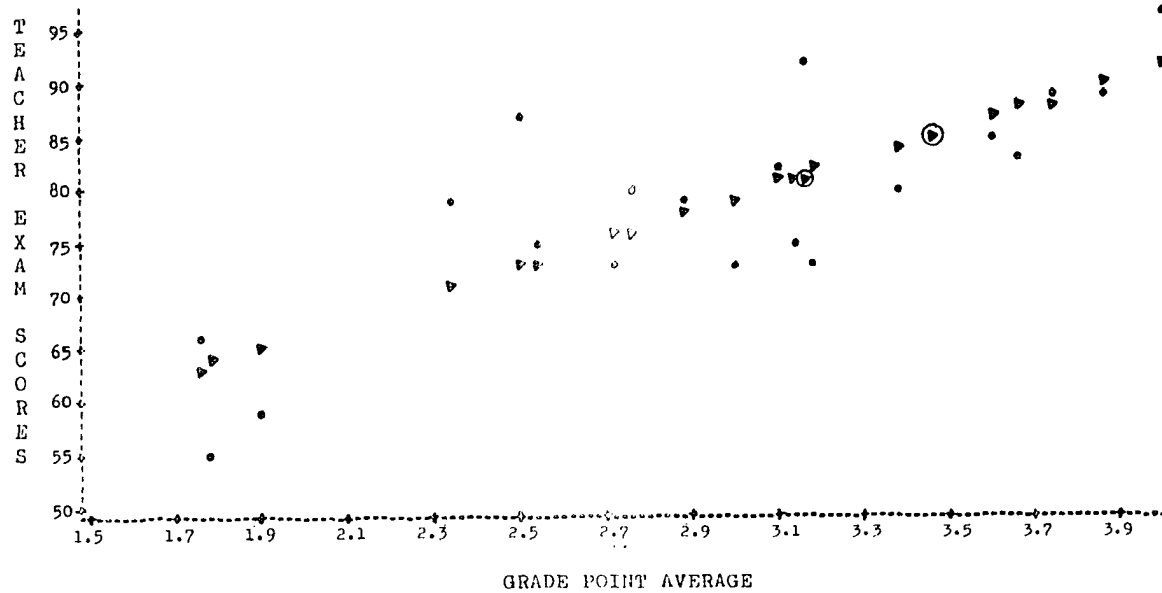
Graph 6

Legend: • = 1 Actual Exam Score
 ▶ = 1 Predicted Exam Score
 ○ = 1 Duplicate Score



Actual and Predicted Teacher Exam Scores for the CONVX Group

Legend: • = 1 Actual Exam Score
 ▴ = 1 Predicted Exam Score
 ○ = 1 Duplicate Score



Graph 8

The post-test scores on the criterion measure, teacher-made exam, were subjected to analysis of covariance, using the GPA scores as the covariate. The results of the analysis of covariance based on post-test teacher-made exam scores are reported in Table 9.

TABLE 9
TWO-WAY ANALYSIS OF COVARIANCE TABLE FOR THE
POST-TEST SCORES ON THE TEACHER-MADE EXAM

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Ratio	PR>F
Method	1	113.63647	113.63647	2.79*	0.0986
Treatment	1	69.13636	69.13636	1.70	0.1962
Interaction of Method and Treatment	1	11.63636	11.63636	0.29	0.5944
GPA	1	5707.16102	5707.16102	140.12	0.0001
Error	83	3380.74807	40.73190		
Corrected Total	87	9282.31818			

*.95F_{4,83} = 2.477

The results of the analysis of covariance in Table 9 were examined within the perspective of the hypotheses tested to formulate the conclusions for this research study.

Hypothesis 4: Students in elementary microeconomics who receive the treatment of instructional objectives stated in behavioral terms will achieve a higher post-test mean on the teacher-made exam than students in elementary microeconomics who do not receive the treatment of instructional objectives stated in behavioral terms. The

difference between the means of the treatment groups, control and experimental, was not statistically significant; therefore, this hypothesis was rejected. (See Table 9.)

Hypothesis 5: Students in elementary microeconomics who are taught by conventional instruction will achieve a higher post-test mean on the teacher-made exam than students in elementary microeconomics who are taught by programmed instruction. The difference between the means of the methods groups, programmed instruction and conventional instruction, is statistically significant and yields an F value of 2.79 with a $PR>F$ value of 0.0986. ($.95F_{4,83} = 2.477$.) This hypothesis was supported. (See Table 9.)

Hypothesis 6: In the study of elementary microeconomics, the treatment of receiving instructional objectives does interact significantly with the two instructional methods, programmed instruction or conventional instruction, as measured by student achievement on the teacher-made exam. Because the interaction between the treatment groups and the method groups was not statistically significant, this hypothesis was rejected. (See Table 9.)

Sub-hypotheses for Hypotheses 4 and 5 were also identified in Chapter I. If Hypothesis 6 was supported, then Hypothesis 4 and Hypothesis 5 were to be tested as simple main effects; otherwise, they were to be tested as main effects. Hypothesis 6 was not supported; therefore, Hypothesis 4 and Hypothesis 5 were tested as main effects. (See Table 9.)

Because Hypothesis 4 was rejected as a main effect (see Table 9), Hypothesis 4a and Hypothesis 4b did not require a posteriori testing. These two sub-hypotheses are listed below.

Hypothesis 4a: Students in elementary microeconomics who are taught by programmed instruction and receive the treatment of instructional objectives will achieve a higher post-test mean on the teacher-made exam than students in elementary microeconomics who are taught by programmed instruction and do not receive the treatment of instructional objectives. This hypothesis was not tested because Hypothesis 4 was rejected as a main effect.

Hypothesis 4b: Students in elementary microeconomics who are taught by conventional instruction and receive the treatment of instructional objectives will achieve a higher post-test mean on the teacher-made exam than students in elementary microeconomics who are taught by conventional instruction and do not receive the treatment of instructional objectives. This hypothesis was not tested because Hypothesis 4 was rejected as a main effect.

Because Hypothesis 5 was supported as a main effect (see Table 9), Hypothesis 5a and Hypothesis 5b were tested for significance at the 0.05 level. Duncan's Multiple Range Test was the a posteriori test applied to find the source of the effects and to control the Type I comparison error rate.

Hypothesis 5a: Students in elementary microeconomics who are taught by programmed instruction and receive the treatment of instructional objectives will achieve a higher post-test mean on the teacher-made test than students in elementary microeconomics who are taught by

conventional instruction and receive the treatment of instructional objectives.

To test Hypothesis 5a, the post-test scores on the teacher-made test for the PROGX and CONVX groups were subjected to Duncan's Multiple Range Test. The results of this a posteriori test are reported in Table 10.

TABLE 10

DUNCAN'S MULTIPLE RANGE TEST FOR THE POST-TEST SCORES--
TEACHER-MADE EXAM--FOR PROGRAMMED INSTRUCTION AND
CONVENTIONAL INSTRUCTION EXPERIMENTAL GROUPS

Duncan Grouping	Mean	N	Treatment
A ^a	78.955	22	CONVX
A ^a	77.409	22	PROGX
Alpha = 0.05	DF = 41	MSE = 39.7194	

*Means with the same letter are not significantly different.

The results of the Duncan's Multiple Range Test, Table 10, examined within the perspective of Hypothesis 5a, led to the following conclusion: Hypothesis 5a is rejected. For those students studying microeconomics by the conventional instruction method with instructional objectives, the post-test mean was not significantly different from the post-test mean of the students using the programmed instruction method with instructional objectives. (See Table 10.)

Hypothesis 5b: Students in elementary microeconomics who are taught by conventional instruction and do not receive the treatment of instructional objectives will achieve a higher post-test mean on the

teacher-made test than students in elementary microeconomics who are taught by programmed instruction and do not receive the treatment of instructional objectives.

To test Hypothesis 5b, the post-test scores on the teacher-made exam for the PROGC and CONV C groups were subjected to Duncan's Multiple Range Test. The results of this a posteriori test are reported in Table 11.

TABLE 11

DUNCAN'S MULTIPLE RANGE TEST FOR THE POST-TEST SCORES
TEACHER-MADE EXAM--FOR PROGRAMMED INSTRUCTION AND
CONVENTIONAL INSTRUCTION CONTROL GROUPS

Duncan Grouping	Mean	N	Treatment
A [#]	77.909	22	CONVC
A [#]	74.909	22	PROGC
Alpha = 0.05	DF = 41	MSE = 42.7276	

*Means with the same letter are not significantly different.

The results of the Duncan's Multiple Range Test, Table 11, examined within the perspective of Hypothesis 5b, led to the following conclusion: Hypothesis 5b is rejected. For those students studying microeconomics by the conventional instruction method without instructional objectives, the post-test mean was not significantly different from the post-test mean of the students using the programmed instruction method without instructional objectives. (See Table 11.)

Additional Analysis of Data

Two additional instruments were used to collect information concerning this research study. The first instrument was designed to serve as a control on experimenter bias. The other was a student survey sheet designed to solicit information concerning student study procedures during the semester. The results of these two forms are discussed under the following headings: Results of Faculty Classroom Visits and Results of the Students' Questionnaires.

Results of Faculty Classroom Visits

As a control for the experimenter effect known as "errors of personality influence," an economics instructor and a humanities instructor were requested to visit the four classes on an unannounced basis to evaluate the consistency of the teaching performance for each class group and the personal attitude of the researcher in the role of instructor. The two instructors were not told the nature of the treatment nor the purpose of the experiment. As a guide for classroom observations, a brief peer evaluation form was designed. (See Appendix B.)

The faculty visitations did not proceed according to plan. The economics instructor visited two of the classes, and the humanities instructor visited three of the classes. Each of the four classes received at least one visit. According to plan, the evaluation forms were held until the end of the spring semester; however, only two of the five forms were filled in completely. The instructors indicated the consistency of the researcher's performance in the classroom did not provide any new information to record on the forms.

The results of the faculty classroom visit forms are summarized in a discussion of three items. These results are provided for general information; at best, only general observations can be drawn.

Instructor manner

The two instructors described the researcher's manner in class as being characteristically "warm, poised, pleasant, patient, and courteous." One instructor was specifically impressed by the "courteous practice of remembering and responding to each student by name." The other instructor indicated that he could not detect "any difference between the researcher's attitude toward the student in class or outside of class." Therefore, the researcher concluded that her manner toward students was reasonably encouraging, not discouraging, toward student performance.

Attitude among classes

Both instructors indicated that the researcher's manner and attitude were "consistent in the classes visited," and they could not "discern any differences in the way one class was treated as compared to the other class--only differences in the method of instruction." The researcher, therefore, concluded that each class was treated in a reasonably similar and agreeable manner.

Additional observations

One instructor made the observation that the researcher's classroom presentation in one class "contained many references to

objectives related to the unit of study, but not one reference to objectives for study was made to the other class." The other instructor commented on the difference in classroom organization between the programmed instruction class and the conventional class. The researcher concluded that she was following the research plan for the four classes in a reasonable manner.

Summary

In response to the comments made by the faculty members who visited the four classes in this study, the researcher tends to discount experimenter bias as being a major factor contributing to the differences in achievement between the four classes.

Results of the Students' Questionnaires

A student questionnaire, exploring several facets of students' study patterns during the semester, was prepared. (See Appendix B.) The purpose of the questionnaire, modeled for each group, was to gain some perception of the students' utilization of and attitudes toward various study materials issued and assigned during this investigation. The questionnaire was administered during the last class period at the time the two post-tests were handed to the instructor. The students were requested to respond voluntarily and candidly to the questionnaire. Nine students did not fill out a questionnaire: one from the PROGC group, two from the PROGX group, two from the CONVC group, and four from the CONVX group. Furthermore, not all students responded to every item in the questionnaire. A summary of the student questionnaires is reported in Table 12.

TABLE 12
SUMMARY OF STUDENT QUESTIONNAIRES

Groups	PROGC		PROGX		CONVC		CONVX		All Groups	
Number of Students	22		22		22		22		88	
Students Not Reporting	1		2		2		4		9	
Analysis	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
<u>Class Attendance:</u>										
Never missed	0	0.0	4	20.0	2	10.0	5	27.8	11	13.9
Missed less than four	13	61.9	13	65.0	15	75.0	9	50.0	50	63.3
Missed more than three	8	38.1	3	15.0	3	15.0	4	22.2	18	22.8
Total responses	21	100.0	20	100.0	20	100.0	18	100.0	79	100.0
<u>Use of Programmed Textbook</u>										
Studied thoroughly	13	65.0	13	65.0	--	--	--	--	26	65.0
Read most of chapter	5	25.0	7	35.0	--	--	--	--	12	30.0
Used text very little	2	10.0	0	0.0	--	--	--	--	2	5.0
Did not use text	0	0.0	0	0.0	--	--	--	--	0	0.0
Total responses	20	100.0	20	100.0	--	--	--	--	40	100.0

TABLE 12--Continued.

Groups	PROGC		PROGX		CONVC		CONVX		All Groups	
Analysis	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
<u>Value of Programmed Textbook</u>										
Very helpful	5	25.0	13	68.4	--	--	--	--	18	46.2
Of some help	8	40.0	4	21.1	--	--	--	--	12	30.8
Generally not helpful	2	10.0	2	10.5	--	--	--	--	4	10.2
Confusing	5	25.0	0	0.0	--	--	--	--	5	12.8
Total responses	20	100.0	19	100.0	--	--	--	--	39	100.0
<u>Use of Conventional Textbook</u>										
Studied thoroughly	--	--	--	--	6	30.0	9	50.0	15	39.5
Read most of chapter	--	--	--	--	12	60.0	4	22.2	16	42.1
Used text very little	--	--	--	--	2	10.0	5	27.8	7	18.4
Did not use text	--	--	--	--	0	0.0	0	0.0	0	0.0
Total responses	--	--	--	--	20	100.0	18	100.0	38	100.0
<u>Value of Conventional Textbook</u>										
Very helpful	--	--	--	--	12	60.0	10	58.8	22	59.5
Of some help	--	--	--	--	8	40.0	7	41.2	15	40.5
Generally not helpful	--	--	--	--	0	0.0	0	0.0	0	0.0
Confusing	--	--	--	--	0	0.0	0	0.0	0	0.0
Total responses	--	--	--	--	20	100.0	17	100.0	37	100.0

TABLE 12--Continued.

Groups	PROGC		PROGX		CONVC		CONVX		All Groups		
Analysis	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%	
<u>Use of Instructional Objectives</u>											
Worked every objective	--	--	9	45.0	--	--	10	55.6	19	50.0	
Worked most objectives	--	--	10	50.0	--	--	5	27.8	15	39.5	
Worked few objectives	--	--	1	5.0	--	--	2	11.1	3	7.9	
Did not use	--	--	0	0.0	--	--	1	5.5	1	2.5	
Total responses	--	--	20	100.0	--	--	18	100.0	38	100.0	
<u>Value of Instructional Objectives</u>											
Very helpful	--	--	15	75.0	--	--	10	55.6	25	65.8	
Of some help	--	--	4	20.0	--	--	4	22.2	8	21.0	
Generally not helpful	--	--	1	5.0	--	--	2	11.1	3	7.9	
Waste of time	--	--	0	0.0	--	--	2	11.1	2	5.3	
Total responses	--	--	20	100.0	--	--	18	100.0	38	100.0	
<u>Programmed Textbooks in Other Courses</u>											
Like to see used	Yes	13	61.9	15	75.0	--	--	--	28	68.3	
	No	8	38.1	5	25.0	--	--	--	13	31.7	
Total responses		21	100.0	20	100.0	--	--	--	41	100.0	
<u>Instructional Objectives in Other Courses</u>											
Like to see used	Yes	9	64.3	18	90.0	11	68.8	14	77.8	52	76.5
	No	5	35.7	2	10.0	5	31.2	4	22.2	16	23.5
Total responses		14	100.0	20	100.0	16	100.0	18	100.0	68	100.0

TABLE 12--Continued.

Groups		PROGC		PROGX		CONVC		CONVX		All Groups	
Analysis		Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
<u>Instructional Objectives in Other Economics Courses</u>											
Aware of use	Yes	4	19.1	--	--	2	10.5	--	--	6	15.0
	No	17	80.9	--	--	17	89.5	--	--	34	85.0
Total responses		21	100.0	--	--	19	100.0	--	--	40	100.0
<u>Same Method in Another Course</u>											
Would enroll	Yes	13	65.0	11	55.0	18	94.7	15	83.3	57	74.0
	No	5	25.0	7	35.0	1	5.3	1	5.6	14	18.2
	Maybe	2	10.0	2	10.0	0	0.0	2	11.1	6	7.8
Total responses		20	100.0	20	100.0	19	100.0	18	100.0	77	100.0
<u>Comments on Instructional Objectives</u>											
Matched to exams				5				4		9	
Made better grades				3				2		5	
Time-consuming				1				3		4	
Helped to study				5				3		8	
<u>Comments on Programmed Instruction</u>											
Boring		1		1						2	
Worked at own pace		1		3						4	
More effort to study		5		6						11	
Helpful to weak student				3						3	
Felt lost		2								2	
Combine with lecture		3		2						5	

TABLE 12--Continued.

Groups	PROGC		PROGX		CONVC		CONVX		All Groups	
Analysis	Freq.	%	Freq.	%	Freq.	%	Freq.	%	Freq.	%
<u>Additional Comments</u>										
Test questions not directly from the textbook	4				2				6	
Liked classroom atmosphere			4		2		3		9	

Some of the student responses were of sufficient exploratory interest that the researcher plotted the student scores on each unit test. The scatterplots provide a visual record for a trace comparison with selected student responses. (See Appendix C for additional scatterplots of actual and predicted scores for the remaining CONVNC unit tests.)

Assuming that the student responses are reliable and valid, the researcher can, at best, formulate general observations only. The researcher cannot draw statistical inferences from the general information provided by the students' responses.

Class attendance

Information concerning class attendance was solicited on the questionnaire to compare the attendance pattern of students studying under the two different modes of instruction. Class attendance in the two programmed instruction classes was voluntary on the part of the student. Class time was scheduled for the programmed classes to provide a committed time and place for the students to study together, to consult the instructor, and to complete test requirements whenever the students desired to do so. Attendance records were not kept by the instructor. Class attendance was required, however, for students in the conventional instruction classes and was a contributory factor in the assignment of semester grades.

On the junior college campus, excessive absence was defined as the number of unexcused absences exceeding the number of credit hours assigned to the course; three unexcused absences are permitted for a

three-credit-hour course. The percentage of students missing more than three class sessions was greater for the PROGC group (38.1%) than for the other three groups. The excessive absence percentages for the other three groups showed very little difference among them. The excessive absence percentage for the CONVX group was 22.2%; the PROGX and CONVC groups had the same excessive absence percentage, 15.0%. (See Table 12.)

The instructor tends to discount differences in class attendance as being a factor contributing to the differences in achievement in the course. Attendance in the programmed instruction classes was voluntary, and students were encouraged to study and progress at their own individual rate. Furthermore, many of the students in the programmed instruction classes sought the personal assistance of the instructor outside the scheduled class period and did not restrict their instructional and learning activities to the scheduled class period.

The programmed textbook

The next two items on the questionnaire, reported on by the students in the two programmed instruction classes, denoted use of the programmed textbook and revealed an attitudinal assessment of its value. Little difference in the use of the programmed textbook existed between the two groups. Of the students reporting, 65.0% of both groups designated that they had studied each chapter thoroughly. The responses to "Read most of each chapter" registered a slight difference: 35.0% of the students in the PROGX group compared to 25.0% of the students in the PROGC group. Two students (10.0%) in the PROGC

group disclosed that they used the programmed textbook very little. (See Table 12.)

Attitudinal differences were represented in the students' responses concerning the value of the programmed textbook. Thirteen students (68.4%) in the PROGX group represented the programmed textbook as being "very helpful" compared to five students (25.0%) in the PROGC group. However, eight students (40.0%) in the PROGC group rated the programmed textbook as being "of some help" compared to four students (21.1%) in the PROGX group. Critically, five students (25.0%) in the PROGC group labelled the programmed textbook as being "confusing." Two of these students declared in the additional comments section that they felt "lost" and needed more guidance concerning what to study. One pointed out that, in order to learn, he needed to "hear teacher instruction in a regular classroom." However, of the forty-one students responding, twenty-eight students (68.3%) indicated that they would "like to see" programmed textbooks used in other courses. (See Table 12.)

The conventional textbook

The next two items on the questionnaire, reported on by the students in the two conventional instruction groups, alluded to use of the conventional textbook and revealed an attitudinal assessment of its value. Some differences in the use of the conventional textbook existed between the two groups. The students' replies to the first three levels of textbook usage varied between the two groups. Of the students responding, nine (50.0%) of the students in the CONVX group

"studied each chapter thoroughly" compared to six (30.0%) of the students in the CONVC group. Twelve students (60.0%) of the students in the CONVC group "read most of each chapter" compared to four students (22.2%) in the CONVX group. Five students (27.8%) in the CONVX group used the text "very little" compared to two students (10.0%) in the CONVC group. (See Table 12.)

The responses of the students in the two conventional instruction groups expressed strong agreement concerning the value of the conventional textbook. Twelve (60.0%) of the students in the CONVC and ten (58.8%) of the students in the CONVX group described the textbook as being "very helpful." The remaining students in both groups agreed "the textbook was of some help." (See Table 12.)

Instructional objectives

The next two items on the questionnaire, reported on by the students in the two experimental groups (PROGX and CONVX), related to the use of instructional objectives and the assessment of the value of instructional objectives. (See Table 12.) The researcher believes the student responses on these two items provide intuitive insight into the differences in achievement among the students in the four groups.

An important piece of information provided by the questionnaire revealed that the students had made considerable use of the instructional objectives in studying for the course. Of the thirty-eight responding from both groups, thirty-four students reported either having worked through every objective or having worked through

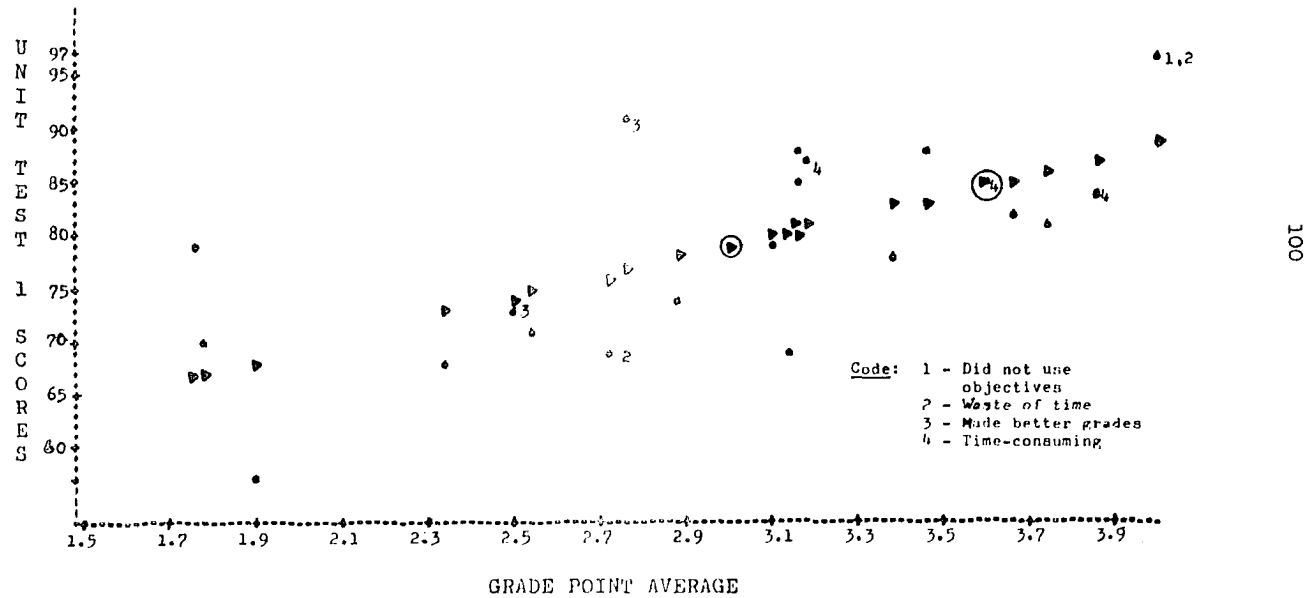
most of the objectives. These responses attest that 89.5% of the students in the two experimental groups used the objectives extensively. The combination of these two responses showed that a higher degree of objective utilization occurred in the PROGX group (95.0%) than in the CONVX group (83.4%). However, ten students (55.6%) in the CONVX group reported working through every objective as compared to nine students (45.0%) in the PROGX group. One student in the CONVX group admitted not using the instructional objectives; this student received one of the two highest grades on each test. Furthermore, the same student rated the instructional objectives as being "a waste of time." (See Table 12.) As a visual trace from the individual response to student score on Graphs 9, 10, 11, and 12, two categories were coded as follows: "did not use objectives," 1; and "waste of time," 2.

The students in the PROGX group awarded the highest appraisal of the value of the instructional objectives. Fifteen students (75.0%) in the PROGX group rated the objectives as being "very helpful" compared to ten students (55.6%) in the CONVX group.

The questionnaire distributed to the two control groups contained an item to discover student awareness of the use of instructional objectives in the experimental sections. Of the forty control students responding, six students (15.0%) indicated that they knew that objectives were used in other economics classes. The researcher tends to believe these responses manifest a low level of contamination of the experimental treatment into the control groups. (See Table 12.)

Actual and Predicted Unit Test 1 Scores for the CONVX Group

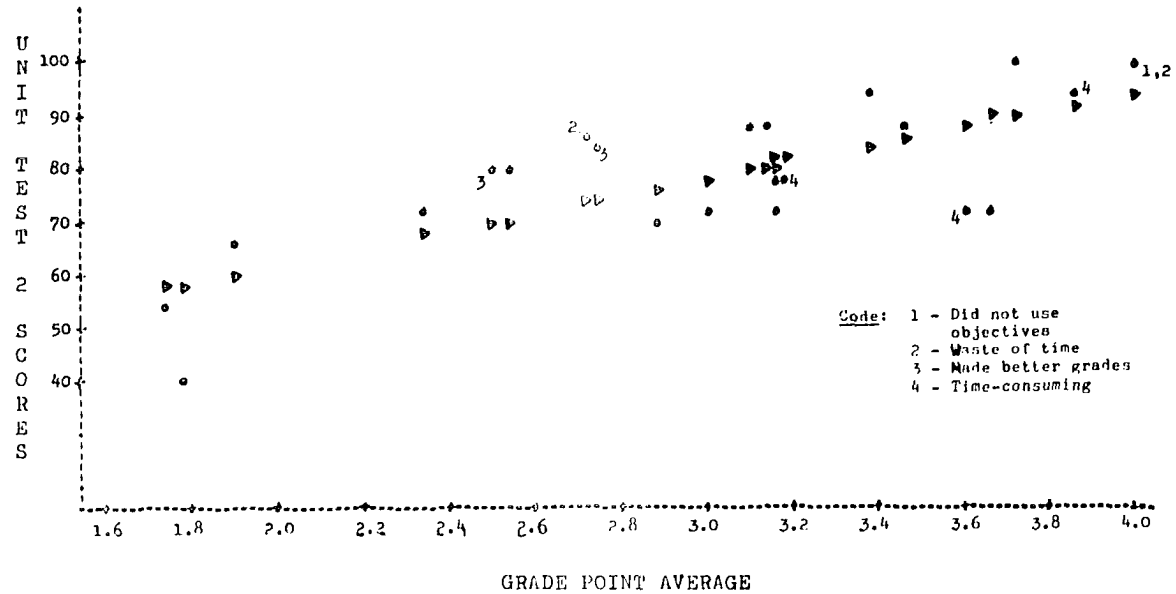
Legend: • = 1 Actual Unit Test 1 Score
 ▲ = 1 Predicted Unit Test 1 Score
 ○ = 1 Duplicate Score



Graph 9

Actual and Predicted Unit Test 2 Scores for the CONVX Group

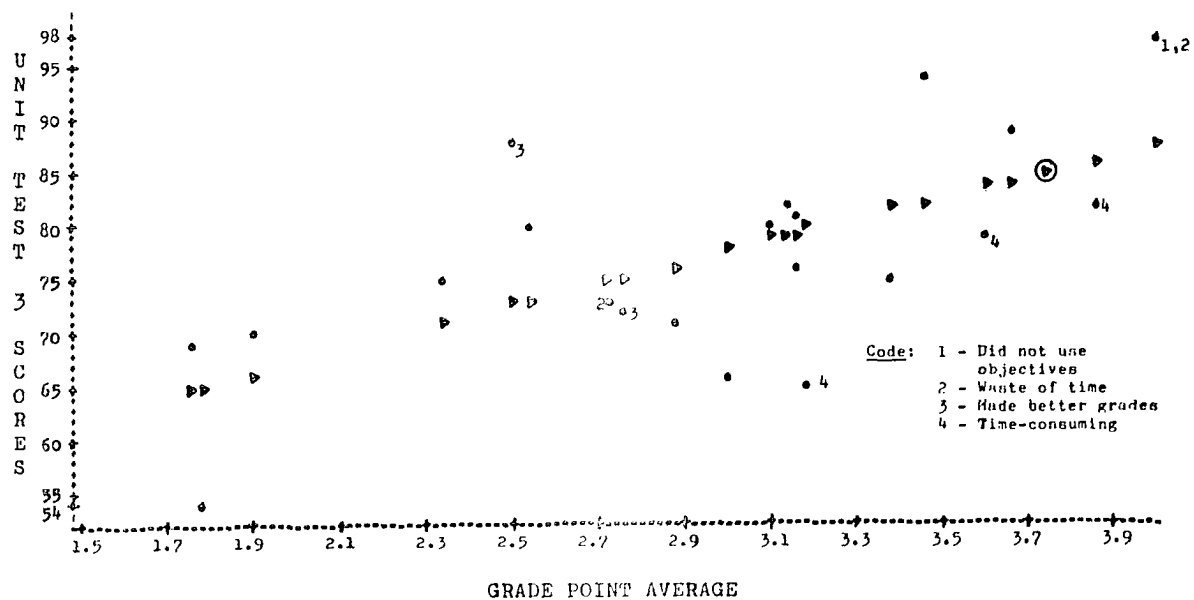
Legend: • = 1 Actual Unit Test 2 Score
 ▶ = 1 Predicted Unit Test 2 Score
 ○ = 1 Duplicate Score



Graph 10

Actual and Predicted Unit Test 3 Scores for the CONVX Group

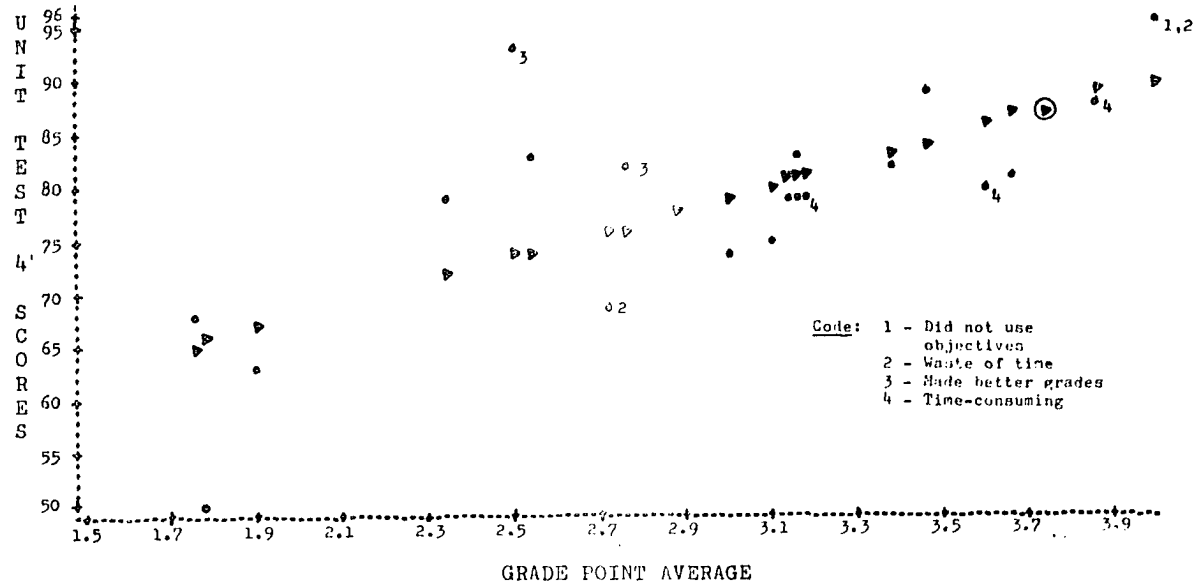
Legend: • = 1 Actual Unit Test 3 Score
 ▶ = 1 Predicted Unit Test 3 Score
 ○ = 1 Duplicate Score



Graph 11

Actual and Predicted Unit Test 4 Scores for the CONVX Group

Legend: • = 1 Actual Unit Test 4 Score
 ▲ = 1 Predicted Unit Test 4 Score
 ○ = 1 Duplicate Score



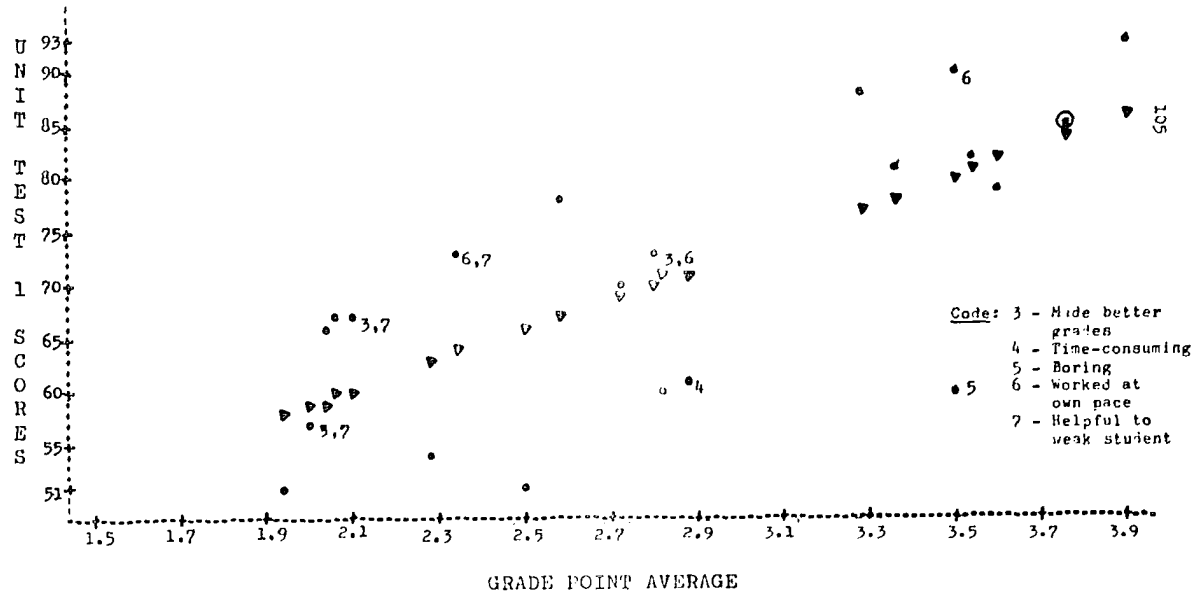
Graph 12

Perhaps the greatest attitudinal inference was disclosed by the item relating to the application of instructional objectives to other courses. The responses of the students in all four groups represented positive agreement concerning the value of instructional objectives. Of the sixty-eight students responding, fifty-two students (76.5%) indicated a desire to have objectives provided in other courses. However, the strongest endorsement for future use of instructional objectives emanated from the PROGX group. Of the twenty respondents, eighteen (90.0%) expressed the desire to use instructional objectives in other courses. The researcher believes these responses provide a meaningful clue that instructional objectives provide a strong study structure undergirding programmed instruction. The guidance of the objectives enable students to identify direction and discipline for self-paced study, to discern the relevance of study assignments, and to realize a test-review base.

Additional comments on instructional objectives represented an acceptable degree of agreement between the two experimental groups. Percentages were not calculated for the written comments because some of the respondents included more than one pertinent comment. Constructive comments were statements of appreciation of the objectives for direction in study, for relevance to examinations, and for attainment of improved grades. As a visual trace from individual responses to student scores on Graphs 9 through 16, two categories were coded as follows: "made better grades," 3; and "time-consuming," 4.

Actual and Predicted Unit Test 1 Scores for the PROGK Group

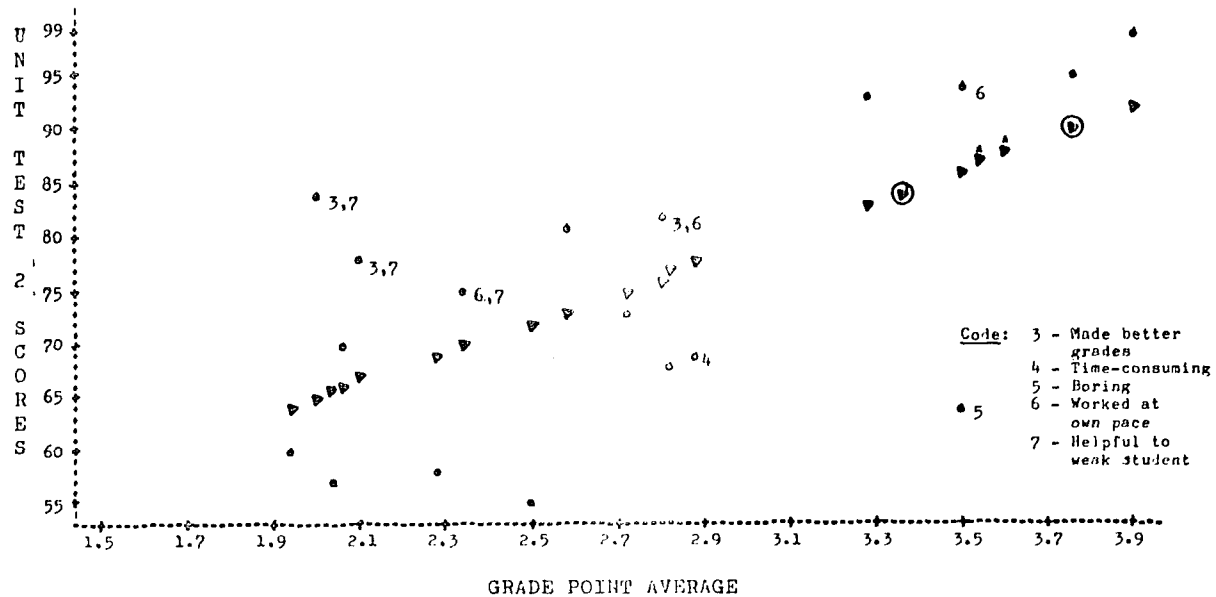
Legend: * = 1 Actual Unit Test 1 Score
 ▴ = 1 Predicted Unit Test 1 Score
 O = 1 Duplicate Score



Graph 13

Actual and Predicted Unit Test 2 Scores for the PROGX Group

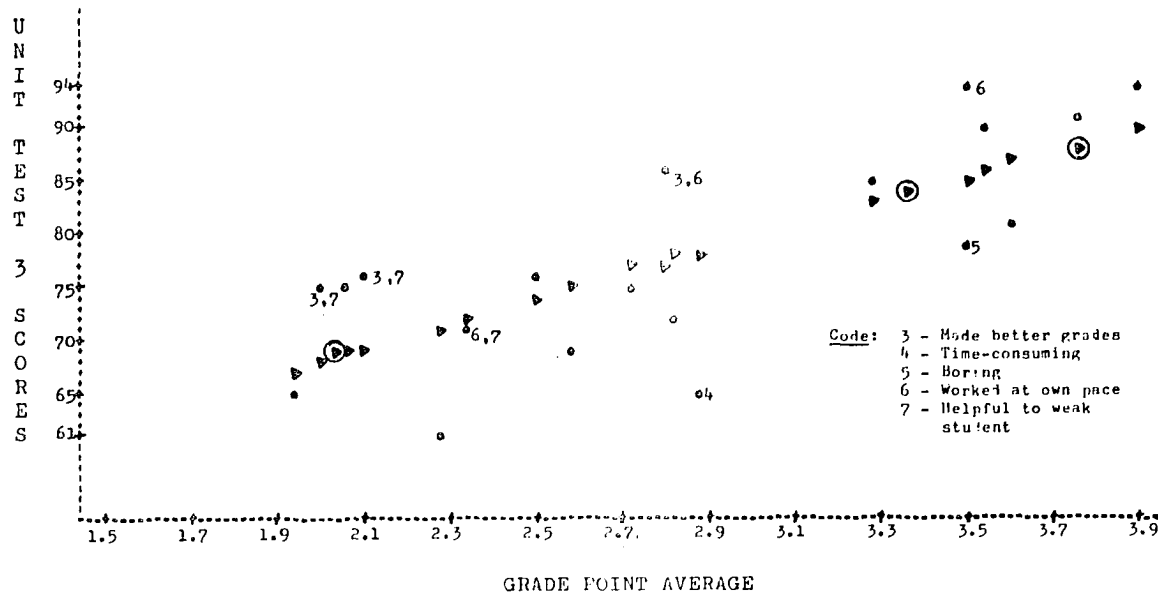
Legend: • = 1 Actual Unit Test 2 Score
 ▲ = 1 Predicted Unit Test 2 Score
 ○ = 1 Duplicate Score



Graph 14

Actual and Predicted Unit Test 3 Scores for the PROGK Group

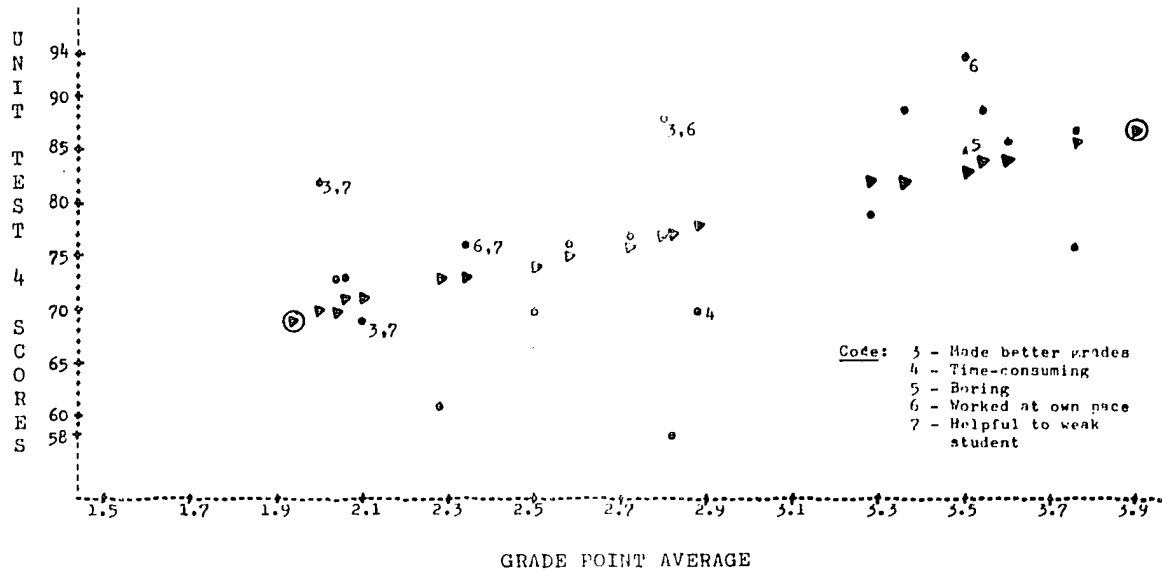
Legend: • = 1 Actual Unit Test 3 Score
 ▲ = 1 Predicted Unit Test 3 Score
 ○ = 1 Duplicate Score



Graph 15

Actual and Predicted Unit Test 4 Scores for the PROGX Group

Legend: • = 1 Actual Unit Test 4 Score
 ▶ = 1 Predicted Unit Test 4 Score
 ○ = 1 Duplicate Score



Graph 16

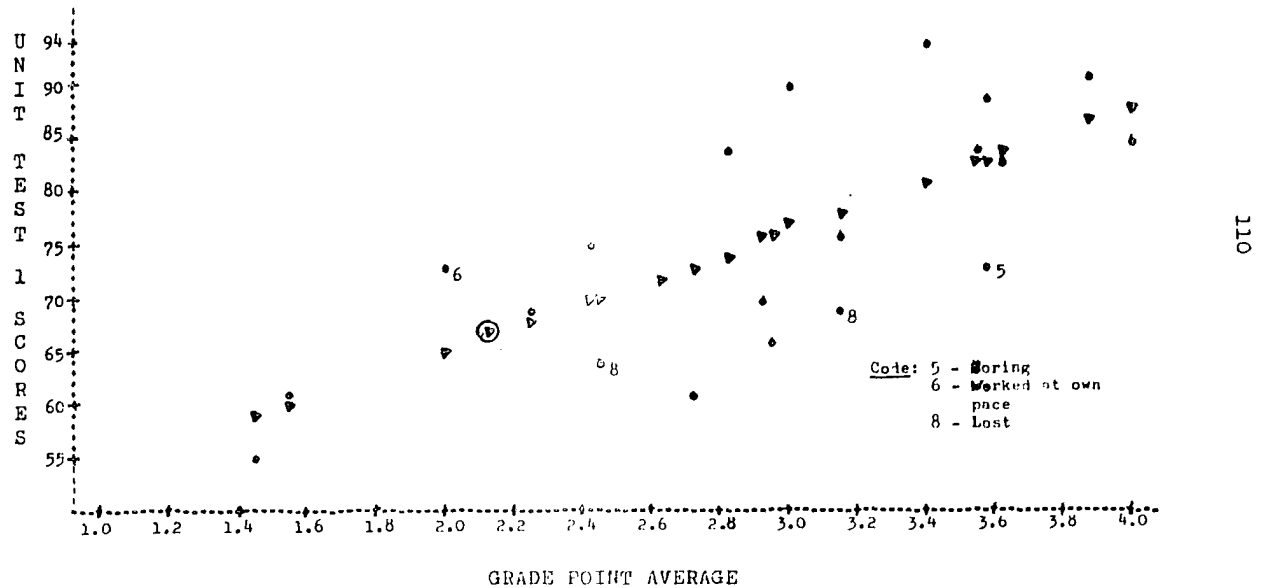
Instructional method

The questionnaire distributed to all four groups contained an item pertaining to future enrollment. The question was asked: "Would you enroll in another course taught in the same manner as this course?" Of the seventy-seven students responding, fifty-seven students (74.0%) indicated they would do so. The highest preference for enrollment under a similar instructional pattern was expressed by students in the CONVC group. Of the nineteen students from the CONVC group responding, eighteen students (94.7%) indicated that they would enroll in another course taught in the same pattern as the control conventional instruction class. (See Table 12.)

Similar comments on programmed instruction were proffered by the students in the two programmed instruction groups. Positive statements addressed the attributes of "worked at own pace" and "helpful to weak student." All references, but one, to these attributes were initiated by students in the PROGX group. Negative statements addressed adverse aspects of programmed instruction. A complaint from eleven students in the two groups was that they expended more time and effort in studying economics with seemingly reduced returns. Two other complaints were "the course was boring" and the students "felt lost" and did not know what to do or what questions to ask. As a visual trace on these responses to individual student scores on Graphs 13 through 20, these two comments were coded as follows: "boring," 5; and "lost," 8. The final negative comment was constructed as a recommendation to combine programmed instruction with lecture. Five students from the two groups (PROGC and PROGX) recorded

Actual and Predicted Unit Test 1 Scores for the PROGC Group

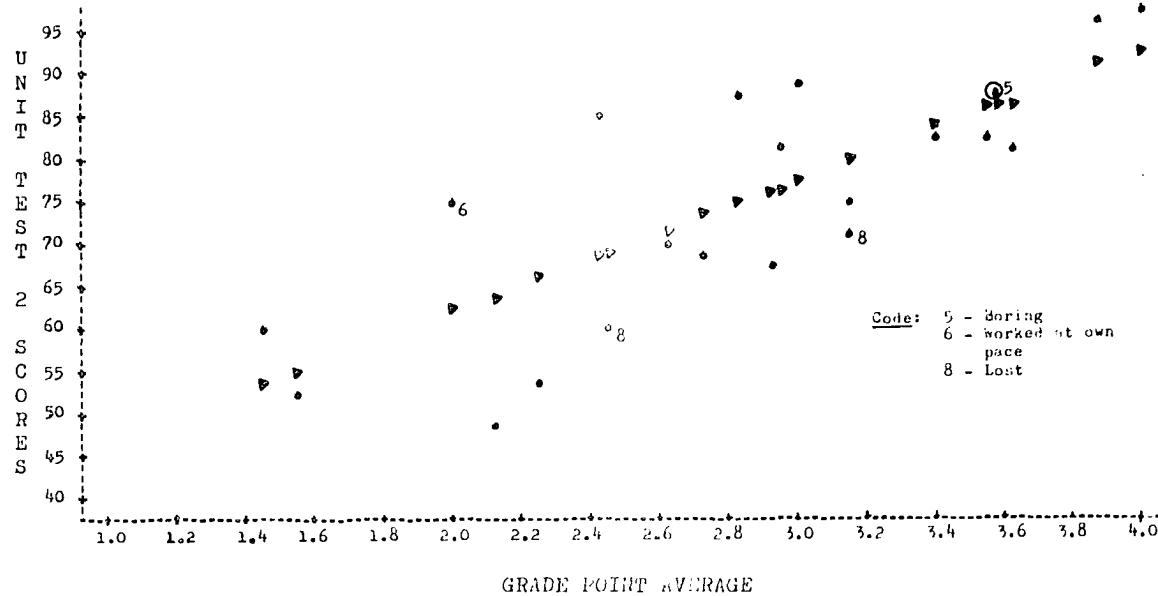
Legend: • = 1 Actual Unit Test 1 Score
 ▴ = 1 Predicted Unit Test 1 Score
 ○ = 1 Duplicate Score



Graph 17

Actual and Predicted Unit Test 2 Scores for the PROGC Group

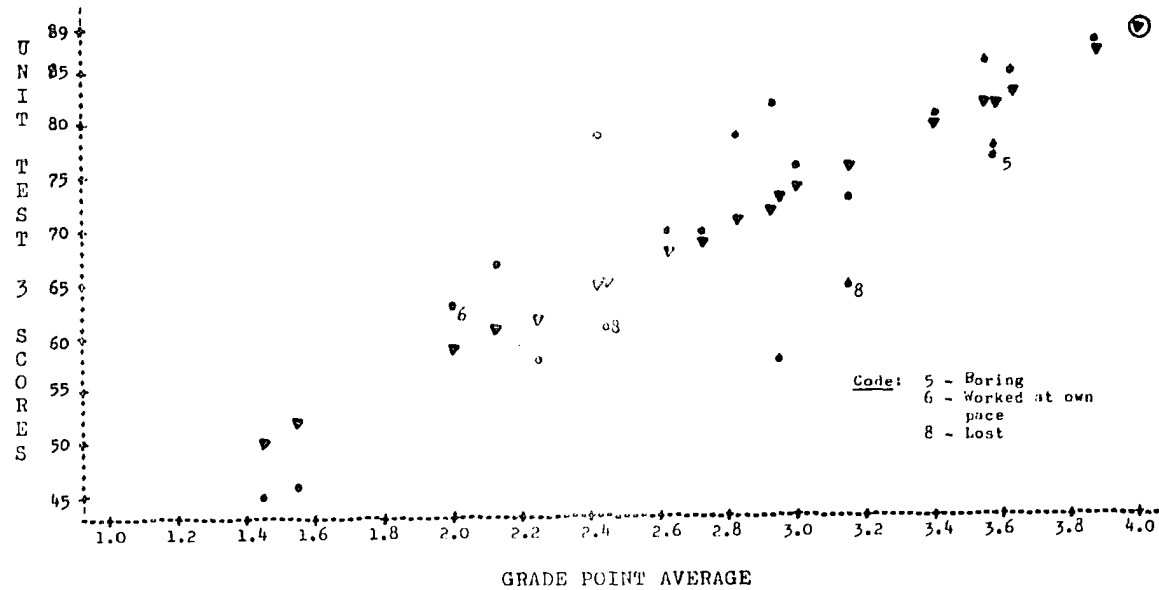
Legend: • = 1 Actual Unit Test 2 Score
 ▶ = 1 Predicted Unit Test 2 Score
 O = 1 Duplicate Score



Graph 18

Actual and Predicted Unit Test 3 Scores for the PROGC Group

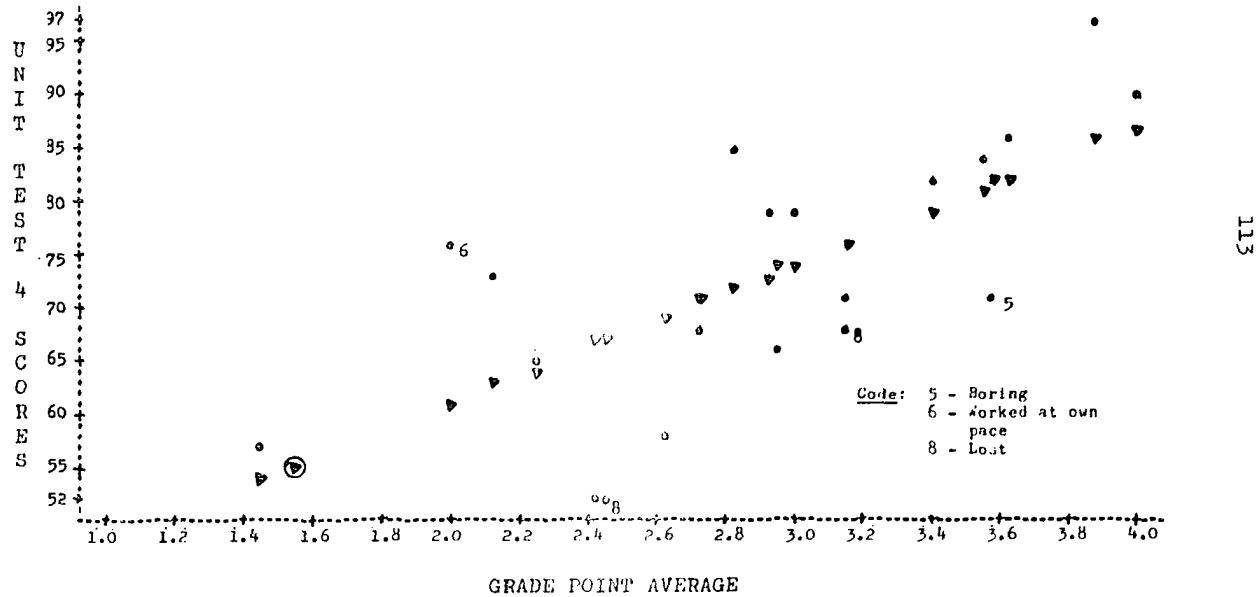
Legend: • = 1 Actual Unit Test 3 Score
 ▴ = 1 Predicted Unit Test 3 Score
 ○ = 1 Duplicate Score



Graph 19

Actual and Predicted Unit Test 4 Scores for the PROGC Group

Legend: • = 1 Actual Unit Test 4 Score
 ▼ = 1 Predicted Unit Test 4 Score
 O = 1 Duplicate Score



Graph 20

similar recommendations concerning the combination of instructional methods. (See Table 12.)

Exploratory Analysis of the Four Unit Tests

After viewing the scatterplots of the student scores on the four unit tests, the researcher decided to explore statistically the unit test data to trace the progression of student achievement from study unit to study unit. The adjusted means, the unadjusted means, and the standard deviations for each of the unit tests are reported in Tables 13, 15, 17, and 19. The results of the two-way analysis of covariance model applied to the scores for each unit test are summarized in Tables 14, 16, 18, and 20.

The students in the two conventional instruction groups achieved higher means on unit test 1 than the students in the two programmed instruction groups. The difference between the means of the methods groups is statistically significant and yields an F value of 11.31 with a $PR>F$ value of 0.0012. ($.99F_{1,83} = 6.95$.) The researcher tends to believe that the significant difference between the means on unit test 1 reflects student familiarity with conventional instruction and unfamiliarity with programmed instruction. (See Tables 13 and 14.)

This observation is bolstered by the lack of significant difference between the means of the methods groups on unit test 2. (See Tables 15 and 16.) Evidently by the end of the second unit of instruction, the students in the programmed instruction groups have learned how to study the programmed materials; at least, their test grades registered improvement in achievement.

TABLE 13

ADJUSTED MEANS, UNADJUSTED MEANS, AND STANDARD DEVIATIONS
FOR UNIT TEST 1 SCORES--TEACHER-MADE TEST--REPORTED
BY TREATMENT AND METHOD GROUPS

Group	N	Adjusted Mean	Unadjusted Mean	Standard Deviation
PROGC	22	75.3232	75.0455	10.9912
PROGX	22	71.8516	71.4091	13.0006
CONVC	22	78.8132	79.9091	12.7201
CONVX	22	77.9182	78.8182	9.2974

TABLE 14

TWO-WAY ANALYSIS OF COVARIANCE TABLE FOR THE
TEST SCORES ON UNIT TEST 1

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Ratio	PR>F
Method	1	721.63636	721.63636	11.31*	0.0012
Treatment	1	84.04545	84.04545	1.32	0.2543
Interaction of Method and Treatment	1	62.22727	62.22727	0.98	0.3261
GPA	1	6005.72408	6005.72408	94.16	0.0001
Error	83	5293.63955	63.77879		
Corrected Total	87	12167.27273			

*.95 $F_{1,83}$ = 3.957 and .99 $F_{1,83}$ = 6.95

TABLE 15

ADJUSTED MEANS, UNADJUSTED MEANS, AND STANDARD DEVIATIONS
FOR UNIT TEST 2 SCORES--TEACHER-MADE TEST--REPORTED
BY TREATMENT AND METHOD GROUPS

Group	N	Adjusted Mean	Unadjusted Mean	Standard Deviation
PROGC	22	75.6941	75.4091	13.8724
PROGX	22	78.3545	77.5455	13.5179
CONVC	22	75.6941	75.7727	12.3864
CONVX	22	77.2364	78.0455	14.2811

TABLE 16

TWO-WAY ANALYSIS OF COVARIANCE TABLE FOR THE
TEST SCORES ON UNIT TEST 2

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Ratio	PR>F
Method	1	4.10227	4.10227	0.04	0.8331
Treatment	1	106.92045	106.92045	1.17	0.2835
Interaction of Method and Treatment	1	0.10227	0.10227	0.00	0.9734
GPA	1	7767.60672	7767.60672	84.65	0.0001
Error	83	7615.98418	91.75885		
Corrected Total	87	15494.71591			

TABLE 17

ADJUSTED MEANS, UNADJUSTED MEANS, AND STANDARD DEVIATIONS
FOR UNIT TEST 3 SCORES--TEACHER-MADE TEST--REPORTED
BY TREATMENT AND METHOD GROUPS

Group	N	Adjusted Mean	Unadjusted Mean	Standard Deviation
PROGC	22	71.6941	71.6364	12.6210
PROGX	22	78.8028	78.2273	9.7391
CONVC	22	75.0587	75.3636	11.4997
CONVX	22	76.8790	77.4545	10.0841

TABLE 18

TWO-WAY ANALYSIS OF COVARIANCE TABLE FOR THE
TEST SCORES ON UNIT TEST 3

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Ratio	PR>F
Method	1	48.01136	48.01136	0.96	0.3306
Treatment	1	414.55682	414.55682	8.27*	0.0051
Interaction of Method and Treatment	1	111.37500	111.37500	2.22	0.1399
GPA	1	6088.23661	6088.23661	121.44	0.0001
Error	83	4161.26339	50.13570		
Corrected Total	87	10823.44318			

*.95 $F_{1,83}$ = 3.957 and .99 $F_{1,83}$ = 6.95

TABLE 19

ADJUSTED MEANS, UNADJUSTED MEANS, AND STANDARD DEVIATIONS
FOR UNIT TEST 4 SCORES--TEACHER-MADE TEST--REPORTED
BY TREATMENT AND METHOD GROUPS

Group	N	Adjusted Mean	Unadjusted Mean	Standard Deviation
PROGC	22	72.8017	72.5455	12.7157
PROGX	22	78.2074	77.8636	9.5981
CONVC	22	73.6983	73.9545	10.0734
CONVX	22	78.0417	76.9545	10.1065

TABLE 20

TWO-WAY ANALYSIS OF COVARIANCE TABLE FOR THE
TEST SCORES ON UNIT TEST 4

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Square	F Ratio	PR>F
Method	1	34.37500	34.37500	0.58	0.4494
Treatment	1	585.55682	585.55682	9.84*	0.0024
Interaction of Method and Treatment	1	0.55682	0.55682	0.01	0.9232
GPA	1	4665.67393	4665.67393	78.39	0.0001
Error	83	4940.28062	59.52145		
Corrected Total	87	10226.44318			

*.95 $F_{1,83}$ = 3.957 and .99 $F_{1,83}$ = 6.95

By the end of the third unit of instruction, the students in the two experimental groups have learned to use the instructional objectives; their unit test grades improved. (See Table 17.) The students using instructional objectives achieved a higher mean on unit test 3 than the students in the control groups without instructional objectives. (See Table 18.) The difference between the means of the treatment groups is statistically significant and yields an F value of 8.27 with a $PR>F$ value of 0.0051. ($.99F_{1,83} = 6.95.$)

The students in the two experimental groups continued to improve their test grades on the fourth unit of study at the end of the semester. (See Table 19.) The students using instructional objectives again achieved a higher mean on unit test 4 than the students in the control groups without instructional objectives. (See Table 20.) The difference between the means of the treatment groups is statistically significant and yields an F value of 9.84 with a $PR>F$ value of 0.0024. ($.99F_{1,83} = 6.95.$)

The researcher tends to believe the continual and consistent re-enforcement of the application and the value of the instructional objectives by the instructor throughout the semester contributed to effective student utilization of the instructional objectives. The gradual incorporation of instructional objectives into the students' study structure significantly increased student achievement in economic understanding measured by unit tests. However, unit tests measure short-term memory gains, not long-term gains in understanding.

Summary

In this chapter, six hypotheses formulated to reflect three specific research questions were statistically tested for significance at the .05 level of confidence. The statistical results answered those three questions. (1) The use of instructional objectives in the study of elementary microeconomics is significantly related to student achievement as measured by a standardized national test. Hypothesis 1 was supported. (2) The kind of instructional method used in the study of elementary microeconomics is significantly related to student achievement as measured by a non-standardized teacher-made exam. Hypotheses 5 was supported. (3) The use of instructional objectives in the study of elementary microeconomics is significantly effective in terms of student achievement, as measured by a standardized national test, when used in conjunction with programmed instruction. Hypothesis 1a was supported.

The conclusions drawn from these results are presented in Chapter V. The final chapter also contains a summary of the study and some suggestions for further research.

CHAPTER V

SUMMARY

Introduction

This investigation developed in response to a nationally recognized need, which was documented in Chapter I, to explore and examine ways whereby the teaching of economics can be improved and the economic understanding of students can be enhanced. In support of the economic education movement, this study was designed to discover whether specific instructional objectives, stated in behavioral terms, are more effective in terms of student achievement when used with programmed instruction or conventional instruction.

The discussion in this chapter is organized under the following headings: Restatement of the Problem, Procedures, Findings, Conclusions, and Recommendations.

Restatement of the Problem

The problem of this study was to analyze the effect of behaviorally stated instructional objectives on the achievement of community college students who study elementary microeconomics under programmed instruction or conventional classroom instruction. Specifically, the problems investigated were:

1. Is the use of instructional objectives in the study of elementary microeconomics related to student achievement as measured by a standardized national test and a non-standardized teacher-made test?

2. Is the kind of instructional method used in the study of elementary microeconomics related to student achievement as measured by a standardized national test and a non-standardized teacher-made test?

3. Is the use of instructional objectives in the study of elementary microeconomics more effective in terms of student achievement, as measured by a non-standardized teacher-made test and a standardized national test, when used in conjunction with programmed instruction or conventional classroom instruction?

These three questions were restated as the specific research hypotheses that were tested in this study.

Procedures

The procedures followed in this study comprised the following steps: (1) a review of the research and the literature on the methods of teaching elementary economics in college, (2) the selection of a research design to evaluate the data gathered in this experiment, (3) the analysis and the interpretation of the data used in solving the problem stated for this study, and (4) the writing of the research report.

This experiment was conducted at a large state-supported two-year college in the Southwest during the spring semester, 1982.

The subjects were 88 students enrolled in the four sections of elementary microeconomics that were assigned to the instructor by administrative scheduling techniques. The instructional method, programmed instruction or conventional instruction, as well as the experimental or control treatment category, was randomly assigned to each section by the drawing of lots.

The treatment involved providing the students in the two experimental groups with instructional objectives, stated in behavioral terms and written according to Bloom's cognitive hierarchy, for each study unit in the course. Provision of objectives alone was not considered entirely suitable as differentiated treatment; accordingly, other conditions were included as part of the treatment. The instructor showed the students how to incorporate the objectives into their study routine, frequently demonstrated the relevancy of the objectives to classroom activities and study assignments, and purposely pointed out the relationship between the objectives and the questions on each unit test. (See scatterplots of the actual test scores with the predicted scores in Chapter IV and in Appendix C.)

Two testing instruments were selected to measure student achievement in economic understanding. One test was a standardized national test, the Revised Test of Understanding College Economics, Micro Parts A and B. The other test was a non-standardized teacher-made test containing items drawn from the list of instructional objectives. The two tests were administered to all four groups as post-tests.

Data from both tests were submitted to statistical analysis. The analysis of covariance was used to control for prior academic achievement of the students being compared. The hypotheses were then tested for significance at the .05 level of confidence.

Findings

Six major hypotheses and eight sub-hypotheses were formulated and tested in this study. Analysis of covariance procedures, using prior academic achievement as the covariate, was applied to the data obtained from the two post-tests. Based on the statistical analysis of the test data presented in Chapter IV, the major findings were:

1. The TUCE post-test mean of the students studying elementary microeconomics with the guidance of instructional objectives was significantly higher than the TUCE post-test mean of the students studying without the guidance of instructional objectives.

2. For those students studying elementary microeconomics by the programmed instruction method, the TUCE post-test mean of those students with the guidance of instructional objectives was significantly higher than the TUCE post-test mean of the students without the guidance of instructional objectives.

3. For those students using the conventional instruction method to study elementary microeconomics, the TUCE post-test mean of the students with instructional objectives was higher than the TUCE post-test mean of the students without instructional objectives. However, the difference was not statistically significant.

4. The difference between the TUCE post-test means of students studying elementary microeconomics under the programmed

instruction method or the conventional instruction method was not statistically different.

5. Interaction between instructional objectives and instructional method, measured by the national standardized test, TUCE, was not statistically significant.

6. The post-test mean on the teacher-made exam of the students studying elementary microeconomics with the guidance of instructional objectives was higher than the post-test mean of the students studying without the guidance of instructional objectives. However, the difference was not statistically significant.

7. The post-test mean of the teacher-made exam for students studying elementary microeconomics and taught by conventional instruction was significantly higher than the post-test mean of the students taught by programmed instruction.

3. For those students studying elementary microeconomics by the conventional instruction method with the guidance of instructional objectives, the post-test mean on the teacher-made exam was higher than the post-test mean of the students using programmed instruction with the guidance of instructional objectives. However, the difference was not statistically significant.

9. For those students studying elementary microeconomics by the conventional instruction method without instructional objectives, the post-test mean on the teacher-made exam was higher than the post-test mean of the students using programmed instruction without objectives. However, the difference was not statistically significant.

10. Interaction between instructional objectives and instructional method, measured by the non-standardized teacher-made exam, was not statistically significant.

Conclusions

The results of this investigation concurred with the findings of several prior experiments conducted in related areas of instructional objectives and programmed instruction methodology in conjunction with the discipline of economics. The results from the TUCE test data corroborated the conclusions of Tieman and Nelson that the use of instructional objectives significantly increases student achievement in economic understanding measured by a national standardized test. The results from the teacher-made exam data substantiated the conclusions of Zeman and Wieder that the use of instructional objectives does not significantly increase student achievement in economic understanding measured by a non-standardized teacher-made exam even though the test items are matched to the objectives. In addition, this investigation also supported the findings of Attiyeh, Lumsden, and Bach that students learn as much economics studying with programmed instruction compared to conventional classroom instruction when the results are measured by a national standardized test.

An important implication of this investigation is that curricular offerings in the economics discipline should not continue to specialize in the conventional lecture-discussion instructional method. A variety of instructional modes should be offered to the economics student in addition to a variety of economics courses. The

student should be advised and encouraged to match instructional methodology to their preferential learning patterns. Tailor-made instruction may have a high marginal cost, but the marginal benefits gained in economic understanding may contribute to optimized economic literacy in our society, a long-standing national goal.

Recommendations

During the conduct of this study, many indications have arisen implying the need for further research. Experiments in innovative teaching by the classroom teacher should be encouraged despite the difficulties of attaining random selection of subjects and statistically working with intact groups. The research-minded educator learns more about subject matter, student learning patterns, and students by experimenting in the classroom whether the results are significant or not. Action research in the economics classroom can disclose a broader range and selection of instruction-related problems for a more formalized level of research in economic education.

The following recommendations for future research are offered:

1. Replication of this study should be made using another college setting in which a larger group of students could be engaged in the experiment. Furthermore, instructors other than the researcher should be incorporated into the design to minimize experimenter bias.
2. An instrument should be prepared and validated to reveal where and to what extent experimenter bias exists within an experiment. Such a control measure has been needed in the past and will continue to be needed in future research.

3. This researcher hopes that other economic educators will continue to build on, to strengthen, and to fill in the specification table structure of instructional objectives based on Bloom's cognitive hierarchy that provided a foundation for this research study.

4. Future experiments could be designed to discover the relationship between reading ability and achievement in economics. The research should cover the impact of reading ability on various student academic ability levels in conjunction with different instructional methods, such as programmed instruction.

5. Future experiments could compare how economic instructors, with and without an educational background, plan and prepare for classroom instruction in economics in institutions of higher learning. Do the instructors merely repeat the information in the textbook chapter? Do they talk "off the top of their head" extemporaneously, and "over the heads of their students" concerning the latest news item? How do the economic instructors select classroom activities and materials? How does planning affect their instructional performance and classroom behavior? This region of research should provide a clear rebuttal to continuing charges that economics is poorly taught and should furnish increased incentive for the continued improvement of economics instruction.

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APPENDIX A

INSTRUCTIONAL OBJECTIVES

Exhibit 1

INSTRUCTIONAL OBJECTIVES

SPECIFICATION CHART FOR INSTRUCTIONAL UNITS OF ECON 2303 (PRINCIPLES OF MICROECONOMICS)						
YOU, as a student, should be able to accomplish these objectives according to the criteria stipulated in the course grade you select as your objective this semester. The grade objectives and their criteria are as follows: A (90% accuracy), B (80% accuracy), C (70% accuracy), and D (60% accuracy).						
COURSE CONTENT	KNOWLEDGE (1.00)	COMPREHENSION (2.00)	APPLICATION (3.00)	ANALYSIS (4.00)	SYNTHESIS (5.00)	EVALUATION (6.00)
I. THE NATURE OF ECONOMIC PROBLEMS A. The Basic Economic Problem 1. Wants 2. Resources 3. Scarcity B. Production Possibilities 1. Allocation of Resources 2. Opportunity Cost C. Comparative Economic Systems 1. Basic 2. Contemporary	I. Given a list of economic terms used in this unit, match each term with the correct definition on a multiple choice test. (1.11) A. List the three basic economic needs or wants. (1.12) A. List the economic resources known as the factors of production. (1.12) A. Given a list of economic resources, classify the items into three categories: natural, human, or capital resources. (1.23) C. State the four questions each economic system	A. State the basic economic problem every society faces. (2.20) A. Explain the fundamental fact of scarcity in relation to the basic economic problem. (2.20) B. Given a production possibilities schedule, graph the alternative resource allocations. (2.12) B. Explain the shape of the production possibilities curve. (2.20) C. Distinguish between laissez faire capitalism and mixed capitalism. (2.20)	B. An allocation of resources changes in either direction on a given schedule of production possibilities, calculate the marginal gain and the marginal loss (or opportunity cost) for each of the decision points or alternatives represented. (3.00)	B. Given a production possibilities curve, analyze points located above, on, or below the frontier. (4.20) B. Given a production possibilities curve, illustrate on the graph the effect of economic growth and technological change on the allocation possibilities of (a) one product or (b) both products that are identified on the graph. (4.20) C. Given statements or vignettes describing various economic activities, identify the basic economic system under-	B. Use a production possibilities curve that illustrates the alternative allocations of resources to the production of capital goods and consumer goods to demonstrate how the choice of a current allocation affects future allocations. (5.10) C. After reading several newspaper articles on public goods versus private goods, formulate a proposal concerning the choices our nation should make in the allocation of scarce resources between the public and private sectors of our economy. (5.10)	B. Given for a fictitious country the available natural resources, the restraint of production capabilities and the identification of the people's expressed wants and needs, (a) evaluate possible alternative allocations of resources, (b) decide how the resources will be allocated to satisfy consumer wants, and (c) justify your choice of alternatives. (6.20) C. Using the two classifications of economic systems (basic and contemporary), compare and contrast the economies of two modern nations. Base your appraisal upon a collection of cur-

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COURSE CONTENT	KNOWLEDGE (1.00)	COMPREHENSION (2.00)	APPLICATION (3.00)	ANALYSIS (4.00)	SYNTHESIS (5.00)	EVALUATION (6.00)
PART I, continued	must answer.(1,12) C. Name the three basic classifications of economic systems. (1,12) D. Name three contemporary economic systems. (1,12) E. State the characteristics of capitalism as a market system. (1,23)			lying each situation. (4,10) F. Analyze the similarities and differences between the three basic economic systems (traditional, market, and command) by describing how each system answers the four basic questions. (4,10) G. Distinguish between the three contemporary economic systems (capitalism, socialism, and communism) by comparing them to the three basic economic systems (traditional, market, and command) and describing how each of the contemporary systems		rent news articles concerning two modern nations of your choice. (6,20)

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COURSE CONTENT	KNOWLEDGE (1.00)	COMPREHENSION (2.00)	APPLICATION (3.00)	ANALYSIS (4.00)	SYNTHESIS (5.00)	EVALUATION (6.00)
PART 1. continued				answers the four questions. (4.10)		
11. THE BASICS OF ECONOMIC ANALYSIS A. Demand for a Product 1. Law of Demand 2. Changes in QD 3. Demand Determinants 4. Shifts in Demand B. Supply of a Product 1. Law of Supply 2. Changes in QS 3. Supply Determinants 4. Shifts in Supply	11. Given a list of economic terms used in this unit, match each term with the correct definition on a multiple choice test. (1.11) A. State the Law of Demand. (1.12) A. List the five factors influencing consumer demand for goods and services. (1.12) A. State the cause for a change in quantity demanded. (1.12) B. State the Law of Supply. (1.12)	A. Explain the relationship between product price and purchase decision. (2.20) A. Explain why a demand curve is downward sloping. (2.20) A. Distinguish between the terms "demand" and "quantity demanded." (2.20) A. Given a demand schedule, graph a demand curve. (2.12) A. Explain the effect of a change in the price of a product on the demand for a substitute good or a complementary good. (2.30) B. Given a supply schedule, graph a supply curve. (2.12)	C. Given a graph of a supply curve and a demand curve, illustrate and explain the effects of an increase and a decrease in demand on price and quantity. (3.00) C. Given a graph of a supply curve and a demand curve, illustrate and explain the effects of an increase and a decrease in supply on price and quantity. (3.00) C. Given a graph of a supply curve and a demand curve, illustrate and explain the effect on quantity demanded and quantity supplied when government acts	A. Analyze the difference between (a) a price movement up and down a demand curve and (b) a demand shift. (4.10) B. Distinguish between (a) a movement along a supply curve and (b) a shift in the supply curve. (4.10) C. Discuss why price tends toward equilibrium in a free market. (4.10) C. Using demand and supply analysis, explain what happens when government interferes with the price	C. Discuss why some goods that are valuable cost so little, such as air. Illustrate your ideas with supply and demand curves for a free good. Explain why this relationship would change in the future if demand specified "clean air." (5.30) C. Devise a plan for gas rationing in our present day society. (5.20) C. Compare the market problems created by the adoption of subsidy (price support) programs and the institution of rationing (ceiling price programs.	C. Using supply and demand analysis, evaluate a series of current events and assess their effect on the market in terms of changes in demand, changes in supply, changes in quantity, and changes in price. (6.20) C. Given a newspaper article containing statements that support minimum wage legislation, use your knowledge of demand and supply to assess the truths and fallacies of the arguments. (6.10)

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COURSE CONTENT	KNOWLEDGE (1.00)	COMPREHENSION (2.00)	APPLICATION (3.00)	ANALYSIS (4.00)	SYNTHESIS (5.00)	EVALUATION (6.00)
PART II, continued C. Interaction of Supply and Demand 1. Market Equilibrium 2. Price Determination 3. Market Equilibrium	B. List the three basic problems that suppliers face in our economy. (1.12) B. Name the causes of changes in supply. (1.12) B. State the cause for a change in quantity supplied. (1.12) C. List a minimum of five criteria for rationing products in short supply when a price-ceiling system is adapted. (1.24)	B. State the relationship of prices to quantities producers are willing to sell. (2.20) C. Differentiate equilibrium price and market price. (2.20) C. Given supply and demand schedules for a product, graph the supply and demand curves and identify the equilibrium price and the equilibrium output. (2.12)	(a) a price (support price) which is above equilibrium or (b) a price (ceiling price) which is below equilibrium. (3.00) C. Given a graph of a supply curve and a demand curve, identify the conditions of surplus, shortage, and black market. (3.00) C. Illustrate graphically and explain the effect of a tax (a) on a supply curve, (b) on a demand curve, and (c) on equilibrium price. (3.00)	system (free market condition.) (4.20)	Formulate solutions for these problems. (5.30)	
III. THE THEORY OF CONSUMER CHOICE	III. Given a list of economic terms used in this unit, match each term with the	A. Explain what MU/\$ is and why it is computed. (2.12)	A. Given the product price and total utility for two products, compute (a) marginal utility	A. Construct a consumer's demand curve for a product using (1) the equal marginal	B. Using economic analysis, compare your views with the views of others concerning the	B. Given a situation involving the product price of two or more goods, the total utility de-

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COURSE CONTENT	KNOWLEDGE (1.00)	COMPREHENSION (2.00)	APPLICATION (3.00)	ANALYSIS (4.00)	SYNTHESIS (5.00)	EVALUATION (6.00)
PART III. continued A. Concept of Utility 1. Total Utility 2. Marginal Utility 3. Diminishing Marginal Utility B. Consumer Equilibrium 1. Budget Constraint 2. Equal Marginal Utility Principle	correct definition on a multiple choice test. (1.11) A. State the formula for marginal utility. (1.31) A. State the Law of Diminishing Marginal Utility. (1.12) A. Given a list of paired goods or services, classify each pair as substitutes or complements. (1.21) B. State the Equal Marginal Utility Principle. (1.12)	A. Explain the concepts of "utility" and "disutility." Give an example of each. (2.20)	(MU) and (b) marginal utility per dollar (MU/\$). (3.00) B. Impose a budget constraint on the data given in the objective above and compute the equilibrium position of the consumer. (3.00)	utility principle and (2) the diminishing marginal utility principle. (4.30) B. Analyze the decision relationship between allocation of income and equal marginal utility principle. (4.20) B. Analyze and discuss the diamond-water paradox. Integrate the concepts of marginal utility and total utility into your discussion. (4.20)	pros and cons of providing cash or food stamps to aid families receiving welfare assistance. Integrate the concepts of consumer and taxpayer utility derived from the allocation of resources to the welfare programs. Identify the moral, economic, and political issues involved in administering the welfare program today. (5.10)	rived from the consumption of the good, and the budget constraint of the consumer, evaluate the alternatives of consumption, and accept or reject each alternative in terms of utility maximization, and justify your decisions. (6.20)
IV. MEASURES OF RESPONSIVENESS A. Price Elasticity of	IV. Given a list of economic terms used in this unit, match each term with the	IV. Explain (a) price elasticity of demand, (b) cross elasticity of demand, (c) income elasticity of demand,	A. Given a demand schedule, calculate the total revenue and the elasticity coefficient E_d , and	A. After examining rate schedules advertised by the telephone company and an	A. Using economic analysis, discuss your views concerning the benefits and costs of	A. Given a case study concerning a proposed price change, accept or reject the proposed price

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COURSE CONTENT	KNOWLEDGE (1.00)	COMPREHENSION (2.00)	APPLICATION (3.00)	ANALYSIS (4.00)	SYNTHESIS (5.00)	EVALUATION (6.00)
PART IV, continued	correct definition on a multiple choice test. (1.11)	and (d) price elasticity of supply. (2.20)	Identify the character of demand as elastic, inelastic, or unitary elastic for each pair of points. (3.00)	airline company, explain how these producers use knowledge of price elasticity of demand. (4.20)	advertising, and analyze the purposes of advertising as it relates to the demand for a product and the price elasticity of demand. (5.10)	change, and justify your answer using price elasticity of demand as criteria. (6.20)
Demand						
1. Types						
2. Determinants						
3. Formula and Total Revenue Methods	A. State the formula for price elasticity of demand. (1.31)	A. Differentiate between elastic demand, inelastic demand, and unitary elastic demand. (2.20)	A. Identify price elasticity of demand for the following price-expenditure relationships: P&S; P&S; P&S; P&S. (3.00)	A. Graphically illustrate and compare the different slopes of demand and supply curves in relation to their elasticities and the effect of shifts on price/quantity equilibrium. (4.30)		IV. Evaluate current Washington policy concerning foreign importation of oil. Explain the conflict between income elastic demand and price inelastic demand for gasoline; then assess the chances for the success of the current policy. (6.20)
B. Cross Elasticity of Demand	A. List the characteristics of products that have elastic demand or inelastic demand. (1.23)	B. Explain the effect of a change in the price of a product on the demand for a substitute good or a complementary good. (2.30)	A. Classify demand as elastic, inelastic, or unitary elastic by using each of the following methods: (a) the total revenue method, (b) the ratio formula for price elasticity of demand, and (c) the factors that characterize price elasticity of demand. (3.00)	C. Given a list of consumer products classify each product as superior goods, inferior goods, or normal goods. (4.10)		
1. Elasticity Coefficient	B. State the formula for cross elasticity of demand. (1.31)	D. Distinguish between long-run elasticity and short-run elasticity. (2.20)				
C. Income Elasticity of Demand	C. State the formula for income elasticity of demand. (1.31)					
1. Elasticity Coefficient	D. State the formula for price elasticity of supply. (1.31)					
D. Price Elasticity of Supply						
1. Determinants						
2. Formula						

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COURSE CONTENT	KNOWLEDGE (1.00)	COMPREHENSION (2.00)	APPLICATION (3.00)	ANALYSIS (4.00)	SYNTHESIS (5.00)	EVALUATION (6.00)
PART IV, continued	D. List the characteristics of inputs that are classified as elastic supply or inelastic supply. (1.23)			IV. Given an elasticity coefficient, interpret and explain. (4.30)		
V. COSTS OF PRODUCTION A. The Production Function 1. The Firm 2. Economic Profit 3. Marginal Productivity 4. Law of Diminishing Returns B. Production Costs in the Short Run 1. Total Costs 2. Average Costs	V. Given a list of economic terms used in this unit, match each term with the correct definition on a multiple choice test. (1.11) A. State the Law of Diminishing Returns. (1.12) A. State the formulas for marginal product and average product. (1.31) B. State the formulas for total costs, average	A. Differentiate between the terms "average" and "marginal." (2.20) A. Give examples of fixed inputs, variable inputs, fixed costs, and variable costs as applied to the production function in the short run. (2.11) A. Given appropriate data, graph the following curves: average product (AP), marginal product (MP), marginal cost (MC), average total cost (ATC), average fixed cost (AFC), average variable cost (AVC),	A. Given data concerning units of input and corresponding output, calculate the following: average product, marginal product, total product, total revenue, marginal revenue, total costs, average total costs, fixed costs, average fixed costs, variable costs, average variable costs, marginal costs, and profit or loss. (3.00)	A. Given a graph of marginal product and average product, identify and label the three states of production. (4.10) A. After examining a production schedule, analyze the effect of the law of diminishing returns. (4.20) A. Using the same production schedule given in the objective above, identify the input that (a) signals the beginning of the	C. Formulate arguments to defend the statement: "prices (costs) tend to economize scarce resources." (5.10)	V. Given a news article concerning the rising costs of health care, assess the validity and effectiveness of the arguments concerning increasing production costs presented by the hospitals, the doctors, and the patients. (6.20)

SPECIFICATION CHART FOR INSTRUCTIONAL UNITS OF ECON 2303 (PRINCIPLES OF MICROECONOMICS)						
YOU, as a student, should be able to accomplish these objectives according to the criteria stipulated in the course grade you select as your objective this semester. The grade objectives and their criteria are as follows: A (90% accuracy), B (80% accuracy), C (70% accuracy), and D (60% accuracy).						
COURSE CONTENT	KNOWLEDGE (1.00)	COMPREHENSION (2.00)	APPLICATION (3.00)	ANALYSIS (4.00)	SYNTHESIS (5.00)	EVALUATION (6.00)
PART V. continued 3. Marginal Costs C. Production Costs in the Long Run 1. Variable Costs 2. Long-run Average Costs 3. Economies and Diseconomies of Scale	costs, and marginal cost. (1.31) C. List the reasons for economies and diseconomies of scale. (1.12) C. State the least cost solution for any given level of output. (1.31)	and marginal revenue (MR). (2.12)		law of diminishing returns, (b) produces a marginal product that is equal to the average product, and (c) enables the producer to maximize profits. (4.10) B. Describe the interrelationship of the various cost concepts: (a) Why does the AFC curve fall continuously? (b) Why are the AVC and the ATC curves U-shaped? (c) Why does the lowest point on the ATC curve occur at a larger output than the lowest point on the AVC curve? (d) Why does the MC curve pass through the lowest points on		

SPECIFICATION CHART FOR INSTRUCTIONAL UNITS OF ECON 2303 (PRINCIPLES OF MICROECONOMICS)						
YOU, as a student, should be able to accomplish these objectives according to the criteria stipulated in the course grade you select as your objective this semester. The grade objectives and their criteria are as follows: A (90% accuracy), B (80% accuracy), C (70% accuracy), and D (60% accuracy).						
COURSE CONTENT	KNOWLEDGE (1.00)	COMPREHENSION (2.00)	APPLICATION (3.00)	ANALYSIS (4.00)	SYNTHESIS (5.00)	EVALUATION (6.00)
PART V. continued				both the AVC and the ATC curves? (4.20) C. Explain why there are no fixed costs in the long run. (4.20) C. Discuss the relationship of economies and diseconomies of scale to the shape of the long-run average cost curve. (4.20)		
VI. PERFECT COMPETITION A. Characteristics B. Short-Run Equilibrium 1. Derive Firm Demand Curve	VI. Given a list of economic terms used in this unit, match each term with the correct definition on a multiple choice test. (1.11)	A. Give an example of the kind of firm or industry that might be classified as perfectly competitive. (2.11) B. Given appropriate data, (a) graph average total cost (ATC), marginal cost (MC),	B. Given data concerning output, total cost, and product price, calculate the following: (a) total revenue, (b) average revenue, (c) marginal revenue, (d) marginal cost, (e) profit or loss,	B. Explain why the demand curve of the perfectly competitive firm is perfectly elastic. (4.20) B. Explain why marginal revenue is the same as average revenue in	B. Suppose a student is given the option of taking or NOT taking the final examination for a course, construct a plan that will enable the student to make the optimal decision. (5.20)	B. Given a case study describing management output decisions, evaluate those decisions by applying your knowledge of marginal analysis. (6.20)

SPECIFICATION CHART FOR INSTRUCTIONAL UNITS OF ECON 2303 (PRINCIPLES OF MICROECONOMICS)						
YOU, as a student, should be able to accomplish these objectives according to the criteria stipulated in the course grade you select as your objective this semester. The grade objectives and their criteria are as follows: A (90% accuracy), B (80% accuracy), C (70% accuracy), and D (60% accuracy).						
COURSE CONTENT	KNOWLEDGE (1.00)	COMPREHENSION (2.00)	APPLICATION (3.00)	ANALYSIS (4.00)	SYNTHESIS (5.00)	EVALUATION (6.00)
PART VI. continued 2. Derive Firm Supply Curve 3. Price and Output Decisions a. Profit Maximization b. Loss Minimization C. Long-Run Industry Supply 1. Constant-Cost Industries 2. Increasing-Cost Industries 3. Decreasing-Cost Industries	A. List the characteristics of pure or perfect competition. (1.12) B. State the formulas for calculating the following: (a) total revenue, (b) average revenue, (c) marginal revenue, (d) profit or loss, (e) profit maximization (1.11) B. State the profit-maximizing rule. (1.12) B. State the loss-minimizing rule. (1.12) C. List the characteristics of (a) constant-cost industries, and	average variable cost (AVC), and average fixed cost (AFC), and (b) label each curve. (2.12) C. Discuss the factors that influence the movement of firms into and out of an industry over the short run and the long run. (2.20) C. Explain the difference between the short-run market supply curve and the short-run supply curve of the firm. (2.20)	(f) average total cost. (3.00) B. Given a graph of revenue and cost data for a firm in perfect competition, identify and label the output quantity and the price of the product. (3.00)	pure competition. (4.20) B. Derive the supply curve for a perfectly competitive firm. (4.20) B. Given average costs, marginal cost, and marginal revenue for a firm in perfect competition, (1) graph the data, and (2) identify and label the following relationships: (a) shutdown point, (b) breakeven point, (c) profit maximization area, and (d) loss minimization area. (4.10) B. Explain the relationship: $P=AR=MR=D$. (4.20)		

SPECIFICATION CHART FOR INSTRUCTIONAL UNITS OF ECON 2303 (PRINCIPLES OF MICROECONOMICS)						
YOU, as a student, should be able to accomplish these objectives according to the criteria stipulated in the course grade you select as your objective this semester. The grade objectives and their criteria are as follows: A (90% accuracy), B (80% accuracy), C (70% accuracy), and D (60% accuracy).						
COURSE CONTENT	KNOWLEDGE (1.00)	COMPREHENSION (2.00)	APPLICATION (3.00)	ANALYSIS (4.00)	SYNTHESIS (5.00)	EVALUATION (6.00)
PART VI, continued	(b) increasing-cost industries, and (c) decreasing-cost industries. (1,12)			B. Graphically illustrate and compare the firm supply and demand curves with the market supply and demand curves. (4,20) B. Explain why a businessman would prefer to operate under conditions where $MC = MR$ rather than $MR > MC$ or $MR < MC$. (4,20) B. Using a graph, develop three models for a perfectly competitive firm. The models will illustrate the firm (a) maximizing profits, (b) earning zero economic profits, and (c) minimizing losses. (4,20)		

SPECIFICATION CHART FOR INSTRUCTIONAL UNITS OF ECON 2303 (PRINCIPLES OF MICROECONOMICS)						
YOU, as a student, should be able to accomplish these objectives according to the criteria stipulated in the course grade you select as your objective this semester. The grade objectives and their criteria are as follows: A (90% accuracy), B (80% accuracy), C (70% accuracy), and D (60% accuracy).						
COURSE CONTENT	KNOWLEDGE (1.00)	COMPREHENSION (2.00)	APPLICATION (3.00)	ANALYSIS (4.00)	SYNTHESIS (5.00)	EVALUATION (6.00)
PART VI. continued				C. Distinguish between the positions indicating long-run equilibrium and short-run equilibrium. (4.10) C. Explain how industries' output or supply is determined in both the short-run and the long-run. (4.20)		
VII. MONOPOLY A. Characteristics B. The Monopoly Model 1. The Demand Curve 2. Marginal Revenue 3. Price and	VII. Given a list of economic terms used in this unit, match each term with the correct definition on a multiple choice test. (1.11) A. List the characteristics of a monopoly. (1.12)	A. Give two examples of firms that can be classified as monopolies. (2.11) B. Given appropriate data concerning a monopolistic firm, graph AR, MR, MC and ATC. (2.12) B. Explain why demand in monopoly is generally	B. Construct an average revenue curve and the related marginal revenue curve. (3.00) B. Given a graph of revenue and cost curves for a monopoly, identify and label the output quantity and the price. (3.00)	B. Given revenue and cost data, graphically illustrate and compare (a) monopolistic equilibrium price and quantity output, (b) area of profit, and (c) area of total cost at both the profit-maximizing level and the	C. Propose a plan whereby governmental regulating agencies could decide what price a public utility be allowed to charge. (5.10)	C. Draw up criteria to evaluate the economic benefits and costs to society of monopolistic practices. (6.20)

SPECIFICATION CHART FOR INSTRUCTIONAL UNITS OF ECON 2303 (PRINCIPLES OF MICROECONOMICS)						
YOU, as a student, should be able to accomplish these objectives according to the criteria stipulated in the course grade you select as your objective this semester. The grade objectives and their criteria are as follows: A (90% accuracy), B (80% accuracy), C (70% accuracy), and D (60% accuracy).						
COURSE CONTENT	KNOWLEDGE (1.00)	COMPREHENSION (2.00)	APPLICATION (3.00)	ANALYSIS (4.00)	SYNTHESIS (5.00)	EVALUATION (6.00)
PART VII. continued Output Decision C. Criticisms 1. Resource Allocation 2. Price Discrimination 3. Alternatives to Profit Maximization 4. Regulation of Public Utilities	A. List barriers to entry into an industry that support monopolies. (1.12)	Inelastic. (2.10) B. Explain why marginal revenue is less than average revenue for a monopolist. (2.30)		socially-optimizing level. (4.10) B. Explain and illustrate why the marginal cost curve of a monopolist is not the same as the supply curve. (4.20) B. Explain and illustrate the relationship: $PMR = MC$. (4.20) B. Discuss and illustrate graphically how the monopolist will determine how much to produce and how to maximize profits. (4.20) B. Using a graph, develop three models for a monopolistic firm. Illustrate the		

SPECIFICATION CHART FOR INSTRUCTIONAL UNITS OF ECON 2303 (PRINCIPLES OF MICROECONOMICS)						
YOU, as a student, should be able to accomplish these objectives according to the criteria stipulated in the course grade you select as your objective this semester. The grade objectives and their criteria are as follows: A (90% accuracy), B (80% accuracy), C (70% accuracy), and D (60% accuracy).						
COURSE CONTENT	KNOWLEDGE (1.00)	COMPREHENSION (2.00)	APPLICATION (3.00)	ANALYSIS (4.00)	SYNTHESIS (5.00)	EVALUATION (6.00)
PART VII. continued				price and output decisions for the firm that result in (a) maximizing profits, (b) earning zero economic profits, and (c) minimizing losses. (4.20) C. Discuss the charge of misallocation of resources by a monopoly in terms of price, output, MC, MR, AR, and ATC. (4.20) C. Explain and discuss the practice of price discrimination. (4.20) C. Using a graph, develop a model for a monopolistic firm that illustrates a price and output decision that is an		

SPECIFICATION CHART FOR INSTRUCTIONAL UNITS OF ECON 2303 (PRINCIPLES OF MICROECONOMICS)						
YOU, as a student, should be able to accomplish these objectives according to the criteria stipulated in the course grade you select as your objective this semester. The grade objectives and their criteria are as follows: A (90% accuracy), B (80% accuracy), C (70% accuracy), and D (60% accuracy).						
COURSE CONTENT	KNOWLEDGE (1.00)	COMPREHENSION (2.00)	APPLICATION (3.00)	ANALYSIS (4.00)	SYNTHESIS (5.00)	EVALUATION (6.00)
PART VII. continued				alternative to profit-maximization. (4.20) C. Discuss the following methods of regulating monopolies and the problems involved: (a) cost-of-service regulation, and (b) controlling the rate of return on investment. (4.10)		
VIII. OTHER MARKET STRUCTURES A. Monopolistic Competition 1. Characteristics 2. The Model a. Marginal Revenue b. Price and Output	VIII. Given a list of economic terms used in this unit, match each term with the correct definition on a multiple choice test. (1.11) A. List the characteristics of monopolistic competition. (1.12)	A. Give two examples of the kind of firm or industry that might be classified as imperfectly competitive firms. (2.11) A. Given appropriate data concerning a firm operating under imperfect competition, graph AR, MR, MC, and ATC. (2.12)	A. Given a graph of a firm under monopolistic competition, identify and label the output quantity and the price. (3.00) B. Construct a graphic model for oligopoly. (3.00)	A. Explain, and illustrate graphically, how price and output are determined in firms operating under monopolistic competition. (4.20) A. Explain why the marginal revenue curve is less than average	VIII. Construct and compare long-run and short-run equilibrium models for (a) pure competition, (b) monopolistic competition, (c) oligopoly, and (d) monopoly. (5.20)	VIII. Evaluate why any economy tolerates firms that are not perfectly competitive. State your conclusions. (6.20) C. After reading a case study of an antitrust suit, critically appraise the judicial arguments presented by

SPECIFICATION CHART FOR INSTRUCTIONAL UNITS OF ECON 2303 (PRINCIPLES OF MICROECONOMICS)						
YOU, as a student, should be able to accomplish these objectives according to the criteria stipulated in the course grade you select as your objective this semester. The grade objectives and their criteria are as follows: A (90% accuracy), B (80% accuracy), C (70% accuracy), and D (60% accuracy).						
COURSE CONTENT	KNOWLEDGE (1.00)	COMPREHENSION (2.00)	APPLICATION (3.00)	ANALYSIS (4.00)	SYNTHESIS (5.00)	EVALUATION (6.00)
PART VIII. continued	A. State two primary purposes of advertising. (1.12)	A. Explain why demand in monopolistic competition is relatively elastic. (2.20)		revenue in imperfect competition. (4.20)		the majority and the minority opinions. (6.20)
3. Product Differentiation	B. List the characteristics of oligopoly. (1.12)	A. Identify the ways in which a firm can differentiate their product. (2.20)		A. Explain why the demand curve of an imperfectly competitive firm is <i>not perfectly</i> elastic. (4.20)		
a. Advertising	C. State two major purposes of government regulation of business. (1.12)	A. Discuss the effect of advertising on the price of a product. (2.30)		A. Discuss the arguments for and against advertising. (4.20)		
B. Oligopoly		B. Give two examples of firms or industries that might be classified as oligopolies. (2.11)		B. Explain the conditions that lead to oligopoly. (4.10)		
1. Characterization		B. Explain the purpose of the cartel and explain why it is illegal in the USA. (2.20)		B. Illustrate graphically and interpret the kinked demand curve and the marginal revenue gap. (4.20)		
2. The Oligopoly Model		B. Identify the conditions that contribute to the breakup of cartels and collusion. (2.20)		B. Explain $P > MC$. (4.20)		
a. Price and Output						
b. Kinked Demand						
c. Marginal Revenue Gap						
3. Interdependence						
a. Price Leadership						
b. Cartels						

SPECIFICATION CHART FOR INSTRUCTIONAL UNITS OF ECON 2303 (PRINCIPLES OF MICROECONOMICS)						
YOU, as a student, should be able to accomplish these objectives according to the criteria stipulated in the course grade you select as your objective this semester. The grade objectives and their criteria are as follows: A (90% accuracy), B (80% accuracy), C (70% accuracy), and D (60% accuracy).						
COURSE CONTENT	KNOWLEDGE (1.00)	COMPREHENSION (2.00)	APPLICATION (3.00)	ANALYSIS (4.00)	SYNTHESIS (5.00)	EVALUATION (6.00)
PART VIII. continued C. Antitrust Legislation 1. Sherman Antitrust Act a. Rule of Reason 2. Clayton Antitrust Act 3. Celler-Kefauver Anti-Merger Act		C. Discuss the major antitrust acts in operation today: the Sherman Act, the Clayton Act, and the Celler-Kefauver Act. (2.20)		B. Explain why interdependence of firms and collusion are significant characteristics of oligopoly. (4.20) B. Explain why prices are relatively stable in oligopolies over a period of time. (4.20) B. Compare graphically the marginal revenue curve, the average revenue curve, and the demand curve faced by a monopoly, an oligopoly, a monopolistic competitor, and a perfect competitor. (4.10)		

SPECIFICATION CHART FOR INSTRUCTIONAL UNITS OF ECON 2303 (PRINCIPLES OF MICROECONOMICS)						
YOU, as a student, should be able to accomplish these objectives according to the criteria stipulated in the course grade you select as your objective this semester. The grade objectives and their criteria are as follows: A (90% accuracy), B (80% accuracy), C (70% accuracy), and D (60% accuracy).						
COURSE CONTENT	KNOWLEDGE (1.00)	COMPREHENSION (2.00)	APPLICATION (3.00)	ANALYSIS (4.00)	SYNTHESIS (5.00)	EVALUATION (6.00)
IX. THE LABOR MARKET A. Perfectly Competitive Labor Market Model 1. Derived Demand 2. Supply of Labor 3. Labor Market Equilibrium B. Market Imperfections 1. Monopony 2. Bilateral Monopoly C. Labor Unions	IX. Given a list of terms used in this unit, match the term to the correct definition on a multiple-choice test. (1,11) A. List the formulas for MPP, VMP, MRP, and MFC. (1,30) A. State the marginal productivity theory of factor demand. (1,12) A. State the profit-maximizing rule for hiring and firing labor. (1,30)	A. Discuss the causes of shifts in the labor factor demand curve. (2,20) A. Explain the derived demand for labor. (2,20) A. Differentiate marginal physical product (MPP) from marginal revenue product (MRP). (2,20) A. Differentiate marginal revenue product (MRP) from marginal factor cost (MFC). (2,20) B. Discuss monopsonistic exploitation. (2,20) C. Explain the economic goals of labor unions. (2,20)	A. Given units of labor, total output, and product price, calculate MPP, VMP, MRP, and MFC. (3,00) A. Given the supply and demand curves for a hypothetical labor market, illustrate how wages and employment are determined. (3,00)	A. Given the supply and demand curves for a perfectly competitive labor market, and given the labor demand curve of a firm operating in the market, describe the supply curve of labor faced by the individual firm, and illustrate graphically how much labor the firm will employ. (4,20) B. Use a graph to compare perfect competition and monopony in the labor market. (4,20) B. Use a graph to illustrate a bilateral monopoly in the labor market. (4,20)	A. Formulate guidelines concerning decisions to hire or fire employees if you owned and operated a business firm. (5,10)	IX. Compare and assess the labor markets for an unskilled worker, a plumber, and a professional football player. (6,20)

SPECIFICATION CHART FOR INSTRUCTIONAL UNITS OF ECON 2303 (PRINCIPLES OF MICROECONOMICS)						
YOU, as a student, should be able to accomplish these objectives according to the criteria stipulated in the course grade you select as your objective this semester. The grade objectives and their criteria are as follows: A (90% accuracy), B (80% accuracy), C (70% accuracy), and D (60% accuracy).						
COURSE CONTENT	KNOWLEDGE (1.00)	COMPREHENSION (2.00)	APPLICATION (3.00)	ANALYSIS (4.00)	SYNTHESIS (5.00)	EVALUATION (6.00)
PART IX, continued				B. Describe and illustrate graphically the effect of a higher-than-equilibrium wage rate. (4.20) B. Use the marginal productivity theory to explain and to assess the economic impact of the minimum wage on the labor market. (4.30)		

APPENDIX B

DATA COLLECTION FORMS

Exhibit 2

STUDENT INFORMATION RELEASE SLIP

(student name)
(social security number)

TO: OFFICE OF ADMISSIONS AND RECORDS
Oscar Rose Junior College

Permission is hereby granted to the researcher to request data from my
academic records in your office for the purpose of gathering data for
educational research only.

Date_____

Signed_____

Student's Signature

Exhibit 3

STUDENT QUESTIONNAIRE

Key Number _____ ECON 2303 Date _____

The purpose of this questionnaire is to gather data for educational research which is being conducted at Oscar Rose Junior College during the 1982 Spring Semester. If you will allow the data from this questionnaire to be used for this doctoral study and if you will grant permission for your academic records in the Office of Admissions and Records to be used, please sign your name on the permission form which is attached.

Be assured that names or social security numbers will not be published in this research report. Names and numbers are needed for statistical identification purposes only which are preparatory to writing the research report.

Please fill in the data requested as completely as possible. Your cooperation and participation in this doctoral study is appreciated.

Name (Last, First, Initial) _____ Social Security Number _____

Major Area of Study _____

_____ Have you taken the American College Test (ACT) for college admissions?

_____ Have you taken a reading test here at ORJC?

_____ Have you ever attended another college or university?

_____ What is the approximate number of total college credit hours that you have completed?

_____ How many credit hours of Economics have you completed before enrolling in this course?

Please indicate which Economics course(s):

Why did you enroll in this particular section of ECON 2303?

Exhibit 4

POST-COURSE

PROGC

STUDENT QUESTIONNAIRE

Key Number _____

ECON 2303

Date _____

NAME: _____

(Last, First, Initial)

The following questions relate to your study of Economics I (Micro).

Class Attendance (Check one)

- _____ Never missed a session.
- _____ Missed less than four sessions.
- _____ Missed more than three sessions.

Use of Programmed Textbook (Check one)

- _____ Studied each chapter thoroughly.
- _____ Read most of each chapter.
- _____ Used the text very little.
- _____ Did not use the text.

Value of Programmed Textbook (Check one)

- _____ The programmed textbook was very helpful.
- _____ The programmed textbook was of some help.
- _____ The programmed textbook was generally not helpful.
- _____ The programmed textbook was confusing.

Answer Yes or No to each of the following questions.

- _____ Would you like to see programmed textbooks used in other courses?
- _____ Would you like to see individualized instruction or the self-paced method used in other courses?
- _____ Would you enroll in another course taught in the same manner as this course?
- _____ Did you know that instructional objectives were being used in other economics courses?
- _____ Would you use instructional objectives if they were made available to you?

ADDITIONAL COMMENTS:

Exhibit 5

POST-COURSE

PROGX

STUDENT QUESTIONNAIRE

Key Number _____

ECON 2303

Date _____

NAME: _____

(Last, First, Initial)

The following questions relate to your study of Economics I (Micro).

Class Attendance (Check one)

- _____ Never missed a session.
- _____ Missed less than four sessions.
- _____ Missed more than three sessions.

Use of Programmed Textbook (Check one)

- _____ Studied each chapter thoroughly.
- _____ Read most of each chapter.
- _____ Used the text very little.
- _____ Did not use the text.

Value of Programmed Textbook (Check one)

- _____ The programmed textbook was very helpful.
- _____ The programmed textbook was of some help.
- _____ The programmed textbook was generally not helpful.
- _____ The programmed textbook was confusing.

Use of Instructional Objectives (Check one)

- _____ Worked through every objective.
- _____ Worked through most of the objectives.
- _____ Worked through only a few of the objectives.
- _____ Did not use the objectives.

Value of Instructional Objectives (Check one)

- _____ The objectives were very helpful.
- _____ The objectives were of some help.
- _____ The objectives were generally not helpful.
- _____ The objectives were a waste of time.

Answer Yes or No to each of the following questions.

PROGX-2

- _____ Would you like to see programmed textbooks used
in other courses?
- _____ Would you like to see instructional objectives used
in other courses?
- _____ Would you like to see individualized instruction or
the self-paced method used in other courses?
- _____ Would you enroll in another course taught in the same
manner as this course?

ANY ADDITIONAL COMMENTS?

Exhibit 6

POST-COURSE

CONVC

STUDENT QUESTIONNAIRE

Key Number _____

ECON 2303

Date _____

NAME: _____
(Last, First, Initial)

The following questions relate to your study of Economics I (Micro).

Class Attendance (Check one)

- _____ Never missed a session.
- _____ Missed less than four sessions.
- _____ Missed more than three sessions.

Use of Textbook (Check one)

- _____ Studied each chapter thoroughly.
- _____ Read most of each chapter.
- _____ Used the text very little.
- _____ Did not use the text.

Value of Textbook (Check one)

- _____ The textbook was very helpful.
- _____ The textbook was of some help.
- _____ The textbook was generally not helpful.
- _____ The textbook was confusing.

Answer Yes or No to each of the following questions.

- _____ Would you enroll in another course taught in the same manner as this course?
- _____ Did you know that instructional objectives were being used in other economics courses?
- _____ Would you use instructional objectives if they were made available to you?
- _____ Would you enroll in a course taught by individualized instruction or the self-paced method?

ANY ADDITIONAL COMMENTS:

Exhibit 7

POST-COURSE

CONVX

STUDENT QUESTIONNAIRE

Key Number _____

ECON 2303

Date _____

NAME: _____
(Last, First, Initial)

The following questions relate to your study of Economics I (Micro).

Class Attendance (Check one)

- ☐ Never missed a session.
- ☐ Missed less than four sessions.
- ☐ Missed more than three sessions.

Use of Textbook (Check one)

- ☐ Studied each chapter thoroughly.
- ☐ Read most of each chapter.
- ☐ Used the text very little.
- ☐ Did not use the text.

Value of Textbook (Check one)

- ☐ The textbook was very helpful.
- ☐ The textbook was of some help.
- ☐ The textbook was generally not helpful.
- ☐ The textbook was confusing.

Use of Instructional Objectives (Check one)

- ☐ Worked through every objective.
- ☐ Worked through most of the objectives.
- ☐ Worked through only a few of the objectives.
- ☐ Did not use the objectives.

Value of Instructional Objectives (Check one)

- ☐ The objectives were very helpful.
- ☐ The objectives were of some help.
- ☐ The objectives were generally not helpful.
- ☐ The objectives were a waste of time.

Answer Yes or No to each of the following questions.

CONVX-2

- _____ Would you enroll in another course taught in the same manner as this course?
- _____ Would you like to see instructional objectives used in other economics courses?
- _____ Would you use instructional objectives in other courses if they were made available to you?
- _____ Would you enroll in a course taught by individualized instruction or the self-paced method?

ANY ADDITIONAL COMMENTS:

Exhibit 8

C L A S S R O O M V I S I T
BY FACULTY MEMBER
To Control For Experimenter Bias

Class Time and Day:_____ Date:_____

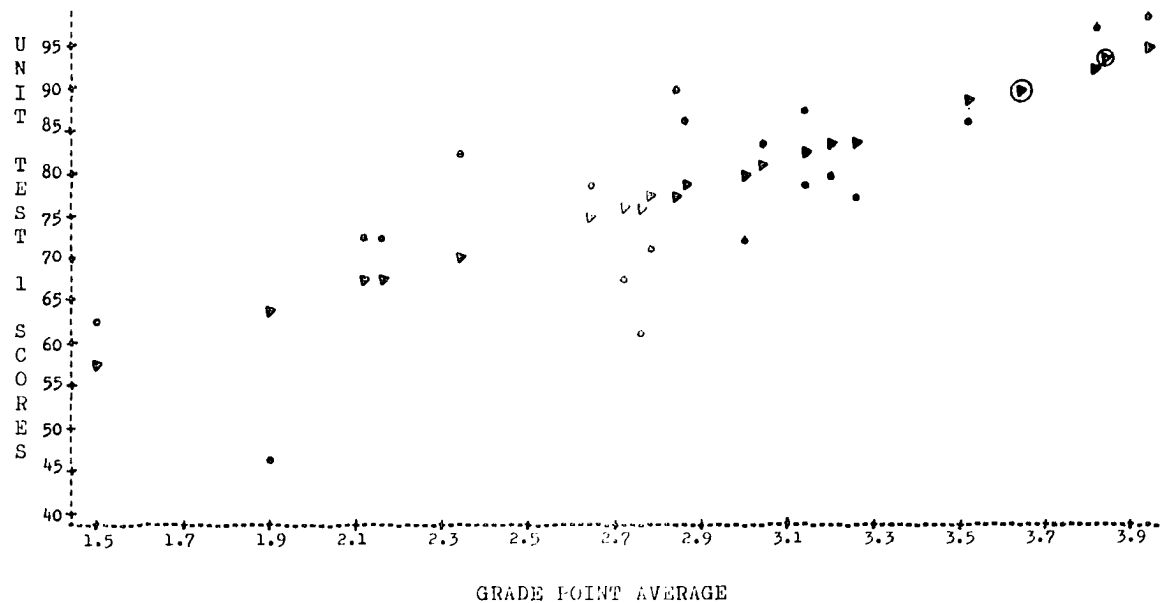
1. Comment on the instructor's clarity in
 - a. Exposition:
 - b. Questioning of students:
 - c. Responding to student questions:
2. Did the students seem involved in the learning process?
How was this involvement manifested?
3. What impressed you most about this class?
4. Every instructor has a characteristic manner toward his students. Try to describe this attitude as you perceived it during this specific classroom visitation.
5. Did you notice any difference in teacher attitude toward students among the classes?
6. Do you have any additional observations to offer?

APPENDIX C

GRAPHS

Actual and Predicted Unit Test 1 Scores for the CONV C Group

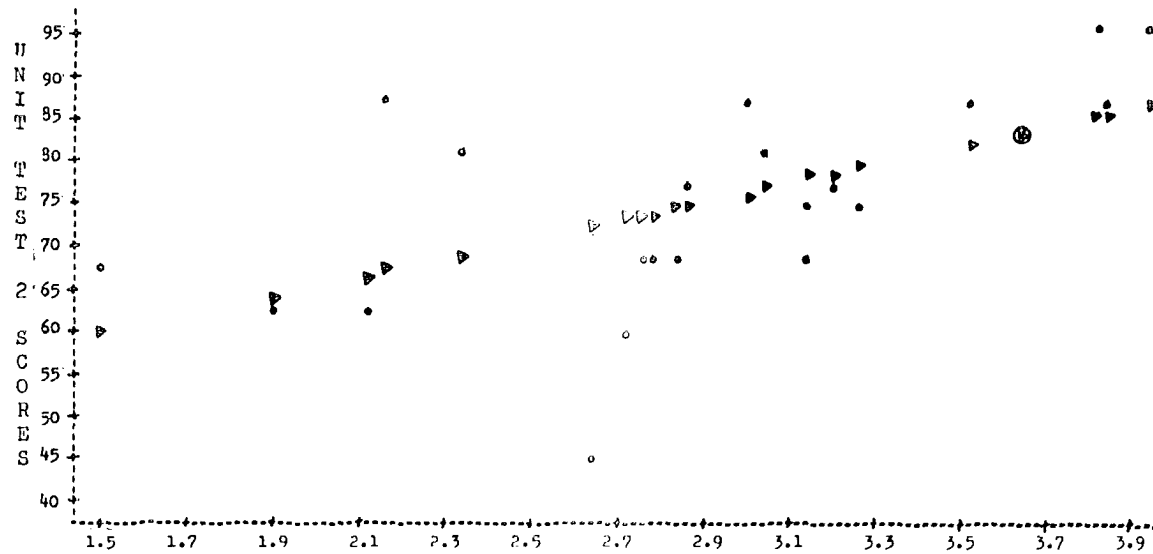
Legend: • = 1 Actual Unit Test 1 Score
 ▶ = 1 Predicted Unit Test 1 Score
 ○ = 1 Duplicate Score



Graph 21.

Actual and Predicted Unit Test 2 Scores for the CONVC Group

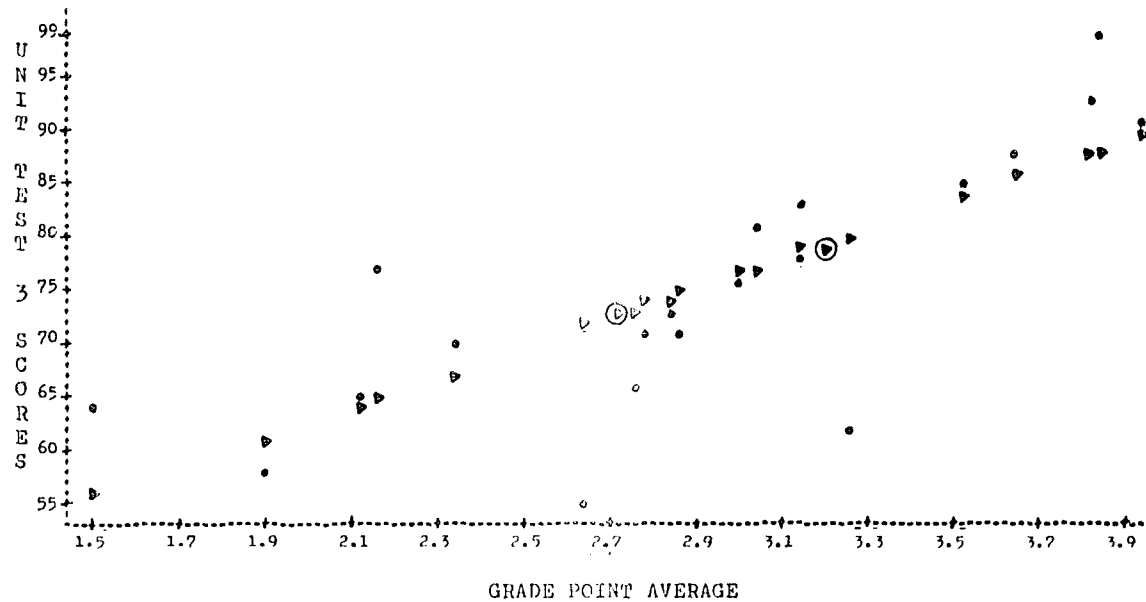
Legend: • = 1 Actual Unit Test 2 Score
 ▲ = 1 Predicted Unit Test 2 Score
 ○ = 1 Duplicate Score



Graph 22

Actual and Predicted Unit Test 3 Scores for the COMVC Group

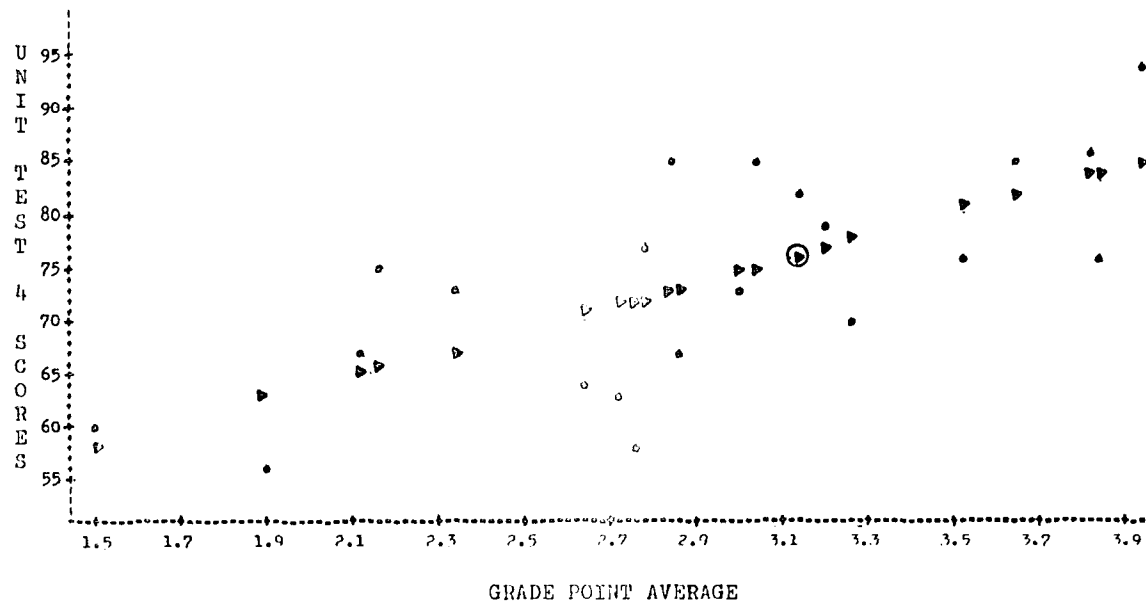
Legend: • = 1 Actual Unit Test 3 Score
 ▲ = 1 Predicted Unit Test 3 Score
 ○ = 1 Duplicate Score



Graph 23

Actual and Predicted Unit Test 4 Scores for the CONVC Group

Legend: * = 1 Actual Unit Test 4 Score
 ▼ = 1 Predicted Unit Test 4 Score
 ○ = 1 Duplicate Score



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Graph 24