THE MASTERY LEARNING AND CONVENTIONAL MODES OF INSTRUCTING COLLEGE-LEVEL COMPOSITION: A COMPARATIVE STUDY BASED UPON SELECTED STUDENT CHARACTERISTICS

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in partial fulfillment of the requirements
for the Degree of
DOCTOR OF EDUCATION
May, 1975

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ACKNOWLEDGMENTS

The author wishes to express his appreciation to Dr. Richard M. Robl, who served as his major thesis advisor; appreciation is also expressed to Dr. Thomas A. Karman, Dr. William D. Warde, and Dr. J. Kenneth St. Clair, who served as his advisory committee and offered assistance throughout the study.

The author is also indebted to the administrators, teachers, and students of the English Department who gave of their time and effort to help with the study. In particular, gratitude is extended to Mr. Stephen P. Witte, Director of the Experimental English Composition Program, and Mr. Jack D. Campbell, Director of English Composition.

Finally, the author wishes to express his appreciation to Mrs. Anne S. Davis, who served as his statistical consultant.

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CHAPTER I

INTRODUCTION

Within institutions of higher learning there appears to be a growing concern that students be viewed and treated as unique individuals with different needs, abilities, and interests. This concern is manifest in many institutional areas: the proliferation of degree titles and course topics, the swelling proportion of electives to required courses, and the expanding diversity of student services. This concern is also affecting the instructional process as evidenced by the number of "new" approaches designed and implemented an an attempt to individualize instruction: "Mastery Learning," "Individually Prescribed Instruction," "Individually Paced Instruction," "Instruction by Guided Design," and the "Keller Plan," to name but a few. These programs have a common intent of either supplanting or offering an alternative to the traditional fixed-time, group based, lecture-discussion methods which characterize what might be called the "conventional" mode of instruction. Supporters of these programs have made claims as to the efficiency and effectiveness of these modes in facilitating the learning of students.[1] However, these statements frequently have been made on the basis of conceptual analyses rather than on research findings. Institutions of higher learning are currently expending considerable amounts of time, effort, and materials to develop, implement, and maintain one or more of these "new"

approaches to instruction--expending resources which at the present time are quite limited. This, of course, prompts the question of whether these resources are being wisely spent.

Background and Need for the Study

In 1963, Wilbert J. McKeachie observed that

> Experienced teachers have felt for years that no one teaching method succeeds with all kinds of students. One reason for the host of experimental comparisons resulting in non-significant differences may be simply that methods optimal for some students are detrimental to the achievement of others. When mean scores are compared, one method thus seems to be no different in its effect from any other.[2]

McKeachie's comment was directed at the considerable number of research studies which inter-compared the lecture, discussion, recitation, and inquiry methods (or modes) of instruction, small class size and large size class, homogeneous grouping and heterogeneous grouping, and other various possibilities. Currently, these issues seem to have lost favor as research topics and have been replaced by inter-comparisons among the methods of individually paced instruction, mastery learning, instruction by guided design, and the "conventional" mode of instruction. All results are not yet in, but one wonders if the conclusions will not be the same as in the past--"no significant difference has been found."[3]

For another reason, however, one must question the appropriateness of such mode of instruction comparisons. Typically, an institution of learning does not implement one of these "new" modes of instruction by replacing all others; rather, it serves as an alternative instructional method to one or more co-existing methods. Thus, the question of which mode is more effective is perhaps of only tangential interest when

compared with the question of what "kind" of student succeeds and/or fails in each mode: for could it not be that the student who succeeds in one mode will fail in another? This question leads to a matter which should be of direct institutional concern, namely, the differential placement of students among alternative modes of instruction. Presumably owing to the inadequacy of research findings on this topic, institutions have been forced to offer these alternative instructional programs under a rather laissez-faire enrollment policy with placement left in the hands of the student.

It is apparent that all these issues hark back to McKeachie's statement that one teaching method does not succeed with all students. This statement not only suggests a possible reason for the multitude of educational research findings of no significant difference, but it also implies the very reason for the existence of more than one mode of instruction. In so doing, the statement indicates where research should begin: it should begin with the student, not with the mode of instruction; that is, the student should be the primary focus for investigating the efficacy of instruction.

Statement of the Problem

The present study sought to determine if, on the basis of select personological variables, different "kinds" of students achieved different levels of "success" in two apparently different modes of instruction.

The two modes selected for analysis were the mastery learning and "conventional" methods of instruction. The subject matter under consideration was Freshman English composition. The level of "success"

was defined by gain scores along an achievement dimension and/or attitude dimension.

Thus, the study sought to identify some of the personological variables exhibited by "successful" and "non-successful" students in the mastery learning mode of instruction, and also several such variables exhibited by "successful" and "non-successful" students in the "conventional" mode of instruction. When identified, these variables were compared across the modes to determine if different "kinds" of students were more or less "successful" in one or the other mode of instruction.

Using simple univariate statistical procedures, the study was also designed to determine if either of the two modes was significantly more "successful" than the other mode. "Success" in this case was defined by the pooled gain scores (along achievement and attitudinal dimensions) of all students enrolled under the particular mode.[4]

Purpose of the Study

The purpose of the study was threefold: (1) to investigate the validity of the research methodology which has sought to compare methods of instruction through the application of simple univariate statistical procedures; (2) to contribute to the development of the theoretical position which contends that students of different abilities, needs, preferences, and attitudes should be differentially instructed on the basis of these characteristics; and, (3) to yield information which may be used to counsel and guide students in their selection among alternative modes of instruction.

Through this last assertion, one sees that a major intent of the

present study was to provide information which could be put to practical use. This influenced the design of the study by affecting both the selection of modes to be studied and the selection of personological variables to be investigated. That is, because the "conventional" mode was the usual alternative to the "new" methods of individualizing instruction and because mastery learning is basic to most of these approaches, the mastery learning and "conventional" methods were those chosen for analysis.[5] Furthermore, while a review of the literature and the conceptual approach to the study indicated which personological variables should be studied, final selection was influenced by the additional constraint that knowledge of the variables was, or could be made, readily available to student advisors.

Discussion and Definition of Selected Terms

The definitions of selected terms for this study are listed below. Since certain key definitions acted to limit and guide the study and thus have special importance, a discussion of their origin and scope is included.

Achievement - A student's score on an achievement test. In this study, a gain in achievement was regarded as one measure of instructional success.

Achievement Test - A test that measured the extent to which a person has "achieved" something--acquired certain information or mastered certain skills, usually as a result of specific information.[6]

Attitude - Literature abounds with definitions of the term "attitude." For example, Allport defined attitude as

> . . . a mental and neural state of readiness, organized through experience, exerting a directive and dynamic influence upon the individual's response to all objects and situations with which it is related.[7]

Klausmeier and Goodwin defined it as a "learned, emotionally toned predisposition to react in a consistent way, favorable or unfavorable, toward a person, object or idea."[8] Excellent summaries of these definitions have been offered by Khan and Weiss[9] and Taylor.[10] For the purpose of this study, it is sufficient to note that attitudes are selectively acquired and integrated through learning and experience; that they are enduring dispositions indicating response consistency; and that positive or negative affect toward a social or psychological object represents the salient characteristic of an attitude.[11] In this study, an observed increase in positive attitude toward the study of composition was seen as one measure of instructional success.

Conventional Mode of Instruction - The traditional method of instruction is characterized by being fixed in time, group based, usually dependent upon lecture-discussion techniques, and usually has tests which are normative in nature. This term will be clarified in Chapter III.

Gain Score - The numerical difference between a student's score on pre- and post-tests. Two gain scores were used in this study: one to measure a change in attitude; the other to measure a change in achievement.

Instruction - The attempt to facilitate learning.

Learning - Learning has been defined in literally dozens of different ways by different theorists.[12] In regard to this problem of definition, Hilgard and Bower took the following position:

> While it is extremely difficult to formulate a satisfactory definition of learning. . .the difficulty does not prove to be embarrassing because it is not a source of controversy as between theories. . . . For the most part it is satisfactory to continue to mean by learning that which conforms to the usual socially accepted meaning that is part of our common heritage.[13]

This position was adopted by the present study; however, to narrow the socially accepted meaning somewhat, the following broad definition of learning was regarded in this study as being representative of common usage:

> Learning is the process by which an activity originates or is changed through reacting to an encountered situation, provided that the characteristics of the change in activity cannot be explained on the basis of native response tendencies, maturation, or temporary states of the organism (e.g., fatigue, drugs, etc.).[14]

Mastery Learning - In this study, mastery learning is defined as a mode of instruction characterized by the "modularization" of subject matter, the setting of criterion levels of performance, and the intent that each student perform to this criterion level on each subject matter module. The term is clarified in Chapter III.

Method of Instruction - That set of experiences planned by the teacher and experienced by the student for the purpose of the student learning the subject matter. In the present study, this term is used synonomously with "mode of instruction."

Personological Variable - Any characteristic which is attached to the individual as an individual rather than to the individual as a member of a group. In the present study, this term is used synonomously with "student characteristic research variable."

Student Characteristic Research Variable - Synonomous with "personological variable."

Success of Instruction - Since instruction is the attempt to facilitate learning, instructional success depends upon positive change. Common usage of the term "learning" suggests that there are three basic factors which can be changed: (1) an achievement factor, (2) a time factor, and (3) an affective factor. The "achievement" factor refers to the "amount" and "degree" of knowledge (cognitive dimension) or skill (psychomotor dimension) learned and its breadth and depth; the "time" factor simply involves any of a number of time measurements--time to attain some level of achievement, time spent by the teacher, etc.; the "affective" factor points to the learner's feeling toward the process of instruction or the attitude change in the learner toward the subject matter. These factors are not independent and are usually combined and differentially weighted to yield some derivative statistic. In the present study, time was held constant (i.e., measurements were made at the beginning and end of one semester's instruction), making the success of instruction dependent upon a positive gain in either the achievement or affective factors. The gain in the achievement factor was the difference between the pre- and post-test scores on the McGraw-Hill Basic Skills System Writing Test. The gain in the affective factor was the difference between the pre- and post-test scores on an attitude scale of the Likert type constructed by the author. The attitude scale purported to measure the student's attitude toward the study of composition.

Organization of the Report

The organization of the report is as follows:

The literature pertaining to the improvement of achievement and attitude vis-a-vis student characteristics and mode of instruction is reviewed in Chapter II. In Chapter III the meaning of the terms "mastery learning" and "conventional" modes of instruction are clarified, and these modes are compared on a conceptual level. Taken together, these two chapters serve to clarify terms, to report the selected research variables, and to suggest hypotheses. In Chapter IV the design and methodology of the study is recorded: research variables are defined; hypotheses and research questions are stated; subjects, data collection, and analytic procedures are described; and the assumptions and limitations of the study are listed. The presentation and analysis of data are dealt with in Chapter V while Chapter VI summarizes the results of this analysis, draws conclusions, and offers recommendations for future studies.

FOOTNOTES

[1]Cf. J. H. Block, Mastery Learning: Theory and Practice (New York, 1971), p. 3: "Mastery learning enables 75 to 90 per cent of the students to achieve to the same high level as the top 25 per cent learning under typical group-based instructional methods. . . . Students learn more material in less time. Finally, mastery learning produces markedly greater student interest in and attitude toward the subject learned than usual classroom methods."

[2]W. J. McKeachie, "Research on Teaching at the College and University Level," Handbook of Research on Teaching, ed. N. L. Gage (Chicago, 1963), p. 1157.

[3]Cf. J. W. Trent and A. M. Cohen, "Research on Teaching in Higher Education," Second Handbook of Research on Teaching, ed. R. M. W. Travers (2nd ed., Chicago, 1973), p. 1031: "Several researchers investigated the relative merit of independent programs. The results of several experimental programs showed little difference between the experimental (independent study) students and the control groups without independent study in their grades on examinations or in retention of knowledge two years later."

[4]The reason for this analysis, of course, is not to determine the "better mode," but, rather, to question if the methodology behind this analytic procedure is valid. That is, the result of this particular analysis is necessary to see if what would be concluded by using simple univariate statistical procedures is the same as the aforementioned analysis centering upon the students.

[5]The concept of learning to mastery is not inherent in the design of these new approaches; but, nevertheless, when implemented, most programs incorporate the mastery concept.

[6]W. A. Mehrens and I. J. Lehmann, Standardized Tests in Education (New York, 1969), p. 299.

[7]G. W. Allport, "Attitudes," A Handbook of Social Psychology, ed. C. A. Murchison (Worcester, Mass., 1935), pp. 798-814.

[8]H. J. Klausmeier and W. Goodwin, Learning and Human Abilities (2nd ed., New York, 1966).

[9]S. B. Khan and J. Weiss, "The Teaching of Affective Responses," Second Handbook of Research on Teaching, ed. R. M. W. Travers (2nd ed., Chicago, 1973), pp. 759-804.

[10]W. T. Taylor, "A Cross Sectional Study of the Modification of Attitudes of Selected Prospective Elementary School Teachers toward Mathematices" (unpub. Ed.D. dissertation, Oklahoma State University, 1969), pp. 11-20.

[11]S. B. Khan and J. Weiss, p. 761.

[12]Cf. E. R. Hilgard and G. H. Bower, Theories of Learning (3rd ed., New York, 1966); or W. F. Hill, Learning: A Survey of Psychological Interpretations (Scranton, Pa., 1963).

[13]E. R. Hilgard and G. H. Bower, Theories of Learning (3rd ed., New York, 1966), p. 6.

[14]Ibid., p. 2.

CHAPTER II

REVIEW OF THE LITERATURE

This chapter presents a chronological review of the literature of educational research vis-a-vis the comparison of instructional methods. This branch of research seeks to determine if one mode of instruction is more successful than another in producing desired student performance. Until recently, the methodology of such comparative studies has remained remarkably consistent.[1] Basically, two groups (sometimes more) of purportedly "equivalent" students were instructed via two purportedly different modes of instruction (e.g., lecture, discussion, small class size) on purportedly the same subject matter. At the end of some interval of time, a mean score was calculated for each group on the basis of student performance on some criterion measure (e.g., grades, final examinations, attitude scales), and a univariate statistical test of equality was performed between those two mean scores. The results of such a test directed the conclusion of the study. Despite the fact that 41 years transpired between their publications, the studies of Edmundson and Maldur[2] (1924) and Bradley[3] (1965) are representative of this type of research.

Edmundson and Muldur sought to determine if class size was a factor in effective instruction. Comparing the performance of students enrolled in a 109-student section matched for intelligence with students enrolled in a 43-student section of the same course in

education, they found that achievement of the two groups was approximately equal. Although the "small" class performed better than the large class on an essay and mid-semester tests, and while the reverse was true on quizzes and the final examination, the results were not statistically different. Bradley compared the lecture-demonstration method with individual laboratory work in a general education science course. Eighty students were instructed via lecture-demonstration while 82 completed their laboratory work individually. Bradley found that class examinations and final grades reflected no significant differences between the two groups.

So far as McKeachie could determine, the Edmundson and Muldur study reviewed above was the first empirical study on college teaching methods.[4] Other early studies were those of Mueller[5] (1924), Spence[6] (1928), and Hudelson[7] (1928). In 1932, Longstaff at the University of Minnesota conducted the first review of the literature which summarized the research findings for this type of comparative research.[8] Because of the lack of definitive results revealed by this review and "the increasing problems brought about by quiz sections,"[9] Longstaff conducted a controlled investigation "to ascertain, if possible, the relative merits of the lecture-quiz and all-lecture methods."[10] Including his own study, Longstaff summarized the findings of comparative research circa 1932 by stating that ". . .we may conclude. . . there is no difference in the value of the two methods employed."[11]

Ten years later, a second review of the subject literature appeared, this time conducted by Wolfle.[12] It was followed by the 1955 review of Birney and McKeachie.[13] Both reviews had identical conclusions. As Birney and McKeachie said:

> In 1942, Wolfle summarized research up to that time by repeating Longstaff's statement of 1932: 'The experimental evidence submitted to the present time tends to support the general conclusions that there is little difference in achievement in large and small classes and, also, that it makes little difference as to what method of presentation of the materials of the course is used.' . . . . The third decade of research has not outdated Longstaff's statement. However, recent research does hold forth the promise that in the next decade we will have a better understanding of the effect of various teaching methods on student learning.[14]

Representative of the type of study being conducted in this era and reviewed in the Birney and McKeachie study is that of Landsman[15] (1950). According to McKeachie, this was "one of the most comprehensive experiments on student-centered teaching."[16] Landsman contrasted a student-centered type of teaching with a more direct type of democratic discussion organized around a syllabus. Eight classes were included in his experiment; the classes were taught by three instructors, each of whom used both the student-centered and the direct discussion methods. Criterion measurement variables included a local case-history analysis test, Rorschach tests, the Minnesota Multiphasic Personality Inventory, autobiographies, and students' reactions to the instructional format. His results showed no significant difference between methods on any of the measures.

Similar studies which reached similar conclusions were those of Johnson[17] (1953) and Bills[18] (1952). Although the 1953 study, based on psychology classes, found no significant difference in achievement test scores between small democratic and large lecture classes, the researcher did find that while one democratic class evaluated their procedure very favorably, the other class tended to be less satisfied than the lecture classes. The 1952 study also found no significant

difference in achievement, but it did find that the students in the student-centered class were signficantly more favorable in their attitude toward psychology.

Not all studies, of course, produced a finding of "no statistical difference." The study of Guetzkow, Kelly, and McKeachie[19] (1954), which compared the recitation, discussion, and group-tutorial methods for the teaching of general psychology, resulted in a significant finding. That is, when compared with the other two methods, the recitation method not only produced superior performance on the final examination but also produced a greater interest in psychology as indicated by the students' selection of advanced courses in psychology. However, the results of the experiment were contrary to the researchers' orginal expectations.

In 1958, the Bureau of Institutional Research at the University of Minnesota published "A Review of the Literature Concerning Studies of College Teaching Methods and Class Size."[20] This study reviewed 66 research reports and reached the following conclusion:

> Undoubtedly the most striking finding of this review is the consistent inability of investigators to demonstrate statistically significant differences between the experimental and control methods of teaching. This seemed to hold true regardless of the subject field or class size being examined. . . . Unfortunately the finding of no significant differences does not legitimately allow one to conclude that differences in teaching efficacy are not related to method and/or class size. Rather, the fact that essentially none of the investigations have been able to demonstrate practical differences suggests that some careful examination of the experimental methodology and evaluation procedures may be in order.[21]

The significance of this study lies in the last sentence appearing above because it is indicative of the attitude of researchers then and now concerning these findings of no significant differences: "Due to

methodological inadequacies, the findings are not valid."

McKeachie produced his second comprehensive review of the subject research in 1963.[22] Although the findings of the research studies themselves appeared to be unaltered (i.e., even in the more recent studies surveyed the overwhelmingly prevalent conclusion was "no significant difference"), McKeachie contended that when all such studies were reviewed in toto, "consistencies" emerged. For example,

> Despite the many findings of no significant differences in effectiveness between lecture and discussion, those studies which have found differences make surprisingly good sense. In only two studies was one method superior to the other on a measure of knowledge of subject matter; both studies favored the lecture method. In all six experiments finding significant differences favoring discussion over lecture, the measures were other than final examinations testing knowledge.[23]

In this article, McKeachie offered persuasive arguments on why different methods should produce significant findings and explicitly detailed the methodological complexities and inadequacies which act to hide the appearance of these differences. It is unfortunate that discussions of these topics were interspersed among the actual findings of research. It was thus difficult to determine precisely what had been found from what McKeachie suggested should have been found, to determine if McKeachie's "consistencies" were based on statistical interpretations or his own desires, and to determine precisely what the "state of the art" really was.[24]

At this same time, a somewhat more restricted review of comparative research findings was undertaken by Schramm who summarized 100 studies which dealt solely with the effectiveness of television relative to other methods of instruction.[25] Eighty-four of the investigations reported no significant differences in achievement.

Expressing no less than disgust at antecedent research findings on the subject topic and frustration at the continued production of such studies, Dubin and Taveggia set out in 1968 to "definitely settle the matter once and for all."[26] These researchers reanalyzed the data from almost 100 studies which were completed over the last 40 years and which dealt with the effectiveness of different instructional methods. Among the many statistical comparisons made by Dubin and Taveggia were (1) lecture versus discussion, (2) lecture versus lecture and discussion, (3) discussion versus lecture and discussion, (4) supervised independent study versus lecture, and (5) unsupervised independent study versus supervised independent study. The researchers thus constructed a continuum ranging from those instructional methods that supposedly emphasized teaching (e.g., lecture, lecture and discussion) to those that supposedly emphasized learning (e.g., unsupervised independent study). Using student performance on a course examination as the criterion, Dubin and Taveggia found only occasional differences between modes, differences which appeared so infrequently that they could have arisen by chance alone. Furthermore, it was found that the "significant" studies canceled each other out; that is, for each study that identified an advantage to one method over another, the researchers found a second study which identified the reverse. Dubin and Taveggia concluded that:

> The results of our intensive reanalysis of data on comparative college teaching methods make it very clear that our intended goal has been achieved. We are able to state decisively that no particular method of college instruction is measurably to be preferred over another, when evaluated by student examination performances. We may also conclude that replication of the 91 studies examined in detail in this survey would not produce

> conclusions different from our own. . . . We are convinced that approximately 40 years of research speaks the truth. It is now time to turn to a reconceptualization of the analytical problem.[27]

Finally, a very comprehensive review of comparisons of instructional methods studies was produced in 1970, once again by McKeachie.[28] This review covered research on college teaching methods from 1924 to 1970 and discussed the relative effectiveness of such factors as class size, lecture, discussion, independent study, and technological media. Representative of the tabulations reported by McKeachie are the following:

(1) Seventy-eight "experiments" were identified as having sought to determine the effect of class size. Of these seventy-eight, twelve showed a significant difference between large and small classes at the .05 level or better. Of these twelve, six favored large classes while the remaining six favored small classes.[29]

(2) Fifty-three comparisons were identified between the lecture and discussion methods of instruction, fourteen of which showed a significant difference (.05 level or better). Nine of the fourteen favored the discussion technique while five favored lecture.[30]

(3) Thirty studies compared student-centered discussion and instructor-centered discussion. Eight showed statistically significant differences. Seven of these eight favored student centered discussions.[31]

(4) Twenty-one studies focused upon student-led discussions versus teacher-led discussions versus the lecture method; five showed significant differences. The student-led discussion method was favored in all five of the significant determinations.[32]

As in his 1963 review, McKeachie claimed that despite the plethora of findings of no significant differences, when the studies were reviewed *in toto*, consistencies emerged. Furthermore, according to McKeachie, there were some reasonably well supported answers to some basic questions about college teaching.

Inasmuch as this conclusion was in direct opposition to the conclusions of Dubin and Taveggia, some observations are in order. First, there is an inherent difference between the Dubin and Taveggia and the McKeachie studies: while the former analyzed the data from previous studies, the latter analyzed only their conclusions. Second, while Dubin and Taveggia explicitly detailed the statistical procedures which they employed to reach their conclusion, McKeachie did not. In fact, it is not altogether clear that McKeachie used statistical procedures at all. Although he *recommended* the use of the sign test in studies such as his own, he made no mention of the fact that it was employed.[33] Third, the use of the sign test is questionable when the inconsistencies existing among the original research studies are considered. That is, for example, if the sign test is to be used to assess the overall conclusions of several independent studies considering the effect of class size, then the definitions of small and large classes must be fairly consistent over these studies: however, the Mueller study[34] defined a *large* class as one containing 40 students, the Edmundson and Muldur study[35] defined a *small* class as one containing 43 students. Fourth, McKeachie claimed that the Dubin and Taveggia study was restricted in that it dealt solely with the effects of teaching on course examinations. And that

> The results presented in [McKeachie's] paper substantially support [Dubin and Taveggia's] conclusion that so far as performance on course examinations is concerned, there is no strong basis for preferring one teaching method over another. When one asks, however, whether knowledge (1) is remembered after the final examination, (2) can be applied to new problems, or (3) is related to attitudes and motives, we find that class size and teaching method do make a difference.[36]

Finally, both studies yielded identical recommendations. The authors' main argument was that the methodology of past studies was clearly inadequate, that the repetition of like studies was hardly worthwhile, and that the entire problem must be reconceptualized. Furthermore, the inadequacies of past methodology are not as simplistic as previously thought; the answer does not lie in the refinement of criterion tests or more rigid control of the treatment. The problem of past methodology is that it has reduced a complex situation into a simplistic and "non-existent" one: basically, it asked the wrong questions and studied the wrong variables. Past research studies have failed to recognize that different methods imply different goals and have thus often failed "to use the criterion measures most appropriate for a particular method or for a particular course goal."[37] Similarly, past research studies have failed to recognize that different "kinds" of students imply different teaching approaches if maximum learning is to take place.[38] Thus, concerning the analytical question of comparing two modes of instruction, research methods should be employed with the aim of determining interactions among student characteristics, modes of instruction, and the goal of instruction.

The 1973 review of "Research on Teaching in Higher Education" by Trent and Cohen[39] indicated that while not all researchers have followed the suggestions of McKeachie and Dubin and Teveggia, there

was an observable trend in that direction.[40] Thus, for example, the studies of Davis, Johnson, and Dietrich[41] and Menne et al.[42] followed the line of "past" methodology--and found no significant difference as a result. Of the studies which followed the "new" line of methodology, conflicting results were reported. Goldberg, for example, did not find significant interaction between student personality characteristics (350 test scores) and course format (structured versus unstructured classes).[43] A similar conclusion was reached by Tallmadge and Shearer.[44] On the other hand, the investigations by Doty[45] and Hoover, Gruber and Terrell[46] indicated that students who achieved most in conventional lecture situations were characterized by moderate achievement and social needs and low creativity while students characterized by high creativity or by high social needs tended to perform best in small discussion groups. Bigelow and Egbert compared the personality development and achievement of students in an independent study group and a traditional study group, each of which was dealing with the same subject matter.[47] Results indicated that students in the traditional study group performed as well on the examination as the independent study group students but that the independent study students developed more in terms of intellectual efficiency and responsibility. Within the group of independent study students who received high grades, those with the higher social needs tended to be less satisfied with completely autonomous study.[48]

Cronbach and Snow reviewed and reanalyzed a number of aptitude-treatment interaction studies.[49] The authors found that most previous studies were inconclusive due to the way the problems were posed, the methods by which the data were analyzed, and their contradictory

results. Few if any interaction effects were clearly confirmed by the research performed to date. It is significant to note, however, that a large portion of the Cronbach and Snow report discussed methodological issues aimed at improving future research concerning interaction effects. In general, then, the authors suggested that instructional treatments may be developed to interact with student aptitudes, and they hold out hope that further investigations might identify methods and modes of instruction which can maximize learning for selected groups of learners.[50]

Thus, in summary and conclusion, the following can be said. After fifty years of research, few, if any, definitive statements can be made concerning the relative efficacy of one mode of instruction over another. By and large, the research methodology which has "produced" this "finding" has been consistent over the years and is characterized by a univariate statistical test of equality between the means of two differentially treated groups of students. There is an emergent trend in research methodology to view the significant variable of concern as being not the instructional treatment, but, rather, the interaction of student characteristics, method of instruction, and goals of instruction. Research along these lines must be thought of as "developing." The complexities of this line of research are enormous in comparison with that of its "predecessor" for, not only must the more involved statistical procedures of multivariate analysis be employed,[51] but the primary problem of "defining" the learner also arises. A countless number of characteristics could be used to define

the student operationally, and the conflicting results of "interaction research" could be attributed to the failure of studying the "wrong" characteristics.

In this context, the present study can be seen as an attempt to contribute to the development of the "interaction research" effort. The next chapter deals with the selection of research variables--i.e., the selection of characteristics which, for the purpose of the present study, define the learner. Several studies concerning "interaction research" are reviewed in that chapter.

FOOTNOTES

[1]Wilbert McKeachie stated this fact in an interesting fashion: "The first empirical study on college teaching was, so far as I can determine, published by Edmundson and Muldur in 1924. . . . The Edmundson and Muldur study would not look greatly out of place in a current journal." W. J. McKeachie, Research on College Teaching: A Review (Washington, D. C., 1970), p. 1.

[2]J. B. Edmundson and F. J. Mulder, "Size of Class as a Factor in University Instruction," Journal of Educational Research, 9 (1924), pp. 1-12.

[3]R. L. Bradley, "Lecture Demonstration versus Individual Laboratory Work in a General Education Science Course," Journal of Experimental Education, 34 (1965), pp. 33-42.

[4]W. J. McKeachie, Research on College Teaching: A Review (Washington, D.C., 1970).

[5]A. D. Mueller, "Class Size as a Factor in Normal School Instruction," Education, 45 (1924), pp. 203-207.

[6]R. B. Spence, "Lecture and Class Discussion in Teaching Educational Psychology," Journal of Educational Psychology, 19 (1928), pp. 454-462.

[7]E. Hudelson, "Class Size at the College Level" (University of Minnesota publication, 1928).

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CHAPTER III

CONCEPTUAL BASE AND RATIONALE

The purpose of this chapter is twofold: (1) to clarify the meaning of the terms "mastery learning" and "conventional" modes of instruction; and (2) to develop a rationale for the selection of research variables. The terms are clarified through a description of each mode and a comparison of their differences. The rationale flows from two sources: the identification of points of difference between the two modes which might promote differential student "success" on the basis of differential student characteristics, and research findings concerning these characteristics.

The Conventional Mode of Instruction

The "conventional" mode of instruction is the most familiar instructional method; its use is so prevalent that many perceive it to be the process of education. Basically, in this mode a student enrolls in a "section" of a particular course, meets with this "section" several times a week to receive instruction from the teacher, does assigned homework, takes tests of his achievement, and is assigned a letter grade on the basis of these tests. Based upon common knowledge of this process, the extremely simplified flow model depicted in Figure 1 can be constructed.

In this model, the term "Instructor Mediated Learning Activities"

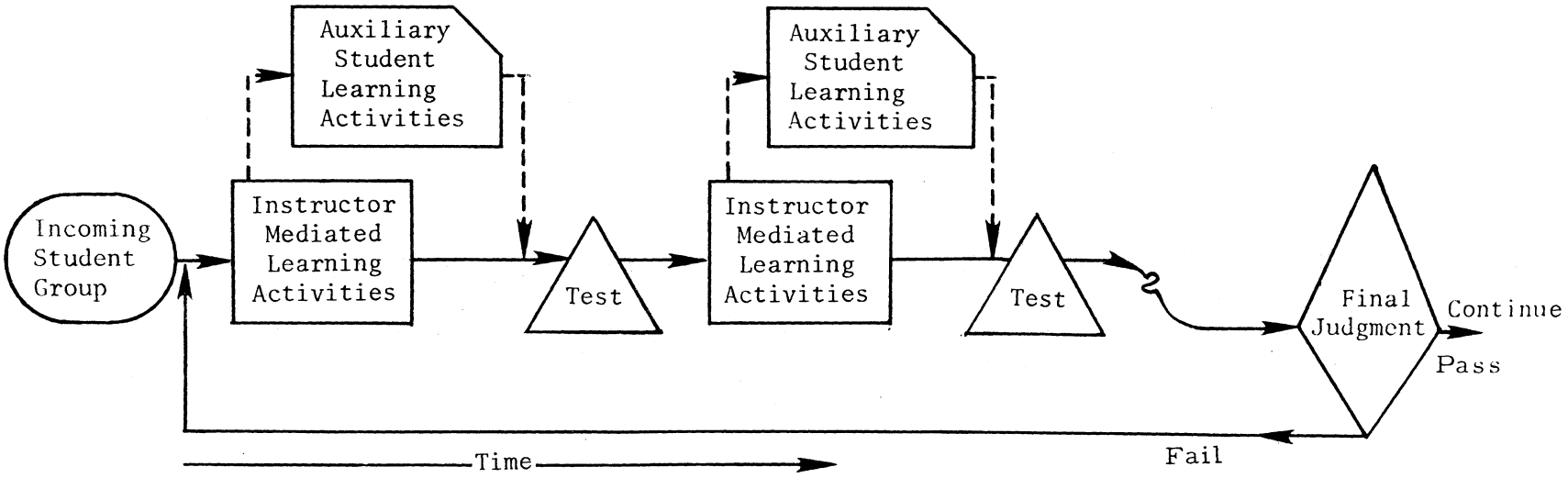

Figure 1. The Conventional Mode of Instruction

is synonomous with what is commonly termed "in-class instruction." It is a group activity offered at one time and one place. "Instructor Mediated Learning Activities" subsumes many of the oft-considered alternative methods of instruction (e.g., discussion, lecture, recitation, inquiry). In the main, these activities are offered orally although in certain instances they are augmented by visual communication.

The term "Auxiliary Student Learning Activities" is synonomous with the term "homework." Generally, in this mode of instruction, these activities are assigned to the group, must be completed within a specified time interval, and are primarily visual (i.e., usually consist of reading or working with a text).

The symbol "Test" in the model denotes any form of teacher-directed evaluative procedure, the most frequent being a written test of achievement (which could be multiple-choice, essay, problem-solving). Generally, these tests are not diagnostic in nature for they merely assign a student to a competency level relative to the material covered. All members of the group (i.e., section) take the same test at the same time, and some "group average" determines the success or failure criteria. Each test is taken only once.

The "Final Judgment" is a decision made by the teacher at the conclusion of instruction and is usually based upon a student's composite score on the tests in relation to the group's average composite score. Should a student's performance be judged deficient or should the student withdraw before this judgment is made, he must, to be certified proficient, begin the instructional process anew at a later date. Therefore, the process must be viewed as a single entity with a

definite beginning and end.

In conclusion, then, the two distinguishing characteristics of the "conventional" mode of instruction are that it is group based and, from the student's point of view, time is inflexible.

The Master Learning Mode of Instruction

In 1963, John B. Carroll published "A Model of School Learning"--a conceptual paradigm which was significantly different from the conventional mode of instruction.[1] In 1968, Benjamin Bloom transformed this conceptual model into a working model for what has come to be called "mastery learning."[2] Although most contemporary authors give Bloom and Carroll credit for developing the first effective strategy for "master learning," the idea of learning for mastery is quite old. For example, the Winnetka Plan of Washburne[3] (1922) and the Morrison Plan at the University of Chicago's Laboratory School[4] (1926) can be cited as two early antecedents.

Carroll's model centered about the analysis of what he called "learning tasks." According to Carroll,

> A learning task may be of any size or complexity. It may be the learning of a single association or concept; it may be the learning of the materials in a particular two-week unit of a course; it may be the learning of the material in a total course or even a four-year curriculum. Obviously it is often important to analyze the more complex tasks into subtasks. It is most essential, however, to be able to state as exactly as possible what the learning task is, particularly its objectives, in testable form. That is, a teacher must be able to determine when a student has mastered the task to a satisfactory degree. Learning psychologists speak of this matter in terms of setting a criterion for satisfactory performance.[5]

Carroll assumed that although different students learn at different rates, given enough time all students can learn "to criterion"--that is, successfully master a learning task. Furthermore, as Carroll said,

> Much is said about motivation. There can be various sources of motivation, but from my point of view, the basic fact is that students vary in the amount of time they are willing to spend on learning. No matter what their interest is, or how they are motivated, if they spend the amount of time they need on learning the task, they will learn to criterion.[6]

Carroll hypothesized that if the student were not allowed enough time to learn, then the degree to which he could be expected to learn was a function of the ratio of the time actually spent in learning to the time needed. That is,[7]

Degree of Learning = f[time actually spent/time needed].

This basic mathematical model is amplified by the addition of two more independent variables: (1) the quality of instruction; and (2) the student's ability to understand and profit from instruction. Quality of instruction refers to the degree to which the mode of presentation and ordering approaches the optimum learning needs for each student; ability to profit and understand instruction is closely identified with general intelligence.[8] Thus, the full Carroll model can be summarized as follows:[9]

$$\text{Degree of Learning} = f\left[\begin{array}{l|l} \text{1. Time allowed} & \text{2. Perseverence} \\ \hline \text{3. Aptitude} & \text{4. Quality of instruction} \\ & \text{5. Ability to understand instruction} \end{array}\right]$$

Bloom borrowed these ideas and developed a model of mastery learning for use in the classroom where the time allowed for learning is relatively fixed. The subject content was divided into "learning tasks," each of which had objectives which were known and measurable.

> The instructor taught each unit using typical group-based methods, but supplemented this instruction with simple feedback/correction procedures to ensure that each student's unit instruction was of optimal quality. The feedback devices were brief, diagnostic (formative) tests administered at the units' completion. Each test covered all of a particular unit's objectives and thus indicated what each student had or had not learned from the unit's group-based instruction. Supplementary instructional correctives were then applied to help the student overcome his unit learning problems before the group instruction continued.[10]

Thus, in master learning, a student is assigned to a "section," receives instruction with this "section," does homework, and takes tests. An extremely simplified flow model of Bloom's scheme (i.e., mastery learning) appears in Figure 2. Although it is obvious that this model is remarkably similar to that which represents the conventional mode of instruction (Figure 1), there are significant differences between the two. Many of these differences are "hidden" within the models and will be pointed out in the next section.

The Development of a Rationale

The primary distinction between the mastery learning and conventional modes of instruction is a totally different conception of the nature and purpose of testing. In mastery learning, tests are formative, diagnostic, and criterion-based; in conventional instruction, tests tend to be summative, "group-average"-based, and only tangentially diagnostic. This conceptual distinction leads to the implementation of several different instructional procedures between the two modes of instruction. These procedures, in turn, seem to call for different student behaviors. This being the case, it may be hypothesized that students of differing characteristics may be more or less

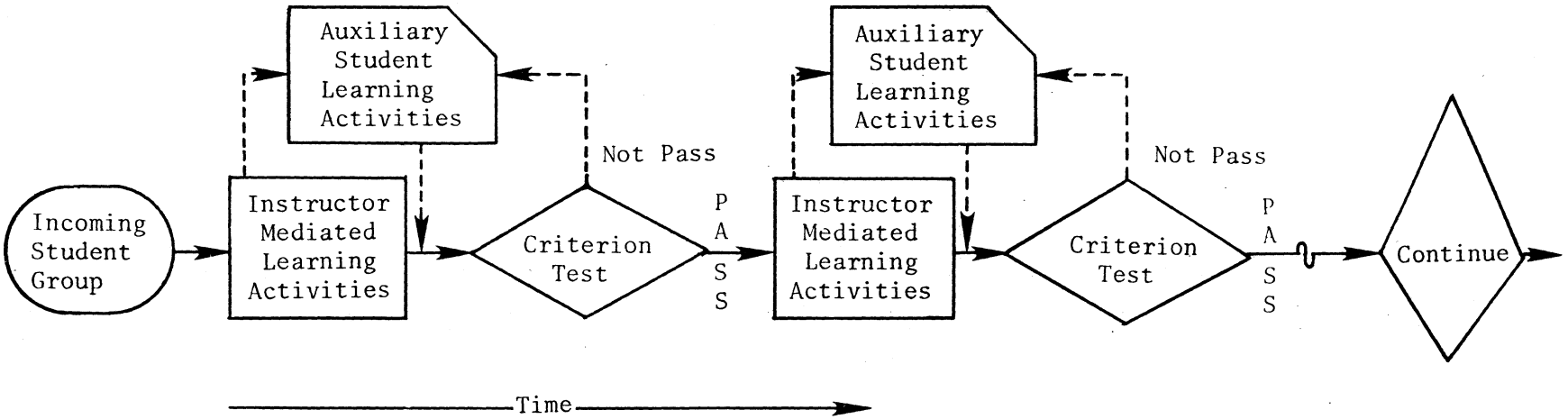

Figure 2. Bloom's Mastery Learning Strategy

successful in performing these behaviors. If so, an interaction effect between mode of instruction and student would be evidenced. This section of the report pin-points areas of differential student behavior between the two modes, suggests student characteristic variables which may influence "successful" performance of these behaviors, and records selected research findings concerning these student characteristics.

1. In both mastery learning and conventional instruction, students perform/receive similar group-based "Instructor Mediated Learning Activities" and then, at some fixed time, take a test over the subject matter considered. In mastery learning, however, if criterion-level performance is not exhibited (i.e., the test is not mastered), the student is permitted/required to continue his efforts on the same material. In conventional instruction, new material is considered independent of a student's performance on the test.

Assuming that students are normally distributed with respect to "in-coming" achievement concerning the subject matter and that this achievement level influences a student's ability to profit from instruction (and that there is an equivalent "Auxiliary Student Learning Activity" effort across a group of students), then students of higher achievement levels should demonstrate a better command of the subject on the test. Over the course of a semester, then, students of a higher achievement level should be more "successful" than students of lower achievement. It is hypothesized that this is the case in the conventional mode but not in the mastery learning mode. In the mastery learning mode, a student on a lower achievement level will be re-cycled over the same material until he "succeeds" at the same level as

students of higher achievement.

Two studies which tested this hypothesis are those of Carroll[11] and Block.[12] Carroll's study dealt with the use of programmed instruction to teach the Arabic writing system. Measuring in-coming achievement via the Modern Language Aptitude Test, Carroll found that when the time allowed for learning was held relatively constant for all students, their performance on the final examination was strongly affected by differences in in-coming achievement. Block's study dealt with teaching eighth grade Algebra via mastery learning. One of his major findings was that despite the individual differences in entry achievement test scores, students in mastery learning achieved to the same level; that while their entry characteristics played a large role in achieving the objectives of the first unit, they played a decreasing role in the learning of subsequent units; and that these entry level characteristics predicted the achievement level of students instructed in the conventional method.

2. Because of the modularization of the subject matter into several learning tasks, and because of the fact that a test must be mastered or re-taken, the student is probably tested many more times in mastery learning than in the conventional mode of instruction.

A student in mastery learning who does not like to take tests and/or re-study the same material could become frustrated with the procedures of this mode of instruction: this may well influence his achievement level and his attitude toward the subject matter. These factors would not seem operable in the conventional mode of instruction.

A preliminary study by Davis, Davis, and Vadala indicated that student response to the statement "In a course, I prefer to have many exams rather than just a few," differentiated successful students (those who earned an "A," "B," or "C" grade) from unsuccessful students in an Individually Paced Instructional method.[13] The study by Seashore and Bavelas concerning the effects of frustration on children is relevant. After frustrating eighteen children by continually asking them to draw and then re-draw a particular figure and offering no positive reinforcement upon completion, the researchers found that "there was a general tendency toward cognitive regression as measured in terms of changes in mental age as measured by the Goodenough scale."[14]

3. Since an un-mastered test must be re-taken after "Auxiliary Student Learning Activities" are individually prescribed by the teacher to the student, a student in the mastery learning mode must confront the teacher on a one-to-one basis; this is not demanded in the conventional mode of instruction.

Inasmuch as different patterns of personal interaction between participants in the instructional process are called for in the two modes, some sociability or affiliation characteristic might be operative.

The studies of Beach[15] and Siegel and Siegel[16] indicated that personal contact with the instructor is valuable for some students, but not for all. Beach studied sociability as a predictor of achievement in lecture and small-group teaching methods. In the lecture section, the nonsociable students achieved significantly more than the sociable students; in small-group sections the results were reversed. Siegel and Siegel found that fact-oriented and low-ability students were

particularly benefitted by contact with the teacher. In a second experiment, they found that the effect of personal contact with the teacher depended upon what the instructor did; high-ability students benefitted from personal contact when the contact involved "exploration," while low-ability students benefitted from "clarification."[17]

4. The point of reference for affixing one's "relative level of competence" is altered between the two modes of instruction. In the conventional mode, a student may easily determine his "rank" of performance in relation to the group (by viewing his test score in relation to that of the group). In mastery learning, although a student does have a better measure of his competence with respect to the subject matter, he does not have a direct measure with relation to other students.

Thus, for those students who "thrive" on student competition, the mastery learning mode may be a detriment to their achievement and attitude gain. That is, they may be "pushed" to higher levels of success in the more competitive atmosphere of the conventional mode of instruction.

Bigelow and Egbert found that in a group of independent study students who received high grades, those with higher social needs tended to be less satisfied with completely autonomous study.[18] McCollough and Van Atta found that students who were less rigid and less in need of social support gained more in measured achievement from independent study than did more dependent students.[19]

5. Although more tests are given in mastery learning, these tests are not "one-shot," "highly pressurized" affairs as is the case in the conventional mode of instruction.

It is possible that students differ in relation to the amount of anxiety produced in a testing situation. This factor could operate to differentiate successful students between the modes and differential levels of student success within each mode.

Smith found that students with high anxiety and low initial achievement gained more on achievement tests and were more highly satisfied in a "teamwork" class than in a conventional lecture taught class.[20] The studies of McKeachie, Pollio, and Speisman suggested that student anxiety during classroom examinations built to such a point that it interfered with memory and problem solving. Reducing the stress (in their case by permitting students to write comments upon the test) resulted in improved performance.[21]

6. "Instructor Mediated Learning Activities" remain essentially the same in the two modes--that is, primarily verbal. However, the role of "Auxiliary Student Learning Activities" is heightened in the mastery learning mode since a student must master a learning task before it is left. "Auxiliary Student Learning Activities" are primarily visual.

It may be that students who can derive meaning visually will be at an advantage over students in the mastery learning mode. This advantage should not be as pronounced in the conventional mode of instruction.

Westover found that some students showed consistent differences in performing on similar tests administered by listening or by reading.[22] Ingersoll identified "visual attenders" and "aural attenders" by their performance on a bisensory auditory-visual digit-span task.[23] On a series of later tasks in which information was presented simultaneously

through both channels, "visual attenders" were found to recall more visual stimuli whereas "aural attenders" recalled more auditory stimuli. Ingersoll noted that students who have developed such stable response characteristics may be at a disadvantage in learning from audio-visual presentations when information in both channels is not redundant.

Thus, it may be concluded that significant differences do exist between the conventional and mastery learning modes of instruction when these modes are compared on a conceptual level. These differences seem to demand different student behaviors if "success" is to be reached via a particular mode; and "successful" performance of these behaviors may be linked to certain student characteristics. Several broad areas (e.g., in-coming achievement level, visual/auditory preference) of these characteristics have been identified and served to guide the selection of such student characteristic research variables employed in the present study.

FOOTNOTES

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[19]C. McCollough and E. L. Van Atta, "Experimental Evaluation of Teaching Programs Utilizing a Block of Independent Work" (unpub. paper read at symposium of American Psychological Assoication, Washington, 1958). Cf. W. J. McKeachie, Research on College Teaching: A Review (Washington, D.C., 1970), p. 11.

[20]H. C. Smith, "Teamwork in the College Class," Journal of Educational Psychology, 46 (1956), pp. 274-286.

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[22]F. L. Westover, "A Comparison of Listening and Reading as a Means of Testing," Journal of Educational Research, 52 (1958), pp. 23-26.

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CHAPTER IV

METHODOLOGY

The purpose of this chapter is to (1) reiterate the problem, (2) discuss the research variables, (3) describe instrumentation, (4) explain the sampling and data collection procedures, (5) state the research questions, (6) discuss the primary hypotheses and analytical procedures, and (7) suggest the limitations of the study.

Statement of the Problem

The basic problem for this study was to determine if, on the basis of select personological variables, different "kinds" of students achieved different levels of "success" in two apparently different modes of instruction.

Research Variables

The Classification Variable

To be a valid exploration of the above problem the study had to consider two modes of instruction which were different. The discussion of Chapter III established that, on a conceptual level, there were significant differences between the mastery learning and conventional modes of instruction. Therefore, the primary classification variable of the study was the "mode of instruction," and the identification of a

situation in which the mastery learning and conventional modes of instruction were employed to teach the same subject matter with the same objectives was required. Such a situation was found in the instruction of an undergraduate course offered by the English Department of Oklahoma State University during the fall semester of 1974.

The course involved in this study was entitled "English 1113 (Freshman Composition)" and was the first half of the University's six-credit-hour requirement in English composition. "English 1113" had a duration of one semester (16 weeks). According to the Rules of Uniformity in Composition Courses, written by J. Campbell, Director of English Composition, and adopted by the English Department of Oklahoma State University, this course had the following objectives:

1. Reading: A student should be able
   a. To isolate the thesis or main idea in an essay.
   b. To determine organizational or structural pattern(s) of an essay.
   c. To recognize type(s) of developmental materials in an essay.
   d. To understand the role of style in an essay--grammar, diction, mechanics, sentence structure, etc.
2. Writing: A student should be able to write an essay (400-750 words) by
   a. Restricting a general subject and constructing a thesis statement consistent with the time alloted for the paper, the audience to which he is writing, and the knowledge available for use.
   b. Choosing a structure and developmental materials appropriate to the thesis.
   c. Demonstrating appropriate mastery of style as it applies to grammar, diction, mechanics, sentence structure, etc. [1]

Approximately 100 sections of "English 1113" were offered each semester; approximately 27 students were enrolled in each section.

During the fall semester of 1974, approximately 86 of these sections were taught in an instructional mode which bore all the

characteristics ascribed to the conventional mode of instruction in Chapter III. That is, each section met three times per week with the teacher and received instruction through typical lecture-discussion-inquiry methods; each student within these sections did assigned homework, took tests of his ability with his section, and earned a letter grade ("A" through "F") on the basis of his test scores. Hence, throughout the remainder of this report, this mode of instructing "English 1113" is referred to as the conventional mode of instruction.

During the 1974 summer semester, a four-year developmental project (the "Experimental English Composition Program"), which aimed at improving the instruction of English composition, was initiated at Oklahoma State University.[2] The first stage of this project was the modularization of the subject matter of "English 1113" into "learning tasks," each of which had explicit objectives stated in measurable terms.[3] The experimental program was implemented during the fall semester of 1974; fourteen sections of "English 1113" were involved in this pilot implementation. Developed around the aforementioned modularization scheme, the instruction of these 14 sections bore all the characteristics ascribed to mastery learning in Chapter III. That is, each section met three times per week with the teacher and received instruction through typical lecture-discussion-inquiry methods; each student within these sections took criterion-based tests of his achievement, received individual diagnosis from the teacher on the basis of his performance on these tests, and--if necessary--was required to re-take the tests until mastery level performance was exhibited. There was, however, one additional feature in the experimental approach which was not specifically ascribed to Bloom's mastery

learning scheme described in Chapter III. This feature was "contract grading" and dealt with the setting of the criterion level for mastery on the tests.

According to Bloom's scheme, there was only one criterion level for all students; in the approach adopted by the English Department, there were three different levels. At the beginning of the semester, each student enrolled in the experimental program selected whether he wished to work for the letter grade of "A," "B," or "C." In essence, this selection set the criterion level to which the student must perform on each test to demonstrate mastery. At any time during the semester, a student was permitted to "re-contract," that is, alter his original choice. Thus, the experimental approach of teaching "English 1113" should most appropriately be called a mastery learning/contract grading mode of instruction. However, a review of the conceptual analysis of mastery learning, presented in Chapter III, indicated that the inclusion of contract grading would not invalidate or alter any of the conclusions of the analysis. That is, the differences between the mastery learning and conventional modes of instruction identified in Chapter III are also differences between the two modes of instructing "English 1113" during the fall semester of 1974. For simplicity, then, the experimental approach will henceforth be termed the mastery learning mode of instruction for the remainder of this paper.

The Dependent Variable

The dependent variable for the study was a two-dimensional index of the "success of instruction." Basically, one dimension was cognitive while the second was affective. This "success of instruction" variable

was defined through consideration of the objectives of the English composition program at Oklahoma State University, in general, and the objectives of "English 1113," in particular.

As has been stated, the primary "subject matter" objectives of "English 1113" were classifiable into two categories: one category called for the student to recognize the rules and conventions of English composition (i.e., "Reading") while the second category called for the student to apply this factual foundation while writing an "acceptable" composition (i.e., "Writing"). Inasmuch as it was difficult (if not impossible) to produce a valid, objective, and comparable measure of a written composition, this study centered upon the "lower level" category--that is, the category dealing with factual knowledge. In this study, then, one dimension of instructional success was defined by a positive increase in a student's knowledge concerning the rules and conventions of English composition. This increase was measured by the difference between a student's pre- and post-test scores (i.e., gain score) on the McGraw-Hill Basic Skills System Writing Test (hereafter referred to as the "Writing Test").[4] The Writing Test was designed to identify the student's strengths and weaknesses in language mechanics (capitalization, punctuation, grammar), sentence patterns (e.g., sentence types, transition), and paragraph patterns (e.g., relationships between the sentences in a paragraph in terms of development of thought).

The second dimension of the dependent variable arose from a stated objective of "The Experimental English Composition Program."[5] The goal of this objective was to improve student attitude toward English composition. In this dimension, a student's gain score was measured by

the difference between his pre- and post-test scores on an attitude scale ("Attitude Scale") constructed by the researcher. A copy of this instrument appears in Appendix A. Some examples of the items on the scale are "Composition is fascinating and fun," and "Composition is something that I enjoy a great deal."

Both the Writing Test and the Attitude Scale will be dealt with in greater depth in the next section.

The Independent Variable

The independent variable for the study was a multi-dimensional vector of student characteristics. The particular student characteristic research variables (i.e., the dimensions of the vector) employed were selected after the review of literature and followed the rationale presented in Chapter III. The variables were drawn from such broad areas as in-coming achievement, preference for auditory or visual instruction, and sociability. The instruments employed to gain information within these areas were: the pre-test of the Attitude Scale, the pre-test of the Writing Test, the McGraw-Hill Basic Study Skills System Reading Test ("Reading Test")[6], the American College Test--Composite ("ACT-Comp."),[7] the American College Test--English Usage ("ACT-Eng."), and a Student Study Habits and Preference Questionnaire ("SSHPQ") constructed by the researcher. All of these instruments will be considered in the following section; a copy of the SSHPQ appears in Appendix B.

Since the first five instruments generated a single score and since the SSHPQ consisted of 26 questions, the student characteristic vector had 31 dimensions. However, due to the obvious dependencies among these measures, the dimensions could not be considered

independent. To alleviate this problem, a Principal Components Analysis was performed to reduce the dimensionality of the vector.[8] The results of this analysis will be presented in Chapter V. In actuality, then, the independent variable for the study was not the vector of the 31 scores produced by the above battery of tests; rather, the vector was a set of linear combinations of these scores (i.e., the principal components revealed through analysis). For this reason, further description of the vector is postponed until Chapter V.

Instrumentation

The American College Test (ACT)

The Act consisted of four parts: English Usage, Mathematics Usage, Social Studies Reading, and Natural Sciences Reading. Standard scores ranging from one to thirty-six are obtained for each part. A composite score is then computed. In this study, only the English Usage and composite score were employed. Purportedly, "the ACT contains a large proportion of complex problem-solving exercises and proportionately few measures of narrow skills."[9]

The English Usage examination purported to measure the student's understanding and use of the basic elements of correct and effective writing.

The Social Studies Reading examination purported to measure the evaluative reasoning and problem-solving skills required in the social sciences.

The Natural Sciences Reading examination purported to measure the student's mathematical reasoning ability.[10]

According to a review reported in Buros' Sixth Mental Measurement

Yearbook,

> The odd-even reliability coefficients were English Usage = .90, Mathematics Usage = .89, Social Studies Reading = .86, and Natural Sciences Reading = .95.[11]

The McGraw-Hill Basic Study Skills System

Writing Test

The Writing Test was a timed objective test designed to identify in a general way the student's weaknesses and strengths in three areas of written communication. Part I of the test measured the student's skills in Language Mechanics--capitalization, punctuation, and grammar. Part II of the test dealt with Sentence Patterns; the student was called upon to identify sentence types, to distinquish between grammatical and ungrammatical sentences, and to link together sentences in a short passage by choosing from four given transition words the one most appropriate in the context of the entire passage. Part III, Paragraph Patterns, required the student to recognize the relationships among the sentences in a paragraph in terms of development of thought. In Part II, the student selected topic sentences, developmental sentences, and concluding sentences for given paragraphs; the student was also asked to organize sentences into a paragraph and to divide a prose passage into paragraphs.

Two "equivalent" forms of the Writing Test ("Form A" and "Form B") were produced by McGraw-Hill. Both forms of the test contained 71 items; the total score of the test consisted of the number of correct responses (i.e., the range of the test was 0 - 71). The working time for the test was 15 minutes for each part, or a total of 45 minutes. According to A. L. Raygor,

> Because the time limits for each of the three parts are very generous, nearly every examinee completes all items; in short, the test is a power test.[12]

The Kuder-Richardson 20 formula (KR-20) was computed by McGraw-Hill for the total test for both forms using a norming group which included (1) freshmen (and a few sophomores) in four-year colleges and universities; (2) two-year college students; and (3) "college-bound" high school juniors and seniors (N greater than 1100).[13] The results of this determination are produced in Table I below.

TABLE I

THE McGRAW-HILL WRITING TEST: RELIABILITY COEFFICIENTS AND STANDARD ERRORS OF MEASUREMENT

	Form A	Form B
KR-20	.85	.86
N	1168	1178
Mean	43.94	45.91
Median	44.00	47.00
Std. Dev.	9.20	9.65
Std. Error of Measurement	3.57	3.59

The McGraw-Hill Basic Study Skills System Reading Test

The Reading Test measured the student's "general level of competence in those reading skills which are most relevant to academic success: Reading Rate and Comprehension (Part I), Skimming and

Scanning (Part II), and Paragraph Comprehension (Part III)."[14] Part I of the test contained two reading passages, one easy and one difficult. Part I yielded four scores: (1) reading rate for the easy passage, (2) reading rate for the difficult passage, (3) reading rate flexibility, and (4) retention.[15] Part II of the test contained 30 items which measured how well the student could obtain information quickly from printed material without actually reading all of it. Part III contained five long reading passages. Each of the five test items which followed each long passage measured one of the following comprehension skills: (1) recognition and understanding of the main idea, (2) recognition of specific facts and understanding their importance and function within the passage, (3) recognition and understanding of general scientific principles in both the physical and social sciences, (4) discovery of paragraph organization and structure, and (5) critical evaluation of the author's writing. Interspersed among the five long reading passages were five short paragraphs with one test item each; these test items measured factual knowledge and are similar to items in an objective test based on a course textbook.

The total score for the Reading Test consisted of the number of correct responses on the 80 items (i.e., a range of 0 - 80). As with the Writing Test, two "equivalent" forms of the Reading Test were available from McGraw-Hill. Using a norming group which included approximately equal numbers of (1) freshmen (and a few sophomores) in four-year colleges and universities, (2) two-year college students, and (3) "college-bound" high school juniors and seniors, McGraw-Hill determined the instrument's coefficients of internal consistency.[16] These figures are presented in Table II below.

TABLE II

THE McGRAW-HILL READING TEST: RELIABILITY COEFFICENTS AND STANDARD ERRORS OF MEASUREMENT

	Form A	Form B
KR-20	.89	.89
N	1485	1502
Mean	49.11	48.37
Median	50.00	49.00
Std. Dev.	11.07	11.27
Std. Error of Measurement	3.63	3.70

Raygor reported a study concerning the criterion-related validity of the Reading Test.

> A total of 67 students in a small two-year college in California participated in this study. They took the MHBSS (McGraw-Hill Basic Study Skills) Reading Test in November, 1969. Of these students 35 took Form A and 32 took Form B. The standard scores for the parts and total of the two reading tests were correlated with standard scores converted from the publisher's listing of percentile ranks for Form B of the Nelson-Denny Reading Test, revised edition, administered to these students in January, 1970.[17]

The Pearson product-moment correlation coefficients obtained in that study are reported in Table III.

TABLE III

CORRELATION OF MHBSS READING TEST WITH
THE NELSON-DENNY READING TEST

	V	C	T
Nelson-Denny			
V-Vocabulary	-		
C-Comprehension	.67	-	
T-Total	.93	.89	-
MHBSS Reading Total	.55	.64	.67

The Attitude Scale

This scale, which was constructed by the author, purported to measure a student's attitude toward English composition; a copy of the instrument appears in Appendix A. The instrument was formed by adapting the Mathematics Attitude Scale (MAS) constructed by L. Aiken and R. Dreger.[18] The MAS measured a student's attitude toward mathematics. The basic modification consisted of changing the word "mathematics" on the MAS to "composition" on the new instrument.

The Attitude Scale was a twenty-item opinionnaire which made use of a 5-point Likert scale ranging from "strongly agree" to "strongly agree" on each item. To guard against the collection of fallacious responses, ten of the 20 items were stated positively and ten were stated negatively. The instrument was scored to reflect a positive attitude toward composition by assigning a "1" to "strongly disagree" and a "5" to "strongly agree" on the positive items and conversely on

the negative items. This produced a possible range of scores from 20 (indicating the most negative attitude toward composition) to 100 (indicating the most positive attitude toward composition).

The short-term (2 days) test-retest reliability (i.e., Pearson product moment correlation) for the Attitude Scale for "English 1113" students (N=20) was .879 (significant at the .01 level). The Attitude Scale exhibited a split-halves reliability coefficient (i.e., odd-even reliability coefficient) of .961 (N=434; corrected by the Spearman-Brown formula; significant at the .01 level). Due to the "obvious" phraseology of the items, content validity was assumed. Due to the great similarity between the Attitude Scale and the MAS, certain properties of the Attitude Scale can be inferred from the findings of Aiken and Dreger concerning the MAS.

The test-retest reliability for the MAS, according to Aiken and Dreger, was r = .94.[19] A test of independence between the scores on the MAS and scores on four items designed to measure attitudes toward academic subjects, in general, suggested that the MAS measured attitudes specific to mathematics.[20]

The Student Study Habits and Preference Questionnaire

This instrument consisted of 26 questions ranging over a wide variety of topics. The questions emanated from three sources: (1) the conceptual comparison of the two modes of instruction and the review of the literature presented in Chapter II, (2) a series of conferences held between the researcher and several members of the English Department, and (3) a preliminary study involving students enrolled in

the Individually Paced Instructional program at Oklahoma State University (fall semester, 1973) by Davis, Davis, and Vadala.[21] A copy of the instrument is presented in Appendix B.

Basically, the questions dealt with student study habits (e.g., "The amount of time I spent studying per week last year was approximately (1) 0 - 6 hours; (2) 7 - 12 hours; (3) 13 - 19 hours; (4) more than 19 hours."); student perception of ability (e.g., "Compared to other students in my class, I write well."); student perception of media preferences (e.g., "I prefer to read to myself rather than to have someone read aloud to me."); student perception of sociability (e.g., "I usually study best for a composition course (1) by myself; (2) with one other person; (3) with two other people; (4) with three or more other people."); and student perception of prestige needs (e.g., "Social recognition (that is, the respect or admiration of others) is very important to me."). Twenty-one of the questions called for a response along a 5-point scale ranging from "strongly agree" to "strongly disagree."

Inasmuch as the items of this instrument were to be subject to a Principal Components Analysis (see Chapter V), no attempt was made to categorize the questions into specific areas.

Sampling and Data Collection Procedures

The target sample of the study was all students enrolled in the 14 mastery learning sections of "English 1113" and all students enrolled in five of the conventional sections. As of the first day of class, 401 students were enrolled in the 14 mastery learning sections; 149 students were enrolled in the five conventional sections. The mastery

learning sections were taught by nine different instructors, with five instructors having responsibility for two sections; the conventional sections were taught by three instructors, with two instructors having responsibility for two sections.

Prior to the first day of the fall semester, 1974, students enrolled in "English 1113" under the normal operating procedures of Oklahoma State University--that is, they were allowed to select the section of their choice so long as that section had not already been "closed." However, this enrollment procedure was completed without knowledge by the students that 14 of the "English 1114" sections were to utilize the experimental approach. That is, the students who enrolled in the mastery learning sections had no prior knowledge that they were to be instructed through the mastery learning approach. The 14 sections which were instructed via mastery learning were selected at random from the approximately 100 sections of "English 1113." The five sections which represented the conventional method were selected to "balance the design" with respect to the time in which class meetings were held. Thus, if one assumed that similar students enrolled for classes meeting at similar times during the day and that time was the principal factor influencing student choice of section, then one could conclude that students were randomly "assigned" to the two modes of instruction.

During the first week of the semester, a battery of tests was administered to the students in all 19 sections. This battery consisted of (1) the pre-test of the Writing Test, (2) the pre-test of the Attitude Scale, (3) the Reading Test, and (4) the SSHPQ. The Scale and the SSHPQ were presented as "one instrument."

The ACT scores for the subject students were collected from the

Registrar's Office of Oklahoma State University during the eighth week of the semester. The subject students had completed this standardized test prior to their entrance to Oklahoma State University.

As expected, data were not collected for all students on all measures of this battery. While over 90% of the subjects (approximately 500 students) completed the Reading and Writing Tests, only 70% completed the Attitude Scale/SSHPQ instrument. The principal reason for the latter figure was the fact that many students failed to realize that the Attitude Scale/SSHPQ instruments had two pages--that is, they responded to only the first page of the form. In addition, several students did not answer all 26 items on the SSHPQ. Seventy-nine per cent (434 students) of the subjects had ACT information on file in the Registrar's Office.

Instruction proceeded via the two modes for fourteen weeks before the second battery of tests was administered. This battery consisted of the post-tests of the Attitude Scale and the Writing Test. The response rate on this battery was not as high as that obtained on the first battery, the primary reason being that two instructors failed to administer certain of the tests to their students. Two sections of the mastery learning mode (both taught by one instructor) were lost on both measures, and two sections (one instructor) of the conventional mode did not complete the Attitude Scale. Thus, the actual sample considered by the study consisted of 12 sections of the mastery learning mode of instruction, 5 sections of the conventional mode concerning student gain on the Writing Test, and 3 sections of the conventional mode concerning student gain on the Attitude Scale. However, not all students were considered in these sections; Table IV presents a tabulation of the number of students responding to each test under the conditions that

TABLE IV

NUMBER OF STUDENT RESPONDENTS
BY INSTRUMENT*

Instrument	Conventional	Mastery L.	Total
Reading Test	103	270	373
Writing Test (pre-)	102	259	361
Attitude Scale (pre-)	92	222	314
ACT-Eng.	93	254	347
ACT-Comp.	93	254	347
SSHPQ-Ques. 1	97	225	322
SSHPQ-Ques. 2	96	221	317
SSHPQ-Ques. 3	97	226	323
SSHPQ-Ques. 4	97	226	323
SSHPW-Ques. 5	97	225	322
SSHPQ-Ques. 6	96	226	322
SSHPQ-Ques. 7	96	227	323
SSHPQ-Ques. 8	96	227	323
SSHPQ-Ques. 9	97	227	324
SSHPQ-Ques. 10	97	227	324
SSHPQ-Ques. 11	97	225	325
SSHPW-Ques. 12	97	227	324
SSHPQ-Ques. 13	97	226	323
SSHPQ-Ques. 14	97	227	324
SSHPQ-Ques. 15	96	227	323
SSHPQ-Ques. 16	96	227	323
SSHPQ-Ques. 17	97	227	323
SSHPQ-Ques. 18	97	224	321
SSHPQ-Ques. 19	96	225	321
SSHPQ-Ques. 20	96	223	319
SSHPQ-Ques. 21	95	225	320
SSHPQ-Ques. 22	96	227	323
SSHPQ-Ques. 23	95	227	322
SSHPQ-Ques. 24	95	226	321
SSHPQ-Ques. 25	95	227	322
SSHPQ-Ques. 26	95	227	322
Writing Test (post-)	115	282	397
Attitude Scale (post-)	59	259	318
Gain Score-Writing	102	259	361
Gain Score-Attitude	51	208	259

*Only students who had taken both the pre- and post-tests of the Writing Test are considered.

their gain score upon the Writing Test could be determined. From this table, it is seen that 397 students (or 72% of the original 550 students) took both the pre- and post-tests of the Writing Test (approximately 77% of the conventional students and 70% of the mastery learning students); only 258 students (47% of the original enrollees) completed both the pre- and post-tests of the Attitude Scale in useable form.

Furthermore, the data presented in Table IV can be misleading in the sense that for certain of the statistical analyses performed (e.g., regression analysis) only those students who completed all measures were considered. In the conventional mode of instruction, 45 students completed all measures and had a gain score on the Attitude Scale while 83 students completed all measures and had a gain score on the Writing Test. Similar figures for the mastery learning mode were 192 and 205 students respectively. For certain other analyses (e.g., the z-test), it was only required that a student had taken both the pre- and post-tests of the Writing Test or Attitude Scale. In this regard, 102 conventional students had a gain score on the Writing Test and 51 on the Attitude Scale; in the mastery learning sections, 259 had gain scores on the Writing Test and 208 on the Attitude Scale. In all cases, of course, the largest permissable sample size was employed; the sample size involved in each analysis will be presented with the results of the analysis in Chapter V.

Research Questions

The purpose of the study was threefold: (1) to investigate the validity of the research methodology which sought to compare methods of instruction through the application of simple univariate statistical

procedures; (2) to contribute to the development of the theoretical position which contends that students of different abilities, needs, preferences, and attitudes should be differentially instructed on the basis of these characteristics; and, (3) to yield information which may be used to counsel and guide students in their selection among alternative modes of instruction.

To satisfy this threefold purpose, three research questions were considered.

Research Question 1

Irrespective of individual student characteristics, does the typical student enrolled in the mastery learning mode "succeed" to a different level than the typical student enrolled in the conventional mode of instruction?

Research Question 2

Considering individual student characteristics, do different "kinds" of students "succeed" to different levels in the mastery learning mode as opposed to the conventional mode of instruction?

Research Question 3

What student characteristics influence the differential level of "success" between the two modes?

Obviously, these three questions are inter-dependent, with Research Question 2 being prime. If Research Question 2 can be answered affirmatively, then the methodology which averaged all students within a mode and compared two such averages (i.e., the methodology

of Research Question 1) was not a valid approach to the problem inasmuch as a significant variable--the individual student--had been ignored. And, if Research Question 2 cannot be answered affirmatively, then Research Question 3 would not be functional.

Primary Hypotheses and Analytical Procedures

Research Question 1

The analytical procedure employed to answer this question was the methodology which has characterized inter-mode of instruction comparative research for the past 50 years. Mean Attitude Scale and Writing Test gain scores were calculated for all students enrolled in the mastery learning mode; the same statistics were computed for all students enrolled in the conventional mode of instruction. The *z*-test (the large sample size equivalent to the Student *t*-test) was then employed to test the following hypotheses.[22]

Hypothesis 1.1 There is no difference between the mean gain score on the Writing Test for all students enrolled in the conventional mode and the mean gain score on the Writing Test for all students enrolled in the mastery learning mode.

Hypothesis 1.2 There is no difference between the mean gain score on the Attitude Scale for all students enrolled in the conventional mode and the mean gain score on the Attitude Scale for all students enrolled in the mastery learning mode.

Research Question 2

The primary analytical procedure employed to explore this question was multiple linear regression.[23] That is, the student characteristic research variables were used to predict student gain scores for the Attitude Scale and Writing Test for each of the two modes. Thus, under this approach, Research Question 2 was transformed into the following two questions.

Research Question 2.1 How did the linear predictor of the gain score on the Writing Test for students in the mastery learning mode compare with that for the conventional mode of instruction?

Research Question 2.2 How did the linear predictor of the gain score on the Attitude Scale for students in the mastery learning mode compare with that for the conventional mode of instruction?

Obviously, these two questions could not be considered unless/until the linear predictors had been produced. Thus, the following four hypotheses were tested:

Hypothesis 2.1 There is no linear relationship between the independent variables (i.e., student characteristic research variables) and student gain score on the Writing Test within the mastery learning mode of instruction.

Hypothesis 2.2 There is no linear relationship between the independent variables and student gain score on the Writing Test within the conventional mode of instruction.

Hypothesis 2.3 There is no linear relationship between the independent variables and student gain score on the Attitude Scale within the mastery learning mode of instruction.

Hypothesis 2.4 There is no linear relationship between the independent variables and student gain score on the Attitude Scale within the conventional mode of instruction.

The F-test was used to test these hypotheses.[24]

In regard to the analytical approach to Research Question 2, multiple linear regression could only be applied if there were no linear dependencies among the predictor variables; that is, the predictor variables were not multicolinear. To ensure that the predictor variables were not multicolinear, therefore, a Principal Components Analysis was performed. Basically, Principal Components Analysis maps all the predictor variables (in the case at hand, the 31 student characteristic research variables) into orthogonal linear factors produced on the basis of extracting maximum variance. Hence, the multiple linear regression analysis outlined above was performed using the principal components so derived and not the 31 student characteristic research variables taken as independent measures.

Research Question 3

After Research Question 2 was answered affirmatively, the results of the multiple linear regresssion analysis served to answer Research Question 3, at least partially. That is, an inspection of the differences between the coefficients and factors of the linear predictors for each gain score between modes revealed the differential student characteristics "demanded" by each mode to yield "success" (i. e., a high gain score). The results of this inspection, of course, were in terms of the principal components.

The above investigation did not, however, reveal if a mode

"demanded" the subject characteristics of all its students, only the highly successful students, or only the highly non-successful students. To overcome this deficiency, Discriminant Analysis was performed.[25] Basically, Discriminant Analysis produces a function which, on the basis of in-coming variables, best discriminates between two known groups. For the present purpose, the two groups were defined by students who had "succeeded" (i.e., had a gain score in the top quartile of all gain scores) and by students who had "failed" (i.e., had a gain score in the bottom quartile of all gain scores). Thus, Discriminant Analysis was performed between "success" and "failure" in the mastery learning mode, and a success/failure-mastery learning mode discriminant function was produced. This function was used to classify those students who "succeeded" in the conventional mode of instruction and then those students who did not "succeed" in the conventional mode. Discriminant Analysis does not generate any testable hypotheses.

Both Discriminant Analysis and multiple linear regression are multivariate methods and, as such, consider a "composite" of all independent variables. It was possible that one or a few of the student characteristic research variables taken separately indicated differential student "success" between or within the modes of instruction. To explore this possibility, a series of Chi-square tests were performed.[26] Since the Chi-square is a non-parametric test, the same categorization scheme employed by the Discriminant Analysis was employed. The interpretation of such a battery of tests was limited, however. For, if a series of Chi-square tests (or any other univariate method) are performed, one for each of several dependent (correlated) variables, the observed significance level for any one test is suspect--that is, the

true significance level will be higher than that observed. Therefore, although the null hypothesis can be correctly "accepted," it cannot be rejected--only tendencies can be observed. However, in the present situation, such a result served the useful purpose of indicating directions for future research.

Each Chi-square tested a unique hypothesis; however, all such hypotheses had the same "form." That is, each Chi-square investigated the hypothesis of equality between the distribution functions of the two or more groups considered.

For all hypotheses tested in the study, statistical significance was accepted at the .05 level. All statistical analyses were performed using the procedures of the Statistical Analysis System (SAS) and are explained in The User's Guide to the Statistical Analysis System.[27]

Assumptions and Limitations of the Study

1. It was assumed that the objectives of "English 1113" were the same in both modes.

2. It was assumed that the students enrolled and the teachers assigned to teach the 19 sections of "English 1113" studied were not extraordinary. It was assumed that the variance between teachers was relatively small.

3. It was assumed that the carry-over effect between the pre- and post-testings of the Attitude Scale was small and not systematically biased.

4. It was assumed that the Attitude Scale and Writing Test were valid for the purposes of the study.

5. It was assumed that the student responses on the SSHPQ and Attitude Scale were not overtly biased by an Experimenter Bias or Demand Characteristic Effect.[28]

6. The study was distinctly limited to the research characteristic variables employed, the modes of instruction studied, the subject matter considered, and the dimensions of "success" examined.

7. The results can be generalized only to similar situations, populations, and subject matter areas.

It is hoped that the study will be viewed as exploratory, as a foundation for future research and not an end in itself.

FOOTNOTES

[1]J. Campbell, Rules of Uniformity in Composition Courses English Department, Oklahoma State University (Stillwater, Oklahoma, 1974), p. 10.

[2]S. Witte, "A Proposed Experimental Alternative Method for Teaching Composition at Oklahoma State University" (unpub. memorandum, Oklahoma State University, 1974).

[3]Of course, the major objectives of the "experimental" and the "conventional" "English 1113" programs were identical and as stated in The Rules of Uniformity in Composition Courses.

[4]A. L. Raygor, McGraw-Hill Basic Skills System Writing Test: Examiner's Manual (Monterey, California, 1970).

[5]Witte, pp. 1-3.

[6]A. L. Raygor, The McGraw-Hill Basic Skills System Reading Test: Examiner's Manual (Monterey, California, 1970).

[7]American College Testing Program Technical Report, American College Testing Program (Iowa City, 1965).

[8]H. Hotelling, "Analysis of a Complex of Statistical Variables into Principal Components," Journal of Educational Psychology, 24 (1933), pp. 417-41, 498-520.

[9]American College Testing Program Technical Report, pp. 4-5.

[10]Ibid., p. 3.

[11]O. Buros, ed., Sixth Mental Measurement Yearbook (Highland Park, New Jersey, 1965), p. 4.

[12]A. L. Raygor, The McGraw-Hill Basic Skills System Writing Test: Examiner's Manual, p. 26.

[13]Ibid., pp. 28-30.

[14]A. L. Raygor, The McGraw-Hill Basic Skills System Reading Test: Examiner's Manual, p. 7.

[15]The reading rate was not employed as a student characteristic research variable in the present study.

[16]A. L. Raygor, The McGraw-Hill Basic Skills System Reading Test: Examiner's Manual, pp. 30-31.

[17]Ibid., pp. 32-33.

[18]M. E. Shaw and J. M. Wright, Scales for the Measurement of Attitudes (New York, 1967), pp. 342-343.

[19]L. R. Aiken and R. M. Dreger, "The Effect of Attitudes on Performance in Mathematics," Journal of Educational Psychology, 52 (1961), p. 20.

[20]Ibid.

[21]A. S. Davis, W. J. Davis, and L. Vadala, "Student Success and Non-Success in the Individually Paced Instruction Pre-Calculus Mathematics Program" (unpub. memorandum, Oklahoma State University, 1974).

[22]G. W. Snedecor and W. G. Cochran, Statistical Methods (6th ed., Ames, Iowa, 1967), p. 51.

[23]Ibid., pp. 135-170.

[24]Ibid., pp. 116-117.

[25]Ibid., pp. 414-418.

[26]Ibid., pp. 20-28.

[27]J. Service, A User's Guide to the Statistical Analysis System (Raleigh, North Carolina, 1972).

[28]W. J. Gephart and D. P. Antonoplos, "The Effects of Expectancy and Other Research-Biasing Factors," Phi Delta Kappan, 50 (1969), pp. 579-583.

CHAPTER V

PRESENTATION AND ANALYSIS OF DATA

The presentation and analysis of data for this research are reported as they relate to each of the research questions under study. Hypotheses that were supported at an observed significance level of .05 were accepted.

Research Question 1

> Irrespective of individual student characteristics, did the typical student enrolled in the mastery learning mode "succeed" to a different level than the typical student enrolled in the conventional mode of instruction?

This research question is explored by Hypotheses 1.1. and 1.2; pertinent data is presented in Tables V and VI.

> Hypothesis 1.1 There is no difference between the mean gain score on the Writing Test for all students enrolled in the conventional mode and the mean gain score on the Writing Test for all students enrolled in the mastery learning mode of instruction.

As is seen from Table V, the *z*-test value of 0.942 was not significant at the .05 level, and the hypothesis of no difference was accepted. Therefore, under the conditions of the statistical test and with respect to "producing" a gain score on the Writing Test, neither mode was more or less "successful" than the other.

> Hypothesis 1.2 There is no difference between the mean gain score on the Attitude Scale for all students enrolled in the conventional mode and the mean gain score on the Attitude Scale for all students enrolled in the mastery learning mode of instruction.

TABLE V

MEAN GAIN SCORES ON THE WRITING TEST, STANDARD DEVIATIONS, AND z-TEST VALUE BETWEEN THE MASTERY LEARNING AND CONVENTIONAL MODES

Group	Number	Mean	Standard Deviation	Value	Obs. Sig. Level
Mastery Learning	259	3.680	6.762		
				0.942	0.374
Conventional	102	3.098	5.345		

As is seen from Table VI, the z-test value of 1.642 was not significant at the .05 level, and the hypothesis of no difference was accepted. Therefore, under the conditions of the statistical test and with respect to "producing" a gain score on the Attitude Scale, neither mode was more or less "successful" than the other.

Thus, with respect to Research Question 1 it was concluded that the employment of the typical research methodology of the past 50 years produced the typical research finding of the past 50 years--no significant difference was observed between the two modes of instruction.

Research Question 2

> Considering individual student characteristics, did different "kinds" of students "succeed" to different levels in the mastery learning mode as opposed to the conventional mode of instruction?

As was noted in Chapter IV, the first analytical step leading to

the resolution of Research Question 2 was to ensure that the 31 student characteristic research variables (i.e., the predictor variables) were not multicolinear. To this end, a Principal Components Analysis was performed on these variables after they were standardized by subtracting their respective means and dividing by their respective standard deviations. Table VII presents the mean and standard deviation of each of the 31 student characteristic research variables. The criteria adopted for accepting a component (i.e., factor) was the determination of an eigenvalue greater than or equal to 1.00.[1] Table VIII presents the "Rotated Factor Matrix" (Varimax orthogonal rotation); Table IX presents the eigenvalues, cumulative percentage of eigenvalues, and percentage of variance explained by the principal components which were accepted.[2]

TABLE VI

MEAN GAIN SCORES ON THE ATTITUDE SCALE, STANDARD DEVIATIONS, AND $\underline{z}$-TEST VALUE BETWEEN THE MASTERY LEARNING AND CONVENTIONAL MODES

Group	Number	Mean	Standard Deviation	Value	Obs. Sig. Level
Mastery Learning	208	-0.462	14.545		
				1.642	0.111
Conventional	51	1.235	11.590		

TABLE VII

MEANS AND STANDARD DEVIATIONS OF STUDENT CHARACTERISTIC RESEARCH VARIABLES

Variable	Number	Mean	Standard Dev.
Reading Test	373	52.879	8.806
Writing Test pre-	361	45.296	7.274
Attitude Scale pre-	314	59.395	15.642
ACT-Eng.	347	19.392	4.063
ACT-Comp.	347	20.259	4.332
SSHPQ-Ques. 1	322	1.602	0.747
SSHPQ-Ques. 2	317	1.871	1.242
SSHPQ-Ques. 3	323	1.505	0.753
SSHPQ-Ques. 4	323	1.604	1.029
SSHPQ-Ques. 5	322	1.519	0.500
SSHPQ-Ques. 6	322	2.627	1.209
SSHPQ-Ques. 7	323	3.186	1.212
SSHPQ-Ques. 8	323	2.195	1.206
SSHPQ-Ques. 9	324	3.846	1.168
SSHPQ-Ques. 10	324	2.883	1.188
SSHPQ-Ques. 11	322	2.388	1.290
SSHPQ-Ques. 12	324	3.167	1.205
SSHPQ-Ques. 13	323	1.975	0.971
SSHPQ-Ques. 14	324	2.787	1.143
SSHPQ-Ques. 15	323	2.910	1.370
SSHPQ-Ques. 16	323	2.415	1.227
SSHPQ-Ques. 17	324	2.290	1.057
SSHPQ-Ques. 18	321	2.000	1.126
SSHPQ-Ques. 19	321	3.252	0.849
SSHPQ-Ques. 20	319	3.730	0.909
SSHPQ-Ques. 21	320	3.216	0.963
SSHPQ-Ques. 22	323	3.446	1.271
SSHPQ-Ques. 23	322	2.078	0.919
SSHPQ-Ques. 24	321	2.539	1.024
SSHPQ-Ques. 25	322	2.700	1.179
SSHPQ-Ques. 26	322	2.407	1.346

TABLE VIII

PRINCIPAL COMPONENTS ANALYSIS: ROTATED FACTOR MATRIX

Variable	Fac.1	Fac.2	Fac.3	Fac.4	Fac.5	Fac.6	Fac.7	Fac.8	Fac.9	Fac.10	Fac.11
Reading	.807	-.043	-.059	.205	.070	-.033	-.092	-.019	.026	.051	.031
Writing (pre)	.820	-.003	.020	-.002	-.037	-.033	.070	.005	.022	-.013	.000
Att. (pre)	.031	.812	.092	.081	-.047	.084	.127	-.014	-.151	.018	-.084
ACT-Eng.	.851	.056	.019	.022	-.085	.004	.018	-.065	-.058	-.038	-.022
ACT-Comp.	.846	-.056	.017	.122	.087	.036	-.081	-.018	.021	.044	.007
SSHPQ-1	.031	.020	.038	-.021	-.171	-.195	.101	-.659	-.037	.014	.144
SSHPQ-2	.023	-.056	-.003	-.048	.048	.046	.110	.126	.812	.077	-.060
SSHPQ-3	-.012	-.100	-.626	-.101	-.037	-.072	-.176	.312	.023	.183	-.015
SSHPQ-4	-.204	.036	-.066	.251	.100	.249	-.403	-.416	.134	.069	-.033
SSHPQ-5	.077	-.671	-.014	.076	.006	-.155	.065	.017	-.024	.102	.062
SSHPQ-6	.015	.014	.737	.013	-.096	.020	-.007	.145	-.019	.097	-.001
SSHPQ-7	-.111	.117	.240	-.088	-.313	.562	-.283	.091	-.072	.110	-.072
SSHPQ-8	.000	-.013	.088	-.108	.244	.648	-.026	.053	.092	-.092	.094
SSHPQ-9	.032	-.690	-.100	-.030	.008	.212	.123	-.011	-.039	.008	-.201
SSHPQ-10	-.065	-.379	.045	-.360	.064	.172	.456	-.217	.054	-.045	-.016
SSHPQ-11	-.069	.188	-.120	-.713	.023	.078	.001	.194	-.080	-.025	.121
SSHPQ-12	.062	-.048	-.362	.144	-.164	.601	.211	.041	-.025	.044	.068
SSHPQ-13	-.014	-.029	.445	.146	.297	-.211	.153	-.055	.113	.368	.178
SSHPQ-14	-.009	-.462	.128	.089	.325	-.016	-.184	.236	-.113	-.115	-.017
SSHPQ-15	-.106	.137	.082	.131	.040	-.014	.708	-.020	.054	.058	.028
SSHPQ-16	.047	-.030	.044	-.097	.000	.090	.049	-.022	-.044	.051	.848
SSHPQ-17	.044	-.004	.043	-.037	-.076	-.015	.031	-.014	.069	.809	.071
SSHPQ-18	-.149	.030	-.128	-.624	.141	-.016	-.092	-.015	.037	.056	.367
SSHPQ-19	-.112	-.395	-.126	-.319	-.052	-.104	-.311	-.120	.349	.128	-.038
SSHPQ-20	-.107	-.048	.149	-.082	-.705	.039	-.031	.009	-.167	.000	-.041
SSHPQ-21	-.182	-.098	.103	-.692	-.141	.002	-.033	-.070	.166	.050	-.203
SSHPQ-22	-.030	.194	-.052	.067	-.438	-.048	.231	.031	-.402	.220	-.103
SSHPQ-23	-.138	-.188	.163	-.166	.572	.071	.085	.113	-.215	.063	-.093
SSHPQ-24	-.030	-.114	.146	-.154	.276	.188	-.334	.146	-.195	.414	-.216
SSHPQ-25	-.016	-.602	.113	.196	.115	.125	-.237	.243	.157	-.068	.105
SSHPQ-26	-.215	-.202	-.012	-.081	-.026	.061	.497	.246	.062	.062	.222

TABLE IX

PRINCIPAL COMPONENTS ANALYSIS: EIGENVALUES AND VARIANCE EXPLAINED

Factor (Component)	Eigen Value	Cumulative % of Eigenvalues	% Variance Explained
1	3.400	.110	16.13
2	3.047	.208	14.31
3	1.888	.269	8.22
4	1.712	.324	10.57
5	1.518	.373	8.74
6	1.391	.418	7.76
7	1.302	.460	8.09
8	1.166	.498	6.78
9	1.133	.534	6.86
10	1.041	.568	6.23
11	1.021	.601	6.30
12 (rejected)	.942		

From these tables it is seen that 11 principal components were accepted and that the first five of these components explained 58% of the variance. For the remainder of the present discussion, these 11 components will be termed "Factor 1" through "Factor 11," respectively.

By viewing the student characteristic research variables which had a high (either positive or negative) communality (i.e., h^2) within a factor, one gains a notion of what that particular factor "represented." For example, the highest communalities within Factor 1 were those of the Reading Test (.807), the Writing Test (.820), the ACT-Eng. (.851), and the ACT-Comp. (.846); all other variables had a loading less than .250. Therefore, it could be concluded that Factor 1 represents an "Achievement Factor." Similarly, Factor 2 could be considered to be an "Attitude Factor," Factor 3 a "Sociability Factor" and Factor 4 a

"Preference for Reading Factor." The remaining seven factors could be similarly analyzed and named.

These 11 factors served as the predictor variables in the second analytical step leading to the resolution of Research Question 2--multiple linear regression analysis. Four regression lines were produced--one for each of the two dimensions of "success" (i.e., the gain score on the Writing Test and the gain score on the Attitude Scale) and for the two modes of instruction. The backward elimination procedure was employed.[3] In this analysis, only those students who have completed all of the instruments (pretest on the Attitude Scale, pretest on the Writing Test, the Reading Test, both ACT measures, the SSHPQ, and the posttest on the subject dependent variable) were considered. The statistical results of this analysis are presented in Tables X, XI, XII, and XIII; the information contained in these tables was used to test Hypotheses 2.1, 2.2, 2.3, and 2.4, respectively.

> Hypothesis 2.1 There is no linear relationship between the independent variables and student gain score on the Writing Test within the mastery learning mode of instruction.

As is seen from Table X, the F-test value of 4.11 was significant at the .05 level, and the hypothesis of "no linear relationship" was rejected. Thus, the linear predictor of the student gain score on the Writing Test (GW) within the mastery learning mode (GW_{ml}) in terms of the student characteristic research variables expressed in the form of Factors 1 through 11 was the following:

$$GW_{ml} = 4.203 - (.888)*\text{Factor 6} - (.710)*\text{Factor 11} - (.240)*\text{Factor 1} \qquad (1)$$

Factors 6, 11, and 1 were the only factors deemed significant at the .10 level of significance.

TABLE X

MULTIPLE LINEAR REGRESSION:
GAIN SCORE WRITING TEST--
MASTERY LEARNING MODE

MODEL:* $GW_{ML} = Mean + B_1*Fac.1 + B_2*Fac.6 + B_3*Fac.11$

Source	Deg. F.	Sum of Sq.	Mean Sq.	F. Value	Obs. Sig. Level
Regression	3	483.32	161.11	4.11	.008
Error	201	7888.32	39.25		
Corrected Total	204	8371.64			

r (mult. lin. correlation coef.) = 0.240

Source	B Val.	Calc. t H_0: B=0	Obs. Sig. Level	Std. Error B
Mean	4.203			
Fac. 6	-.888	-2.87	.005	.309
Fac. 11	-.710	0.19	.053	.369
Fac. 1	-.240	-1.64	.098	.146

*Only variables (factors) deemed signficant at the .10 level are included in the model; all other variables are eliminated.

TABLE XI

MULTIPLE LINEAR REGRESSION: GAIN SCORE
WRITING TEST--CONVENTIONAL MODE

MODEL:* $GW_C = Mean + B_1 * Fac.4$

Source	Deg. F.	Sum of Sq.	Mean Sq.	F-Value	Obs. Sig. Level
Regression	1	101.28	101.28	3.531	.061
Error	81	2323.52	28.69		
Corrected Total	82	2424.80			

r (mult. lin. correlation coef.) = 0.204

Source	B. Val.	Calc. t H_0: B=0	Obs. Sig. Level	Std. Error B
Mean	2.945			
Fac. 4	.693	1.88	.061	.369

*Only variables (factors) deemed significant at the .10 level are included in the model; all other variables are eliminated.

TABLE XII

MULTIPLE LINEAR REGRESSION: GAIN SCORE
ATTITUDE SCALE--MASTERY
LEARNING MODE

MODEL:* $GA_{ML} = Mean + B_1 * Fac.\ 2 + B_2 * Fac.5$

Source	Deg. F.	Sum of Sq.	Mean Sq.	F-Value	Obs Sig. Level
Regression	2	4102.51	2051.26		
Error	189	35486.16	187.76	10.93	.0001
Corrected Total	191	35486.67			

r (mult. lin. cor. coef.) = 0.322

Source	B. Val.	Calc. t H_0: B=0	Obs. Sig. Level	Std. Error B
Mean	-0.576			
Fac. 2	-1.995	-4.66	.0001	.428
Fac. 5	-1.295	-1.87	.0594	.692

*Only variables (factors) deemed significant at the .10 level are included in the model; all other variables are eliminated.

TABLE XIII

MULTIPLE LINEAR REGRESSION: GAIN SCORE
ATTITUDE SCALE--CONVENTIONAL MODE

MODEL:* $GA_C = Mean + B_1 * Fac.2 + B_2 * Fac.\ 5$

Source	Deg. F.	Sum of Sq.	Mean Sq.	F-Value	Obs. Sig. Level
Regression	2	2505.56	1252.78	16.248	.0001
Error	42	3238.35	77.10		
Corrected Total	44	5743.91			

r (mult. lin. cor. coef.) = 0.660

Source	B. Val.	Calc. t H_0: B=0	Obs. Sig. Level	Std. Error B
Mean	1.751			
Fac.2	-3.201	-5.70	.0001	.562
Fac.5	-2.940	-3.23	.0027	.910

*Only variables (factors) deemed significant at the .10 level are included in the model; all other variables are eliminated.

Although this fit was significant, the square of the multiple correlation coefficient (i.e., "r") presented in Table X indicated that the equation explained only 5.7% of the variance. This implied that although a better prediction could be made of GW_{ml} when the values of Factors 6, 11, and 1 were known as opposed to when they were not known, these factors were not crucial. That is, the above equation was not a "good" predictor of GW_{ml} but it was reasonable to assume that a "good" predictive equation would include Factors 6, 11, and 1.

Hypothesis 2.2 There is no linear relationship between the independent variables and student gain score on the Writing Test within the conventional mode of instruction.

As is seen from Table XI, the F-test value of 3.531 was not significant at the .05 level, and the hypothesis of "no significant linear relationship" was accepted. That is, on the basis of the 11 factors, the gain score on the Writing Test for conventional students (GW_c) could not be predicted with 95% confidence.

The observed significance level of the F-test value was .061, thus revealing that the F-test value failed to reach significance by a narrow margin. The linear predictor which was produced, but rejected, was the following:

$$GW_c = 2.945 + (.693)*\text{Factor 4} \qquad (2)$$

This equation explained only 4.2% of the variance.

Hypothesis 2.3 There is no linear relationship between the independent variables and student gain score on the Attitude Scale within the mastery learning mode of instruction.

As is seen from Table XII, the F-test value of 10.925 was significant at the .05 level, and the hypothesis of "no linear relationship" was rejected. The linear predictor of the student gain score on the Attitude Scale within the mastery learning mode (GA_{ml}) was:

$$GA_{ml} = -.576 - (1.995)*\text{Factor 2} - (1.295)*\text{Factor 5} \quad (3)$$

This equation explained 10.4% of the variance. Factors 2 and 5 were the only factors deemed significant at the .0 level of significance.

Hypothesis 2.4 There is no linear relationship between the independent variables and student gain score on the Attitude Scale within the conventional mode of instruction.

As is seen from Table XIII, the F-test value of 16.248 was significant at the .05 level, and the hypothesis of "no significant linear relationship" was rejected. The linear predictor of the student gain score on the Attitude Scale within the conventional mode (GA_c) was:

$$GA_c = 1.751 - (3.201)*\text{Factor 2} - (2.940)*\text{Factor 5} \quad (4)$$

This equation explained 43.6% of the variance. However, the high percentage of variance explained could be attributed to the fact that there were only 44 degrees of freedom and the analysis employed 11 predictor variables. Factors 2 and 5 were the only factors deemed significant at the .10 level of significance.

Research Question 2.1

How did the linear predictor of the gain score on the Writing Test for students in the mastery learning mode compare to that for the conventional mode?

The resolution of this question called for a comparison between the linear predictors for GW_{ml} and GW_c. However, as was noted under Hypothesis 2.2. above, the "best" linear predictor for GW_c based upon the 11 factors was deemed non-significant. The linear predictor for GW_{ml}, on the other hand, was significant at the .05 level (see Table X or Hypothesis 2.1 above) and contained three independent variables (Factors 1, 6, and 11). The simultaneous consideration of these two results

suggested that students who had low (due to the negative B weights) Factor 1, Factor 6, and Factor 11 scores tended to have high gain scores on the Writing Test in the mastery learning mode but not in the conventional mode of instruction. (If this occurence was true in the conventional mode, Factors 1, 6, and 11 would have emerged as predictors of GW_c.) This determination, of course, supported Research Question 2 inasmuch as it was found that a certain "kind" of student succeeded in the mastery learning mode, but the same "kind" of student did not succeed in the conventional mode.

The same conclusion was reached even if the linear predictor for GW_c had been deemed significant (in this regard, it was significant at the .07 level). For, in this case, the linear predictor of GW_c contained only one factor, Factor 4 (see Table XI). Hence, in comparison, it would be concluded that students who had a high score on Factor 4 tended to have a high gain score on the Writing Test in the conventional mode, but students who had a low score on a combination of Factors 1, 6, and 11, tended to have a high gain score on the Writing Test in the mastery learning mode. Once again, this implied that different "kinds" of students "succeed" to different levels of "success" between the two modes when "success" was measured by a positive gain score on the Writing Test.

However, these conclusions must be tempered under recognition of the small amount of variance explained by the predictor equations. Thus, although Research Qestion 2 was supported with respect to student gain upon the Writing Test, the foundation of this support was hardly firm.

Research Question 2.2

> How did the linear predictor of the gain score on the Attitude Scale for students in the mastery learning mode compare to that for the conventional mode of instruction?

The resolution of this question called for a comparison between the linear predictors for GA_{ml} and GA_{c}. Referring to Equations (3) and (4), it is seen that both predictors were composed of Factors 2 and 5. For both the conventional and mastery learning modes of instruction, then, students who scored low (due to the negative B weights) on a combination of Factor 2 and Factor 5 tended to have a high gain score on the Attitude Scale. Furthermore, when the numerical difference between respective B weights for the two equations were viewed with respect to their standard error of estimates (see Tables XII and XIII), it was concluded that, for all practical purposes, the two linear predictors were identical.

This conclusion, of course, failed to support Research Question 2 inasmuch as the same "kind" of student "succeeded" in the mastery learning and conventional modes of instruction when "success" was measured by a positive gain score on the Attitude Scale.

Research Question 3

> What student characteristics influenced the differential level of "success" between the two modes of instruction?

Due to the conclusions drawn concerning Research Question 2, Research Question 3 was only applicable to "success" defined by a positive gain score on the Writing Test.

As indicated under Research Question 2.1, students who had a

low score on Factors 1, 6, and 11 tended to have a high positive gain score in the mastery learning mode but not in the conventional mode.

The student characteristic research variables most heavily loaded (i.e., of highest communality) on Factor 1 were: (1) the Reading Test (.820), (2) the pretest of the Writing Test (.820), (3) the ACT-Eng. (.851), and (4) the ACT-Comp. (.846). Therefore, this factor could be interpreted as representing an "Achievement Factor."

The student characteristic research variables most heavily loaded on Factor 6 were items #7 (.562), #8 (.648), and #12 (.601) on the SSHPQ. Sequentially, these items were:

> I do well in classes that rely heavily on textbooks.
>
> If I read a chapter in a book and it doesn't make sense, I'm likely to re-read it several times until it does make sense.
>
> I prefer to be in lecture type classes.

Under the assumption that lecture-type classes relied more heavily on textbooks than did discussion-type classes, all three of the above items related to a preference toward instruction through reading and an affinity for reading. Factor 6, therefore, could be interpreted as representing a student's preference for instruction which relied on textbooks.

The only student characteristic research variable which had a loading greater than .250 on Factor 11 was item #16 (.848) on the SSHPQ. This item was:

> When told to write an essay, I prefer selecting my own topic to having one assigned to me.

Due to the high loading of this variable and the negligible loadings of all other variables, it was unwise to interpret Factor 11 as representing any general tendency. More appropriately, Factor 11 could be

interpreted as being primarily equivalent to item #16 on the SSHPQ.

In general, then, a student who had a small numerical score on an "achievement factor," a "preference for being instructed through the use of textbooks factor," and item #16 on the SSHPQ, was likely to have obtained a high gain score on the Writing Test in the mastery learning mode, but not in the conventional mode of instruction. It must be remembered, however, that for items #6 through #26 on the SSHPQ, a small numerical score indicated a strong degree of agreement with the item (i.e., the response of "strongly agree" was given a weight of "1"). Thus, the above determination could be restated as: students in the mastery learning mode who were likely to receive a high gain score on the Writing Test were characterized by having a low in-coming Reading Test score, Writing Test score, ACT-Eng. score, and ACT-Comp. score; strongly preferred to be instructed through textbooks; and strongly preferred to choose their own essay topics.

The practical usefulness of this finding is questionable since the predictor equation upon which it was based explained only 5.7% of the variance. Furthermore, multiple linear regression did not reveal if these characteristics were "demanded" of all students, only "successful" students, or only "non-successful" students. To investigate this issue, a Discriminant Analysis was performed.

Considering only those mastery learning students who had responded to all of the measurement instruments, a discriminant function was produced to discriminate between "success" and "failure" in the mastery learning mode of instruction. For this analysis, a "successful" student was defined as a student whose gain score on the Writing Test was in the top quartile of all such gain scores (i.e., for the subject

group a gain score greater than or equal to "8"); a "failing" student was defined as a student whose gain score on the Writing Test was in the bottom quartile of all such scores (i.e., a gain score less than or equal to "-1"). Using the discriminant function of the mastery learning mode, first "successful" and then "failing" students in the conventional mode were classified. The results of these two classification procedures are tabulated in Table XIV.

TABLE XIV

DISCRIMINANT ANALYSIS: SUMMARY OF CLASSIFICATION PERFORMANCE

Number of Obs. from Group:	Classified Into: Success	Failure	% Successful Classification
Successful mastery learning	28	11	71.8
Failing mastery learning	9	45	83.3
Successful conventional	3	12	20.0
Failing conventional	7	8	53.3

By comparing the "% of successful classifications" for similar groups between modes, it is seen that the mastery learning discriminant function was distinctly unsuccessful in correctly classifying either "successful" or "failing" conventional students. Therefore, it was

deduced that the difference identified between the students in the two modes by multiple linear regression analysis was spread throughout all students and not restricted to either of the extremes.

The last dimension of Research Question 3 investigated by the present study was the possibility that one, or a few, of the items on the SSHPQ, taken separately, differentiated between "success" and "failure" within and between the two modes of instruction.

To this end, four groups of students were formed on the basis of their mode of instruction and whether they were "successful" or "failing" students. "Success" and "failure" for this analysis were defined in the same manner as in the Discriminant Analysis procedure. A series of Chi-square tests was performed between the following groups of students: (1) "successful" and "failing" mastery learning students, (2) "successful" and "failing" conventional students, (3) "successful" mastery learning students and "successful" conventional students, and (4) "failing" mastery learning students and "failing" conventional students. The variables compared were the student responses to the 26 items of the SSHPQ. The results of these tests (before any "re-grouping" was performed) are tabulated by group and presented in Tables XV, XVI, XVII, and XVIII.

After certain of the analyses were re-grouped to conform to Cochran's criteria (i.e., the expected frequency in any cell could not be less than 1, or no less than 20% of the expected frequencies could be less than 5), only three of the 104 separate Chi-square analyses proved to be significant at the .05 level.[4] Furthermore, as was mentioned in Chapter IV, the observed significance level of these three tests were suspect; that is, the true significance level may well be

greater than that observed. With these limitations in mind, the three significant Chi-square analyses are presented in Tables XIX, XX, and XXI, and interpreted below.

TABLE XV

CHI-SQUARE ANALYSIS: SUCCESSFUL MASTERY LEARNING STUDENTS VS. SUCCESSFUL CONVENTIONAL STUDENTS

Variable	Chi-Square Value	d.f.*	Observed Sig. Level
SSHPQ-1	5.48	4	.240
SSHPQ-2	2.15	6	.905
SSHPQ-3	0.91	4	.921
SSHPQ-4	7.12	4	.128
SSHPQ-5	1.07	2	.593
SSHPQ-6	3.78	5	.584
SSHPQ-7	5.39	5	.370
SSHPQ-8	2.97	5	.707
SSHPQ-9	1.79	5	.880
SSHPQ-10	6.39	5	.270
SSHPQ-11	7.25	5	.202
SSHPQ-12	0.77	5	.976
SSHPQ-13	11.24	5	.046
SSHPQ-14	10.15	5	.070
SSHPQ-15	4.49	5	.482
SSHPQ-16	1.32	5	.932
SSHPQ-17	6.88	5	.228
SSHPQ-18	4.04	5	.545
SSHPQ-19	4.45	5	.489
SSHPQ-20	6.11	4	.189
SSHPQ-21	5.27	5	.384
SSHPQ-22	4.70	5	.454
SSHPQ-23	2.48	5	.782
SSHPQ-24	3.29	5	.658
SSHPQ-25	0.67	5	.983
SSHPQ-26	3.57	5	.616

*No response on an item was considered to be a valid response.

TABLE XVI

CHI-SQUARE ANALYSIS: SUCCESSFUL MASTERY LEARNING STUDENTS VS. FAILING MASTERY LEARNING STUDENTS

Variable	Chi-Square Value	d.f.*	Observed Sig. Level
SSHPQ-1	2.64	4	.622
SSHPQ-2	5.49	6	.483
SSHPQ-3	3.39	4	.496
SSHPQ-4	0.88	4	.926
SSHPQ-5	1.42	2	.496
SSHPQ-6	2.02	5	.847
SSHPQ-7	3.83	5	.575
SSHPQ-8	5.83	5	.323
SSHPQ-9	10.31	5	.066
SSHPQ-10	1.80	5	.877
SSHPQ-11	1.89	5	.865
SSHPQ-12	1.31	5	.933
SSHPQ-13	4.38	5	.498
SSHPQ-14	6.70	5	.243
SSHPQ-15	4.30	5	.509
SSHPQ-16	4.24	5	.517
SSHPQ-17	1.08	5	.955
SSHPQ-18	3.63	5	.606
SSHPQ-19	3.09	4	.546
SSHPQ-20	1.53	4	.824
SSHPQ-21	4.72	5	.452
SSHPQ-22	1.37	5	.927
SSHPQ-23	4.35	5	.501
SSHPQ-24	1.60	5	.901
SSHPQ-25	5.95	5	.311
SSHPQ-26	2.92	5	.716

* No response on an item was considered to be a valid response.

TABLE XVII

CHI-SQUARE ANALYSIS: SUCCESSFUL CONVENTIONAL STUDENTS VS. FAILING CONVENTIONAL STUDENTS

Variable	Chi-Square Value	d.f.*	Observed Sig. Level
SSHPQ-1	2.73	3	.438
SSHPQ-2	3.07	5	.692
SSHPQ-3	3.19	3	.364
SSHPQ-4	9.04	4	.059
SSHPQ-5	0.61	2	.742
SSHPQ-6	3.86	5	.571
SSHPQ-7	3.84	5	.575
SSHPQ-8	4.26	5	.514
SSHPQ-9	2.39	5	.800
SSHPQ-10	4.46	5	.487
SSHPQ-11	4.94	5	.424
SSHPQ-12	2.11	5	.834
SSHPQ-13	9.15	5	.102
SSHPQ-14	3.23	5	.667
SSHPQ-15	3.14	5	.681
SSHPQ-16	2.65	5	.756
SSHPQ-17	10.09	5	.072
SSHPQ-18	2.55	4	.639
SSHPQ-19	3.96	5	.557
SSHPQ-20	3.73	4	.445
SSHPQ-21	6.63	5	.249
SSHPQ-22	3.99	5	.553
SSHPQ-23	2.47	4	.654
SSHPQ-24	3.73	5	.591
SSHPQ-25	3.58	5	.614
SSHPQ-26	2.69	5	.750

*No response on an item was considered to be a valid response.

TABLE XVIII

CHI-SQUARE ANALYSIS: FAILING MASTERY LEARNING STUDENTS VS. FAILING CONVENTIONAL STUDENTS

Variable	Chi-Square Value	d.f.*	Observed Sig. Level
SSHPQ-1	7.15	4	.127
SSHPQ-2	15.35	6	.018
SSHPQ-3	5.52	4	.237
SSHPQ-4	4.48	4	.345
SSHPQ-5	3.92	2	.138
SSHPQ-6	4.79	5	.443
SSHPQ-7	7.02	5	.218
SSHPQ-8	5.08	5	.406
SSHPQ-9	5.33	5	.377
SSHPQ-10	8.51	5	.129
SSHPQ-11	3.08	5	.690
SSHPQ-12	3.90	5	.568
SSHPQ-13	3.68	4	.452
SSHPQ-14	5.65	5	.342
SSHPQ-15	5.31	5	.380
SSHPQ-16	1.82	5	.874
SSHPQ-17	8.90	5	.112
SSHPQ-18	3.76	5	.587
SSHPQ-19	2.24	4	.695
SSHPQ-20	4.13	4	.390
SSHPQ-21	6.07	5	.300
SSHPQ-22	4.64	5	.463
SSHPQ-23	5.76	4	.217
SSHPQ-24	6.95	5	.223
SSHPQ-25	9.41	5	.093
SSHPQ-26	3.44	5	.636

*No response on an item was considered to be a valid response.

TABLE XIX

CHI-SQUARE ANALYSIS: FAILING STUDENTS IN THE MASTERY LEARNING MODE VS. FAILING STUDENTS IN THE CONVENTIONAL MODE; ITEM #2 ON THE SSHPQ

Response to Item #2		Group: Conventional	Mastery L.	Totals
1 and 3	Obs.	13.00	45.00	58.00
	Exp.	16.57	41.43	58.00
	Cell χ^2	0.77	0.31	1.08
2 and 4	Obs.	7.00	5.00	12.00
	Exp.	3.43	8.57	12.00
	Cell χ^2	3.72	1.49	5.21
Totals	Obs.	20.00	50.00	70.00
	Exp.	20.00	50.00	70.00
	Cell χ^2	4.49	1.80	6.29

Chi-square = 6.29
d.f. = 2
Significant at the .05 level

Item #2 on the SSHPQ. When "failing" students in the conventional mode were compared with "failing" students in the mastery mode of instruction, the distribution functions of student response to Item #2 were significantly different at the .05 level of significance. Item #2 on the SSHPQ was:

> When I have a problem concerning a composition course, I usually solve it by consulting (1) the instructor, (2) the text, (3) another student, (4) my notes, (5) by not worrying about it, (6) by waiting until someone else brings it up in class.

TABLE XX

CHI-SQUARE ANALYSIS: SUCCESSFUL STUDENTS IN THE MASTERY LEARNING MODE VERSUS SUCCESSFUL STUDENTS IN THE CONVENTIONAL MODE; ITEM #13 ON THE SSHPQ

Response to Item #13 (*)		Group: Conventional	Mastery L.	Totals
1	Obs.	3.00	22.00	25.00
	Exp.	5.38	19.62	25.00
	Cell χ^2	1.05	0.29	1.34
2	Obs.	5.00	24.00	29.00
	Exp.	6.24	22.76	29.00
	Cell χ^2	0.25	0.07	0.32
3	Obs.	8.00	8.00	16.00
	Exp.	3.44	12.56	16.00
	Cell χ^2	6.04	1.66	7.70
4 and 5	Obs.	1.00	8.00	9.00
	Exp.	1.94	7.06	9.00
	Cell χ^2	0.46	0.13	0.59
Totals	Obs.	17.00	62.00	79.00
	Exp.	17.00	62.00	79.00
	Cell χ^2	7.80	2.15	9.95

Chi-square = 9.95
d. f. = 4.
Significant at the .05 level

(*) A response of "1" indicated "strong agreement" with the item; a response of "5" indicated "strong disagreement" with the item.

TABLE XXI

CHI-SQUARE ANALYSIS: SUCCESSFUL STUDENTS IN THE CONVENTIONAL MODE VERSUS FAILING STUDENTS IN THE CONVENTIONAL MODE; ITEM #17 ON THE SSHPQ

Response to Item #17 (*)		Group: Failure	Success	Totals
1 and 2	Obs.	9.00	13.00	22.00
	Exp.	12.41	9.59	22.00
	Cell	0.94	1.21	2.15
3,4,5	Obs.	13.00	4.00	17.00
	Exp.	9.59	7.41	17.00
	Cell	1.21	1.57	2.78
Totals	Obs.	22.00	17.00	39.00
	Exp.	22.00	17.00	39.00
	Cell	2.15	2.78	4.93

Chi-square = 4.93
d.f. = 2
Significant at the .05 level

(*) A response of "1" indicated "strong agreement" with the item; a response of "5" indicated "strong disagreement" with the item.

To conform to Cochran's criteria, responses 5 and 6 were eliminated, and responses 1 and 3, and 2 and 4 were grouped together. The conclusion derived from this analysis was, therefore, that students who had circled either response 2 or 4 were more apt to "fail" in the conventional mode than in the mastery learning mode of instruction. Responses 2 and 4, it is noted, dealt with a student's preference for consulting written material; responses 1 and 3 dealt with a student's preference for consulting another person verbally.

Item #13 on the SSHPQ. When "successful" students in the mastery learning mode were compared with "successful" students in the conventional mode, the distribution functions of student responses to Item #13 were significantly different at the .05 level. Item #13 on the SSHPQ was:

> I learn a subject better when I can discuss it with other students in my class.

Responses to this item ranged along a five-point continuum from "strongly agree" to "strongly disagree." To conform to Cochran's criteria, the two points of greatest disagreement were grouped together. The conclusion derived from this analysis was that mastery learning students who responded at the extremes of the continuum tended to "succeed" more frequently than their counterparts in the conventional mode of instruction; and, that conventional students who responded in the "middle" range of the continuum tended to "succeed" more frequently than their counterports in the mastery learning mode.

Item #17 on the SSHPQ. When "successful" students in the conventional mode were compared with "failing" students in the conventional mode, the distribution functions of student responses to Item #17 were significantly different on the.05 level. Item #17 on the SSHPQ was:

> Social recognition (that is, the respect or admiration of others) is very important to me.

Responses to this item ranged along a five-point continuum from "strongly agree" to "strongly disagree." To conform to Cochran's criteria, the two points of strongest agreement with the item were grouped together and the remaining three points formed a second category. From this analysis, one concludes that conventional students who either "agreed" or "strongly agreed" with Item #17 were more apt to "succeed" in the conventional mode than were students who did not so respond.

FOOTNOTES

[1]H. Hotelling, "Analysis of a Complex of Statistical Variables into Principal Components," Journal of Educational Psychology, 24 (1933), pp. 417-441, 498-520.

[2]H. H. Harmon, Modern Factor Analysis (2nd ed., Chicago, 1967), pp. 304-313.

[3]G. W. Snedecor and W. G. Cochran, Statistical Methods (6th ed., Ames, Iowa, 1967), pp. 412-414.

[4]W. J. Conover, Practical Nonparametric Statistics (New York, 1971), p. 152.

CHAPTER VI

SUMMARY, INTERPRETATION AND RECOMMENDATIONS FOR FUTURE STUDY

Review of the Study

This study was designed to determine if, on the basis of select personological variables, different "kinds" of students achieved different levels of "success" in two apparently different modes of instruction.

To be a valid exploration of this problem, the two modes of instruction studied had to be different. On a conceptual level, the mastery learning and conventional modes of instruction were compared, and it was deemed that several significant procedural differences existed between them. Therefore, a situation in which the mastery learning and conventional modes of instruction were employed to teach the same subject matter with the same objectives had to be identified. Such a situation was found in the instruction of "English 1113 (Freshman Composition)," an undergraduate course taught by the English Department of Oklahoma State University, during the fall semster of 1974. Fourteen sections of "English 1113" were taught using the mastery learning approach; these 14 sections were randomly assigned to already existing groups of students. That is, prior to the first day of class of the fall semester of 1974, students who were to be instructed via mastery learning had no knowledge that this was to be the case. Five sections

taught in the conventional mode of instruction were selected to "balance the design" with respect to the time of class meetings. Hence, the target sample of the study was all students enrolled in the 14 mastery learning sections of "English 1113" and all students enrolled in the five chosen conventional sections.

To be a fair and illuminating exploration of the basic problem, the particular personological variables (i.e., student characteristic research variables) selected for study had to be those which could be expected to identify differential student "success" between the conventional and mastery learning modes of instruction. On the basis of a conceptual comparison of the two subject modes of instruction and a review of the literature, several broad areas of such variables were identified (e.g., in-coming achievement, in-coming attitude, student preference for auditory or visual communication). To measure tendencies within these areas, six instruments were either selected or created. These instruments were: (1) the McGraw-Hill Basic Skills System Reading Test; (2) the McGraw-Hill Basic Skills System Writing Test; (3) the American College Test--Composite; (4) the American College Test--English Usage; (5) an attitude scale which purported to measure a student's attitude toward composition; and (6) a Student Study Habits and Preference Questionnaire (26 items). These six tests generated 31 measures which served as the primary independent variables of the study.

The basic problem of the study was distinctly limited to the definition of "instructional success" adopted. The definition so adopted was derived through consideration of the objectives of "English 1113" and the stated objectives behind the implementation of the

mastery learning mode of instruction. "Success of instruction" was defined as being either a positive gain score on the McGraw-Hill Basic Study Skills System Writing Test (i.e., factual knowledge) or a positive gain score on the Attitude Scale (i.e., attitude toward composition). Thus, the dependent variable of the study had two dimensions.

During the first week of the fall semester of 1974, all instruments except the American College Test were administered to the 19 sections. During the eighth week of the semester, the American College Test scores were obtained from the Registrar's Office of Oklahoma State University for those students who had completed this instrument prior to their entrance to the University.

Instruction of the 19 sections proceeded via the two modes for fourteen weeks before the second battery of tests were administered. Tests administered during the fifteenth week of the semester were the post-tests of the Attitude Scale and McGraw-Hill Basic Study Skills System Writing Test (Form B). Due to non-response, two sections in the mastery learning mode (both taught by the same instructor) were lost on both the Attitude Scale and Writing Test, and two sections taught by the conventional mode (one instructor) were lost on the Attitude Scale.

The purpose of the study was threefold: (1) to investigate the validity of the research methodology which seeks to compare methods of instruction through the application of simple univariate statistical procedures; (2) to contribute to the development of the theoretical position which contended that students of different abilities, needs, preferences, and attitudes should be differentially instructed on the basis of these characteristics; and, (3) to yield information which may be used to counsel and guide students in their selection among

alternative modes of instruction.

The data collected were analyzed with the intent to satisfy this purpose.

Summary of the Findings

The first analytical technique to which the data were subjected was the typical research methodology of the past 50 years concerning inter-mode of instruction comparisons. That is, the mean gain score on the Writing Test of all students enrolled in the mastery learning mode was compared by a z-test with the mean gain score on the Writing Test of all students enrolled in the conventional mode of instruction. A similar test was performed between the mean gain scores on the Attitude Scale for the same groups of students. Both hypotheses of "no significant difference" between the modes were accepted at the .05 level. Thus, it was concluded that the employment of the typical research methodology of the past 50 years generated the typical research finding of the past 50 years--"no significant difference was observed between the two methods of instruction."

The data were then analyzed with the intent to determine if, on the basis of the student characteristic research variables, different "kinds" of students achieved differential levels of "success" between the two modes. This basic question was explored independently for the two dimensions of instructional "success" adopted by the study: a gain score on the Attitude Scale and a gain score on the Writing Test. The principal statistical technique employed was multiple linear regression. To ensure that the student characteristic research variables were not multicolinear, a Principal Components Analysis was undertaken. Eleven

"factors" were produced which explained approximately 60% of the variance and served as the predictor variables for the regression analysis. Four linear predictors were produced: one for each of the gain scores taken by mode of instruction. On the basis of an F-test, the predictor of the gain score on the Writing Test for students enrolled in the conventional mode was deemed insignificant at the .05 level. The other three linear predictors were accepted as significant at the .05 level. All four of these regression equations were "suspect" in the sense that they explained relatively little of the variability of the data (typically less than 10%) or were based on a small sample. Thus, it was concluded that although a better prediction could be made of the gain scores (i.e., dependent variables) when the revealed predictor values were known as opposed to when they were not known, the predictor variables were not crucial in this predictive determination. Analysis continued under recognition of this circumstance.

The predictor equations of the gain score on the Attitude Scale for the two modes of instruction were compared. Both equations were comprised of identical factors; in comparison with their respective standard errors of estimate, the corresponding B-weights were deemed equivalent. Thus, with respect to a gain score on the Attitude Scale, the position that different "kinds" of students achieved differential levels of "success" between the conventional and mastery learning modes of instruction was not supported. For those student characteristic research variables employed in the study, the same "kind" of student achieved to the same level of "attitude improvement" regardless of the mode of instruction.

However, inasmuch as a significant linear predictor was determined

for a gain score on the Writing Test in the mastery learning mode but could not be determined for the conventional mode, the above-stated position was supported. That is, with respect to a gain score on the Writing Test, different "kinds" of students achieved differential levels of "success" between the conventional and mastery learning modes of instruction.

Considering only that dimension of "success" defined by a gain score on the Writing Test, the data were then analyzed to determine what "kinds" of students "succeeded" in the two instructional modes. However, any generalization of the findings in this area must be tempered by the fact that the predictor variables explained only a small percentage of the variability.

On the basis of the independent variables which comprised the linear predictor of a student's gain score on the Writing Test within the mastery learning mode, it was reasoned that students who had obtained low scores on Factors 1, 6, and 11 tended to have a high positive gain score in the mastery learning mode but not in the conventional mode. With some imprecision, these three factors were resolved into terms of the student characteristic research variables. Thus, in terms of the student characteristic research variables, mastery learning students who were likely to receive a high gain score on the Writing Test were characterized as having: (1) a low in-coming score on the Writing Test, (2) a low in-coming score on the Reading Test, (3) low in-coming scores on the two ACT measures, (4) strongly preferred to be instructed through textbook methods, and (5) strongly preferred to choose their own essay topics. Students with these qualities in the conventional mode of instruction did not make equal progress.

A Discriminant Analysis technique was employed to determine whether the same characteristics were "demanded" by each mode to obtain the same level of gain score between "successful" and "failing" students. "Successful" students were those whose gain scores on the Writing Test were in the top quartile of all such scores; "failing" students were those whose gain scores were in the bottom quartile. On the basis of this analysis, it was deduced that the difference identified between the students in the two modes through regression analysis was spread throughout all students and not restricted to either of the extremes.

The final analysis performed on the data was undertaken to determine if any of the 26-items of the SSHPQ, taken independently, differentiated between "success" and "failure" within and between the conventional and mastery learning modes of instruction. The same definitions of "successful" and "failing" students employed in the Discriminant Analysis were adopted in this analysis. A series of Chi-square tests was performed between the following groups: (1) "successful" and "failing" mastery learning students, (2) "successful" and "failing" conventional students, (3) "successful" students in both the mastery learning and conventional modes, and (4) "failing" students in both the mastery learning and conventional modes of instruction. This analysis was performed under recognition that the true significance level of the statistic was probably greater than that which was observed; therefore, the results--at least those which were accepted as being significant--could only be viewed as exploratory in nature. Of the 104 Chi-square tests performed, only three proved significant at the .05 level. The conclusions derived from these three tests were:

(1) Students who responded to the item

> When I have a problem concerning a composition course, I usually solve it by consulting (1) the instructor, (2) the text, (3) another student, (4) my notes, (5) by not worrying about it, (6) by waiting until someone else brings it up in class.

by suggesting that they preferred to consult written material as opposed to those who preferred to consult another person, were more apt to "fail" in the conventional mode than in the mastery learning mode of instruction.

(2) Considering the statement "I learn a subject better when I can discuss it with other students in my class," mastery learning students who either strongly agreed or strongly disagreed tended to "succeed" more frequently than did their counterparts in the conventional mode; and, conventional students who did not have such strong feelings about the statement tended to "succeed" more frequently than did their counterparts in the mastery learning mode.

(3) Conventional students who either agreed or strongly agreed that "social recognition" was very important to them were more apt to "succeed" in the conventional mode than were students who did not so respond.

Interpretation of the Findings

A primary function of this study was to question the research methodology which has characterized inter-mode of instruction comparative studies in the past. It seemed that this methodology omitted the individual student from consideration. It was once again demonstrated that when this methodology was employed, the frequent result is a finding of no significant difference between the modes considered.

Tentative support for the position that the individual student should be considered in inter-mode of instruction comparisons was evidenced by the study, but it was apparent that the present study did not demonstrate that the individual student should be considered as the major variable. Rather, the study demonstrated that the individual student is a variable in the instructional situation. In fact, the major conclusion reached by the study is that the primary research question is much more complex than is usually assumed and that it cannot be resolved by the simple incorporation of the student as a functional variable. Several of the findings of the study pointed to this conclusion.

1. Since the predictor equations reported in the study (based on 11 linear combinations of 31 variables) could explain only 10% of the variability of the data, it is suggested that one or several of the following had occurred: (1) the instruments used to measure the gain scores were not consonant with the goals and objectives of "English 1113," (2) the instruction offered in "English 1113" was not consonant with the stated goals and objectives of "English 1113," (3) the instruction of "English 1113" was ineffectual in reaching the stated objectives of "English 1113," and/or (4) one or several significant variables were neglected in the investigation. If this last possibility was the case, then the neglected variable(s) might have been related to the student or to some other aspect of the instructional process.

2. The fact that different "kinds" of students achieved different levels of "success" between the two modes when "success" was defined in terms of a gain score on the Writing Test, but not when

"success" was defined in terms of a gain score on the Attitude Scale, indicated that the goal or objective of instruction is a variable of importance. This, of course, had been stated several times in the past; McKeachie, in particular, had been warning the researcher of its presence for over ten years.[1] However, most frequently this warning has gone unheeded. Furthermore, such a "goal" variable is obviously multi-dimensional, and when included in an instructional model which contains other multi-dimensional variables (such as the "student"), the number of combinatorial effects is vastly escalated.

Thus, it is maintained that the present study reached the same conclusion as that procalimed by Dubin and Taveggia[2] and McKeachie,[3] namely, that the entire problem of researching the instructional process must be reconceptualized. While it is patently evident that at least four variables (i.e., the goal of instruction, the teacher, the student, and the subject matter) are operating in the instructional milieu, these variables have not been viewed and treated as interactive and multi-dimensional. The findings of the present study, however, tend to confirm that these variables are interactive and multi-dimensional.

A secondary function of the study was to provide information which could be used to counsel and guide students in their selection among alternative modes of instruction. In this regard, the present study did not generate any immediately useable information. Although it was determined that different "kinds" of students "succeeded" to differential levels between the two modes (with respect to a gain score on the Writing Test), the basis for this finding was not of sufficient strength to render the information useable in a practical situation.

Conversely, however, this finding indicated that it would be unwise for an institution to dissuade students possessing certain characteristics from entering either of the two modes considered.

Recommendations for Future Study

This study should be viewed as exploratory in nature; as such, it will have value only if it stimulates and influences research in the area of investigating and determining the factors that play a role in the instructional process. Some areas that may be considered include the following:

1. A similar study should be conducted with distinct emphasis placed upon those student characteristic research variables that predicted a gain score on the Writing Test and a gain score on the Attitude Scale.

2. A similar study should be conducted in a disciplinary area other than English to determine a possible "subject matter" effect. It is recommended that the discipline selected be one which enables the researcher to include "higher level" instructional goals than those included in the present study.

3. In future studies, the methodology of the present study should be altered in that the instructors involved should teach sections via both modes of instruction. The obtained data could then be analyzed to separate a "teacher" effect and/or interaction.

4. Future studies should consider defining the teacher in terms of a multi-dimensional vector of characteristics in similar fashion to the treatment which the present study gave to the student.

5. Methods of direct observation (e.g., the Flanders method[4])

should be employed to investigate longitudinally the dynamics of a particular section of students to identify those student characteristics and behaviors which influence student "success."

6. The effects of student characteristics upon instructional "success" should be examined within the same disciplinary area at various levels (e.g., primary, secondary) of the educational system.

FOOTNOTES

[1]W. J. McKeachie, Research on College Teaching: A Review (Washington, 1970), p. 11.

[2]R. Dubin and T. C. Taveggia, The Teaching-Learning Paradox: A Comparative Analysis of College Teaching Methods (Eugene, Oregon, 1968), pp. 1-14.

[3]McKeachie, p. 11.

[4]R. F. Peck and J. A. Tucker, "Research on Teacher Education," Second Handbook of Research on Teaching, ed. R. M. W. Travers (2nd ed., Chicago, 1973), pp. 940-978.

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APPENDIX A

THE ATTITUDE SCALE

Instructions: Below are a number of statements. Indicate how well these statements apply to you. If you strongly agree, circle the far left number (1); if you strongly disagree, circle the far right number (5); if you are indifferent about the statement, circle the middle number (3).

1	2	3	4	5
Strongly Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Disagree	Strongly Disagree

1.	I am always under a terrible strain in a composition course.	1	2	3	4	5
2.	I do not like composition, and it scares me to have to take it.	1	2	3	4	5
3.	Composition is interesting, and I enjoy composition classes.	1	2	3	4	5
4.	Composition is fascinating and fun.	1	2	3	4	5
5.	I feel secure in a composition class, and at the same time it is stimulating.	1	2	3	4	5
6.	My mind goes blank, and I am unable to think clearly when writing a composition.	1	2	3	4	5
7.	I feel a sense of insecurity when I write a composition.	1	2	3	4	5
8.	Composition makes me feel uncomfortable, restless, irritable and impatient.	1	2	3	4	5
9.	The feeling I have toward composition is a good feeling.	1	2	3	4	5
10.	Composition makes me feel as though I'm lost in a jungle of words and thoughts and can't find my way out.	1	2	3	4	5

11.	Composition is something that I enjoy a great deal.	1	2	3	4	5
12.	When I hear the word "composition," I have a feeling of dislike.	1	2	3	4	5
13.	I approach composition with a feeling of hesitation, resulting from a fear of not being able to write well.	1	2	3	4	5
14.	I really like composition.	1	2	3	4	5
15.	Composition is a course in school that I have always enjoyed studying.	1	2	3	4	5
16.	It makes me nervous even to think about having to write a composition.	1	2	3	4	5
17.	I have never liked composition, and it is my most dreaded subject.	1	2	3	4	5
18.	I am happier in a composition class than in any other class.	1	2	3	4	5
19.	I feel at ease in composition courses and like them very much.	1	2	3	4	5
20.	I feel a definite positive reaction towards composition; it is enjoyable.	1	2	3	4	5

APPENDIX B

THE STUDENT STUDY HABITS AND

PREFERENCES QUESTIONNAIRE

A. For each of the following questions or statements, place, in the blank beside each item, the number of the response which best answers the question or completes the statement for you.

___ 1. The amount of time I spent studying per week last year was approximately (1) 0 - 6 hours; (2) 7 - 12 hours; (3) 13 - 19 hours; (4) more than 19 hours.

___ 2. When I have a problem concerning a composition course, I usually solve it by consulting (1) the instructor; (2) the text; (3) another student; (4) my notes; (5) by not worrying about it; (6) by waiting until someone else brings it up in class.

___ 3. I usually study best for a composition course (1) by myself; (2) with one other person; (3) with two other people; (4) with three or more other people.

___ 4. The amount of time I expect to be working at a job for money this semester is (1) 0 hours; (2) 1 - 9 hours; (3) 10 - 19 hours; (4) more than 19 hours.

___ 5. Would you take this composition course if it were not a required course? (1) Yes, I would; (2) No, I would not.

B. Below are a number of statements. Indicate how well these statements apply to you. If you strongly agree, circle the far left number (1); if you strongly disagree, circle the far right number (5); if you are indifferent about the statement, circle the middle number (3).

1	2	3	4	5
Strongly Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Disagree	Strongly Disagree

6. While writing an essay, I like to confer with a few friends. 1 2 3 4 5

7.	I do well in classes that rely heavily on textbooks.	1	2	3	4	5
8.	If I read a chapter in a book and it doesn't make sense, I'm likely to re-read it several times until it does make sense.	1	2	3	4	5
9.	In a course, I prefer to write many essays rather than just a few.	1	2	3	4	5
10.	It is fairly easy for me to remember new words I hear during a conversation and/or in a class.	1	2	3	4	5
11.	I prefer to read directions rather than having someone read them to me.	1	2	3	4	5
12.	I prefer to be in lecture type classes.	1	2	3	4	5
13.	I learn a subject better when I can discuss it with other students in my class.	1	2	3	4	5
14.	I like revising the essays I write.	1	2	3	4	5
15.	I express myself better orally than in writing.	1	2	3	4	5
16.	When told to write an essay, I prefer selecting my own topic to having one assigned to me.	1	2	3	4	5
17.	Social recognition (that is, the respect or admiration of others) is very important to me.	1	2	3	4	5
18.	I prefer to read to myself rather than to have someone read aloud to me.	1	2	3	4	5
19.	Compared to other students in my class, I write well.	1	2	3	4	5
20.	When I take composition classes, I learn more by reading the text than by attending class sessions.	1	2	3	4	5
21.	I probably read better than most other students my age.	1	2	3	4	5
22.	Writing good essays consists mainly in saying what the teacher wants me to say.	1	2	3	4	5
23.	Often the way a thing is stated impresses me as much as what is said.	1	2	3	4	5

24.	The grades I have received in classes usually reflect my command of the subject accurately.	1	2	3	4	5
25.	I usually enjoyed my high school English composition courses.	1	2	3	4	5
26.	I have learned or would like to learn a language other than English.	1	2	3	4	5

VITA

William J. Davis

Candidate for the Degree of

Doctor of Education

Thesis: THE MASTERY LEARNING AND CONVENTIONAL MODES OF INSTRUCTING COLLEGE-LEVEL COMPOSITION: A COMPARATIVE STUDY BASED UPON SELECTED STUDENT CHARACTERISTICS

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