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INSTRUCTIONAL MODE ON PERFORMANCE
AND COURSE ATTITUDES.

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Interactive Effects of Achievement Anxiety,
Academic Achievement, and Instructional Mode
on Performance and Course Attitudes

Dissertation

Presented in Partial Fulfillment of the Requirements for
the Degree Doctor of Philosophy in the Graduate
School of The Ohio State University

By

Virginia Carolyn Callis, B.S., M.S.

* * * * *

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CHAPTER I

INTRODUCTION

Educational psychologists have postulated for years that learning is an individual phenomenon. The implication of this premise with respect to maximizing student learning within the college classroom is apparent. McKeachie (1970, p. 13) has suggested that college faculty improve their teaching techniques by clearly specifying goals, assisting students in assessing their needs and competencies, and maximizing motivation and learning through learner options. The proposition that learning is an individual matter suggests that no one instructional approach matches the learning style of all students. Thus, the need is obvious for further research to identify individual characteristics which make one instructional approach more likely to provide optimal learning on the part of a given learner than another approach.

McKeachie (1970), in a comprehensive review of research on college teaching from 1924 to 1970, discussed the relative effectiveness of various factors including class size, lecture, discussion, independent study, and use of new

technological media. In agreement with others, he concluded that as far as performance on course examinations is concerned there is no strong basis for preferring one teaching method over another. However, different teaching methods do make a difference when the educational goals are retention, application, problem solving, attitude change, and motivation for continued learning.

The educational environment offers a setting where students may gain much prestige and self-satisfaction from their classroom performance. On the other hand, students are confronted with the threat of failure which may cost prestige as well as other social rewards (McKeachie, 1951, pp. 153-154). The threat of failure or the effort to maintain satisfactory performance may result in anxiety. It is highly unlikely that all anxiety experienced in the educational environment could be eliminated, even if one were to attempt to do so. Attempting to eliminate all anxiety in the educational environment is not only unrealistic but also unimportant, for anxiety may be facilitative as well as debilitating in its effect on academic achievement. Research concerning the influence of anxiety on learning and performance has significance for educational practices as well as psychological theory. Within the context of educational practices, anxiety research has particular relevance to the environmental setting in which instruction occurs and for procedures used in student evaluation and testing

(Sinclair, 1971, p. 95).

Obviously, not all students enter the classroom with a set of traits which facilitate achievement. Thus, educators are challenged to adapt instruction to compensate for individual differences in learners. The focus in the present study was on non-academic as well as academic outcomes of students in differing learning situations who had prior records of high or low achievement and high or low facilitative minus debilitative (F-D) anxiety scores.¹

Statement of the Problem

The major purpose of the study was to investigate the effects on performance and course attitudes of selected individual characteristics of subjects in two learning situations. Specifically, there were three concerns of the researcher in the present study. The first was to investigate the effect of the independent variables of instructional mode, initial achievement anxiety, and academic achievement on the dependent variables of knowledge and application of course content and student attitudes toward instruction. The second was to investigate the effect of

¹Alpert and Haber (1960) have suggested that the score resulting from subtraction of the debilitative from the facilitative scale of the Achievement Anxiety Test (AAT) is a better predictor of academic achievement than either scale score used separately.

the independent variables of instructional mode and academic achievement on the dependent variable of end-of-unit achievement anxiety. The third was to investigate the effect of the independent variables of instructional mode and initial achievement anxiety on the dependent variable of end-of-unit achievement anxiety.

Importance of the Study

Based on the results of research in the areas of academic achievement and anxiety, students with high academic achievement or facilitative anxiety would be expected, generally, to perform better in achievement situations than students with low academic achievement or debilitating anxiety. Studies of the comparative effectiveness of lecture and individualized instruction on student performance on a course examination characterize much of the educational research to date. Where the criterion variable is performance on a course examination, the findings have generally been that instructional mode makes no difference. However, little attention has been given to the differential effectiveness of instructional modes with students with differing attributes.

Evidence of the differential effectiveness of instructional modes utilized with students possessing different characteristics is prerequisite to designing instructional experiences for learners which will maximize achievement

and also reduce the threat of failure, promote positive self feelings, foster independence, and stimulate the desire for continued learning. Unless one instructional approach is best for all learners, instructional procedures should be differentiated in such a way as to maximize their interaction with learner characteristics. There have been relatively few reported attempts to systematically alter selected aspects of the college environment in an effort to directly influence academic and non-academic outcomes.

Hypotheses

The focus of the study was on the academic and non-academic outcomes of students with differing attributes in two learning situations. Three hypotheses important in providing instructional design guidance were formulated.

Hypothesis 1. Of the students in the independent study mode, those in the various level combinations of academic achievement and achievement anxiety (high CPHR²/high F-D anxiety; high CPHR/low F-D anxiety; low CPHR/high F-D anxiety; and low CPHR/low F-D anxiety) will score differently on an unannounced clothing design unit test, a clothing design exercise, and a course attitude scale than will their

²CPHR refers to cumulative point-hour ratio.

counterparts in the TV lecture-supervised laboratory mode.

Hypothesis 2. Low CPHR subjects in the TV lecture-supervised laboratory mode will report experiencing more facilitative end-of-unit achievement anxiety than will their counterparts in the independent study mode.

Hypothesis 3. Low F-D anxiety subjects in the TV lecture-supervised laboratory mode will report experiencing more facilitative end-of-unit achievement anxiety than will their counterparts in the independent study mode.

CHAPTER II

REVIEW OF SELECTED LITERATURE

The review of selected literature is presented under the sub-headings of (1) college instructional techniques, and (2) anxiety and achievement. Studies of the comparative effectiveness of lecture and individualized instructional modes with respect to academic and non-academic outcomes are summarized. Findings related to academic outcomes are discussed in terms of performance on course examinations, application of concepts and principles, and retention. Non-academic outcomes, including attitudes of students toward instruction and time management, are also discussed. Literature summarized is pertinent to the relationship between anxiety and academic achievement in various types of learning situations. The results of the studies are discussed within the contexts of Drive Theory and State-Trait Anxiety Theory.

College Instructional Techniques

Today, as throughout most of the history of education, a major concern of educators is how to meet the individual

needs of students in school operations geared to educating the masses (Blake and McPherson, 1969, p. 63). Renewed attention to the problems of individualizing instruction is probably the result of a variety of factors. One factor is that the development of new media and new modes of instruction has increased the feasibility of adapting instruction to compensate for individual differences in learners. Another factor is the recognition that some type of individualized instruction is becoming a necessity. Educators have become increasingly aware that educational experiences should be based on the student's unique needs and interests as well as prepare the student to become a life-long learner (Lindvall and Bolvin, 1970, pp. 38-40). Holloway (1974, p. 56) has noted that increased enrollments, budget cuts, technological innovations, and the information explosion make the concept of independent study easy to justify.

Although lecture is the most widely-utilized method of instruction at the college level, an increasing number of instructors are experimenting with individualized systems of instruction. One of the more popular instructional systems is the Personalized System of Instruction (PSI) developed by Fred Keller in the early 1960's. The Keller plan received national recognition in 1968 with the publication of "Good-bye, Teacher . . ." (Keller, 1968). In this paper, Keller summarized the features which distinguish PSI from conventional teaching procedures as (1) the go-at-your-own-pace

feature; (2) the unit-perfection requirement for advance; (3) the use of lectures and demonstrations as vehicles of motivation, rather than sources of critical information; (4) the related stress upon the written word in teacher-student communication; and (5) the use of proctors, which permits repeated testing, immediate scoring, almost unavoidable tutoring, and a marked enhancement of the person-social aspect of the educational process (Keller, 1968, p. 83).

Many college instructors began experiments using Keller's approach in the late 1960's. The number of courses duplicating the Keller plan, as well as course modifications of Keller's design, has been increasing every year not only in the field of psychology, but also in other fields. A number of researchers have confirmed that the Personalized System of Instruction (PSI) produces higher average student performance on major course examinations than traditional instruction (Born, Gledhill and Davis, 1972; Johnston and Pennypacker, 1971; McMichael and Corey, 1969; Sheppard and MacDermot, 1970; and Morris and Kimbrell, 1972).

In spite of numerous studies supporting the superiority of the Keller method, one criticism of the technique is that PSI is useful only for teaching simple academic skills. Morris and Kimbrell (1972, pp. 523-530) sought to determine whether the Keller method has the same effect on both simple recognition and more complex recall and application processes. When they compared the final examination scores of

two groups of students, a significant difference was found. The experimental group performed only slightly better than the control group on the recognition items. The researchers attributed the superior performance of the experimental group subjects to their greater ability to recall and apply concepts and principles on the final examination. Apparently, the Keller method is not necessarily limited to the transmission of simple factual information.

Another criticism of Keller-plan courses as well as other alternative instructional approaches has been the lack of research evidence of superior retention by students exposed to these instructional modes. Cooper and Greiner (1971, pp. 391-400) compared a variation of the Keller contingency management method of instruction with the traditional lecture method of instruction. They found that the students in the modified Keller-plan course scored significantly higher on a Long Term Retention Test as well as on an unannounced mid-term and final examination than students in the lecture course. In another study, the individualized instruction group showed greater acquisition, greater transfer of learning to a related course, and greater retention one year later than the traditional instruction group (Moore, Hauck, and Gagne, 1973, pp. 335-340). These findings are of considerable importance since the typical study reported in the literature involves no follow-up study to determine long-term retention.

In a comparison of matched-ability students Hartnett and Stewart (1966, pp. 356-357) found the mean performance scores on the final examination were higher for students enrolled in courses on an independent study basis than for students who attended class on a "regular" basis. The difference between mean examination scores in two of the six courses was statistically significant. Similarly, Hastings (1972, pp. 411-416) found that the independent study group scored significantly higher on four of six unit examinations as well as on the final examination.

A number of researchers have investigated some of the non-academic outcomes of individualized instruction. Connolly and Sepe (1973, pp. 30-31) attempted to identify the characteristics of individualized and traditional instruction preferred by students. The students were presented with statements describing the characteristics of individualized instruction and statements of corresponding characteristics of traditional instruction. The majority of students preferred the characteristics of the individualized instructional approach with one exception. The characteristic of individualized instruction not preferred was "learner control." The students indicated a preference for the traditional counterpart, "external control." Thus, student willingness to assume responsibility for learning, an essential ingredient for individualized instruction, may be lacking in many students. Jioia (1973, pp. 32-33) found

that an important reason why students enrolled in the individualized instruction course was the expectation of being able to work at their own pace. The students particularly liked having behavioral objectives, student-teacher conferences, an unstructured and independent environment, and immediate feedback on their work. Two aspects of independent study that students disliked were a feeling of being isolated from their peers, and a lack of exchange of ideas with fellow students.

One of the more impressive aspects of PSI courses is the high ratings the courses receive from students. The superiority of PSI courses over traditional courses with respect to student attitudes toward instruction has been established in a number of studies (Born and Herbert, 1971; Born, Gledhill, and Davis, 1972; Hastings, 1972; McMichael and Corey, 1969; Morris and Kimbrell, 1972; Sheppard and MacDermot, 1970; and Witters and Kent, 1972). Lloyd and Knutzen (1969, pp. 125-133) reported that a majority of students expressed positive course attitudes despite feelings of being overworked in a completely programmed undergraduate course.

Time management on the part of students and instructors is an important consideration in instructional design. The results of student questionnaire ratings have provided some indication that PSI requires more time than comparable lecture courses (Born and Herbert, 1971). However, Born and

Davis (1974, pp. 365-375) found that the total student preparation time for PSI and lecture students was approximately the same. In comparing audio-tutorial and lecture methods of instruction, Stuck and Manatt (1970, pp. 114-118) found that the traditional group spent approximately 38 percent more time on a study unit and scored significantly lower than the audio-tutorial group. Thus, support is provided for the conclusion that a student's performance on an examination is a result of many factors other than the amount of time devoted to studying.

Both educators and researchers are concerned with maximizing academic achievement. Yet, few attempts have been reported to systematically alter selected aspects of the college environment in an effort to directly influence academic achievement. The goal in aptitude-treatment-interaction (ATI) studies is to find significant disordinal interactions between alternative treatments and personalogical variables (Bracht, 1970, p. 627). Cronbach (1957, p. 681) has suggested that findings from aptitude-interaction studies will lead to the measurement of readiness for different types of teaching and result in the development of teaching methods to fit different types of readiness. Unless one treatment is best for all persons, treatments should be differentiated in such a way as to maximize their interaction with aptitude variables.

In agreement with Cronbach's position, Carroll (1967) has suggested that the study of instructional methods and individual differences would be psychologically interesting but cautioned that it might be extremely difficult and frustrating as well. Researchers might not be able to produce a sufficiently solid set of conclusions to justify adoption into educational practice, or cost might be too high in relation to increased efficiency. Mitchell (1969, p. 701) concluded that research is always a gamble. Likewise, the payoff is difficult to predict from an ATI approach.

Bigelow and Egbert (1968, pp. 37-39) sought to ascertain the personality factors relevant to student success and satisfaction within independent and traditional study groups. No significant differences were found between successful experimental and successful control subjects. The researchers concluded that students who are successful in college probably will be successful in either traditional or independent study. Doty (1967, pp. 363-365) also found that high grade-point-average, high achievement-need subjects performed well under three different instructional methods. Erickson (1967, pp. 330-333) found that low-scoring students gained more from the programmed textbook than from usual classroom procedures. The implication of the results of these studies is apparent. Researchers need to direct their efforts toward designing instruction to meet the academic and non-academic needs of low-achievers.

Based on findings reported in the literature concerning motivation and learning, certain individuals would be expected to operate effectively under the conditions of discovery learning. Evans (1967, pp. 195-200) found that subjects with high achievement motivation were superior in learning by discovery than were subjects with low achievement motivation.

Domino (1971, pp. 427-429) studied entering college freshmen who were selected because of their extreme scores on the Achievement-via-Conformance and Achievement-via-Independence scales of the California Psychological Inventory. He found an interaction between student achievement orientation and teaching style. Students taught in a manner consonant with their achievement orientation scored significantly higher on a multiple-choice and essay examination and on their ratings of teacher effectiveness and course evaluation, than their peers taught in a dissonant manner. Tallmadge and Shearer (1969, pp. 222-230) found significant interaction among instructional methods, learner characteristics, and subject matters. These findings imply the existence of learning styles.

In summary, studies of the comparative effectiveness of lecture and individualized instruction on student performance on a final examination constitute much of the educational research to date. The findings of such studies have generally been that instruction makes no difference when the

criterion variable is the score on a final examination (McKeachie, 1970). In contrast to this general finding is the demonstrated superiority of Keller-Plan courses. However, an issue which has scarcely been considered with respect to individualized instruction is the effect on persons with differing characteristics. It seems reasonable to assume that teaching method effectiveness varies as a function of learner characteristics. However, the interaction of achievement orientation with teaching style is an important dimension which has been seriously neglected by educators and researchers (Domino, 1971, p. 430).

Anxiety and Academic Achievement

The influence of anxiety on performance is well documented. McKeachie (1958, pp. 580-584) concluded from research on anxiety and test performance that anxiety during classroom examinations accelerates to such a point that it interferes with memory and problem solving. He cautioned that too much emphasis can be placed on student motivation. In trying to scare some of the poorly motivated students into doing better, educators may be pushing some of the more anxious students over the brink into disorganization.

Complexity of the task and level of stress inherent in the task are particularly important in explaining the influence of anxiety on performance. Anxiety appears to facilitate performance on simple tasks, while interferring with

performance on complex tasks (O'Neil, Spielberger, and Hansen, 1969; Spence and Taylor, 1951; Standish and Champion, 1960; Taylor, 1951; and Tennyson and Wooley, 1971). These findings are consistent with Drive Theory from which the prediction has been made that the effects on performance of subjects differing in anxiety (drive) level will depend on the relative strength of the correct response and competing error tendencies. High drive would be expected to facilitate performance on simple learning tasks where the correct response is dominant. Conversely, high drive would be expected to produce debilitating effects on difficult tasks where error tendencies are stronger (Leherissey, O'Neil, and Hansen, 1971, pp. 413-20).

Considerable confusion in interpreting the results of research on anxiety stems from failure of researchers to distinguish between anxiety conceptualized as a transitory state and as a relatively stable personality trait. State anxiety (A-State) refers to feelings of apprehension and heightened autonomic nervous system activity. Trait anxiety (A-Trait) refers to individual differences in anxiety proneness. High A-Trait persons are more likely than low A-Trait persons to perceive certain types of situations as dangerous, particularly situations that involve some threat to the person's self-esteem (O'Neil, Spielberger, and Hansen, 1969, p. 343).

Leherissey, O'Neil, and Hansen (1971) investigated the relationship between state anxiety and memory support on a complex computer-assisted learning task for persons differing in trait anxiety. Independent variables were (1) levels of A-Trait anxiety: high (HA), medium (MA), and low (LA); (2) memory conditions: memory-support--MS and no memory support--NMS; and (3) learning task periods: A, B, and C. Mean errors per correct response was the dependent variable. The researchers concluded that the performance of high state-anxious students can be facilitated by the provision of some type of memory support. From the perspective of Drive Theory, the effect of drive or state anxiety on learning is a function of the relative strength of correct and competing error tendencies. If memory support reduces the disruptive effects of anxiety on performance, memory support may be viewed as reducing task-irrelevant responses for high A-State subjects in the memory support condition, thereby leading to a reduction in errors. However, providing high A-State subjects with their previous incorrect responses also caused an increase in levels of state anxiety for subjects in the MS condition. Threat of failure may be the undesirable side effect of memory support of this nature (Leherissey, et al., 1971, p. 419).

The implications of studies supporting the thesis that anxiety interferes with problem-solving performance resulted in an investigation by West, Lee, and Anderson (1969,

pp. 51-52). They studied the influence of anxiety in situations in which the amount of irrelevant information was deliberately controlled at a high or low level. From a phenomenological perspective, high anxiety should narrow the perceptual field, thereby inhibiting the selection of relevant from irrelevant information. Consistent with this theoretical position, anxiety was found to interact with irrelevant information to suppress achievement test scores.

O'Neil (1972, pp. 473-481) investigated the effects of stress on state anxiety and computer-assisted learning of college students who differed in anxiety proneness (trait anxiety). The State-Trait Anxiety Inventory was used to measure both A-Trait and A-State. High A-State subjects made significantly more errors than low A-State subjects on the easy sections of the computer-assisted task, but not on the difficult sections. The findings of this study are consistent with predictions from Trait-State Anxiety Theory that negative feedback poses a threat to self-esteem and, thus, is perceived as more threatening by high A-Trait than by low A-Trait subjects. However, the results are not consistent with the hypothesis derived from Drive Theory that high Drive (high A-State) subjects will make fewer errors than low A-State subjects on the easier sections of a learning task.

Tobias and Abramson (1971, pp. 357-364) conducted a study intended to establish an Attribute X Treatment

interaction (ATI) among anxiety, stress, and response mode to programmed instruction. Based on the results of the Achievement Anxiety Test (Alpert and Haber, 1960), subjects were classified as high or low anxious and randomly assigned to a stress condition. Within the stress condition, subjects were randomly assigned to one of three presentation modes: two constructed response groups (one with and one without reinforcement) and a reading group.

Subjects in the constructed response groups scored significantly higher on technical unfamiliar material than subjects exposed to the reading condition. Both the constructed response groups spent significantly longer than the reading group to cover the same material. An ATI between debilitating anxiety, stress, and response mode to programmed instruction was not found for technical materials. However, stress did interact with anxiety to improve achievement on easy familiar content. The researchers concluded that the subjects' prior experience with a particular content may prove to be more useful in the prediction of optimal instructional strategies than the attribute measures employed in typical ATI investigations (Tobias and Abramson, 1971, p. 363).

Another area which has received considerable attention by researchers in the area of anxiety concerns the relationship among anxiety, academic aptitude, and achievement. In one such study, Sarason (1961, pp. 201-206) obtained scores

on thirteen intellectual measures and correlated each of the measures with scores on six different personality scales. Six of the intellectual measures were high-school grade point averages in a variety of subjects, and seven were objective tests included in a college entrance battery. The personality variables included test anxiety, general anxiety, lack of protection, hostility, need for achievement, and defensiveness. Test anxiety was the only personality variable which related consistently to the measures of academic aptitude and achievement. All of the correlations involving test anxiety were negative. Eleven of the thirteen correlations were statistically significant.

Gaudry and Spielberger (1970, pp. 386-391) investigated the effects of anxiety and intelligence on paired-associate learning. From the results of the study the researchers concluded that early in the learning process, high anxiety facilitated performance for high-IQ subjects but impaired performance for low-IQ subjects. Later in the learning process, however, high anxiety tended to facilitate performance for both high-and low-IQ subjects. The overall performance of high-IQ subjects was superior to that of low-IQ subjects.

The interactive effects of intelligence and test anxiety in determining concept-learning proficiency was investigated by Mazzei and Goulet (1969, p. 842). The performance of low intelligence, high anxiety subjects exceeded that of low anxiety subjects. The reverse was true of high

intelligence subjects. Thus, high anxiety, as measured by the Test Anxiety Questionnaire (TAQ), does not unequivocally lead to inferior performance.

The hypothesis that significant differences in academic performance between extreme anxiety groups may be largely due to differences in ability was confirmed in both male and female samples in two studies by Lin and McKeachie (1970, pp. 306-309). However, student study habits contributed to academic achievement independently of college aptitude, particularly for women.

Desiderato and Koskinen (1969, pp. 162-165), in a study utilizing female undergraduates, found a significant difference between grade point average of high-facilitative-low-debilitative anxiety and high-debilitative-low-facilitative anxiety subjects. The differences in levels of the Alpert-Haber Anxiety scores were related to differences in study habits. High study-habit subjects were found to be academically superior to low study-habit subjects. Wittmaier (1972, pp. 352-354) also studied the relationship between facilitating (AAT+) and debilitating (AAT-) test anxiety and study habits. Anxious subjects were more likely to have ineffective study habits and were more likely to delay academic tasks than those showing low debilitating anxiety.

Many researchers have been concerned with the relationship between anxiety and achievement in various types of learning situations. Tobias (1973, pp. 233-237) studied

the effects of distraction, mode of responding to computer-assisted instruction, and anxiety on achievement. Undergraduate students were randomly assigned to the instructional program under neutral or distraction conditions and to either a constructed response mode with feedback or a reading condition. Distraction did not affect achievement. However, distraction did increase the amount of time on the computer instructional program. Constructed responding resulted both in higher achievement and increased time on the computer instructional program. There were no significant effects on test anxiety.

The possibility of an Aptitude X Treatment interaction between two modes of classroom instruction and manifest anxiety was investigated by Dowaliby and Schumer (1973, pp. 125-232). The researchers found a disordinal interaction between anxiety and mode of instruction. The teacher-centered mode optimized performance for high-anxious students, whereas the student-centered approach resulted in superior examination performance for low-anxious students.

Ripple, Millman, and Glock (1969, pp. 113-20) investigated the relationship between selected characteristics of students (anxiety, compulsivity, exhibitionism, and convergent-minus-divergent thinking style) and the relative degrees of success experienced in learning from programmed versus conventionally structured learning tasks. High anxiety was associated with lower criterion scores. Tobias

(1973, p. 237), however, has questioned the relevance of anxiety in investigations where error rates are relatively low, as in individualized instruction and programmed instruction. He concluded that anxiety may well have limited utility in the area of individualized instruction.

In a recent study, Jacko (1974, pp. 30-31) compared the Personalized System of Instruction (PSI) and the lecture method of instruction. He found for the high facilitative minus debilitating (F-D) anxiety female subjects that neither teaching method demonstrated any clear advantage in relation to facilitative end-of-course achievement anxiety scores. However, with the low facilitative minus debilitating (F-D) anxiety subjects, the lecture technique proved more beneficial than PSI with respect to facilitative end-of-course achievement anxiety scores. The lecture technique tended to be associated with more facilitative end-of-course anxiety scores for students with low-grade-point averages than the PSI technique. One implication of Jacko's study appears to be the need to take a critical look at instructional modes and their effects on personalological variables rather than upon academic achievement alone.

In another study, Allen, Giat, and Cherney (1974, pp. 968-973) sought to examine the behaviors of students differing on locus of control and test anxiety in a "personalized" Keller-Plan course. Students possessing an external locus of control contracted for and ultimately earned lower

grades, began working more slowly, reported more state anxiety during oral assessments, and performed more poorly on a written final examination than more internally oriented subjects. Trait test anxiety was not reliably related to the academic outcome measures. A steady and significant reduction in self-reported state anxiety occurred during oral examinations throughout the quarter.

The influence of testing procedures on the relationship between anxiety and academic performance has been the focus of other research studies. Mandler and Sarason (1952, pp. 166-173) investigated the influence of anxiety evoked by a testing situation on the performance of subjects on typical intelligence test items. The mean time scores on test items for the low anxiety group were lower than those of the high anxiety group. The variability of the scores of the high anxiety group was significantly greater than that of the low anxiety group. However, as the learning process proceeded the anxiety drive of the high anxiety group tended to improve performance scores. The researchers suggested that the presence of anxiety in the testing situation is an important variable in test performance.

Munz and Smouse (1968, pp. 370-374) investigated the notion that test item-difficulty arrangement significantly affects performance scores but only by interacting with test-taking personality variables. The item-difficulty sequence was easy-to-hard (E-H), hard-to-easy (H-E), and

random (R). Anxiety-reaction types were facilitators, debilitators, nonaffecteds, and high affecteds. Facilitators and high-affecteds scored significantly higher than the debilitators and nonaffecteds on the R form. On the E-H form, facilitators scored significantly higher than the other three anxiety types. Thus, a complicated relationship apparently exists between item-difficulty arrangement of test items, specific personality correlates, and achievement-test performance.

Tennyson and Boutwell (1973, pp. 88-92) investigated the hypothesis that within-task anxiety measures are significantly better predictors of learner performance than pretask trait or state anxiety measures. A time series design was employed to obtain the typical anxiety level of each subject. The researcher concluded that the within-task anxiety measurement is a significant predictor of performance. The implication of the study is that aptitude-treatment interactions using within-task measures may be more useful in designing adaptive instruction than using pretask measures as is typically done.

In summary, numerous researchers cited have provided evidence of (1) test anxiety as a specific measurable factor, and (2) the differential effects of anxiety on learning and academic achievement. Variations in the learning environment and in testing procedures may have considerable influence on the relationship between anxiety and academic

performance (Gaudry and Spielberger, 1971, p. 77). While individualized instruction is assumed to alleviate anxiety to a greater extent than traditional lecture courses, the findings of recent studies (Jacko, 1974; Dowaliby and Schumer, 1973; Allen, Giat, and Cherney, 1974) fail to completely support this assumption. The question of the effects of various instructional modes on learners with differing personalogical characteristics awaits further investigation.

CHAPTER III

METHODOLOGY

A generally accepted premise among educators is that some attributes of persons have strong interactions with treatment variables. However, a measure of attributes which will predict who will learn better in one situation than in another remains to be developed. A major purpose of this study was to investigate the effects of selected individual characteristics on performance and course attitudes of subjects in two learning situations.

The procedures followed in this study will be presented under the following sub-headings: identification of variables; selection and development of instruments; research design; subjects; data collection; and data analysis.

Identification of Variables

The variables included (1) academic achievement (high cumulative point-hour ratio, low cumulative point-hour ratio); (2) achievement anxiety (high facilitative minus debilitative and low facilitative minus debilitative); (3) knowledge and application of course content; and (4) course

attitudes. The manipulated variable was instructional mode (TV lecture-supervised laboratory and independent study). A discussion of instructional modes is presented first to provide background information.

Instructional modes

Two instructional modes were utilized in the study. The operational procedures for the TV lecture-supervised laboratory and independent study instructional modes will be specified in the sections which follow.

TV lecture-supervised laboratory. Students enrolled in the course Clothing: Design Analysis, in Autumn Quarter 1975, received instruction via televised lectures and supervised laboratory experiences throughout the quarter. The students met twice a week for televised lectures. Lecture periods were structured to facilitate the achievement of two major goals. The first goal was to present substantive material which was accomplished via televised lectures. The second goal was to promote instructor/student interaction, thereby providing opportunities for amplification and clarification. A course manual designed to accompany the TV lectures served as an organizer and study guide. The students had access to videocassette tapes of the TV lectures for further clarification of concepts and principles or for review purposes. The videocassette playback unit, monitor, and tapes were located in a room adjoining the

clothing laboratory. Students were asked to fill in a usage slip each time they viewed a videocassette tape. In addition to the two lecture periods, six hours of supervised laboratory work were scheduled per week.

Independent study. The students enrolled in the course Clothing: Design Analysis in Winter Quarter 1976 received instruction for the first and third units of study through the televised lecture-supervised laboratory format. However, for the second unit of study, the experimental unit, an independent study instructional mode was implemented. Students worked independently in a mediated self-instructional laboratory which was open from 8:00 A.M. to 5:00 P.M. Monday through Friday. In addition to videocassette tapes of the TV lectures, instructional materials developed by the researcher were available to students in the self-instructional laboratory. Instructional materials available to the students included a self-administered and self-scored Clothing Selection and Costume Design Mastery Test which covered prerequisite concepts and principles related to clothing design, art elements, and flat pattern manipulations; suggested review activities based upon mastery test sub-scores; a slide/tape set on "Designing Clothes to Flatter the Figure" with an accompanying exercise on figure analysis and sketches of garment designs which would be flattering to the figure. Other instructional materials included flip charts illustrating selected clothing design features; flat

pattern design exercises and a display of examples of the completed patterns along with the stated principles of pattern manipulations; sketches of selected garment designs from the previous quarter; and a perceptual exercise on matching actual pattern pieces with pictures of clothing design features. The educational value of the instructional materials for the clothing design unit was evaluated by the course instructor, the course graduate teaching associate, and two other textiles and clothing faculty members. The students were asked to report the amount of time they engaged in three of the activities (viewing videocassettes, viewing and listening to the slide/tape set, and completing the flat pattern design exercises) by filling in usage records.

Each student was provided a copy of a four-page outline of the procedures to be followed during the independent study unit. The handout was called "Guidelines for Independent Study." Optional learning activities for each week were outlined on the Calendar of Events which was included in the guidelines. Thus, the students had available instructional materials which were intended to facilitate their progress throughout the unit. However, the number of activities completed was optional. No attempt was made to determine on an individual basis the number of activities completed. Therefore, the system provided some flexibility as to how and when the students studied, what they chose to

study, and the amount of time they decided to devote to a given activity based on a personal assessment of need.

A two-hour interaction period was scheduled each week for analysis of clothing design problems. The major focus of each interaction period was indicated in the Guidelines for Independent Study. The instructor was also available for individual assistance during the additional four hours the students would have ordinarily been in the laboratory each week.

Selection and Development of Instruments

The selection and development of instruments for the assessment of academic achievement, achievement anxiety, knowledge and application of course content, and course attitudes are discussed in this section. The criteria utilized in the selection of the instruments, including reliability coefficients, are presented.

Academic achievement

Cumulative point-hour ratios (CPHR) were provided by the subjects during the pre-testing session. The students in the TV lecture-supervised laboratory and independent study groups were divided into two cumulative point-hour ratio levels (high and low). In the School of Home Economics at The Ohio State University, a cumulative point-hour ratio of 2.70 was the criterion for admission to a

graduate program without taking the Graduate Record Examination. Thus, a 2.70 or above CPHR was established as the criterion for inclusion in the high CPHR group. Students with cumulative point hour ratios below 2.70 were classified in the low CPHR group.

Achievement anxiety

Students within the various level combinations of instructional mode and academic achievement were further dichotomized on achievement anxiety scores (high F-D and low F-D). The Alpert-Haber Achievement Anxiety Test (AAT) (1960) was utilized to measure achievement anxiety.

Much of the confusion in anxiety research results from a failure to distinguish conceptually between anxiety as (a) a stable trait of anxiety proneness (trait anxiety: "How anxious are you generally?") and (b) a transitory emotional state (state anxiety: "How anxious are you now?") (Spielberger, Lushene, and McAdoo, 1971, p. 403).

The two divergent positions will be briefly considered. The theoretical position regarding general anxiety includes the concept of a relatively constant level of internal anxiety and the possibility of ascertaining the intensity of this anxiety by a paper-and-pencil test. If there exists such a general anxiety state, then a single measure of a set of manifest anxiety responses obtained in many situations would be an adequate predictor of the presence and effects

of anxiety responses in any situation (Alpert and Haber, 1960, p. 208). Evidence exists, however, of intra-individual differences in the content and intensity of anxiety from one situation to another (Child, 1954; Mandler, 1954). Thus, there seem to be limitations to the use of a general anxiety scale as an indicator of anxiety in any type of situation.

The alternative position is that items composing the measuring instrument should be concerned with the specific situations in which the instrument is to be used. The underlying assumption of this type of scale is that the increased situational specificity of the items will result in a more sensitive measurement of anxiety and its effect in the academic achievement situation (Alpert and Haber, 1960, p. 208).

Alpert and Haber (1960) attempted to evaluate the relative merits of situation-specific versus general item content. They administered a variety of anxiety scales to introductory psychology students including the Taylor Manifest Anxiety Scale (MAS) (Taylor, 1953), the Welsh Anxiety Index (AI) (Welsh, 1952), and the Freeman Anxiety Scale (AS) (Freeman, 1953). The two specific anxiety scales included the Mandler-Sarason Test Anxiety Scale (TAS) (Mandler and Sarason, 1952) and the two scales of the Achievement Anxiety Test (AAT) (Alpert and Haber, 1960). Only male subjects were included in the data analysis. In comparing

intercorrelations among the three general and two specific scales, in most cases, intercorrelations among the specific scales were significantly higher than the correlations involving the general scales either with each other or with the specific scales. Thus, the comparability of the two types of anxiety scales seems questionable.

In another test of the substitutability of the general for the situationally specific anxiety scales, a comparison was made of the two types of scales as predictors of various measures of academic performance. Correlations were computed between the six anxiety scales and four measures of academic performance, including grade-point average, course grade, final examination grade, and midterm examination grade. The four specific anxiety scales were more often significantly correlated with academic performance measures than were the two general anxiety scales.

The evidence seems to indicate that specific anxiety scales and general anxiety scales measure something different. In addition, it appears that the variable which the specific scales measure, and which is not measured by the general scales, is related to academic performance to such an extent that the specific scales are better predictors of academic performance than are the general anxiety scales (Alpert and Haber, 1960, pp. 208-209).

Alpert and Haber (1960) have further suggested that researchers must be aware of the relationship between the

anxiety measures and intellectual ability in evaluating the efficiency of anxiety scales in the academic situation. Since the goal is to predict performance variance attributable to something other than aptitude, it seems desirable for an anxiety scale to correlate highly with performance and only slightly with aptitude.

Alpert and Haber (1960, pp. 210-211) have presented evidence that the debilitating scale of the AAT added significantly, over and above aptitude, to the prediction of the grade-point average (GPA) in two out of three cases reported, and in one out of three cases reported for the final examination. The facilitating scale of the AAT increased prediction of GPA in the three cases reported and in two out of three instances for the final examination grade. The Mandler-Sarason Test Anxiety Scale (TAS) was also shown to add significantly to the prediction of final examination grade, but not to GPA with a limited sample of subjects. Alpert and Haber concluded that specific anxiety scales are able to account for variance in academic performance other than that accounted for by a measure of aptitude.

Mandler and Sarason (1952) have suggested that measurable anxiety responses, when present, are debilitating. Thus, all items of the Test Anxiety Scale (TAS) are unidimensional, that is, all anxiety responses are either debilitating or not. The implication is that for the person without task irrelevant responses in his repertoire of

responses the anxiety-provoking cues, when present, raise general drive level and result in improved performance (Sarason, Mandler, and Craighill, 1952, p. 561). Thus, if an individual had a great deal of facilitative anxiety, he would have little debilitating anxiety. Alpert and Haber (1960) have suggested that this is an unwarranted inference. They have proposed an anxiety scale which is intended to measure the presence of both kinds of anxiety responses, those which facilitate performance and those which interfere with it. An individual who scores low on both of these scale components is considered to be unaffected by anxiety-provoking cues with respect to test performance.

Based on the requirements of the present research, a situation specific anxiety scale was selected. Alpert and Haber constructed the Achievement Anxiety Test (AAT) to measure the extent of anxiety a person experiences in academic test situations and the direction, facilitative or debilitating, of the experienced anxiety. The AAT consists of two independent scales with a total of 28 items. The facilitative scale consists of 9 items; the debilitating scale consists of 10 items. Nine neutral buffer items are also included. Items in the two scales are randomly mixed. The responses are tailored to each statement and thus the phraseology of the responses varies across the 28-item inventory. Subjects respond to each statement by selecting one of the five responses which best describes their

feelings. Three test scores are obtainable from the AAT: Facilitative (F), Debilitative (D), and Facilitative Minus Debilitative (F-D). The F and D scores reportedly correlate about equally, but opposite in sign with academic performance. Combining the facilitative and debilitative scores (F-D) leads to a significant increase in the successful prediction of academic performance scores, such as grade-point average, course achievement, and examinations.

The authors have reported that both scales have undergone numerous revisions based on item analyses, correlations with various criteria, and theoretical reformulations. Reported test-retest reliabilities for a 10-week interval are .83 for the facilitative scale and .87 for the debilitative scale. The reported test-retest reliabilities over an 8-month period for the facilitative and the debilitative scales are .75 and .76, respectively (Alpert and Haber, 1960, p. 213).

Alpert and Haber (1960, p. 214) conceded that despite efforts to minimize the intercorrelations of the scales without affecting validity coefficients, a low but significant correlation remains. However, they noted that the correlation is neither perfect nor high, an assumption which is required for the use of the Mandler-Sarason TAS.

The researcher administered the AAT to a group of junior and senior home economics majors during Summer Quarter 1975. Pearson correlation coefficients for the pre-test

and post-test facilitative and debilitative scale scores, based on an N of 22, were as follows: for the facilitative scale, $r = .88$, $p = .001$; for the debilitative scale, $r = .53$, $p = .006$. Item-total correlations were also computed. The Kuder Richardson Reliability (Formula 8) for the debilitative and facilitative scales were, respectively, .90 and .84. Thus, the AAT reliabilities were considered to be satisfactory.

Validity of the Achievement Anxiety Test. The researcher utilized two techniques for assessing the construct validity of the AAT, factor analysis and correlation of AAT scale scores with total Positive score on the Tennessee Self Concept Scale (TSCS). Factor analysis is a method of determining the number and nature of the underlying variables among larger numbers of measures. In essence, factor analysis assists the researcher in locating and identifying unities or fundamental properties underlying tests and measures (Kerlinger, 1973, p. 659).

All 28 items (9 facilitative, 10 debilitative, and 9 buffer) of the AAT were factor analyzed. It should be noted that the buffer items did not enter into the computation of the anxiety score. The buffer items were scored for the purpose of the factor analysis to determine if the items would load on a factor. Thus, the existence of three factors was anticipated. The results of the factor analysis based on the responses of 35 students who completed the

AAT in the Summer Quarter 1975 should be considered inconclusive due to the small sample size.

The X72 program in the BMD factor analysis package (Sampson and Jennrich, 1972) was utilized. Orthogonal factors were formed employing varimax rotation. The maximum absolute row values served as communality estimates. An eigen value of 1.0 was specified in the program. Three factors were extracted. The 10 items on the scale identified by the test developers as debilitating items loaded on factor one and thereby gave support to the existence of a debilitating factor. Seven out of the 9 items identified by the test developers as facilitative anxiety items loaded on factor 2. Eight out of the 9 items identified by the test developers as buffer items loaded on factor 3. Two of the items identified by the test developers as facilitative anxiety items loaded on factor 3 (buffer items) and one item previously identified as a buffer item loaded on factor 2 (facilitative items).

As has been previously noted, no conclusions regarding the validity of the AAT may be drawn from the results of the factor analysis of the scale items. A decision was made to repeat the factor analysis of the AAT combining the responses of the pre-experimental and experimental subjects.

A second technique for assessing the validity of the AAT was utilized. The procedure involved correlating AAT scale scores with the total P, or Positive, Score on the Clinical

and Research Form of the Tennessee Self-Concept Scale.

The Tennessee Self Concept Scale (hereafter referred to as the TSCS), published in 1965 by William H. Fitts, is a frequently used self-regard instrument. The TSCS consists of 100 self-descriptive statements to which the subject gives one of five responses ranging from "completely true" to "completely false" (Buros, 1972, p. 364). Ten items from the L Scale of the Minnesota Multiphasic Personality Inventory constitute the Self Criticism Score. The other 90 items were drawn from a number of self-concept measures including those developed by Balester (1956), Engel (1956), and Taylor (1953). Some items were derived from written self descriptions of patients and non-patients. The criterion for selection of items was agreement by seven psychologists as to the classification of the items on the basis of their content.

The norms for the TSCS were developed from a broad sample of 626 persons. The sample for standardization included persons from various parts of the country who ranged in age from 12 to 68 years. The norms were based on approximately equal numbers of male and female, negro and white subjects representative of all social, economic, and intellectual levels from the sixth grade through the doctoral level (Fitts, 1965, p. 13). Fitts reported in the manual (1965, p. 14) a two-week test-retest reliability coefficient for total self regard of .92.

The TSCS was pre-tested with a group of junior and senior home economics students during Summer Quarter 1975. Twenty-two students completed the TSCS and the AAT. Thus, the correlations reported are based on a sample size of twenty-two.

A positive correlation between the facilitative anxiety scores on the AAT and the TSCS and a negative correlation between the debilitating anxiety scores on the AAT and the TSCS were anticipated. A Pearson Correlation coefficient of .88 ($p = .001$) was found between TSCS scores and scores on the facilitative scale of the AAT. The Pearson r for the TSCS and debilitating scale scores of the AAT was $-.67$ ($p = .001$). Thus, these correlations provided some support for the construct validity of the AAT.

Knowledge and application of course content

For the purpose of assessing student knowledge and application of course content, the researcher modified a pre-test which had previously been utilized in the course. The initial form of the Clothing Design Unit Test consisted of 24 multiple-choice items. During Summer Quarter 1975, eight students who had previously completed Clothing: Design Analysis agreed to take the test and to evaluate both the clarity and the content of the test items. Based on the students' performance and their comments regarding the test items, revisions were made in the test.

During the first week of Autumn Quarter 1975, thirty-four students who had previously completed Clothing: Design Analysis completed the revised test which consisted of 26 multiple-choice items. A review of a detailed item analysis for the 26 items resulted in the dropping of two easy items to improve the mean item difficulty and the mean item discrimination values. The mean and standard deviation for the final version of the Clothing Design Unit Test, based on 24 items, were 13.44 and 2.74, respectively. The mean item difficulty was .44 and the mean item discrimination was .25.

A second measure of the students' knowledge and application of course content was a clothing design-task-completion exercise. The Clothing Design Exercise was developed to measure the students' ability to apply concepts and principles learned in the unit to the solution of the clothing design problem. The Clothing Design Exercise required the students to analyze a sketched garment design and to prepare the pattern pieces for the design from a basic sloper pattern. Three dress designs were utilized which had been judged by three textiles and clothing faculty members and the researcher as being equivalent with respect to the pattern manipulations required in completing the design problem. The clothing design task-completion exercise was included on the mid-term practical laboratory examination. The three garment designs were randomly assigned to the three course sections Autumn and Winter Quarters. The Clothing Design

Exercise was graded by the course instructor and thus constituted a portion of the mid-term grade. However, the Clothing Design Exercise was independently scored by two judges for the purpose of the research.

A score sheet outlining the criteria for evaluation of the clothing design problem was developed by the researcher. Each criterion item for the bodice front, skirt front, neckline facing and sleeve pattern pieces was rated on a scale ranging from 0 to 2. The total possible points for the exercise was 61. Two graduate students in textiles and clothing served as judges. The researcher met with the judges to review the evaluation procedure and to review the score sheet. The judges were asked to evaluate two clothing design exercises completed by two undergraduate non-participants in the study. Comparisons of the ratings by the two judges were made, item by item, for the two clothing design problems. When inconsistencies in the ratings occurred, the judges and the researcher discussed the reasons for the discrepancies and established a guideline which would be helpful in future discriminations. The interrater agreement based on total scores for the two garment designs evaluated during the pre-testing session, was 96 percent and 97 percent, respectively. An average of the two judges' scores constituted the score for the Clothing Design Exercise. The score on the Clothing Design Exercise as well as the score on the unannounced examinations did not enter into the

determination of the course grade.

Course attitudes

The Purdue Rating Scale for Instruction (Remmers and Elliott, 1950) purportedly measures the students' judgments of the instructor and the course on the 26 traits of the scale. According to the manual (Remmers and Weisbrodt, 1965) the 26 items in the scale have been chosen from among various sources as being among the most important contributors to the "generalized attitude" toward instruction. The first 10 items are a list of desirable qualities of instructors. The remaining 16 items relate to other important features of the teaching-learning situation which exert influence upon the effectiveness of that situation. According to the manual the scale has been subjected to many rigorous and searching investigations over the years. Reliability coefficients for the 26 items are reported for two different samples of instructors ($N_1 = 205$, $N_2 = 114$). The median reliability coefficients for the 26 items for the two samples are, respectively, .87 and .83. These values compare favorably with the reliabilities of frequently used psychological instruments. Also reported in the manual are the reliabilities (internal consistency coefficients) and the intercorrelations of the ratings of the ten instructor characteristics for a sample of 59 teachers and 1908 student ratings. Students were shown to discriminate reliably among these ten

traits, since all the intercorrelations were significantly lower than the reliabilities.

Research Design

At The Ohio State University, Textiles and Clothing 374, Clothing: Design Analysis, is a five-hour undergraduate course offered Autumn, Winter, and Spring Quarters. The focus of the course is on the adaptation of standard patterns to individual proportions, flat pattern designing, and application of principles of design and construction in making garments. Three sections of the course were offered by the same instructor and graduate teaching associate Autumn Quarter 1975 and Winter Quarter 1976. These six sections of the course composed the experimental groups for the study.

Two instructional modes were alternated Autumn and Winter Quarters for the Clothing Design Unit, the experimental unit. The instructional method utilized in the course Autumn Quarter 1975 consisted of two televised lectures and six hours of supervised laboratory experiences per week. The instructional method utilized in the course Winter Quarter 1976, during the experimental unit, consisted of independent study in a mediated self-instructional laboratory.

Randomization of subjects was not possible due to the constraints operable in the institutional setting in which

the research was conducted. Kerlinger (1973, p. 323) has stated that to the extent randomization is not possible, the design is weak. However, Campbell and Stanley (1973, p. 47) have acknowledged that the design involving the pretesting and posttesting of naturally assembled classrooms is one of the most widely used designs in educational research.

The results of a multivariate analysis of variance will be presented in the Results Chapter to demonstrate that the students comprising the two groups were not significantly different with respect to the variables of cumulative point-hour ratio (CPHR), initial achievement anxiety scores, initial course attitudes, and Clothing Design Unit test scores. Relevant to internal validity, if the similarity of the two groups with respect to recruitment and pre-test scores can be demonstrated, the design controls the main effects of history, maturation, testing, and instrumentation (Campbell and Stanely, 1973, p. 48). Mortality could be a threat to internal validity if too many subjects dropped out from one of the comparison groups. One of the major concerns of the researcher was to control for subject reactivity. The threat to external validity represented by reactive arrangements, though present in the design utilizing intact classrooms, was probably less in the present study than in most true experiments where there is greater student awareness of the experimental situation (Campbell and Stanley, 1973, p. 50).

Subjects

The subjects were the 92 students enrolled in Textiles and Clothing 374, Clothing: Design Analysis, at The Ohio State University, Autumn Quarter 1975 and Winter Quarter 1976. The students enrolled in the junior level course during the two quarters the research was conducted were female home economics majors. Only those students for whom a complete set of data was available were included in the study.

Data Collection

Arrangements were made so that the course instructor and graduate teaching associate would not be in the classroom during data collection. This procedure was considered to be necessary to encourage students to respond honestly to the questionnaires. In the Autumn Quarter 1975 and Winter Quarter 1976, the researcher introduced herself to the students at the beginning of the final laboratory period the week prior to the introduction to the Clothing Design Unit, the experimental unit. She referred to herself as a textiles and clothing Ph.D. student involved in the departmental study of the undergraduate curriculum and asked the students to provide information useful in the study. An explanation was provided on a consent form to the effect that a series of questionnaires would be administered and that the results would in no way affect the course grade. All

students voluntarily signed consent forms indicating their willingness to participate in the study.

The students were told that as a part of a continuous departmental program of course development and curriculum improvement the researcher would like to know their reaction to instruction in Textiles and Clothing 374. The Purdue Rating Scale for Instruction and IBM Response cards were distributed to the students for completion. Social security numbers rather than names were requested on the response cards. The students were encouraged to be honest in responding to the measures since their responses would not affect their course grade and since the researcher would be the only person aware of individual responses. The IBM response cards, rating scales, and consent forms were collected. The students were thanked for their cooperation.

The following week, during a lecture period, three additional instruments were administered. The instruments administered were the Clothing Design Unit Test, the Achievement Anxiety Test (AAT) and the Tennessee Self Concept Scale (TSCS). A packet, consisting of the test booklets, score sheets, and a number two pencil, was distributed by a student assistant to each participant. Social security numbers rather than names were requested on the forms to assure a certain degree of anonymity during data analysis. The students were asked to provide other information, including age, major, classification, and cumulative point-

hour ratio.

Procedural instructions were read to the students prior to the administration of each of the instruments. The Clothing Design Unit Test was a timed test. The students had 16 minutes to complete the 24 items on the test. The Achievement Anxiety Test (AAT), which consisted of 28 items, was not timed. Approximately 10 minutes were required by the students to complete this instrument. The Tennessee Self Concept Scale (TSCS) was administered last. The amount of time required by the students to complete the TSCS varied considerably. However, no one exceeded the maximum 20 minute time limit established by the test developer. The materials were collected by the researcher at the end of the class period.

Three weeks following the pre-testing session, the students completed the Clothing Design Exercise as a part of the mid-term practical laboratory examination. The exercise required the students to analyze a sketched dress design and to make the pattern pieces from a half-scale basic sloper pattern.

During a lecture period the week following the completion of the Design Unit, Autumn Quarter 1975 and Winter Quarter 1976, the researcher again administered all instruments, except the Tennessee Self Concept Scale. Test packets were distributed to the participants by a student assistant. Once again the researcher explained that the

results would have no effect on the course grade. Subjects were encouraged to give honest responses. Identification by social security number was requested to assure some degree of anonymity during data analysis. The time limit on the Clothing Design Unit Test was reduced to 13 minutes. At the end of the testing period, the test packets were returned. The students received a letter from the researcher explaining the nature of the research and thanking them for participating in the study.

Data Analysis

The statistical procedures used to summarize and analyze the data included frequency distributions, correlations, item analysis, factor analysis, multivariate analysis of variance, analysis of variance, and analysis of covariance. An explanation of the statistical techniques used in testing the hypotheses follows.

Only those subjects for whom a complete set of scores was available ($n_1 = 47$ and $n_2 = 46$) were included in the initial data analysis. One subject in the TV lecture-supervised laboratory group was dropped from the analysis in accordance with a procedure for dropping of outliers outlined by Anscombe (1960, pp. 125-147).

A multivariate analysis of variance test was utilized in examining the capability of the ad hoc method of assignment in providing near-equivalent groups. The analysis was

utilized to determine if the two independent samples (groups) could have come from the same population with respect to the dependent variables of CPHR, initial achievement anxiety, initial course attitudes, and clothing design unit test scores. The .20 probability level provided a stringent test (two-tailed) for the hypothesis of no difference.

A three-way multivariate analysis of variance (MANOVA) was utilized in analyzing the effect of instructional mode together with achievement anxiety and academic achievement on knowledge and application of course content and on course attitudes. The students within the TV lecture-supervised laboratory and independent study modes were divided into two CPHR levels (high and low); then, within each CPHR level, they were further divided into two achievement anxiety levels (high F-D and low F-D). Two analyses were performed. The first analysis included all students in both groups ($n_1 = 46$ and $n_2 = 46$). The second analysis included a reduced sample of the top 25 percent (12 students) and the bottom 25 percent (12 students) in each group on the variable of CPHR. The second analysis was performed to determine if the extreme scores of the sample would corroborate the results obtained with the entire sample.

A one-way analysis of covariance was utilized to ascertain the effect of instructional mode on end-of-unit achievement anxiety of low CPHR subjects. The initial anxiety score served as the covariate. Two analyses were

completed. The first analysis involved all the students and the second analysis involved only the bottom 50 percent of the sample.

The effect of instructional mode on end-of-unit achievement anxiety of initially low F-D anxiety subjects was analyzed using a one-way analysis of covariance. Again, the initial anxiety score served as the covariate. Low F-D anxiety subjects in the two instructional modes were compared with respect to end-of-unit achievement anxiety. Two analyses were completed. In one analysis, all subjects were considered. In the other analysis, the bottom 50 percent of the subjects were considered.

All statistical analyses were conducted at The Ohio State University Computing Center. The Clyde Manova Program (Clyde, 1969) was utilized in computing all multivariate analyses of variance and analyses of covariance. The Statistical Analysis System (SAS) computer program (Service, 1972) was utilized in computing analyses of covariance. Descriptive statistics were computed utilizing the SPSS computer program (Nie, Hull, Steinbrenner, and Bent, 1975). The BMDX72 computer program (Sampson and Jennrich, 1972) was utilized for the factor analyses. Wherry's Item Analysis for Tests and Scales (TESCAN) computer program (Wherry, 1975, pp. 52-53) was utilized in computing reliabilities for the Achievement Anxiety Test. The Subtest Analysis of Scales (SCST) program in the STATPACK computer program

(IRCC, 1974) was utilized in computing the reliabilities for the Purdue Rating Scale for Instruction. Item analyses of the Clothing Design Unit Test were completed by the Office of Evaluation at The Ohio State University. An a priori decision was made to use and report the .05 level of significance.

In summary, the identification of variables, selection and development of instruments, research design, sample, data collection, and data analysis have been presented in this chapter. The statistical results of the study are presented in Chapter IV. Chapter V contains a discussion of the results.

CHAPTER IV

RESULTS OF THE STUDY

The data for the study consisted of the responses to instruments administered to students within two intact classrooms. Students in an undergraduate clothing course (Clothing: Design Analysis) were classified with respect to cumulative point-hour ratio (CPHR), achievement anxiety, and instructional mode. Comparisons were made on student knowledge and application of course content and course attitudes. Comparisons were also made on the post-treatment anxiety scores of selected subgroups. Statistics were computed for the entire sample and for a specified reduced sample to determine if the extreme scores represented in the sample would corroborate the results obtained with the entire sample.

The results of the study are presented in this chapter under the major headings of (1) initial classroom equalities; (2) achievement and course attitudes of subjects in the level combinations of instructional mode, CPHR, and anxiety; (3) effect of instructional mode on post-treatment anxiety scores of low CPHR subjects; and (4) effect of

instructional mode on post-treatment anxiety scores of initially low F-D anxiety subjects. Results of the tests of the hypotheses are presented in each section.

Initial Classroom Equalities

Presented in Table 1 (Appendix A) are the pre-treatment mean scores and standard deviations on the clothing design unit test, attitude scale, anxiety scale, and cumulative point-hour ratio for the TV lecture-supervised laboratory and independent study groups ($n_1 = 47$ and $n_2 = 46$, respectively). To test these initial observations, the two group centroids were compared by performing a multivariate analysis of variance (MANOVA). The multivariate test of significance utilizing Wilks' lambda criterion was not significant ($F = 1.46$; $df = 4/88$; $P < .22$), thereby preventing rejection of the null hypothesis of equality. Thus, prior to treatment, the two groups did not differ significantly on the four variables considered simultaneously.

Subsequent univariate analyses of variance were performed to compare group mean scores on each of the criterion variables (See Table 2, Appendix A). With the exception of anxiety, none of the univariate Fs were significant at the .20 probability level. As may be observed in Table 2, the difference between the two anxiety means was significant ($F = 4.40$; $df = 1/91$; $p < .04$). Thus, considering the results of the univariate F tests, the assumption that the

independent classrooms could have come from the same sampling distribution (in terms of anxiety) may be questionable. Any interpretation of the univariate F tests, however, must be done with the realization that a single probability level applicable to all variables jointly cannot in general be obtained from the separate F tests (Bock and Haggard, 1968, p. 102). In other words, given multiple criterion variables, significant differences on a few of them could be expected by chance (Tatsuoka, 1971, p. 62).

Inspection of the frequency distributions for anxiety scores of the two groups lead the researcher to believe that the anxiety score of one subject in the TV lecture-supervised laboratory group was discordant. Rules for the rejection of outliers have historically been important in many sciences, including chemistry, physics, and astronomy. Anscombe (1960, pp. 125-147) has outlined procedures for rejecting spurious observations. According to Anscombe's Rule 1, not more than one observation can be rejected. Application of this rule to the anxiety score of the subject in question lead to the rejection of the total set of scores for that subject.

After dropping the outlier ($n_1 = 46$, $n_2 = 46$), all statistics were recalculated. The pre-treatment mean scores and standard deviations on the clothing design unit test, attitude scale, anxiety scale, and CPHR for the TV

lecture-supervised laboratory and independent study groups are presented in Table 3 (Appendix A). The multivariate test of significance utilizing Wilks' lambda criterion was not significant ($F = 1.21$; $df = 4/87$; $p < .31$), thereby preventing rejection of the null hypothesis of centroid equality. Thus, prior to treatment, the two groups did not differ significantly on the four variables considered simultaneously. Subsequent univariate ANOVAs are presented in Table 4 (Appendix A). Interpretation of the results of the univariate Fs is essentially the same as in the first analysis ($n_1 = 47$, $n_2 = 46$). The univariate F for anxiety was 3.49 ($p < .07$).

The contention that the two intact classrooms were equivalent, prior to treatment, on the variables of CPHR, achievement anxiety, clothing design unit test scores, and course attitudes is predicated on the results of the MANOVA. Additional support is provided for the utilization of a multivariate rather than a univariate technique of analysis by the existence of low to moderately high correlations among the dependent variables, as may be observed in Table 5 (Appendix A).

The data analyses which follow are appropriate if the assumptions concerning classroom equalities prior to treatment are tenable. The results which follow are based on a sample size of 92. The reader may verify that the interpretation of the results of the statistical tests for the

sample of 93 (prior to dropping outlier) is essentially the same as for the reported sample ($N = 92$) through inspection of the tables in Appendix B.

Achievement and Course Attitudes of
Subjects in the Level Combinations
of Instructional Mode, CPHR, and Anxiety

The achievement and course attitudes of subjects in the level combinations of instructional mode, CPHR, and anxiety were measured by performance on the Clothing Design Unit Test, the Clothing Design Exercise, and the Purdue Rating Scale for Instruction. The major research hypothesis concerning achievement and course attitudes was as follows:

Hypothesis I: Of the students in the independent study sections, those in the various level combinations of academic achievement and achievement anxiety will score differently on an unannounced clothing design unit test, a clothing design exercise, and a course attitude scale than will their counterparts in the TV lecture-supervised laboratory sections.

Results of the Analysis of Data for Hypothesis I

Post-treatment scores and standard deviations on the Clothing Design Unit Test, Clothing Design Exercise, and Purdue Rating Scale for Instruction for the two instructional modes are presented in Table 6 (Appendix A). The cell means for the dependent variables of knowledge and application of course content for the entire sample ($N = 92$) are presented in Table 7 (Appendix A). Means for the

reduced sample ($N = 48$) are in Table 8 (Appendix A).

The data on the three dependent variables were analyzed using a three-factor multivariate analysis of variance (MANOVA) design. The $2 \times 2 \times 2$ factorial design was a fixed model in that the three independent variables considered in the study were fixed. The purpose of this analysis was to ascertain the differences between the groups in terms of the three dependent variables considered simultaneously. The results of the comparison of the centroids of the two groups with respect to the dependent variables are summarized in Table 9 (Appendix A). The results for the reduced sample are in Table 10 (Appendix A).

In Table 9 (Appendix A) it may be observed that none of the three main effects of instructional mode, CPHR, and initial anxiety were found to have statistically significant differences between their levels. None of the four interaction effects approached significance. For the reduced sample, there was a significant main effect of CPHR (Table 10, Appendix A).

The two groups did not differ significantly on the criterion variables considered simultaneously as evidenced by the non-significant multivariate F tests (entire sample). Inspection of the results of the univariate F tests provides insight as to the differences between the two groups on the criterion variables considered separately. In Table 11 (Appendix A) it may be observed that the main effect of

CPHR was found to be significant ($p < .03$) for the dependent variable clothing design unit test scores. However, none of the interactions approached significance. None of the univariate F tests for the dependent variables of clothing design exercise scores and attitude scores was significant (Tables 12 and 13, Appendix A). For the reduced sample (Tables 14 and 15, Appendix A), the main effect for CPHR was significant for the dependent variables of clothing design unit test scores ($p < .004$) and clothing design exercise scores ($p < .001$). The mode X anxiety interaction for the clothing design exercise scores (Table 15, Appendix A) approached significance ($p < .06$). As may be observed in Table 16 (Appendix A), the main effect of CPHR ($p < .06$) and the mode X CPHR interaction ($p < .08$) also approached significance for the dependent variable course attitude scores.

Figures 1 and 2 provide graphic representations of the differences between various mean scores considered in the three-way analyses of variance for the dependent variable clothing design unit test scores. In Figure 1, the tendency toward parallelism of the lines on the graph indicates the lack of a significant second-order interaction. The interpretation of Figure 2 (reduced sample) is essentially the same as for Figure 1 (entire sample) with the exception of the reversal of the means of the low CPHR subjects in the TV lecture-supervised laboratory group. The mean score for the high F-D, low CPHR subjects in the TV lecture-supervised

Figure 1. Clothing design unit test mean scores for the levels of instructional mode, CPHR, and initial AAT, entire sample ($n_1 = 46$, $n_2 = 46$).

Figure 2. Clothing design unit test mean scores for the levels of instructional mode, CPHR, and initial AAT, reduced sample ($n_1 = 24$, $n_2 = 24$).

laboratory group is slightly higher than the mean score for the low F-D, low CPHR subjects. As indicated in Figure 1, the high CPHR points for each set of lines are definitely above the low CPHR line points. The difference between levels of CPHR on the dependent variable of clothing design unit test is depicted in Figure 3. In Figure 1, the set of lines for the independent study mode are not substantially higher than for the lecture set. The lines for low F-D anxiety subjects are not substantially above those of high F-D anxiety subjects.

As may be seen in Table 12 (Appendix A) neither the main effects nor the interactions for the dependent variable knowledge and application of course content (measured by the Clothing Design Exercise) was significant. Figures 4 and 5 provide graphic representations of the differences between various mean scores considered in the three-way analyses of variance. In Figures 4 and 5, the dissimilar patterns for high F-D and low F-D lines indicate that high F-D anxiety was not associated with the higher knowledge and application of course content, as measured by the Clothing Design Exercise, in every situation. In the independent study mode, low CPHR/low F-D anxiety subjects scored higher on the Clothing Design Exercise than low CPHR/high F-D anxiety subjects (Figure 4). Conversely, in the TV lecture-supervised laboratory mode, low CPHR/high F-D anxiety subjects outperformed low CPHR/low F-D anxiety subjects.

Figure 3. Clothing design unit test mean scores for the levels of instructional mode and CPHR, entire sample ($n_1 = 46$, $n_2 = 46$).

Figure 4. Clothing design exercise mean scores for the levels of instructional mode, CPHR, and initial AAT, entire sample ($n_1 = 46$, $n_2 = 46$).

Figure 5. Clothing design exercise mean scores for the levels of instructional mode, CPHR, and initial AAT, reduced sample ($n_1 = 24$, $n_2 = 24$).

For the reduced sample, there was one significant univariate F. High CPHR subjects scored higher than low CPHR subjects on the Clothing Design Exercise (Table 15, Appendix A). In the independent study mode, low F-D anxiety subjects outperformed high F-D anxiety subjects, irrespective of CPHR (Figure 5). A reversal in the mean scores for low CPHR subjects in the TV lecture-supervised laboratory mode resulted in a disordinal interaction. Low CPHR/high F-D anxiety subjects outperformed low CPHR/low F-D anxiety subjects in the TV lecture supervised laboratory mode.

As may be seen in Table 13 (Appendix A) neither the main effects nor the interactions approached statistical significance for the dependent variable of course attitude. Figures 6 and 7 provide graphic representations of the differences between various mean scores considered in the three-way analyses of variance. In both figures the dissimilar patterns for high F-D and low F-D lines indicate that high F-D anxiety was not associated with the more positive course attitude score in every situation. Again, as for the Clothing Design Exercise, the mean attitude score for the low CPHR, low F-D anxiety subjects in the independent study mode exceeded the mean attitude score for the low CPHR, high F-D anxiety subjects. As can be seen in Table 13 (Appendix A), the mode X CPHR interaction is closer to being significant than are the main effects or the other first-order and the second-order interaction effects. The

Figure 6. Course attitude mean scores for the levels of instructional mode, CPHR, and initial AAT, entire sample ($n_1 = 46$, $n_2 = 46$).

Figure 7. Course attitude mean scores for the levels of instructional mode, CPHR, and initial AAT, reduced sample ($n_1 = 24$, $n_2 = 24$).

non-significant mode X CPHR interaction does appear as a disordinal interaction in Figure 8.

Hypothesis I, as stated in the research form, was not accepted. The results of a multivariate analysis of variance did not lend support to the predicted second-order interaction; namely, that of the students in the independent study sections, those in the various level combinations of academic achievement and achievement anxiety would score differently on an unannounced clothing design unit test, a clothing design exercise, and a course attitude scale than would their counterparts in the TV lecture-supervised laboratory sections.

Effect of Instructional Mode on Post-
Treatment Achievement Anxiety Scores
of Low CPHR Subjects

The effect of instructional mode on post-treatment achievement anxiety of low CPHR subjects was measured by performance on the Achievement Anxiety Test (AAT). The hypothesis concerning post-treatment achievement anxiety was as follows:

Hypothesis II: Low CPHR subjects in the TV lecture-supervised laboratory mode will report experiencing more facilitative end-of-unit achievement anxiety than will their counterparts in the independent study mode.

Results of the Analysis of Data for Hypothesis II

A one-way analysis of covariance was utilized in

Figure 8. Course attitude mean scores for the levels of instructional mode and CPHR, entire sample ($n_1 = 46$, $n_2 = 46$).

examining the post-treatment achievement anxiety scores of low CPHR subjects. Analysis of covariance is a form of analysis of variance. The purpose of the analysis of covariance is to test the significance of the differences between the group means by taking into account the correlation between the dependent variable and one or more covariates, or concomitant variables (Kerlinger, 1973, p. 370). That is, group means on a dependent variable are compared after the means have been adjusted for differences between the groups on some relevant covariate variable, such as score on a pretest. In the present study, the dependent variable was the post-treatment score on the Achievement Anxiety Test (AAT). The covariate was the pre-treatment score on the AAT.

As may be seen in Tables 17 and 18 (Appendix A), the adjusted mean scores reflect a more debilitating achievement anxiety score for the independent study instructional mode than for the TV lecture-supervised laboratory mode. Summaries of the analyses for the entire sample and the reduced sample appear in Tables 19 and 20, respectively (Appendix A). With respect to association with more facilitative end-of-unit F-D anxiety scores for low CPHR subjects, the advantage was with the TV lecture-supervised laboratory mode (Tables 17 and 18, Appendix A). However, the advantage was not great enough to reach significance, as may be observed in Tables 19 (entire sample) and 20 (reduced sample) which

are presented in Appendix A.

Hypothesis II, as stated in the research form, was not accepted. The results of an analysis of covariance did not lend support to the predicted main effect for instructional mode; namely, that low CPHR subjects in the TV lecture-supervised laboratory sections would report experiencing more facilitative end-of-unit achievement anxiety than would their counterparts in the independent study sections.

Effect of Instructional Mode on Post-Treatment Achievement Anxiety Scores of Initially Low F-D Anxiety Subjects

The effect of instructional mode on post-treatment achievement anxiety scores of initially low F-D anxiety subjects was measured by performance on the Achievement Anxiety Test (AAT). The hypothesis concerning post-treatment anxiety was as follows:

Hypothesis III: Low F-D anxiety subjects in the TV lecture-supervised laboratory mode will report experiencing more facilitative end-of-unit achievement anxiety than will their counterparts in the independent study mode.

Results of the Analysis of Data for Hypothesis III

A one-way analysis of covariance was utilized in examining the post-treatment achievement anxiety scores of initially low F-D anxiety subjects. The dependent variable was the post-treatment score on the AAT. The covariate was the pre-treatment score on the AAT.

The adjusted achievement anxiety mean scores for the entire sample and the reduced sample are presented in Tables 21 and 22, respectively (Appendix A). With respect to association with more facilitative F-D anxiety scores for initially low F-D anxiety subjects the advantage was with the TV lecture-supervised laboratory instructional mode. However, the advantage was not great enough to be significant, as is shown for the entire sample and the reduced sample in Tables 23 and 24, respectively (Appendix A).

Hypothesis III, as stated in the research form, was not accepted. The results of an analysis of covariance did not lend support to the predicted main effect for instructional mode; namely, that low F-D anxiety subjects in the TV lecture-supervised laboratory mode would report experiencing more facilitative end-of-unit achievement anxiety than would their counterparts in the independent study mode.

In summary, the achievement and course attitudes of subjects in the level combinations of instructional mode, CPHR, and anxiety were measured by performance on the Clothing Design Unit Test, the Clothing Design Exercise, and the Purdue Rating Scale for Instruction. A comparison was made of the centroids of the two groups with respect to the dependent variables, utilizing multivariate analysis of variance (MANOVA). No significant main effects of instructional mode, CPHR, and initial anxiety were found. Furthermore, none of the four interactions approached significance.

Subsequent analyses of variance (ANOVAs) revealed a significant main effect for CPHR on the dependent variable clothing design unit test scores. None of the univariate F tests for the dependent variables clothing design exercise scores and course attitude scores was significant. Thus, for the entire sample, there was only one significant difference between the two groups. High CPHR subjects scored significantly higher than the low CPHR subjects on the Clothing Design Unit Test ($p < .03$). A subsequent ANOVA on the reduced sample corroborated the findings for the entire sample with respect to CPHR. For the reduced sample, a significant main effect for CPHR was also observed for the dependent variable clothing design exercise scores ($p < .001$). While the main effect for CPHR on the dependent variable course attitudes was not significant ($p < .06$), it did appear that there were differences in the data that might be significant with a larger sample and more stringent controls. In general, high CPHR was associated with higher criterion scores than low CPHR. Non-significant first-order interactions were observed for the dependent variables clothing design exercise scores and course attitude scores. Again, with a larger sample and more stringent controls, significant interactions might be observed. Hypothesis I, as stated in the research form, was not accepted.

The effect of instructional mode on post-treatment achievement anxiety of low CPHR subjects was measured by

performance on the Achievement Anxiety Test (AAT). A one-way analysis of covariance was utilized in examining the post-treatment achievement anxiety scores of low CPHR subjects. As hypothesized, the TV lecture-supervised laboratory mode was associated with more facilitative end-of-unit F-D anxiety scores for low CPHR subjects than the independent study mode. However, the advantage was far from being significant. Thus, Hypothesis II, as stated in the research form, was not accepted.

Finally, the effect of instructional mode on post-treatment achievement anxiety of initially low F-D anxiety subjects was measured by performance on the Achievement Anxiety Test (AAT). A one-way analysis of covariance was utilized in examining the post-treatment achievement anxiety scores of initially low F-D anxiety subjects. As hypothesized, the TV lecture-supervised laboratory mode was associated with more facilitative end-of-unit F-D anxiety scores for initially low F-D anxiety subjects than the independent study mode. However, the advantage was not enough to be significant. Thus, Hypothesis III, as stated in the research form, was not accepted.

CHAPTER V

DISCUSSION

One of the primary objectives of this study was to determine if a disordinal interaction existed between instructional mode and selected learner characteristics on student achievement and course attitudes. Another objective was to ascertain the effect of instructional mode on the post-treatment achievement anxiety of subjects with differing characteristics. In this chapter a discussion of the findings will be presented with respect to the three research hypotheses. The instructional modes, data gathering instruments, and techniques of analysis will be considered in the discussion.

Discussion of the Findings Related to the Research Hypotheses

The pre-test data were analyzed to determine the equivalency of the two groups. The results of the comparison of the two group centroids with respect to the variables of cumulative point-hour ratio (CPHR), achievement anxiety, clothing design unit test scores, and course attitudes suggested that the two independent groups could have come from

the same population regarding these four variables. Utilizing a multivariate analysis of variance (MANOVA), the tested equalities supported the contention that prior to treatment the two intact classrooms were equivalent insofar as the variables under study were concerned. From this perspective, differences between the two groups on the dependent variable scores were attributed to the instructional mode variable and not to CPHR, initial achievement anxiety, pre-treatment clothing design unit test scores, and initial course attitudes.

Concerning the achievement and course attitudes of the 92 students in the study, the results of the MANOVA suggested that the differences in CPHR, achievement anxiety, and instructional mode had no relationship with the students' performance on a multiple-choice clothing design test, a clothing design exercise, and an attitude scale. Further, there were no interaction effects observed among the independent variables. Thus, the two groups did not differ significantly on the three criterion variables considered simultaneously.

The differences between the two groups on the criterion variables considered separately were examined utilizing analysis of variance (ANOVA). A significant main effect of CPHR was observed for the dependent variable clothing design unit test scores. High CPHR subjects outperformed low CPHR subjects irrespective of instructional mode ($\bar{X}_1 = 13.63$ and

$\bar{X}_2 = 11.90$, respectively). Thus, with respect to grade-point average, this finding is in agreement with general research findings. High grade-point average subjects have generally been found to perform well under different instructional modes (Bigelow and Egbert, 1968, pp. 37-39; Doty, 1967, pp. 363-365).

A non-significant main effect of instructional mode was observed on the dependent variable clothing design unit test scores. An advantage, though not statistically significant, was observed in favor of the independent study mode when a comparison was made of the mean scores on the Clothing Design Unit Test. Regardless of the comparative level combinations of previous academic achievement/achievement anxiety considered (high CPHR/high F-D, high CPHR/low F-D, low CPHR/high F-D, or low CPHR/low F-D), students in the independent study instructional mode outperformed students in the TV lecture-supervised laboratory mode on the Clothing Design Unit Test. In numerous comparative studies, students enrolled in PSI or independent study sections of courses have been shown to score higher on course examinations than students in the lecture sections of the course (Born, Gledhill, and Davis, 1972; Cooper and Greiner, 1971; Hartnett and Stewart, 1966; Hastings, 1972; Jacko, 1974; Johnston and Pennypacker, 1971; McMichael and Corey, 1969; Moore, Hauck, and Gagne, 1973; Morris and Kimbrell, 1972; and Sheppard and McDermot, 1970).

With respect to CPHR, it is readily apparent that within each instructional mode the mean scores on the Clothing Design Unit Test decreased in a straightforward manner from the high CPHR/low F-D and the high CPHR/high F-D level combinations on through to the low CPHR/low F-D and the low CPHR/high F-D level combinations (TV lecture-supervised laboratory: 13.33, 12.83, 12.13, 10.00; independent study: 14.50, 13.85, 13.67, 11.85). Thus, on the Clothing Design Unit Test, high CPHR subjects outperformed low CPHR subjects, irrespective of anxiety level and instructional mode. Contrary to expectation, the low F-D anxiety subjects scored higher on the Clothing Design Unit Test than high F-D anxiety subjects. These results both support and contradict findings by Jacko (1974) where high grade-point average (GPA) and high F-D anxiety were associated with higher achievement scores than were low GPA and low F-D anxiety. It may be conjectured that the threat of failure was reduced in the present study by informing students that their responses on the achievement test would in no way affect their course grades thereby facilitating rather than suppressing performance of low F-D anxiety subjects. In numerous studies of the relationship between anxiety and achievement, high anxiety has been shown to be associated with low criterion scores (Mandler and Sarason, 1952; Ripple, Millman, and Glock, 1969; Sarason, 1961; West, Lee, and Anderson, 1960).

Subsequent analysis of the data for the reduced sample ($n_1 = 24$, $n_2 = 24$) resulted in a significant main effect of CPHR ($p < .001$) for the clothing design unit test scores. A comparison of mean scores for the reduced sample in Table 8 (Appendix A) reveals an advantage, though not enough to be significant, in favor of the independent study mode on the variable of clothing design unit test scores. The variables of instructional mode and CPHR were again associated with the clothing design unit test scores in the same manner as they were with the entire sample. The variable of initial F-D anxiety did not reflect this same relationship in the TV lecture-supervised laboratory group. Low CPHR/high F-D anxiety type subjects outperformed low CPHR subjects who were low F-D anxiety types. However, the difference between the means of 12.50 and 12.00 was not significant. Therefore, it must be maintained that there was no real difference between the performance of these two anxiety types under the TV lecture-supervised laboratory instructional mode. As can be seen in Figure 2 (p. 63), this slight reversal under the lecture technique was not sufficient to cause a significant interaction, but prevented a main effect for initial F-D anxiety.

The results of the two analyses of variance (entire sample and reduced sample) seem to suggest that CPHR affected, or was at least associated with, performance on the Clothing Design Unit Test. Despite the nonsignificance

of the instructional mode variable, the independent study mode was associated with high performance scores on the Clothing Design Unit Test. The result was not significant ($p < .08$) with respect to the relationship between initial F-D anxiety and performance on the Clothing Design Unit Test. Thus, from a statistical perspective, it must be maintained that anxiety level did not affect the test performance of the subjects. However, to dismiss anxiety as irrelevant to test performance seems to be unwarranted.

The pattern of performance by students in the level combinations of CPHR and anxiety on the variables of clothing design exercise and course attitudes varied across and within instructional modes. The mean scores for the TV lecture-supervised laboratory group on the Clothing Design Exercise and attitude scale decreased in a straightforward manner from the high CPHR/high F-D and the high CPHR/low F-D level combinations on through the low CPHR/high F-D and the low CPHR/low F-D levels (Clothing Design Exercise: 46.54, 46.42, 45.17, 44.31; course attitudes: 147.42, 145.50, 143.83, 140.13). The performance of subjects on the measure of achievement is consistent with the manner in which subjects in Jacko's study (1974) performed on a course examination. The two situations are not directly comparable, however, since the criterion measure in Jacko's study involved only cognitive skills whereas in the present study the criterion measure involved both cognitive and motor skills.

McKeachie (1958, pp. 580-84) has suggested that anxiety during classroom examinations accelerates to such a point that it interferes with memory and problem solving. It may be argued that the achievement anxiety operative in the instructional environment served to suppress scores of low F-D anxiety subjects on the Clothing Design Exercise in a situation where the results contributed to the course grade. On the other hand, informing the low F-D anxiety subjects that the results on the Clothing Design Unit Test would not affect their course grades may have reduced the debilitating effects of achievement anxiety. Likewise, the results relative to performance on the Clothing Design Exercise are consistent with Drive Theory from which the prediction is made that high drive produces debilitating effects on difficult tasks where error tendencies are strong (Leherissey, O'Neil, and Hansen, 1971, pp. 413-20).

Sarason (1959, pp. 272-75), in a study of the intellectual and personality correlates of test anxiety, found a negative correlation between anxiety and grade-point average. This negative correlation between anxiety and grade-point average reportedly approached a zero correlation as a function of number of years in college. According to Sarason, the implication of this observation is that when the students are given time to adapt to perceived threatening situations, anxiety reactions may extinguish. In the present study utilizing junior and senior female home economics

subjects, the correlations between initial F-D anxiety scores and the criterion variables of clothing design unit test scores and clothing design exercise scores were indeed non-significant (Table 5, Appendix A). Relative to the question of whether or not a negative correlation exists between test anxiety and grade-point average, another consideration in the present study is that the experimental unit was the second unit of study. Thus, the students had already experienced some degree of success or failure in the Clothing: Design Analysis course. Theoretically, at least, students had time to adapt to any perceived threatening situations prior to data collection.

The most important outcomes with respect to instructional design are related to the performance of subjects on the Clothing Design Exercise and course attitude scale in the independent study group. In the independent study mode, the difference in anxiety level tended to widen the difference in scores for high CPHR subjects on the Clothing Design Exercise. High CPHR/high F-D anxiety was associated with the highest level of performance on the Clothing Design Exercise ($\bar{X} = 48.96$), whereas a high CPHR/low F-D anxiety represented the lowest level of achievement on the exercise ($\bar{X} = 42.69$). Low CPHR/low F-D anxiety subjects in the independent study mode outperformed low CPHR/high F-D and high CPHR/low F-D anxiety subjects on the Clothing Design Exercise. However, it should be noted that the performance of

low CPHR/low F-D anxiety subjects in the independent study mode on the Clothing Design Exercise was essentially the same as for the low CPHR/low F-D anxiety subjects in the TV lecture-supervised laboratory mode ($\bar{X} = 44.92$ and 44.31 , respectively). As expected, high CPHR/high F-D anxiety subjects performed well under both instructional modes. However, high CPHR/high F-D anxiety subjects in the independent study mode scored higher on the Clothing Design Exercise than their counterparts in the TV lecture-supervised laboratory group ($\bar{X} = 48.96$ and 46.54 , respectively).

With respect to performance on the Clothing Design Exercise, the subsequent ANOVA for the reduced sample corroborated the results for the entire sample. As was the case for the Clothing Design Unit Test, the high CPHR subjects outperformed low CPHR subjects irrespective of anxiety level and instructional mode. The mode X anxiety interaction for the reduced sample approached significance ($p < .06$). Thus, future researchers may confirm that test performance varies as a function of anxiety level and instructional mode.

With respect to the dependent variable of course attitudes, neither the main effects nor the interactions approached statistical significance (Table 13, Appendix A). A comparison of score means (Table 6, Appendix A) for the TV lecture-supervised laboratory and independent study groups reveals an advantage, though not enough to be

statistically significant, in favor of the independent study mode on the variable of course attitudes. In a number of studies, researchers have reported more favorable course attitudes among students enrolled in PSI and programmed courses than in lecture courses (Born and Herbert, 1971; Born, Gledhill, and Davis, 1972; Hastings, 1972; Lloyd and Knutzen, 1969; McMichael and Corey, 1969; Morris and Kimbrell, 1972; Sheppard and MacDermot, 1970; Witters and Kent, 1972).

The mean attitude score for low CPHR subjects was slightly higher than for high CPHR subjects (145.10 and 144.06, respectively). High F-D anxiety was associated with more favorable course attitudes than low F-D anxiety. For the high CPHR subjects in both instructional modes, high F-D anxiety scores were associated with more favorable course attitudes than low F-D anxiety scores. The same relationship existed for low CPHR subjects in the TV lecture-supervised laboratory mode and high CPHR subjects in the independent study mode. The reversal in the mean attitude score for the low CPHR/low F-D anxiety subjects in the independent study mode resulted in a disordinal interaction. Low CPHR/low F-D anxiety subjects scored higher on the attitude scale than low CPHR/high F-D anxiety subjects. A subsequent univariate ANOVA for the reduced sample revealed no significant findings. However, the main effect for CPHR and the mode X CPHR interaction approached significance

($p < .06$ and $p < .08$, respectively).

The similarity in the pattern of performance of subjects on the Clothing Design Exercise (Figure 4, p. 66) and the attitude scale (Figure 6, p. 69) indicates that there were existent in the independent study mode elements which not only facilitated academic performance but also fostered positive course attitudes among low CPHR/low F-D anxiety subjects. In future studies, researchers may be able to confirm that course attitudes of subjects differing on CPHR vary as a function of instructional mode.

The second area of concern of the researcher was in regard to the effect of instructional mode on the post-treatment achievement anxiety of low CPHR subjects. The results for the entire sample and the reduced sample one-way analyses of covariance were similar (Tables 19 and 20, Appendix A). Neither main effect for instructional mode was significant. However, the results were in the predicted direction as may be seen through inspection of the adjusted achievement anxiety means in Tables 17 and 18 (Appendix A). The TV lecture-supervised laboratory mode tended to result in more facilitative end-of-unit achievement anxiety scores for students with low CPHR than did the independent study mode. The advantage in favor of the TV lecture-supervised laboratory mode in relation to end-of-unit anxiety was contrary to the findings with respect to achievement, as measured by the Clothing Design Unit Test, and with respect to

course attitudes. In a study utilizing female home economics majors, Jacko (1974) found that subjects in a lecture section and those with a high CPHR became more facilitative in achievement anxiety than did those in a PSI section and those with a low GPA. Jacko also found that the lecture mode tended to be associated with more facilitative end-of-course anxiety scores for students with low GPA than the PSI mode.

Finally, the effect of instructional mode on the post-treatment achievement anxiety of initially low F-D anxiety subjects was investigated. The one-way analyses of covariance for both the entire sample (Table 23, Appendix A) and the reduced sample (Table 24, Appendix A) resulted in no significant main effect of instructional mode. However, as may be observed in Table 21 (Appendix A), the adjusted achievement anxiety mean scores were in the predicted direction. The TV lecture-supervised laboratory instructional mode was slightly more effective than the independent study mode in producing an environment conducive to facilitative end-of-unit anxiety scores.

In a similar study, Jacko (1974) found that the lecture method was clearly superior to the PSI mode in producing a climate for facilitative anxiety scores among female home economics majors. For a reduced sample, Jacko found a significant mode X initial F-D anxiety interaction. The differential effectiveness of the modes of instruction varied

according to whether the students were initially high F-D or low F-D anxiety types. For the high F-D anxiety student, neither instructional mode was advantageous in relation to a more facilitative end-of-course anxiety score. However, with the low F-D anxiety student, the lecture mode proved to be more beneficial than the PSI in relation to facilitative end-of-course anxiety scores. In the present study, the researcher was unable to replicate Jacko's findings relative to achievement anxiety with a group of home economics students.

The researcher predicted a second-order interaction among instructional mode, academic achievement, and achievement anxiety on the dependent variables clothing design unit test scores, clothing design exercise scores, and course attitude scores. Additionally, the researcher predicted a main effect of instructional mode for low CPHR and initially low F-D anxiety subjects on end-of-unit achievement anxiety. Neither the predicted interaction nor the main effects were statistically significant. To help account for the unexpected findings, the instructional modes, data gathering instruments, and the techniques of analysis will be considered.

Instructional Modes

Aptitude-treatment interaction studies are based on the assumption that one instructional method may be superior for students at one point on a set of individual difference

dimensions than another method. Divergent instructional methods are assumed to draw on different abilities, which in turn are presumed to be assessed by ability measures (Tobias, 1976, p. 64).

In the present study, both instructional modes were devised to promote attainment of the unit goals to the extent possible. The TV lecture-supervised laboratory mode was under the control of a regular faculty member with the lecture material on videotape. A discussion in a large-group setting followed each lecture. Six hours per week of laboratory experiences were likewise under the control of the faculty member in charge of the course. The independent study mode was designed by the researcher. The interaction periods were under the control of the course instructor. In a sense, the two instructional modes had in common a discussion period lead by the course instructor. Thus, the two instructional methods utilized in the study were not pure examples of lecture-laboratory and independent study instructional modes. The intent of the preceding comments is to emphasize the somewhat atypical nature of the instructional modes being compared and to suggest that with instructional modes of a different nature or duration the results could be different.

The two instructional approaches differed in other important respects. The instructional modes differed with respect to the number of instructional materials and the

amount of time students spent interacting with the instructional materials.

In the independent study mode, the students had a variety of instructional materials available to them. Thirty-six students (out of 46) reported viewing the slide/tape set on "Designing Clothes to Flatter the Figure." Reasons for viewing the slide/tape set other than first-time viewing were to review material and to learn a technique. The total reported viewing time for the slide/tape set was 22 hours and 12 minutes.

Only six students reported completing the flat pattern design exercise. The total reported amount of time engaged in this activity was 12 hours and 10 minutes. It should be noted that illustrations of the completed pattern manipulations were available to the students. They may have elected to study these illustrations rather than complete the steps themselves. Nevertheless, the only criterion on which the performance of the independent study group did not exceed that of the TV lecture-supervised laboratory group was on the Clothing Design Exercise. The question remains as to whether or not instructional support in the form of a series of flat pattern design problems could affect the performance of independent study students on the Clothing Design Exercise.

The estimated total amount of time students in the TV lecture-supervised laboratory group engaged in viewing the

videocassettes was approximately 158 hours. The reported total amount of time students in the independent study group interacted with selected instructional materials was 147 hours and 39 minutes. A summary of the reasons for viewing the videocassettes appears in Table 29 (Appendix C). Considering the number of instructional materials the students utilized in the mediated self-instructional laboratory for which usage records were impracticable, a reasonable conclusion is that students in the independent study mode spent more time with the instructional materials than the TV lecture-supervised laboratory group. The greater amount of time spent by the independent study group with the instructional materials may have been one of the more important variables producing the difference on the clothing design unit test scores in favor of the independent study group. The opportunity for students to advance at a pace commensurate with their abilities and interest may have been a factor in the more positive course attitudes of the independent study group than the TV lecture-supervised laboratory group.

The reactions of independent study students to the instructional media are summarized in Table 30 (Appendix C). The results are based on the responses of 28 independent study students who completed the course questionnaire. Mean ratings for the instructional media were on the positive end of the scale which indicates that students perceived the

media as contributing to the overall objectives of the Design Unit. In Table 31 (Appendix C) a summary is presented of student ratings and comments relative to the course in general.

Data-Gathering Instruments

There is no question that much effort is needed to improve the state of paper-and-pencil measures of learner characteristics before conclusive statements regarding results from studies in which they are utilized are justified (Ripple, Millman, and Glock, 1969, p. 118). Nevertheless, researchers must rely on self-constructed instruments or select from among available instruments those which best meet the specifications of a particular research situation. The instruments utilized in the present study were judged to be valid and reliable measures prior to their administration to the research sample. The bases for the selection of the instruments were reported in Chapter III. Further checks on the validity and reliability of the Clothing Design Unit Test, the Purdue Rating Scale for Instruction (PRSI), and the Achievement Anxiety Test (AAT) will be considered in this section.

Clothing Design Unit Test. Procedures followed in the construction of the Clothing Design Unit Test were described in Chapter III. The final form of the Clothing Design Unit Test consisted of 24 items. Following the administration of

the instrument to the research participants, the test was again analyzed. Summary statistics and the results of the item analysis for the Clothing Design Unit Test are presented in Tables 32 and 33 (Appendix D). The Kuder-Richardson (Formula 20) Reliability coefficient was .58. An index of the internal consistency of the test, the Kuder-Richardson 20, is a function of the number of items on the test, the variability of the scores, and the proportion passing and failing each item. The Kuder-Richardson 20 Reliability was considered high enough for a 24-item criterion test. With respect to test-retest reliability, the correlation coefficient was significant ($r = .42$, $p = .001$).

Achievement Anxiety Test. Included in Chapter III was a discussion of reported reliabilities of the Achievement Anxiety Test (AAT) as well as validation procedures followed by the researcher prior to administering the instrument to the research sample. An item analysis was performed to ascertain the reliabilities for the facilitative and debilitative scales of the AAT. The Item Analysis for Tests and Scales (TESCAN) Computer program by Wherry (1975, pp. 52-53) was utilized to ascertain item and total reliabilities of the AAT. The reliability of each item and the overall reliability for each of the two scales were calculated, utilizing the Kuder-Richardson Reliability (Formula 8). Summary statistics and the results of the item analysis for the AAT are presented in Table 34 (Appendix D). For the

debilitative scale, the Kuder-Richardson Reliability coefficient (Formula 8) was .88. The Kuder-Richardson Reliability coefficient was .75 for the facilitative scale. With respect to test-retest reliability, the correlation coefficients for the two scales were significant (for the facilitative scale, $r = .71$, $p = .001$; for the debilitating scale, $r = .77$, $p = .001$). The resultant correlation for the criterion variable, the F-D anxiety score, was .86 ($p = .001$).

The 19 items on the AAT were factor analyzed utilizing the X72 program in the BMD factor analysis package (Sampson and Jennrich, 1972). Orthogonal factors were formed employing varimax rotation. The maximum absolute row values served as communality estimates. An eigen value of 1.0 was specified in the program to serve as a limiting value for the number of factors to be formed. The results of the factor analysis of the AAT are presented in Table 35 (Appendix D). Eigenvalue magnitudes and the size of loadings in the factor matrix suggested that two salient factors accounted for most of the common variance in the anxiety data. Moreover, the solution clearly revealed the presence of two strong factors (debilitative anxiety and facilitative anxiety). Thus, the results of the factor analysis provided some support for the construct validity of the AAT.

Purdue Rating Scale for Instruction. Validation procedures followed by the developers of the Purdue Rating Scale for Instruction (PRSI) as well as reliabilities were

reported in Chapter III. An item analysis was performed to ascertain the item and test reliabilities of the PRSI. The SCST program in the STATPACK computer program (IRCC, 1974) was utilized to calculate the Kuder-Richardson Reliabilities (Formula 8). Summary statistics and the results of the item analysis for the PRSI are presented in Table 36 (Appendix D). The Kuder-Richardson Reliability coefficient for the overall test was .94. The test-retest correlation coefficient was .69 ($p = .001$). The item-total and test-retest reliability coefficients for the PRSI were considered to be satisfactory.

In summary, based on the logical and statistical considerations for item selection and their reliability indices, the researcher viewed the measures of learner characteristics (achievement anxiety and prior academic achievement) as sufficiently valid to make the necessary dichotomous classifications and to detect the predicted interactions, if they existed under the conditions of the research procedures. In like manner, the criterion measures (Clothing Design Unit Test, Clothing Design Exercise, Purdue Rating Scale for Instruction, and the Achievement Anxiety Test) were viewed as valid and reliable measures of the dependent variables.

Techniques of Analysis

Multivariate analysis is that branch of statistics which is devoted to the study of multivariate (or multidimensional) distributions and the samples from those distributions. In applied contexts, multivariate analysis is concerned with a group (or groups) of individuals each of whom possesses values or scores on two or more variables. Multivariate techniques enable the researcher to study the interrelations among the variables, to look for possible group differences with respect to the variables, and to make inferences relevant to the variables concerning the populations from which the sample groups were selected (Tatsuoka, 1971, p. 1). Multivariate analysis of variance is a technique for studying the differences among groups in terms of multiple dependent variables considered simultaneously (Tatsuoka, 1971, pp. 62-63).

In the present study, a three-factor multivariate analysis of variance (MANOVA) was utilized in analyzing the differences in achievement and course attitudes of subjects in the level combinations of instructional mode, CPHR, and achievement anxiety. The existence of low to moderately high correlations between the dependent variables is indicative of the need to initially employ a multivariate technique of analysis rather than a univariate technique. The variables were dichotomized at the median based on the total

sampling distribution.

With respect to the predicted second-order interaction (instructional mode X achievement anxiety X CPHR), the result was not significant. Likewise, there were no significant first-order interactions nor main effects. Subsequent ANOVAs on the data likewise revealed no significant second-order nor first-order interactions. There was, however, a significant main effect for CPHR on the Clothing Design Unit Test. High CPHR subjects outperformed low CPHR subjects. Although the main effect for instructional mode was not significant, students in the independent study mode outperformed students in the TV lecture-supervised laboratory mode on two of the three criterion variables. There was no significant main effect for anxiety. However, on two of the three criterion variables, high F-D anxiety subjects outperformed low F-D anxiety subjects. The tendency for high CPHR, high F-D anxiety, and independent study subjects to outperform low CPHR, low F-D anxiety, and TV lecture-supervised laboratory subjects helps to explain the absence of a significant disordinal interaction.

Analysis of covariance (ANCOVA) was employed in analyzing the differential effectiveness of instructional mode on end-of-unit achievement anxiety. No significant main effects for instructional mode were observed for low CPHR and initially low F-D anxiety subjects. Although ANCOVA should not be considered as an acceptable alternative to

randomization, the adjustment of post-treatment anxiety scores based on pre-treatment anxiety scores in the present study seemed to be the appropriate approach.

In summary, within the limitations of sampling, measurement, and statistical techniques, it would seem that if there were differences between the two groups they were minimal. The analysis of the results of the present study failed to support the basic assumption of aptitude (or attribute)-treatment interaction studies that one instructional method may be superior for students at one point on a set of individual difference dimensions than another method. There were no significant differences in the performance and course attitudes of students dichotomized on achievement anxiety and prior academic achievement who were instructed by different methods. Further, the differential effectiveness of instructional modes with respect to promoting facilitative achievement anxiety was unsubstantiated.

Despite the lack of clear-cut findings the researcher would hesitate to rule out the interaction of mode of instruction and the learner characteristics of achievement anxiety and academic achievement as a component of any general formulation of classroom learning.

CHAPTER VI

SUMMARY, IMPLICATIONS, AND RECOMMENDATIONS

Despite the emphasis on individualized instruction, there have been few systematic attempts to adapt the mode of instruction to learner characteristics. Tobias (1976, p. 61) has noted that existing adaptations generally consist of varying instructional rate to students rather than instructional mode. In the present study the researcher attempted to demonstrate the interaction of selected learner traits with instructional mode.

Summary

There were three purposes of the study. The first was to investigate the effects of achievement anxiety, prior academic achievement, and instructional mode on student performance and course attitudes. The second was to investigate the differential effectiveness of instructional mode on achievement anxiety of subjects with low academic achievement. The third was to investigate the differential effectiveness of instructional mode on achievement anxiety of subjects with initially low facilitative minus debilitating

achievement anxiety scores. The data were provided by the 92 female home economics majors enrolled in the Clothing: Design Analysis course, at The Ohio State University, during Autumn Quarter 1975 and Winter Quarter 1976. Random assignment of subjects was not possible. Thus, the groups were studied intact which places limitations on interpretation and generalization of the findings. Pre-treatment scores of subjects were utilized to support the contention of near-equivalency of the two groups on the relevant variables of cumulative point-hour ratio (CPHR), achievement anxiety, clothing design unit test scores, and course attitudes.

The 46 students enrolled in Clothing: Design Analysis during Fall Quarter 1975 received instruction twice a week via a televised lecture. Six hours of laboratory experience under the direction of the course instructor were also scheduled each week. The 46 students enrolled in the course during Winter Quarter 1976 worked independently in a mediated self-instructional laboratory for the second of three units of study. The potential contribution of each of the instructional materials to the overall goal of the Design Unit was evaluated by four textiles and clothing faculty members. A two-hour interaction period was scheduled each week for the analysis of clothing design problems. The instructor was available for individual assistance for four additional hours each week.

Variables considered included cumulative point-hour ratio (CPHR), F-D anxiety score on the Achievement Anxiety Test (AAT), instructional mode (TV lecture-supervised laboratory and independent study), and scores on three criterion instruments. Knowledge and application of course content was measured by performance on a Clothing Design Unit Test and a Clothing Design Exercise. Course attitudes were assessed by responses to items in the Purdue Rating Scale for Instruction (PRSI).

An investigation of the interactive effects of CPHR, achievement anxiety, and instructional mode on the three criterion variables considered simultaneously utilizing multivariate analysis of variance (MANOVA) yielded no significant second-order interaction. Further, there were no significant first-order interactions and no significant main effects. Subsequent analyses of variance for the purpose of analyzing the differences between the two groups on each of the criterion variables revealed a significant main effect for CPHR on the Clothing Design Unit Test. High CPHR subjects outperformed low CPHR subjects irrespective of anxiety level and instructional mode.

Hypothesis I was not supported based on the evidence generated in the study. Thus, the null form of the hypothesis held true, yielding the following:

Hypothesis I: Of the students in the independent study mode, those in the various level combinations of academic achievement and achievement

anxiety (high CPHR/high F-D anxiety; high CPHR/low F-D anxiety; low CPHR/high F-D anxiety; and low CPHR/low F-D anxiety) will not score differently on an unannounced clothing design unit test, a clothing design exercise, and a course attitude scale than will their counterparts in the TV lecture-supervised laboratory mode.

The differential effectiveness of instructional mode on achievement anxiety of subjects with initially low academic achievement was investigated. An analysis of covariance was utilized to ascertain the difference between the two groups on post-treatment scores on the AAT. As predicted, the TV lecture-supervised laboratory mode was associated with more facilitative anxiety scores among low CPHR subjects than the independent study mode. However, the difference was not significant.

In view of the statistical evidence Hypothesis II was not supported. Thus, the null form of the hypothesis held true, yielding the following:

Hypothesis II: Low CPHR subjects in the TV lecture-supervised laboratory mode will not report experiencing more facilitative end-of-unit achievement anxiety than will their counterparts in the independent study mode.

Finally, the differential effectiveness of instructional mode on post-treatment anxiety of subjects with initially low F-D anxiety scores was investigated. An analysis of covariance was utilized to ascertain the difference between the two groups on post-treatment scores on the AAT. As predicted, the TV lecture-supervised laboratory mode was

associated with more facilitative anxiety scores among initially low F-D anxiety subjects than the independent study mode. However, the difference was not significant.

The statistical evidence failed to support Hypothesis III. Thus, the null form of the hypothesis held true, yielding the following:

Hypothesis III: Low F-D anxiety subjects in the TV lecture-supervised laboratory mode will not report experiencing more facilitative end-of-unit achievement anxiety than will their counterparts in the independent study mode.

Implications

From a multivariate perspective, the data analysis revealed no significant differences in achievement and course attitudes of students dichotomized on achievement anxiety and CPHR who received instruction via a TV lecture-supervised laboratory mode or an independent study mode. From a univariate perspective, there was one significant finding. High CPHR subjects scored significantly higher than low CPHR subjects on the Clothing Design Unit Test, irrespective of level of achievement anxiety and instructional mode. The mean score of high CPHR subjects on a problem-solving task, however, was not significantly different from that of low CPHR subjects. Although the Clothing Design Unit Test required students to recognize from among the options the most appropriate answer, there were items which required students to demonstrate problem-solving skills. The two criterion

measures of student knowledge and application of course content were included precisely for the reason that they were expected to draw on different abilities. One criterion involved only cognitive skills, whereas the other criterion involved both cognitive and motor skills. Considering the absence of clear-cut patterns of performance by the two groups on the achievement measures, the picture is inconclusive. Whether or not differences in the data are meaningful or random is unknown.

The fact that the independent study group outperformed the TV lecture-supervised laboratory group on two out of three criterion tests is indicative of the overall success of the instructional design of the independent study mode. The tendency for independent study students to outperform TV lecture-supervised laboratory students helps to explain the lack of significant interactions among the independent variables. Nevertheless, the CPHR X achievement anxiety interactions (reduced sample) for the Clothing Design Exercise and course attitudes approached significance. This finding suggests that the independent study mode may be differentially effective with respect to these variables.

There was some evidence that students' knowledge that test results would or would not affect course grades differentially influenced their performance on the two achievement tests. In general, low F-D anxiety types outperformed high F-D anxiety types when the students were told that the test

results would not affect their course grades. In a situation where test performance contributed to the course grade, high F-D anxiety students tended to outperform low F-D anxiety students. It appears that studies of the effects of achievement anxiety on academic performance would be more effectively accomplished by having the classroom teacher administer the anxiety questionnaire to students prior to classroom examinations as a measurement of within-task anxiety. Another alternative in research situations would be to desensitize the students following a testing session. Both of these approaches seem preferable to informing students that test results will have no bearing on academic assessment.

A reasonable general conclusion to be drawn from the results of the study is that each of the instructional modes could continue to be refined and optimized for the benefit of learners. It seems probable that various combinations of activities utilized in the two instructional approaches would relate in optimal ways to learners with given traits. If learners are given adequate opportunity to choose from among a rich variety of educational experiences, they will likely select those activities which will facilitate their attainment of the instructional goals. The insight that such learner decisions can provide with respect to optimizing academic and non-academic outcomes should not be overlooked by researchers in the future.

Recommendations for Further Research

As a result of the study, the need for further research in two general categories was discerned. In one category are recommendations relative to the variables investigated in the present study. In the other category are recommendations with respect to other variables which should be explored.

Variables in the Present Study. Four recommendations seem appropriate. First, the study should be replicated utilizing randomization of subjects to treatments and tighter controls. Randomization would result in increased experimental control and simpler statistical analysis of the data. The overall effect of randomization, tighter controls, and simpler statistical analysis of the data would be to render results more interpretable than in the present study.

Secondly, similar studies should be conducted with male subjects and across subject-matter disciplines. Males and females have been shown to score differently on the Achievement Anxiety Test. Sex differences not only with respect to achievement anxiety but also with respect to achievement motivation ought to be investigated.

Thirdly, longitudinal studies to ascertain the differential effectiveness of instructional modes with respect to retention and transfer of knowledge, achievement anxiety,

and course attitudes would be beneficial. Research is needed to determine if students' prior experiences with a mode of instruction affect both performance and attitudes in subsequent experiences with that instructional mode.

Finally, studies with elementary and secondary school students would be beneficial. Elementary and secondary school students should be studied so that educators can more effectively teach them. The results of such studies would have implications with respect to curriculum and instructional decisions at the college level.

Other Variables. Other variables which should be studied include locus of control and the amount of instructional support which optimizes performance of subjects with differing learner characteristics. The usefulness of the locus of control variable in predicting academic outcome has been suggested by findings of Allen et al. (1974, pp. 968-73). The researchers compared the grade-point averages and final course grades of internal and external locus of control subjects in a Keller-type "personalized instruction" course. From the data analysis the researchers concluded that internal subjects may maintain a constant level of performance regardless of instructional format. However, the achievement of external subjects declined sharply in the Keller-plan course which stresses student control of contingencies. If further research should verify that internal subjects progress more rapidly and accrue more benefits

from a semiautonomous self-paced instructional mode, educators would likely gain greater administrative and financial support for providing this type of learner option.

Level of prior academic achievement is a variable which has been utilized by educators for many purposes, including homogeneous grouping and to establish the starting point within an individualized curricular sequence. Tobias (1976, pp. 61-74) has hypothesized that the higher the level of prior achievement, the lower the instructional support required to accomplish instructional objectives. Conversely, the lower the level of prior achievement, the higher the level of instructional support must be to accomplish instructional objectives. Adequate experimental support is yet to be demonstrated for this hypothesis.

Implications for Instructional Design

The results of attribute-interaction studies have not provided guidelines for instructors with respect to matching students with instructional mode. However, from the results of the present study, several implications for instructional design were discerned.

One implication for instructional design supported by the results of the study relates to academic achievement. Students will likely be able to select those components of the educational environment most congruent with their readiness states if provided with the opportunity to make

choices. Thus, the outcomes of educational experiences are likely to be enhanced by providing a wide variety of instructional activities and allowing students to both select and devise those experiences which will be most meaningful to them.

Another implication for instructional design relates to the variable of prior academic achievement. Tobias (1976) has suggested that it may become possible to use level of prior achievement adaptively. Students with high prior familiarity in a given area could be assigned to an instructional mode with minimal instructional support or to a forward-branching sequence. On the other hand, students with low prior achievement could be assigned to an instructional mode offering maximal instructional support throughout the learning sequence. As emphasized by Tobias, such adaptations to individual differences would be a significant step toward individualizing the mode of instruction rather than the rate of instruction.

With respect to non-academic outcomes, the findings of the study suggest the differential effectiveness of a student-centered instructional mode in fostering positive course attitudes. In the independent study group, students with low prior academic achievement and high debilitating achievement anxiety exhibited the most positive course attitudes of the four categories of students. Thus, it seems possible to engineer an instructional environment which

results in favorable reactions by students with a set of characteristics which may not in traditional courses result in pleasant educational experiences. Providing adequate instructional support for a wide range of ability types coupled with student decision-making capabilities may foster positive course attitudes.

The findings relative to anxiety, although inconclusive, suggest that in designing independent study modes instructors should be aware of the potential for increasing achievement anxiety. This may be particularly true for students with low prior academic achievement and high debilitating achievement anxiety. Provisions should be made for remediation, clearly established goals, the setting of individual objectives, adequate feedback, open channels of communication, and fair evaluation practices.

Despite a wide variety of instructional modes, at the college level lecture, discussion, and laboratory persist as major instructional approaches. Students enter the classroom with divergent backgrounds, abilities, and interests. In order to meet the needs of an increasingly diverse student population, educators will be forced to consider a variety of learning routes. Educational technology has reached a level of sophistication which makes individualized instruction not only desirable but also feasible. Finally, in an age where there is likely to be even greater emphasis on accountability, cost effectiveness, and preparing

students to become lifelong learners, educators will be challenged to adapt instruction to compensate for individual differences in learners.

In conclusion, educators do not know which students ought to be assigned to which treatment in order to maximize the effectiveness of instruction. Although prescriptions are not yet possible, a reasonable assumption is that no one instructional mode promotes optimal learning for all students. Until prescriptions are possible, educators need to provide a rich variety of learning activities and to allow learners to assume active roles in engineering their educational experiences.

Appendix A

Table 1

Pre-Treatment Mean Scores and Standard Deviations on the Clothing Design
Unit Test, Attitude Scale, Anxiety Scale, and CPHR
by Instructional Mode, Initial Sample

Measure	Instructional Mode			
	TV Lec-Lab (n = 47)		Independent Study (n = 46)	
	$\bar{X}$	SD	$\bar{X}$	SD
Clothing Design Unit Test	10.85	2.89	10.28	2.58
Attitude Scale	140.47	15.88	143.41	17.94
Anxiety Scale	- 10.06	9.58	- 5.87	9.71
CPHR	2.71	0.44	2.72	0.48

Table 2
Univariate ANOVAs of Pre-Test Scores by Instructional
Mode, Initial Sample

Variable	Mean Square	Univariate F Tests (df = 1/91)	Prob
Clothing Design Unit Test Score	7.5122	1.00	< .32
Achievement Anxiety Score	408.9633	4.40	< .04
Course Attitude Score	201.6188	.70	< .40
CPHR	.0013	.01	< .94

Table 3

Pre-Treatment Mean Scores and Standard Deviations on the Clothing Design
Unit Test, Attitude Scale, Anxiety Scale, and CPHR
by Instructional Mode

Measures	Instructional Mode			
	TV Lecture-Lab (n = 46)		Independent Study (n = 46)	
	$\bar{X}$	SD	$\bar{X}$	SD
Clothing Design Unit Test	10.80	2.90	10.28	2.58
Attitude Scale	140.63	16.01	143.41	17.94
Anxiety Scale	- 9.48	8.80	- 5.87	9.71
CPHR	2.71	0.45	2.72	0.48

Table 4
Univariate ANOVAs of Pre-Test Scores by Instructional Mode

Variable	Mean Square	Univariate F Tests (df = 1/90)	Prob
Clothing Design Unit Test Score	6.2610	.83	< .37
Achievement Anxiety Score	299.5180	3.49	< .07
Course Attitude Score	178.1070	.62	< .44
CPHR	.0001	.01	< .94

TABLE 5
Pearson Correlation Coefficients for Variables

	<u>PSE</u>	<u>FF</u>	<u>PD</u>	<u>POF</u>	<u>POD</u>	<u>PT</u>	<u>POT</u>	<u>PA</u>	<u>POA</u>	<u>CPHR</u>	<u>FFD</u>	<u>POFD</u>	<u>DE</u>
PSE	1.000 S= .001	.172 S= .05	-.328 S= .001	.047 S= .33	-.252 S= .01	-.100 S= .17	-.189 S= .04	.323 S= .001	.189 S= .04	-.008 S= .47	.291 S= .002	.304 S= .002	-.156 S= .07
FF		1.000 S= .001	-.595 S= .001	.711 S= .001	-.529 S= .001	-.032 S= .38	.023 S= .41	.070 S= .25	.048 S= .32	.374 S= .001	.858 S= .001	.715 S= .001	.102 S= .17
PD			1.000 S= .001	-.476 S= .001	.768 S= .001	-.003 S= .49	-.117 S= .13	-.152 S= .07	-.088 S= .20	-.421 S= .001	-.923 S= .001	-.819 S= .001	-.131 S= .11
POF				1.000 S= .001	-.610 S= .001	.127 S= .11	.066 S= .27	-.072 S= .25	-.142 S= .09	.386 S= .001	.644 S= .001	.742 S= .001	.058 S= .30
POD					1.000 S= .001	-.139 S= .09	-.110 S= .15	-.001 S= .50	.061 S= .28	-.381 S= .001	-.743 S= .001	-.845 S= .001	-.153 S= .07
PT						1.000 S= .001	.415 S= .001	-.015 S= .44	.065 S= .27	.239 S= .01	-.013 S= .45	.108 S= .15	.271 S= .004
POT							1.000 S= .001	.204 S= .03	.216 S= .02	.352 S= .001	.086 S= .21	.131 S= .11	.351 S= .001
PA								1.000 S= .001	.694 S= .001	-.053 S= .31	.131 S= .11	.108 S= .15	.113 S= .14
POA									1.000 S= .001	.138 S= .10	.079 S= .23	.038 S= .36	.273 S= .004
CPHR										1.000 S= .001	.447 S= .001	.431 S= .001	.332 S= .001
FFD											1.000 S= .001	.865 S= .001	.133 S= .10
POFD												1.000 S= .001	.155 S= .07
DE													1.000 S= .001

PSE = Pre Self-Esteem
FF = Pre Facilitative Anxiety
PD = Pre Debilitative Anxiety
POF = Post Facilitative Anxiety
POD = Post Debilitative Anxiety
PT = Clothing Design Unit Pre Test
POT = Clothing Design Unit Post Test

PA = Pre Attitude
POA = Post Attitude
CPHR = Cumulative Point - Hour Ratio
FFD = Pre F-D Anxiety
POFD = Post F-D Anxiety
DE = Design Exercise

Table 6

Post-Treatment Mean Scores and Standard Deviations on the Clothing Design
Unit Test, Clothing Design Exercise, and Attitude Scale
by Instructional Mode, Entire Sample

Measure	Instructional Mode			
	TV Lecture-Lab (n = 46)		Independent Study (n = 46)	
	$\bar{X}$	SD	$\bar{X}$	SD
Clothing Design Unit Test	12.35	3.73	13.35	2.78
Clothing Design Exercise	45.55	7.71	45.29	9.21
Attitude Scale	143.91	23.95	145.44	19.91

TABLE 7

Post-Treatment Mean Scores and Standard Deviations
On the Clothing Design Unit Test, Clothing Design
Exercise, and Attitude Scale for the Levels of
Instructional Mode, CPHR, and Anxiety,
Entire Sample

Low CPHR High F-D							Low CPHR Low F-D					
TV Lec-Lab (n=6)			Independent Study (n=13)				TV Lec-Lab (n=16)			Independent Study (n=12)		
	<u>Design Unit Test</u>	<u>Design Exercise</u>	<u>Attitude Scale</u>	<u>Design Unit Test</u>	<u>Design Exercise</u>	<u>Attitude Scale</u>	<u>Design Unit Test</u>	<u>Design Exercise</u>	<u>Attitude Scale</u>	<u>Design Unit Test</u>	<u>Design Exercise</u>	<u>Attitude Scale</u>
M	10.00	45.17	143.83	11.85	43.58	144.69	12.13	44.31	140.13	13.67	44.92	151.75
SD	3.29	5.89	21.46	2.38	8.41	17.55	4.29	7.66	27.86	1.44	6.15	19.91
High CPHR High F-D							High CPHR Low F-D					
TV Lec-Lab (n=12)			Independent Study (n=13)				TV Lec-Lab (n=12)			Independent Study (n=8)		
	<u>Design Unit Test</u>	<u>Design Exercise</u>	<u>Attitude Scale</u>	<u>Design Unit Test</u>	<u>Design Exercise</u>	<u>Attitude Scale</u>	<u>Design Unit Test</u>	<u>Design Exercise</u>	<u>Attitude Scale</u>	<u>Design Unit Test</u>	<u>Design Exercise</u>	<u>Attitude Scale</u>
M	12.83	46.54	147.42	13.85	48.96	144.31	13.33	46.42	145.50	14.50	42.69	139.00
SD	4.22	8.02	19.94	3.51	5.61	18.99	2.15	4.48	25.36	3.02	16.51	25.71

Table 8

Post-Treatment Mean Scores and Standard Deviations on the Clothing Design Unit Test, Clothing Design Exercise, and Attitude Scale by Instructional Mode, Reduced Sample

Measure	Instructional Mode			
	TV Lecture-Lab (n = 24)		Independent Study (n = 24)	
	$\bar{X}$	SD	$\bar{X}$	SD
Clothing Design Unit Test	13.42	3.72	14.21	2.83
Clothing Design Exercise	46.03	7.59	45.98	7.36
Attitude Scale	141.88	24.22	147.38	15.54

Table 9

Summary of the MANOVA Results on the Dependent Variables of Clothing
Design Unit Test Scores, Clothing Design Exercise Scores, and
Course Attitude Scores, Entire Sample

Source	Multivariate F-ratio (df = 3/82)	Prob
Instructional Mode	.90	< .45
CPHR	1.75	< .16
Anxiety	1.74	< .17
Mode X CPHR	.54	< .66
CPHR X Anxiety	.50	< .68
Mode X Anxiety	.19	< .90
Mode X CPHR X Anxiety	.67	< .57

Table 10

Summary of the MANOVA Results on the Dependent Variables of Clothing
Design Unit Test Scores, Clothing Design Exercise Scores, and
Course Attitude Scores, Reduced Sample

Source	Multivariate F-ratio (df = 3/38)	Prob
Instructional Mode	.51	< .68
CPHR	5.40	< .003
Anxiety	.63	< .60
Mode X CPHR	1.26	< .30
CPHR X Anxiety	.23	< .88
Mode X Anxiety	1.48	< .24
Mode X CPHR X Anxiety	.82	< .49

Table 11

Summary of the ANOVA Results on the Dependent Variable
of Clothing Design Unit Test Scores, Entire Sample

Source	Mean Square	Univariate F Tests (df = 1/84)	Prob
Instructional Mode	23.0000	2.20	< .14
CPHR	48.5800	4.65	< .03
Anxiety	3.1620	3.16	< .08
Mode X CPHR	.5930	.06	< .81
CPHR X Anxiety	10.1520	.97	< .54
Mode X Anxiety	.0780	.01	< .93
Mode X CPHR X Anxiety	.2770	.03	< .87

Table 12

Summary of the ANOVA Results on the Dependent Variable
of Clothing Design Exercise Scores, Entire Sample

Source	Mean Square	Univariate F Tests (df = 1/84)	Prob
Instructional Mode	1.5700	.02	< .88
CPHR	105.0270	1.59	< .21
Anxiety	33.3780	.51	< .48
Mode X CPHR	1.9130	.03	< .87
CPHR X Anxiety	69.5750	1.06	< .31
Mode X Anxiety	13.7260	.21	< .65
Mode X CPHR X Anxiety	91.8250	1.39	< .24

Table 13

Summary of the ANOVA Results on the Dependent Variable
of Course Attitude Scores, Entire Sample

Source	Mean Square	Univariate F Tests (df = 1/84)	Prob
Instructional Mode	53.2650	.11	< .75
CPHR	1.1120	.01	< .96
Anxiety	15.1030	.03	< .86
Mode X CPHR	696.6330	1.38	< .24
CPHR X Anxiety	165.8750	.33	< .57
Mode X Anxiety	97.5250	.19	< .66
Mode X CPHR X Anxiety	264.4110	.52	< .47

Table 14

Summary of the ANOVA Results on the Dependent Variable
of Clothing Design Unit Test Scores, Reduced Sample

Source	Mean Square	Univariate F Tests (df = 3/38)	Prob
Instructional Mode	7.5210	.79	< .74
CPHR	88.0200	9.23	< .004
Anxiety	16.6190	1.74	< .19
Mode X CPHR	.0030	.01	< .99
CPHR X Anxiety	.8960	.09	< .76
Mode X Anxiety	14.8230	1.56	< .22
Mode X CPHR X Anxiety	.1000	.01	< .92

Table 15

Summary of the ANOVA Results on the Dependent Variable
of Clothing Design Exercise Scores, Reduced Sample

Source	Mean Square	Univariate F Tests (df = 3/38)	Prob
Instructional Mode	.0800	.00	< .97
CPHR	540.0220	12.60	< .001
Anxiety	45.6920	1.07	< .31
Mode X CPHR	18.4670	.43	< .52
CPHR X Anxiety	19.3180	.45	< .51
Mode X Anxiety	166.3130	3.88	< .06
Mode X CPHR X Anxiety	66.2840	1.55	< .22

Table 16

Summary of ANOVA Results on the Dependent Variable
of Course Attitude Scores, Reduced Sample

Source	Mean Square	Univariate F Tests (df = 3/38)	Prob
Instructional Mode	363.0140	.94	< .61
CPHR	1518.7140	3.92	< .06
Anxiety	9.5760	.03	< .88
Mode X CPHR	1295.0310	3.34	< .08
CPHR X Anxiety	79.8990	.21	< .65
Mode X Anxiety	390.8550	1.01	< .32
Mode X CPHR X Anxiety	254.8390	.66	< .42

Table 17

Achievement Anxiety Mean Scores for the One-Way Analysis of
Covariance of Low CPHR Subjects by Instructional
Mode, Entire Sample

Low Cumulative Point-Hour Ratio	Instructional Mode			
	TV Lecture-Lab (n = 22)		Independent Study (n = 25)	
	cov $\bar{X}$	-12.50	cov $\bar{X}$	- 7.64
	$\bar{X}$	-10.32	$\bar{X}$	- 7.92
	$\bar{X}$ adj	- 8.60	$\bar{X}$ adj	- 9.43

Table 18

Achievement Anxiety Mean Scores for the One-Way Analysis of
Covariance of Low CPHR Subjects by Instructional
Mode, Reduced Sample

Low Cumulative Point-Hour Ratio	Instructional Mode			
	TV Lecture-Lab (n = 12)		Independent Study (n = 12)	
	cov $\bar{X}$	-15.25	cov $\bar{X}$	- 8.58
	$\bar{X}$	-11.42	$\bar{X}$	- 8.42
	$\bar{X}$ adj	- 9.33	$\bar{X}$ adj	-10.50

Table 19

One-Way Analysis of Covariance of Achievement Anxiety Mean Scores
for Low CPHR Subjects by Instructional Mode,
Entire Sample

Source	DF	Sum of Squares	Mean Square	F	Prob
Initial AAT	1	1675.2707	1675.2707	82.1744	< .0001
Mode	1	7.6257	7.6257	.3741	< .54
Error	<u>44</u>	<u>897.0185</u>	20.3868		
TOTAL	46	2579.9149			

Table 20

One-Way Analysis of Covariance of Achievement Anxiety Mean Scores
for Low CPHR Subjects by Instructional Mode,
Reduced Sample

Source	DF	Sum of Squares	Mean Square	F	Prob
Initial AAT	1	623.3820	623.3820	27.1900	< .0001
Mode	1	6.9864	6.9864	.3047	< .59
Error	<u>21</u>	<u>481.4649</u>	22.9269		
TOTAL	23	1111.8333			

Table 21

Achievement Anxiety Mean Scores for the One-Way Analysis of
Covariance of Initially Low F-D Anxiety Subjects by
Instructional Mode, Entire Sample

Initially Low F-D	Instructional Mode			
	TV Lecture-Lab (n = 28)		Independent Study (n = 20)	
	cov $\bar{X}$	-15.43	cov $\bar{X}$	-14.85
	$\bar{X}$	-13.21	$\bar{X}$	-12.90
	$\bar{X}$ adj	-13.01	$\bar{X}$ adj	-13.19

Table 22

Achievement Anxiety Mean Scores for the One-Way Analysis of
Covariance of Initially Low F-D Anxiety Subjects by
Instructional Mode, Reduced Sample

Initially Low F-D	Instructional Mode			
	TV Lecture-Lab (n = 12)		Independent Study (n = 12)	
	cov $\bar{X}$	-20.17	cov $\bar{X}$	-18.00
	$\bar{X}$	-16.58	$\bar{X}$	-16.25
	$\bar{X}$ adj	-15.39	$\bar{X}$ adj	-17.44

Table 23

One-Way Analysis of Covariance of Achievement Anxiety Mean Scores
for Low CPHR Subjects by Instructional Mode,
Entire Sample

Source	DF	Sum of Squares	Mean Square	F	Prob
Initial AAT	1	844.1678	844.1678	39.44	< .0001
Mode	1	0.4028	.4028	.02	< .89
Error	<u>45</u>	<u>963.0961</u>	21.4021		
TOTAL	47	1807.6667			

Table 24

One-Way Analysis of Covariance of Achievement Anxiety Mean Scores
for Initially Low F-D Anxiety Subjects by
Instructional Mode, Reduced Sample

Source	DF	Sum of Squares	Mean Square	F	Prob
Initial F-D	1	236.5294	236.5294	8.6979	< .008
Mode	1	22.2341	22.2341	.8176	< .38
Error	<u>21</u>	<u>571.0698</u>	27.1938		
TOTAL	23	829.8333			

Appendix B

Table 25

Summary of the MANOVA Results on the Dependent Variables of Clothing
Design Unit Test Scores, Clothing Design Exercise Scores
and Course Attitude Scores, Initial Sample

Source	Multivariate F-ratio (df = 3/83)	Prob
Instructional Mode	.94	< .43
CPHR	1.83	< .15
Anxiety	1.70	< .17
Instructional Mode X CPHR	.48	< .70
Instructional Mode X Anxiety	.25	< .86
CPHR X Anxiety	.49	< .69
Instructional Mode X CPHR X Anxiety	.72	< .55

Table 26

Summary of the ANOVA Results on the Dependent Variable of
Clothing Design Unit Test Scores, Initial Sample

Source	Mean Square	Univariate F Tests (df = 1/85)	Prob
Instructional Mode	22.6070	2.19	< .14
CPHR	49.0000	4.74	< .03
Anxiety	32.6830	3.16	< .08
Instructional Mode X CPHR	.4930	.05	< .83
Instructional Mode X Anxiety	.1240	.01	< .91
CPHR X Anxiety	10.4430	1.01	< .32
Instructional Mode X CPHR X Anxiety	.3120	.03	< .86

Table 27

Summary of the ANOVA Results on the Dependent Variable of
Clothing Design Exercise Scores, Initial Sample

Source	Mean Square	Univariate F Tests (df = 3/83)	Prob
Instructional Mode	3.2990	.05	< .82
CPHR	115.1030	1.76	< .19
Anxiety	28.2900	.43	< .51
Instructional Mode X CPHR	.7510	.01	< .92
Instructional Mode X Anxiety	17.8700	.27	< .60
CPHR X Anxiety	62.4600	.96	< .33
Instructional Mode X CPHR X Anxiety	100.6020	1.54	< .22

Table 28

Summary of the ANOVA Results on the Dependent Variable of
Course Attitudes, Initial Sample

Source	Mean Square	Univariate F Tests (df = 3/83)	Prob
Instructional Mode	68.0910	.14	< .71
CPHR	3.6740	.01	< .93
Anxiety	22.3210	.05	< .83
Instructional Mode X CPHR	644.9060	.01	< .92
Instructional Mode X Anxiety	121.0720	.24	< .62
CPHR X Anxiety	187.5540	.38	< .54
Instructional Mode X CPHR X Anxiety	237.1040	.47	< .49

Appendix C

Table 29

Videocassette Viewing Patterns of Students by Instructional Mode

Videocassette Usage	Number Viewing			
	TV Lec-Lab		Independent Study	
	In Class ^a + Out = Total		Total	
<u>Videocassette Title</u>				
Planning	46	+ 5 = 51		28
Proof of a Design	46	+ 1 = 47		34
Adding Fullness	46	+ 1 = 47		33
Seams to Shape	46	+ 2 = 48		39
Plus or Minus	46	+ 0 = 46		35
No-Waistline Dress	46	+ 4 = 50		38
<u>Viewing Pattern</u>				
Alone		7		80
With Others		5		107
<u>Reason for Viewing Videocassette</u>				
to see for first time		0		173
to review material not understood		4		4
to learn a technique		4		5
to study something not yet covered		2		13
to view missed lecture		3		0
other		1		1
<u>Estimated Total Viewing Time</u>	158 hrs. 1 min.		113 hrs. 17 min.	

^aIn Class number viewing videocassettes based on total number of students in the TV lecture-supervised laboratory group.

Table 30

Mean Ratings for Instructional Media by the
Independent Study Group

Medium	Mean Rating ^a
Flip Chart Illustrations "Flat Pattern Exercises"	5.55
Interaction Period	5.53
Slide/tape Set "Designing Clothes to Flatter the Figure"	5.47
Flip Chart Illustrations "Clothing Design Ideas"	5.44
Flat Pattern Exercises	5.39
Panel Board Display "Perceptual Exercise on Matching Sketched De- sign Features and Pattern Pieces"	5.39
Clothing Selection and Costume Design Mastery Test	5.03
Review Activities (based on Mastery Test scores)	4.96
Videocassettes	4.91

^aStudents rated media on a scale from 1 (very bad) to 7 (excellent).

Table 31
General Course Evaluation by the
Independent Study Group

Instructional Feature	Mean Rating
Number of Interaction Periods (1 = too few, 7 = too many)	3.90
Number of <u>Optional</u> Activities (1 = too few, 7 = too many)	4.25
Amount of <u>Required</u> Work (1 = too little, 7 = too much)	4.31
Overall Rating of Design Unit (1 = very bad, 7 = excellent)	5.30
	<u>Number of Responses</u>
<u>Aspects of Design Unit Especially Liked</u>	
Freedom to design a garment, to incorporate challenging details, and to see results	9
Working at own pace	7
Comparing designs	3
Interaction periods	3
Illustrative materials	2
Videocassettes	2
Helping each other	2
Interesting	1
<u>Aspects of Design Unit Especially Disliked</u>	
Not enough time to complete work	3

Table 31 (continued)

Instructional Feature	Number of Responses
Videocassettes	3
Not enough personalized instruction	1
Waiting to see results of project	1
Only one class per week	1
Pattern work	1
Sequence having Design Unit before Construction Unit	1
Worked at home and had problems	1
Unsure of what I was doing	1
<u>Suggestions for Improvement of Design Unit</u>	
Few more interaction-periods	2
Little more structure	2
Have Design Unit last	1
Have two shorter interaction periods	1
Have instructors in classroom	1
Little more preparation	1

Appendix D

Table 32
Clothing Design Unit Test Score Distribution
All Items, Unweighted

Raw Score	Frequency	Cumulative Frequency	Percentile Rank
20	1	92	99.5
19	2	91	97.8
18	5	89	94.0
17	6	84	88.0
16	8	78	80.4
15	5	70	73.4
14	8	65	66.3
13	17	57	52.7
12	9	40	38.6
11	14	31	26.1
10	4	17	16.3
9	5	13	11.4
8	1	8	8.2
7	2	7	6.5
6	3	5	3.8
5	2	2	1.1

Table 33
Summary Statistics for the Clothing Design
Unit Test

Number of Students Taking Test = 92		
Number of Items in Test = 24		
Mean Test Score = 12.86	Standard Deviation =	3.29
Median = 13	Skewness =	-.21
Mode = 13	Kurtosis =	-.17
Maximum = 20	Range =	15
Minimum = 5		

Reliability Estimates

Kuder-Richardson 20	=	.575
Kuder-Richardson 21	=	.466
Standard Error of Measurement	=	2.400

Item Analyses

Item Difficulty Distribution

Range	Number of Items	Percentage of Items
.81-1.00	1	4
.61-.80	6	25
.41-.60	6	25
.21-.40	9	38
.00-.20	2	8

Mean Item Difficulty = .464

Item Discrimination Distribution

Range	Number of Items	Percentage of Items
.81-1.00	0	0
.61-.80	0	0
.41-.60	5	21
.21-.40	15	63
.00-.20	4	17
Below .00	0	0

Mean Item Discrimination = .311

Table 34
Item Analysis of Achievement Anxiety Test

Scale	Item No.	Mean	SD	Item Reliability (Kuder-Richardson #8)
Debilitative		30.80	5.94	.88
	1	3.36	1.05	.76
	3	3.29	.93	.56
	5	3.01	.74	.65
	6	2.83	.85	.73
	10	3.07	.87	.58
	15	2.89	.99	.74
	17	2.95	1.01	.63
	18	3.10	.98	.54
	23	3.50	.91	.60
	26	2.82	.79	.68
Facilitative		30.80	5.94	.75
	2	3.01	.89	.55
	9	3.03	.96	.60
	11	2.08	.89	.44
	12	2.88	1.05	.49
	14	2.39	.88	.63
	16	1.72	.86	.49
	19	3.08	.96	.51
	21	2.07	1.00	.43
	24	2.77	.90	.61

Table 35
Factor Analysis of the Achievement Anxiety Test

Item Number		Factor Loading	Communality	
			Estimate	Final
	<u>Factor 1</u> - Debilitative Anxiety			
1	Nervous while taking an exam or test hinders me from doing well.	.710	.563	.576
3	In a course where I have been doing poorly, my fear of a bad grade cuts down my efficiency.	.495	.506	.368
5	When I am poorly prepared for an exam or test, I get upset, and do less well than even my restricted knowledge should allow.	.567	.555	.423
6	The more important the examination, the less well I seem to do.	.666	.555	.530
10	During exams or tests, I block on questions to which I know the answers, even though I might remember them as soon as the exam is over.	.626	.500	.392
15	I find that my mind goes blank at the beginning of an exam, and it takes me a few minutes before I can function.	.758	.563	.576

Table 35 (continued)

Item Number		Factor Loading	Communality	
			Estimate	Final
17	I am so tired from worrying about an exam, that I find I almost don't care how well I do by the time I start the test.	.458	.473	.352
18	Time pressure on an exam causes me to do worse than the rest of the group under similar conditions.	.453	.430	.255
23	I find myself reading exam questions without understanding them, and I must go back over them so that they will make sense.	.530	.473	.333
26	When I don't do well on a difficult item at the beginning of an exam, it tends to upset me so that I block even on easy questions later on.	.681	.493	.464
<u>Factor 2</u> - Facilitative Anxiety				
2	I work most effectively under pressure as when the task is very important.	.410	.430	.240
9	While I may (or may not) be nervous before taking an exam, once I start, I seem to forget to be nervous.	.396	.487	.385

Table 35 (continued)

Item Number		Factor Loading	Communality	
			Estimate	Final
11	Nervousness while taking a test helps me to do better.	.458	.430	.213
12	When I start a test, nothing is able to distract me.	.381	.449	.236
14	In courses in which the total grade is based mainly on one exam, I seem to do better than other people.	.495	.472	.356
16	I look forward to exams.	.361	.370	.201
19	Although "cramming" under pre-examination tension is not effective for most people, I find that if the need arises, I can learn material immediately before an exam, even under considerable pressure, and successfully retain it to use on the exam.	.521	.313	.272
21	I enjoy taking a difficult exam more than an easy one.	.489	.300	.240
24	The more important the exam or test, the better I seem to do.	.590	.472	.396

Table 36
Item Analysis of the Purdue Rating
Scale for Instruction

Item	Mean	SD	Item Reliability (Kuder-Richardson #8)
	142.24	16.93	.938
1	8.71	1.63	.764
2	8.27	1.84	.831
3	7.75	1.85	.523
4	8.32	1.52	.770
5	8.27	1.67	.787
6	7.83	2.02	.833
7	8.55	1.35	.747
8	8.09	1.47	.761
9	9.30	1.13	.569
10	8.14	1.82	.841
11	3.86	0.88	.350
12	4.05	0.73	.312
13	3.78	0.84	.436
14	3.87	0.68	.380
15	3.98	0.82	.329
16	4.12	0.73	.255
17	3.65	0.83	.392
18	3.22	0.51	.233
19	3.40	0.83	.283
20	3.92	0.88	.430
21	3.60	0.71	.441
22	3.49	0.79	.436
23	3.39	0.69	.331
24	3.33	0.55	.310
25	3.28	0.61	.331
26	4.07	0.89	.877

BIBLIOGRAPHY

- Allen, George J., Giat, Laura, and Cherney, Roger J. "Locus of Control, Test Anxiety, and Student Performance in a Personalized Instruction Course." Journal of Educational Psychology, 1974, 66(6), 968-973.
- Alpert, Richard, and Haber, Ralph Norman. "Anxiety in Academic Achievement Situations." Journal of Abnormal and Social Psychology, 1960, 61(2), 207-215.
- Anscombe, F. J. "Rejection of Outliers." Technometrics, 1960, 2, 123-147.
- Balester, R. J. "The Self-Concept and Juvenile Delinquency." Unpublished Doctoral dissertation, Vanderbilt University, 1956.
- Bigelow, Gordon S., and Egbert, Robert L. "Personality Factors and Independent Study." The Journal of Educational Research, 1968, 62, 37-39.
- Blake, Howard E., and McPherson, Ann W. "Individualized Instruction--Where Are We?" Educational Technology, 1969 (December), 63-65.
- Bock, R. Darrell, and Haggard, Ernest A. "The Use of Multivariate Analysis of Variance in Behavioral Research." In Dean K. Whitla (Ed.), Handbook of Measurement and Assessment in Behavioral Sciences. Reading, Massachusetts: Addison-Wesley Publishing Company, 1968.
- Born, David G., and Davis, Michael. "Amount and Distribution of Study in a Personalized Instruction Course and in a Lecture Course." Journal of Applied Behavior Analysis, 1974, 7(3), 365-375.
- _____, Gledhill, S. M., and Davis, M. L. "Examination Performance in Lecture-Discussion and Personalized Instruction Courses." Journal of Applied Behavior Analysis, 1972, 5, 33-43.

- _____, and Herbert, Emily W. "A Further Study of Personalized Instruction for Students in Large University Classes." The Journal of Experimental Education, 1971, 40(1), 6-11.
- Bracht, Glenn H. "Experimental Factors Related to Aptitude-Treatment Interactions." Review of Educational Research, 1970, 40, 627-645.
- Buros, Oscar (Ed.). The Seventh Mental Measurements Yearbook. Highland Park, New Jersey: Gryphon Press, I, 1972.
- Campbell, Donald T., and Stanley, Julian C. Experimental and Quasi-Experimental Designs for Research. Chicago: Rand McNally College Publishing Company, 1973.
- Carroll, John B. "Instructional Methods and Individual Differences." In Robert M. Gagne (Ed.), Learning and Individual Differences. Columbus, Ohio: Charles E. Merrill, 1967.
- Child, Irvin L. "Personality." Annual Review of Psychology, 1954, 5, 149-170.
- Clyde, Dean J. Multivariate Analysis of Variance on Large Computers. Miami, Florida: Clyde Computing Service, 1969.
- Connolly, John J., and Sepe, Thomas D. "Individualized Instruction: Are Students Ready?" Community and Junior College Journal, 1973, 43(6), 30-31.
- Cooper, James L., and Greiner, Jerry M. "Contingency Management in an Introductory Psychology Course Produces Better Retention." The Psychological Record, 1971, 21, 391-400.
- Cronbach, Lee J. "The Two Disciplines of Scientific Psychology." The American Psychologist, 1957, 12, 671-684.
- Desiderato, Otello, and Koskinen, Patricia. "Anxiety, Study Habits, and Academic Achievement." Journal of Counseling Psychology, 1969, 16(2), 162-165.
- Domino, George. "Interactive Effects of Achievement Orientation and Teaching Style on Academic Achievement." Journal of Educational Psychology, 1971, 62(5), 427-431.

- Doty, Barbara A. "Teaching Method Effectiveness in Relation to Certain Student Characteristics." The Journal of Educational Research, 1967, 60(8), 363-365.
- Dowaliby, Fred J., and Schumer, Harry. "Teacher-Centered Versus Student-Centered Mode of College Classroom Instruction As Related to Manifest Anxiety." Journal of Educational Psychology, 1973, 64(2), 125-132.
- Engel, Mary. "The Stability of the Self Concept in Adolescence." Unpublished Doctoral dissertation, George Peabody College, 1956.
- Erickson, Ralph J. "Programmed Learning and Personality Styles at the College Level." The Journal of Educational Research, 1967, 60(7), 330-333.
- Evans, Ellis D. "The Effects of Achievement Motivation and Ability Upon Discovery Learning and Accompanying Incidental Learning Under Two Conditions of Incentive Set." The Journal of Educational Research, 1967, 60(5), 195-200.
- Fitts, William H. Tennessee Self Concept Scale Manual. Nashville, Tennessee: Counselor Recordings and Tests, 1965.
- Freeman, M. J. "The Development of a Test for the Measurement of Anxiety: A Study of its Reliability and Validity." Psychological Monographs, 1953, 67(3, Whole No. 353).
- Gaudry, Eric, and Spielberger, Charles D. "Anxiety and Intelligence in Paired-Associate Learning." Journal of Educational Psychology, 1970, 61(5), 386-391.
- _____, and Spielberger, Charles D. Anxiety and Educational Achievement. New York: John Wiley and Sons, 1971.
- Hartnett, Rodney T., and Stewart, Clifford T. "Final Examination Grades of Independent Study Students Compared With Those of Students Taught by Traditional Methods." The Journal of Educational Research, 1966, 59(8), 356-357.
- Hastings, Glen R. "Independent Learning Based on Behavioral Objectives." The Journal of Educational Research, 1972, 65(9), 411-416.

- Holloway, Robert E. "Independent Learning Facilities and Instructional Development." Educational Technology, 1974 (February), 56.
- Jacko, Edward Joseph. "Lecture Instruction Versus a Personalized System of Instruction: Effects on Individuals With Differing Achievement Anxiety and Academic Achievement." Unpublished Ph.D. dissertation, The University of Tennessee, Knoxville, 1974.
- Jioia, Joseph. "Individualized Instruction In Sociology: Myth and Fact." Community and Junior College Journal, 1973, 43(6), 32-33.
- Johnston, James M., and Pennypacker, H. S. "A Behavioral Approach to College Teaching." American Psychologist, 1971, 26(3), 219-244.
- Keller, Fred S. "Good-Bye Teacher..." Journal of Applied Behavioral Analysis, 1968, 1, 79-88.
- Kerlinger, Fred N. Foundations of Behavioral Research. New York: Holt, Rinehart and Winston, Inc., 1973.
- Leherissey, Barbara L., O'Neil, Harold F., Jr., and Hansen, Duncan N. "Effects of Memory Support on State Anxiety and Performance in Computer-Assisted Learning." Journal of Educational Psychology, 1971, 62(5) 413-420.
- Lin, Yi-Guang, and McKeachie, Wilbert J. "Aptitude, Anxiety, Study Habits, and Academic Achievement." Journal of Counseling Psychology, 1970, 17(4), 306-309.
- Lindvall, C. M., and Bolvin, John O. "The Role of the Teacher in Individually Prescribed Instruction." Educational Technology, 1970 (February), 37-41.
- Lloyd, Kenneth E., and Knutzen, Norma J. "A Self-Paced Programmed Undergraduate Course in the Experimental Analysis of Behavior." Journal of Applied Behavior Analysis, 1969, 2, 125-133.
- Mandler, G. "Anxiety and Performance: Empirical and Theoretical Aspects of Anxiety Scales. Unpublished manuscript, Lab. Soc. Relat., Harvard University, 1954.

- _____, and Sarason, Seymour, B. "A Study of Anxiety and Learning." Journal of Abnormal and Social Psychology, 1952, 47(2), 166-173.
- Mazzei, Joseph, and Goulet, L. R. "Test Anxiety and Intelligence in Concept Formation." Psychological Reports, 1969, 24, 842.
- McKeachie, Wilbert J. "Anxiety in the College Classroom." Journal of Educational Research, 1951, 45(2), 153-160.
- _____. "Students, Groups, and Teaching Methods." American Psychologist, 1958, 13, 580-584.
- _____. Research on College Teaching: A Review. Report 6, Washington, D.C.: ERIC Clearinghouse on Higher Education, 1970.
- McMichael, J. S., and Corey, J. R. "Contingency Management in an Introductory Psychology Course Produces Better Learning." Journal of Applied Behavior Analysis, 1969, 2, 79-83.
- Mitchell, James V., Jr., "Education's Challenge to Psychology: The Prediction of Behavior from Person-Environment Interactions." Review of Educational Research, 1969, 39, 695-721.
- Moore, J. William, Hauck, William E., and Gagne, Ellen D. "Acquisition, Retention, and Transfer in an Individualized College Physics Course." Journal of Educational Psychology, 1973, 64(3), 335-340.
- Morris, Charles J., and Kimbrell, G. McA. "Performance and Attitudinal Effects on the Keller Method in an Introductory Psychology Course." The Psychological Record, 1972, 22, 523-530.
- Munz, David C., and Smouse, Albert D. "Interaction Effects of Item-Difficulty Sequence and Achievement-Anxiety Reaction on Academic Performance." Journal of Educational Psychology, 1968, 59(5), 370-374.
- Nie, Norman, Hull, C. Hadlai, Steinbrenner, Karin, and Bent, Dale H. Statistical Package for the Social Sciences. New York: McGraw Hill, 1975.

- O'Neil, Harold F., Jr. "Effects of Stress on State Anxiety and Performance in Computer-Assisted Learning." Journal of Educational Psychology, 1972, 63(5), 473-481.
- _____, Spielberger, Charles D., and Hansen, Duncan N. "Effects of State Anxiety and Task Difficulty on Computer-Assisted Learning." Journal of Educational Psychology, 1969, 60(5), 343-350.
- Remmers, H. H., and Elliott, D. N. The Purdue Rating Scale for Instruction. West Lafayette: The Purdue Research Foundation, Purdue University, 1950.
- _____, and Weisbrodt, J. A. Manual of Instructions for the Purdue Rating Scale for Instruction. West Lafayette, Indiana: University Bookstore, 1964.
- Ripple, Richard E., Millman, Jason, and Glock, Marvin D. "Learner Characteristics and Instructional Mode: A Search for Disordinal Interactions." Journal of Educational Psychology, 1969, 60(2), 113-120.
- Sampson, P. J., and Jennrich, R. I. "BMDX72: Factor Analysis." In W. J. Dixon (Ed.), BMD Biomedical Computer Programs, X-Series Supplement, University of California Press, Berkeley, California, 1972.
- Sarason, I. G. "Intellectual and Personality Correlates of Test Anxiety." Journal of Abnormal and Social Psychology, 1959, 272-275.
- _____. "Test Anxiety and the Intellectual Performance of College Students." Journal of Educational Psychology, 1961, 52(4), 201-206.
- Sarason, Seymour B., Mandler, George, and Craighill, Peyton G. "The Effect of Differential Instruction on Anxiety and Learning." Journal of Abnormal and Social Psychology, 1952, 47, 561-565.
- Service, Jolayne. A User's Guide to the Statistical Analysis System. Raleigh, North Carolina: Student Supply Stores, North Carolina State University, 1972.
- Sheppard, W. C., and MacDermot, H. G. "Design and Evaluation of a Programmed Course in Introductory Psychology." Journal of Applied Behavior Analysis, 1970, 3, 5-11.

- Sinclair, Kenneth E. "The Influence of Anxiety on Several Measures of Classroom Performance." In Eric Gaudry and Charles D. Spielberger, Anxiety and Educational Achievement. New York: John Wiley and Sons, 1971.
- Spence, K. W., and Taylor, Janet. "Anxiety and Strength of the UCS as Determiners of the Amount of Eyelid Conditioning." Journal of Experimental Psychology, 1951, 42, 183-188.
- Spielberger, C. D., Lushene, R. E., and McAdoo, W. G. "Theory and Measurement of Anxiety States." In R. B. Cattell (Ed.), Handbook of Modern Personality Theory. Chicago: Aldine, 1971.
- Standish, R. R., and Champion, R. A. "Task Difficulty and Drive in Verbal Learning." Journal of Experimental Psychology, 1960, 59(6), 361-365.
- Stuck, Dean L., and Manatt, Richard P. "A Comparison of Audio-Tutorial and Lecture Methods of Teaching." The Journal of Educational Research, 1970, 63(9), 414-418.
- Tallmadge, G. Kasten, and Shearer, James W. "Relationships Among Learning Styles, Instructional Methods, and the Nature of Learning Experiences." Journal of Educational Psychology, 1969, 60(3), 222-230.
- Tatsuoka, Maurice M. Multivariate Analysis: Techniques For Educational and Psychological Research. New York: John Wiley and Sons, 1971.
- Taylor, D. M. "Consistency of the Self-Concept." Unpublished Doctoral dissertation, Vanderbilt University, 1953.
- Taylor, Janet A. "The Relationship of Anxiety to the Conditioned Eyelid Response." Journal of Experimental Psychology, 1951, 41(2), 81-92.
- _____. "A Personality Scale of Manifest Anxiety." Journal of Abnormal Social Psychology, 1953, 48, 285-290.
- Tennyson, Robert D., and Boutwell, Richard D. "Pretask Versus Within-Task Anxiety Measures in Predicting Performance on a Concept Acquisition Task." Journal of Educational Psychology, 1973, 65(1), 88-92.

- _____, and Woolley, F. Ross. "Interaction of Anxiety With Performance On Two Levels of Task Difficulty." Journal of Educational Psychology, 1971, 62(6), 463-467.
- Tobias, Sigmund. "Distraction, Response Mode, Anxiety, and Achievement in Computer Assisted Instruction." Journal of Educational Psychology, 1973, 65(2), 233-237.
- _____. "Achievement Treatment Interactions." Review of Educational Research, 1976, 46(1), 61-74.
- _____, and Abramson, Theodore. "Interaction Among Anxiety, Stress, Response Mode, and Familiarity of Subject Matter on Achievement from Programmed Instruction." Journal of Educational Psychology, 1971, 62(4), 357-364.
- Welsh, George S. "An Anxiety Index and an Internalization Ratio for the MMPI." Journal of Consulting Psychology, 1952, 16, 65-72.
- West, Charles K., Lee, J. Frank, and Anderson, Thomas H. "The Influence of Test Anxiety on the Selection of Relevant from Irrelevant Information." The Journal of Educational Research, 1969, 63(2), 51-52.
- Wherry, Robert J. The Wherry Multivariate Analyses Program Package. (Systems Staff Report #73) Columbus: Behavioral Sciences Laboratory, The Ohio State University, 1975.
- Witters, Donald R., and Kent, George W. "Teaching Without Lecturing: Evidence in the Case for Individualized Instruction." The Psychological Record, 1972, 22, 169-175.
- Wittmaier, Bruce C. "Test Anxiety and Study Habits." The Journal of Educational Research, 1972, 65(8), 352-354.