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Lecture Instruction Versus a Personalized System of Instruction: Effects on Individuals with Differing Achievement Anxiety and Academic Achievement

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To the Graduate Council:

I am submitting herewith a dissertation written by Edward Joseph Jacko entitled "Lecture Instruction Versus a Personalized System of Instruction: Effects on Individuals with Differing Achievement Anxiety and Academic Achievement." I have examined the final electronic copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Education, with a major in Educational Psychology.

Schuyler W. Huck, Major Professor

We have read this dissertation and recommend its acceptance:

Dr. O. Milton, Dr. W.H. Calhoun, Dr. S.C. Dietz

Accepted for the Council:

Carolyn R. Hodges

Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

April 23, 1974

To the Graduate Council:

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Schuyler W. Huck
Schuyler W. Huck, Major Professor

We have read this dissertation
and recommend its acceptance:

Stephen C. Mott
Oliver Milton
William M. Laake

Accepted for the Council:

Hilton A. Smith
Vice Chancellor
Graduate Studies and Research

LECTURE INSTRUCTION VERSUS A PERSONALIZED SYSTEM OF INSTRUCTION:
EFFECTS ON INDIVIDUALS WITH DIFFERING ACHIEVEMENT
ANXIETY AND ACADEMIC ACHIEVEMENT

A Dissertation
Presented for the
Doctor of Education
Degree
The University of Tennessee

Edward Joseph Jacko

June 1974

ACKNOWLEDGMENTS

The author would like to express his appreciation to the members of his graduate committee for their advice, guidance, and assistance during the course of this study: Dr. S. W. Huck, for his analysis suggestions and overall supervision; Dr. O. Milton, for his help in my "discovery" of the literature on college teaching and of a resultant topic for exploration; Dr. W. H. Calhoun, for his humanistic perspective on research with college "Ss"; and Dr. S. C. Dietz, for his relaxing influence on this old, anxious student.

Gratitude is also expressed to Carolyn Callis for allowing me to conduct this study in her classes. Her cooperation throughout the effort was simply wonderful.

Finally, to all the students who took part in the study, I wish to express a sincere thanks for their willingness to record their anxieties and achievements.

ABSTRACT

A relatively new instructional technique called the Personalized System of Instruction (PSI) has been highly praised by both instructors and students as a development in higher education which promises better student performance, higher morale, greater teacher effectiveness, and sometimes reduced cost of instruction. Studies of PSI conducted by others have been concerned, for the most part, with course examination scores and course grades in a variety of content, fact-oriented courses including psychology, engineering, library science, and physics.

An important issue which has not been investigated is the comparative effectiveness of the PSI method and the lecture method of instruction with individuals of differing achievement anxiety. Because of this, the major concerns of this study involved determining (1) whether students within the same levels of previous academic achievement and anxiety but taught by PSI or lecture then performed differently on an unannounced, end-of-course test on knowledge and practical application of course content, (2) whether there was any relationship between method of teaching (PSI or lecture) and end-of-course anxiety when students in the same levels of previous academic achievement were examined, and (3) whether there was any relationship between method of teaching (PSI or lecture) and end-of-course anxiety when students in the same levels of initial anxiety were considered.

Two, all female, sections of a Textile and Clothing course in the College of Home Economics at The University of Tennessee were

involved in the study which was conducted in the Fall Term, 1973. A total of 88 students, 44 in each section of the course, completed all tests and thus made up the sample in the study.

In addressing possible differences in the knowledge and practical application issue, a three-way analysis of variance was used to compare the two levels of instructional method, two levels of previous academic achievement, and two levels of anxiety. The main effect results, significant at the .05 level, seemed to indicate that PSI, high previous academic achievement, and high facilitative-debilitative anxiety were all clearly associated with higher knowledge and practical application scores. There were no significant interaction effects.

A two-way analysis of covariance yielded some significant results (.05 level) concerning the effect of instructional method and previous academic achievement on end-of-course anxiety. The lecture technique was associated with more facilitative end-of-course anxiety scores than was the PSI technique. Further, this advantage in favor of lecture was especially true for individuals who were low in previous academic achievement.

Another two-way analysis of covariance was used to compare instructional method and initial anxiety effects on end-of-course anxiety. Statistically significant results at the .05 level again suggested (1) that the lecture technique was more associated with higher facilitative-debilitative anxiety scores than was PSI, and (2) that the association was more evident with those who were low in initial anxiety.

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CHAPTER I

INTRODUCTION

Over the last 25 years or so, research in the psychology of learning has determined that academic achievement is correlated not only with intellectual aptitude but also with many other variables, including achievement motivation, personality, class size, teaching methods, and even course goals themselves. With the complex interaction of these variables suggesting that there may not be one best way of learning for all people, a considerable amount of current research has dealt with the study of particular types of students in particular educational settings.

Having "discovered" the numerous and rather fascinating comparative reports dealing with college teaching techniques and having recently assisted in some research on anxiety, this writer felt that the investigation of teaching methods in conjunction with anxiety and previous academic achievement would prove to be a worthwhile endeavor. A review of the literature indicated this particular combination of variables had not been explored very extensively.

The major concern of this study, then, was to measure how the independent variable of instructional method differentially affects individuals of differing anxiety and previous academic achievement. The dependent variables were end-of-course anxiety plus knowledge and practical application of course content. Two levels each of instructional method, anxiety and academic achievement were considered.

I. Methods of Instruction

Of all the instructional methods in use today on college campuses, the lecture and an individualized system of instruction were selected for study because the first is perhaps the most utilized method and the second is acquiring an almost "cult" type following by many educators today.

The lecture method has been most popular with college instructors because of large classes, personal convenience, and academic tradition. However, the student in a lecture has often been amusingly compared with a defective recording machine. He takes frantic, error-filled notes with many important omissions and decides later what is and what is not relevant. Unfortunately, with increasing college enrollments, lecture classes become larger; and, education becomes less personalized and offers little or no consideration of the individual differences of students.

As an alternative on many college campuses, there is an increasing number of course areas being taught by individualized systems of instruction. The reasons given by those using these systems are that no two students are motivated to achieve the same goals, have the same interests, progress at the same rate, have the same background and experiences, achieve through the same study techniques, or have the same abilities. One of the more popular of these systems is the Personalized System of Instruction (PSI) developed by Fred Keller in the early 1960's. Its advocates, both teachers and students, report nothing but praise for the method. Already, there is a Center for Personalized Instruction at Georgetown University, which, among its activities, publishes a PSI

Newsletter and holds national PSI conventions. Further, the Center claims that PSI is a development in higher education which is gaining rapid acceptance because it promises better student performance and morale, greater teacher effectiveness and sometimes reduced cost of instruction.

II. Measures of Anxiety

Of the various anxiety scales which have been developed, four in particular reappear in educational research. These instruments are the Manifest Anxiety Scale by Taylor; the Test Anxiety Questionnaire by Mandler and Sarason; the Achievement Anxiety Test by Alpert and Haber; and the State-Trait Anxiety Inventory by Spielberger, Gorsuch, and Lushene (Gaudry & Spielberger, 1971).

In contrast to the other three scales which tend to focus on the debilitating effects of anxiety, the Achievement Anxiety Test (AAT) was constructed to identify individuals whose academic performance is facilitated by the stress of a test situation as well as individuals whose academic performance is debilitated by that situation. Alpert and Haber (1960) maintain that individuals may possess one type of anxiety, both, or neither, and that facilitative anxiety is not just a mirror image of debilitating anxiety. In evaluating the ability of specific and general anxiety scales to predict college success, Alpert and Haber reported that specific and general anxiety scales appeared to measure something different and that specific scales, including the AAT, are better predictors of academic achievement at the college level than are the general scales.

This author's experience with the AAT tended to influence his decision to use the instrument in this study. Results of the Alpert and Haber report, indicating significant correlations between the AAT and typical measures of academic performance, reinforced the decision to use the instrument.

III. The Problem

Statement of the problem. There were three concerns of this study. The first was to investigate the effect of the independent variable of instructional method (lecture versus PSI) together with the independent variables of achievement anxiety (high facilitative versus high debilitative, as measured by the AAT at the beginning of the course) and academic achievement (high versus low, as indicated by college grade-point average)¹ on the dependent variable of knowledge and practical application of course content (as determined by an unannounced examination on the last day of the course). The second was to investigate the effect of the independent variables of instructional method (lecture versus PSI) and academic achievement (high versus low GPA) on the dependent variable of end-of-course achievement anxiety (as determined by a readministration of the AAT on the last day of the course). The third was to investigate the effect of the independent variables of instructional method and initial achievement anxiety on the same dependent variable of end-of-course achievement anxiety scores.

¹Known as GPA.

Hypotheses. With respect to the three concerns mentioned above, the present researcher had three separate hypotheses. First, of the students in the PSI section, those in the various level combinations of academic achievement and anxiety (high GPA/high facilitative, low GPA/high facilitative, high GPA/high debilitative, and low GPA/high debilitative) would score differently on the unannounced examination at the end of the course than would their counterparts in the lecture section. Second, it was hypothesized that those students in the two levels of academic achievement (high GPA and low GPA) who were taught by PSI would report experiencing an end-of-course anxiety that differed from what their counterparts in the lecture section would report. Third, of the students in the PSI section, those in the two levels of initial anxiety (high facilitative and high debilitative) would indicate an end-of-course anxiety that also differed from what their counterparts in the lecture section would indicate.

Significance of the study. In all comparisons with the lecture technique, PSI is continually being reported as the superior method of teaching, regardless of the criterion of success. Likewise, individuals with high academic achievement or more facilitative anxiety scores are generally reported to perform better in achievement situations than do individuals with low academic success or more debilitative anxiety.

This study would only tend to confirm these findings if individuals in all level combinations of academic achievement/anxiety taught by PSI realize higher course examination scores and more facilitative end-of-course anxiety scores than do their counterparts taught by

the lecture technique. However, if the results were to hold true for only certain level combinations or should a certain combination in the lecture section outperform the PSI counterpart, then any statement regarding the general preferability of PSI over lecture for academic achievement and anxiety types would have to be qualified.

Assumptions and limitations. This study was conducted at The University of Tennessee during the Fall Term, 1973. Involved were two sections of Textiles and Clothing 3410, a core course in the College of Home Economics. All class members were female, and one of the two sections had been identified as PSI in the Fall Timetable. Therefore, random assignment to the two sections was not possible.

The author realizes that the lack of randomized assignment precluded the study design from being considered truly experimental. An argument that the design was, in any event, quasi-experimental is based on an in-being method of section assignment. This method, referred to hereafter as the ad hoc method of assignment, had as its features an equal number of total spaces in each section of the course, similar scheduled times for the two sections, no advance information on the specific differences between the teaching methods to be employed, and the individual demands of each student's schedule which determined the section chosen. Of utmost relevance was the capability of the ad hoc method of assignment in providing for near-equivalent sections on the critical variables of GPA and initial AAT scores. A comparison of section means, standard deviations, rankings, and distributions for both GPA and initial AAT scores will be presented to show that the students

comprising the two sections were not significantly different with respect to these two variables.

The purpose of the above argument is not to minimize the requirement for random assignment but rather to identify important independent variable equalities achieved through the ad hoc method of assignment. If successful, this would mean that any differing results in the dependent variable scores could not be attributed to the sectional differences in initial academic achievement or anxiety. Finally, any generalizations concerning associative relationships must be limited to situations where female students are enrolled in the particular course under the same conditions.

CHAPTER II

RELATED LITERATURE

The inclusion of the material in this chapter was intended to serve two purposes. Firstly, a review of reported studies concerning anxiety, instructional techniques, and academic achievement would reveal that there is still a definite need for further research of these variables. Secondly, the rationale for this particular study would become evident from the conclusions drawn from the reviewed literature. Divided into four sections, this chapter begins with the broad relationship between anxiety and academic achievement and progresses into a discussion of achievement anxiety types. These two sections are then followed by another which discusses college instructional techniques and suggests that the lecture and programmed instruction are at opposite ends of a scale regarding teaching methods. The last section describes a modified programmed instruction technique called the Personalized System of Instruction and poses a comparative investigation of the technique with the lecture technique.

I. Anxiety and Academic Achievement

Wilbert J. McKeachie (1958), in his research concerning the relationship between anxiety and test performance, found that student anxiety during examinations increases to such a level that it interferes with memory and problem solving and that the more anxious students are often driven over the brink into disorganization. Similarly, Runkel

(1959) and Broen (1959) found that test performance improves under low anxiety; but, high levels of anxiety consistently bring about a decrement in performance. In a study of classroom testing procedures, test anxiety, and achievement (Marso, 1970), the results supported previous research and theoretical formulations which imply that feedback, spacing of learning, motivation, and anxiety are related to learning in a course of study. Nevertheless, the data did not support Marso's hypothesis that frequent, graded, unit examinations followed by test feedback would foster achievement and enable students with high anxiety to perform better on final course examinations. More recently, Bostow and O'Connor (1973) found their college classroom contingency system, requiring students who performed poorly to retake tests over troublesome content material, increased performance on a comprehensive final examination by a statistically significant average of one-half letter grade higher.

In their overview of anxiety and educational attainment, Gaudry and Spielberger (1971) indicate that high anxiety is, indeed, associated with lower grades and higher dropout rates due to academic failure. They further suggest that, regarding the effects of anxiety on academic achievement, some of the conditions that facilitate the achievement of high-anxious students may actually have adverse effects upon the low-anxious students. This would certainly seem to argue against any unitary educational strategy. From their reported investigations of the relationship between anxiety and academic achievement, Gaudry and Spielberger reiterate that scales which are more specific to the school situation such as the AAT and other test anxiety questionnaires are better

predictors of academic achievement than are the more general scales. With these thoughts in mind, it would definitely seem that further research concerning anxiety, academic achievement, and teaching methods appears warranted if the feasibility of optimum student performance is to be realized.

II. Achievement Anxiety Types

Alpert and Haber believed that the incorporation of items designed to measure facilitative anxiety into a questionnaire which effectively measured debilitating anxiety would significantly increase the effectiveness of the questionnaire in predicting academic achievement. They, therefore, developed the AAT (1960) which consisted of two independent measures of anxiety: a facilitative scale and a debilitating scale. Both scales have gone through many revisions based upon item analyses, correlations with various criteria, and theoretical reformulations. For the final version, test-retest reliabilities for a 10-week interval are .83 and .87, respectively. The two scales are administered in one questionnaire, the items being mixed with neutral buffer items. Alpert and Haber found that the two scales of the AAT correlated about equally, but opposite in sign, with the variables of grade-point averages and final examination grades. Additionally, the authors demonstrated that combining the two anxiety measures resulted in a significantly better predictor of academic achievement performance than did either scale alone.

Several studies by other authors (Dember, Nairne & Miller, 1963; Walsh, Engbretson & O'Brien, 1968; and Smouse & Munz, 1969) have also

indicated that AAT scores are valid predictors of academic achievement as measured by performance on classroom tests and by grade-point average. No case could be established for sex, anxiety, and academic achievement since one study suggested that the AAT was a better predictor of grade-point average for males while another study resulted in a more significant relationship being found between the scale and test performance for females.

In a related effort, Walsh (1969) explored the correlations between anxiety as measured by the AAT and certain attitude and personality characteristics. Since the significant relationships found among neuroticism, optimism, and anxiety types were logical and in the proper direction, he argued that the AAT had some construct validity. Another study by Wittmaier (1972) reported that subjects with low debilitating scores had more effective study habits and avoided delaying academic tasks more than subjects with high debilitating scores. The author suggested that the test performance of those subjects high in debilitating anxiety is partially affected by ineffective pre-examination behavior.

These studies with the AAT tend to confirm that there are, indeed, two types of test anxiety and that high facilitating anxiety correlates with worthy attitudes and pre-examination as well as examination performance, while high debilitating anxiety is related to undesired attitudes and performance. From this vantage position, over those dealing only with high or low test anxiety, there appears to be a need for investigations with instructional techniques to determine if certain techniques are more successful than others in creating an environment for optimal student achievement anxiety and resultant

performance. Initially, such research should be conducted at the college level in keeping with Frost (1969) who presents evidence that the distinction between general anxiety and test anxiety seems stronger in the older ranges, e.g., college students.

III. College Instructional Techniques

McKeachie's (1970) comprehensive review of research on college teaching from 1924 to 1970 discusses the relative effectiveness of various factors including class size, lecture, discussion, independent study, and use of new technological media. He agreed with Dubin and Taveggia (1968) that as far as performance on course examinations is concerned, there is no strong basis for preferring one teaching method over another. However, McKeachie indicated that different teaching methods do make a difference in learning if the educational goals are retention, application, problem solving, attitude change, and motivation for further learning. He also suggested that there seems to be some evidence that different teaching methods do work well for differing types of students. An encouraging implication of his findings is that in order to improve student learning, faculties should be improving college teaching techniques, specifying goals clearly, helping students think through their own skills and needs, and offering various options to maximize motivation and learning.

Those preferring the status quo with regard to traditional lecture instruction might comment that the method has worked fairly well for many students. They might even add that the technique is convenient and economical. As a humorous rebuttal, Green (1971), in

discussing the teaching of physics at MIT, quipped that "the convenience is to the teacher and the economy is to the administration." He also presented a serious defense of his position. In it, learning is viewed as a three-step cycle: presentation, response, and consequence. Presentation is the transmission of information; response is what the student does after receiving the information; and consequence, which completes the cycle, is a favorable reinforcement such as getting a good grade on a test. The design of any instructional system, then, can be thought of as an arrangement of these cycle sequences. At one end of a scale of developed systems is programmed instruction with numerous cycles; and, at the other end is lecture (including a final examination) with its one giant cycle. Good college courses, Green stated, fall somewhere between these ends of the scale.

IV. The Personalized System of Instruction

Gradually, and with a great deal of resistance, the traditional lecture is beginning to give way to new approaches to instruction. One of these, a personalized, individualized or self-paced instruction, was developed by Fred S. Keller (1966, 1968) while establishing a Department of Psychology at the University of Brasilia. Basically, a modification of programmed instruction, this "Personalized System of Instruction" (PSI) has several note-worthy features:

- a. Self-pacing, which allows each student to proceed through the course at a rate commensurate with his ability and other commitments in his time schedule.

- b. Unit-perfection requirement for advancing, which permits each student to go ahead to the next unit only after demonstrating mastery of the preceding unit.
- c. Minimizing or eliminating the lecture as a source of critical information, which maximizes student participation.
- d. Using proctors, which permits repeated testing, immediate scoring, almost unavoidable tutoring, and an enhancement of the personal-social aspect of the educational process.
- e. Stressing the written word in teacher-student communication.

PSI advocates feel the method subordinates social, economic, cultural, and ethnic background differences; assures each student of at least a moderate amount of individual attention, approval, encouragement, plus a chance to succeed; and produces a reinforcing state of affairs for all concerned.

In discussing the system, Keller described it as a feasible method for efficiently and reliably producing optimal student performance in a manner preferred by student and teacher to other methods of instruction. He reported that discouraging the use of incomplete grades together with the provision of more testing hours results in improvement of study habits, more positive attitudes toward testing, diminishing worry about final grades, and mutual reinforcement for student, proctor, and instructor.

The single most conspicuous effect of an instructional technique such as PSI is its overwhelming popularity among students (Johnston & Pennypacker, 1971). There have been almost no data to the contrary. Indications of such popularity come from every source--from

questionnaires, from proctors, and from students themselves. The rumor seems to be that the course is easy but requires effort.

In comparison with the lecture method, PSI demands a much greater mastery of work assignments, requires greater memorization of details, and much greater understanding of basic concepts; but it gives much greater recognition of the student as a person and it is enjoyed to a much greater extent. Mastery, enjoyment, plus fewer low and more high grades are consistent results (Keller, 1968; Witters & Kent, 1972).

Numerous other studies comparing the effects of PSI and the traditional lecture on student performance and course attitudes have all resulted in PSI enhancing final examination performance and course ratings (McMichael & Corey, 1969; Sheppard & MacDermott, 1970; Morris & Kimbrell, 1972; and Born, Gledhill & Davis, 1972). In attesting to the universality of the approach with different course matter, the comparative studies already discussed and several descriptive studies (Koen, 1970; Green, 1971; and Knightly & Sayre, 1972) have reported using PSI with a variety of content, fact-oriented courses such as psychology, engineering, library science and physics. The list of studies continues to grow; the results are always the same--favorable to PSI.

One issue not yet addressed by any investigation of PSI is its results with individuals of differing achievement anxiety. It would surely seem that this method would produce effects quite dissimilar to those the traditional lecture method produces. There is less emphasis by PSI on rigid time requirements, group assembly, competition, and comparison with others while more emphasis is placed on quality of

achievement, attention to the individual, success without providing anything gratis, privacy for the student, cooperation with others, and greater respect for human dignity than has been evident before in large-scale education.

CHAPTER III

METHOD AND PROCEDURE

At The University of Tennessee, Textiles and Clothing 3410 is one of seven core courses in the College of Home Economics. These seven courses are intended to contribute to the individual's overall understanding of man in his near environment. In Textiles and Clothing 3410, the student is exposed to the use and meaning of textiles and clothing to the individual and to families. Emphasis is on the cultural, social, psychological, and economic implications of textiles and clothing, thus providing an interdisciplinary approach to the study of clothing.

In the fall of 1973, there were two sections of the course offered by the same instructor. One section was listed in the timetable as being taught by individualized instruction. The listing of the other section did not include the method of instruction.

I. PSI Policies

During the first meeting of the PSI section, the course policies, including procedures, responsibilities, and goals, were explained by the instructor:

1. The subject matter had been divided into six units. Each unit was further subdivided into lessons for which the instructor had prepared mimeographed materials including the topic of the lesson, major concepts, objectives, generalizations, learning activities and

study guide or outline emphasizing pertinent points in the lesson.

2. Personnel for the course included the instructor and six student assistants who had been selected to assist with the course based upon their past performance in the course and their willingness to help others learn the material. The student assistant assigned to each student would work with her throughout the quarter. The instructor worked directly with the student assistants and was available to discuss the material and otherwise assist the student during indicated hours and at other times by appointment.

3. The student would not be attending lectures three times a week. Instead she would study on her own utilizing the unit materials and textbook, group discussions, interviews, and special events. The dates of special events were noted on a course calendar.

4. When the student felt she had achieved the objective for the unit, she should meet with her student assistant for an interview over the material. A stack of cards containing questions constructed from the study guide and the objectives would be given the student. If she had studied sufficiently, she would be able to answer the questions with no difficulty. That was not to be thought of as a test; there was no grade awarded or penalty for incorrect answers. After completing the stack of questions, the student could go back and study again the questions missed. The student assistant would discuss any points not understood and possibly make suggestions concerning ways to study. If the student was able to answer most questions correctly (90 percent accuracy) and without hesitation, the student assistant would indicate successful completion of that particular unit and provide materials for

the next unit. If some of the answers were not clear, the student assistant would suggest reviewing the unit, or a segment of the unit, and making another appointment to answer questions on the unit. A student would not be penalized in any way for not passing the unit. It just meant that she had not learned the material and had to go back and review it further. The total number of required interviews were nine.

5. At four times during the quarter the instructor would present overviews of the study units. The purpose of the overviews was to provide students the opportunity to clarify material and to enable the students and instructor to summarize the material in the given units. Each student was to prepare at least one question, generalization, or brief summary statement to be considered during the overview.

6. A Resource Center was set up and a schedule of the hours of operation was posted. One of the student assistants would be in the Resource Center at all times it was open. Zeroxed copies of articles listed under "Learning Activities" for each lesson were available at this location. Additional materials were on reserve in the Undergraduate Library.

7. The units of study were outlined on the course calendar which also served as a timetable to help each student pace herself during the quarter. Within some limitations, it was possible to work ahead or behind if one wished to do so. But, maximum flexibility was not possible due to the quantity of materials (visual aids, displays, etc.) which had to be set up for each unit and the limited amount of space. Therefore, the student needed to check the course calendar to determine when the materials for each unit would be available in the Resource

Center. Additionally, there were films available on scheduled viewing dates during the quarter.

8. As a word of caution, the instructor indicated that the freedom to progress at one's own pace occasionally resulted in a few students letting their work "slide" because of the demands on their time. The class was, therefore, reminded that the flexibility of this type of learning experience was only an advantage if it was not taken to extremes.

9. Each student's course grade was determined by points earned in three activities. First, a total of 90 points was assigned for the required, successful completion of interviews over all six study units. Second, a maximum of 30 possible and a minimum of 20 required quest points were attainable through some outside activity such as a term paper (30 points), community involvement with special groups (30 points), a short paper (10 points), an analysis of personal attitudes toward clothing (5 points), summarizing articles found in the Resource Center (3 points each with a maximum of 9 points), and participating in discussion sessions held throughout the quarter (4 points each with a maximum of 8 points). Third, a maximum of 300 points could be earned on three written tests given during the quarter. The minimum number of points needed for a course grade of "A" was 396, for a course grade of "B" was 366, for a "C" was 336, and for a "D" was 306.

II. Lecture Policies

The course policies for the lecture section were also explained during the first meeting of that section:

1. Students would be attending lectures three times a week. However, there were no penalties assessed for absences.

2. The division of the subject matter was the same as for the PSI section. Mimeographed materials were also identical for both sections.

3. Teaching and pacing of the course was the sole responsibility of the instructor.

4. The outside reading was equally available to both sections.

5. Course grade was also determined by points earned throughout the quarter. First, the system of quest points was the same for each section. Second, the same three written examinations were taken by both the lecture and the PSI sections. Since there were no points attainable from interviews, the maximum number of points one could earn totaled 330. The minimum needed for a course grade of "A" was 306, for a course grade of "B" was 276, for a "C" was 246, and for a "D" was 216.

III. Subjects

Forty-four students from the lecture section and forty-six students from the PSI section of Textiles and Clothing 3410 were utilized in this study. All students were female home economics majors and had enrolled in the course without any prior knowledge that they would be involved in a study. A complete set of measurements was obtained on each of these students.

IV. Instrument for Anxiety Measurement

The Alpert-Haber Achievement Anxiety Test (AAT) (Appendix A) was used in this study. The AAT was developed to indicate the extent of anxiety an individual experiences in academic test situations and the direction, facilitative or debilitative, of this experienced anxiety.

Of the 28 items on the instrument, 9 constitute the facilitative scale, 10 constitute the debilitative scale, and 9 are considered "buffer items." Each item consists of a statement and five possible responses listed vertically, as in multiple choice format.

Scoring of the responses is on a positive or negative five-point scale depending on whether the item is a facilitative or debilitative one. Three test scores are obtainable from the AAT: Facilitative (F), Debilitative (D), and Facilitative minus Debilitative (F-D). The F and the D scores are said to correlate about equally, but opposite in sign, with academic performance. Additionally, when the facilitative and debilitative scores are combined (F-D), there is a significant increase in the successful prediction of academic performance scores such as grade-point average, course achievement, and examinations.

V. Instrument for Academic Achievement Measurement

For the purposes of this study, the instructor devised a 50-item multiple-choice examination which was intended to measure the students' knowledge and practical application of the course content. This examination served as one of the dependent variable measures and was an unannounced addition to the three scheduled tests administered

throughout the quarter. The examination did not, however, enter into the determination of course grade.

VI. Procedure

At the first meeting of each section, the author was introduced to the students as a researcher interested in their responses to a survey of feelings toward pressure. The students were encouraged to be honest since their responses would not affect their grade in the course and since the researcher would be the only person aware of individual responses. Social security numbers rather than names were requested on the survey form to assure a certain measure of anonymity during analysis. Additionally, individuals were asked to indicate their current grade-point average. The responses were collected by the researcher at the end of the meeting.

There was no further contact between the students and the author until the last day of the quarter. The instructor and author met on several occasions to discuss and finalize the examination which was intended to measure the students' knowledge and practical application of course content.

For both sections of the course, the last meeting of the quarter had been listed as a mandatory meeting. By the time this meeting was held, all course work had been accomplished and there remained only a critique of the course itself. Prior to the critique the author reintroduced himself and again requested the students' assistance in a research effort. Needed were responses to a survey on feelings under pressure and to an examination covering the content of Textiles and

Clothing 3410. Once again it was explained that results would have no bearing on course grade. However, the students were encouraged to respond with a sincere, honest effort so as the research would be meaningful. Identification by social security number was also requested to insure anonymity during analysis of results. After all materials had been collected, the researcher gave a short explanation of the research project to the students as a mutual courtesy for their cooperation. The discussion and questions generated in both sections seemed to indicate an appreciation of the explanation and no adverse feeling concerning participation in the study.

VII. Statistical Analyses

Since there were 44 students in the lecture section and 46 in the PSI section, data on two of the PSI students were randomly eliminated from the study in order to make section sizes identical. This is in keeping with an accepted practice which suggests that up to 5 percent of the data may be discarded to achieve equal sample sizes (Glass & Stanley, 1970). With equal n , the analysis of variance is robust to the assumptions of homogeneity of variance and normality.

In examining the capability of the ad hoc method of assignment to provide near-equivalent sections, comparisons of section means, standard deviations, rankings and frequency distributions on both GPA and initial AAT scores were accomplished. This was done to determine if the two independent samples (sections) could have come from the same population regarding these two variables. T tests for independent samples were used to test the difference between sample means. Using

Bullshit!

two-tailed tests, the .20 level of significance provided a stringent trial for the hypotheses of no difference. The observed t-values could have been quite small and still have been significant with this level, thus, necessitating the rejection of the null hypotheses. A direct comparison of standard deviations seemed to suffice, especially if the means were shown to be similar. The Mann-Whitney U Test was used to examine whether the score rankings on GPA and initial AAT were equally distributed throughout both samples. Two-tailed tests at the .20 level were also used for the same reasons cited earlier for the t-tests. Finally, the Kolmogorov-Smirnov Two-Sample test was used to determine whether the frequency distributions of the section scores on GPA and initial AAT were similar and could have arisen by random sampling from the same population. Again, two-tailed tests at the .20 level of significance provided a considerable opportunity to reject the hypotheses of no difference.

A 2 x 2 x 2 factorial design, more often referred to as a three-way analysis of variance, was used to analyze the effect of instructional method together with anxiety and academic achievement on the knowledge and practical application of course content. The students within PSI and lecture were divided into two GPA levels (high and low); then, within each GPA level they were further divided into two AAT levels (high F-D and low F-D). Two such analyses were accomplished. The first one included all students in both sections. The second analysis included a reduced sample of approximately the top 25 percent (12 students) and bottom 25 percent (12 students) in both sections on the variable of GPA. This second analysis was conducted to determine whether results with

these extremes of the sample corroborated the results obtained with the entire sample.

The investigation of the effect of instructional method and academic achievement on end-of-course anxiety was carried out by means of a two-way analysis of covariance. Students within PSI and lecture were divided into high or low levels of GPA; and these groups or level combinations were then compared on the dependent variable of end-of-course AAT. Two such analyses were also conducted in this investigation. The first involved all the students, the second, again, involved only the top and bottom 25 percent on the variable of GPA.

The final problem dealing with the effect of instructional method and initial anxiety on end-of-course anxiety was also analyzed using a two-way analysis of covariance. Here, the students within each level of instructional method were divided into high F-D or low F-D levels of initial AAT before being compared in terms of end-of-course AAT. As before, the initial AAT scores served as the covariate; and again, two analyses were carried out. One analysis considered all students, the other considered only the top and bottom 25 percent of them on the variable of initial AAT.

All analyses of variance and covariance were conducted at The University of Tennessee Computer Center using the SAS library programs. An a priori decision was made to use and report the .05 level of significance.

CHAPTER IV

RESULTS

I. Initial Section Equalities

The first set of course section comparisons was on the means, standard deviations, rankings, and frequency distribution of GPA scores. The mean of 2.71 for the PSI section and the mean of 2.58 for the lecture section were tested for differences using an independent sample *t* test. The observed *t* was calculated to be 1.23 (*df* = 86, $p > .20$, two-tailed). Standard deviations were .49 for the PSI section and .50 for the lecture section. In determining whether the ranked values for GPA scores were equally distributed throughout both samples, the Mann-Whitney U test provided a *z* statistic equal to 1.26 ($p > .20$). Finally, the Kolmogorov-Smirnov Two-Sample test was applied to determine whether the independent sections could have come from the same distribution (in terms of GPA). From a comparison of the cumulative frequency distributions of the two sections, the largest proportional difference was utilized in a chi-square determination (with samples greater than 40, chi-square can be approximated using the Kolmogorov-Smirnov statistic). The calculated chi-square of 2.225 was not considered significant at the .20 level of significance, using a two-tailed test (a chi-square of 3.219 being required for significance).

The same tests were used to compare the two course sections on initial AAT scores. The PSI section's mean of -6.05 and lecture

section's mean of -8.25 were not statistically different at the .20 level of significance (two-tailed test). Standard deviations of 9.65 and 9.75 were considered similar through inspection and no further analysis was undertaken. Section rankings on initial AAT were not considered significantly different either ($z = 1.16$, $p > .20$, two-tailed). Also, a comparison of cumulative frequency distribution using the Kolmogorov Smirnov Two-Sample test did not show any significant dissimilarities between sections at the two-tailed .20 level of significance.

II. The First Study Problem

The $2 \times 2 \times 2$ factorial design was a fixed model in that all three of the variables considered in the study were fixed. In testing for main, first-order interaction, and second-order interaction effects, the within-groups mean square was the error term used in the denominator of all F-ratios. The cell means for the dependent variable of knowledge and practical application of course content for the entire sample are presented in Table 1 (Appendix B). Means for the reduced sample are in Table 2 (Appendix B). The analyses of variance summary tables for the entire sample and the reduced sample are presented in Tables 3 and 4, respectively (Appendix B).

In Table 3 (Appendix b), it may be observed that all three of the main effects of instructional method, GPA, and initial AAT were found to have statistically significant differences between their levels. However, none of the four interaction effects even approached significant differences among their cells. For the reduced sample, Table 4 (Appendix B) indicates that the main effects of instructional method

and GPA were again found to have statistically significant differences between their levels. But, with this sample, no statistically significant differences were found for either the main effect of initial AAT or the interaction effects.

Figures 1 and 2 (Appendix C) provide a graphic representation of the differences between various means considered in the three-way analyses of variance. In both figures, the tendency toward parallelism on each separate graph indicates the lack of a significant second-order interaction. The significant differences between levels of all three variables for the entire sample are clearly depicted in Figure 1. The lines for high F-D anxiety are substantially above those of low F-D anxiety, the high GPA points for each set of lines are definitely above the low GPA line points, and the set of lines for PSI is also higher than the lecture set. Thus, it can be seen that, considered separately, the levels of anxiety, GPA, and instructional method did have a differential relationship with the dependent variable of academic achievement. The interpretation of Figure 2 is almost identical to that of Figure 1 except for the nonsignificant main effect of initial AAT. In Figure 2, 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 practical application of course content score in every situation with the reduced sample.

III. The Second Study Problem

In examining end-of-course anxiety, the two-way analyses of covariance yielded quite different results. A survey of the entire

sample adjusted means (Table 5, Appendix B) reflects a more debilitating anxiety score for both the PSI technique and low GPA. An analysis summary appears in Table 6 (Appendix B). The differences for both instructional method and GPA are shown, in Table 6, as significant while the interaction effect is not significant. The graphic representation of these results, presented in Figure 3 (Appendix C), adds a pictorial confirmation of the main effects on end of course AAT.

The adjusted anxiety means for the reduced sample are listed in Table 7 (Appendix B). There is no indication of any straightforward differences for particular levels of either GPA or instructional method. In further testimony, the analysis summary in Table 8 (Appendix B) shows no significant differences for main effects or for the interaction effect. Examining the table fully, it is apparent that the interaction effect is closer to being significant than are the main effects. Further, this near-significant interaction effect ($p = .06$) does appear as a disordinal interaction in Figure 4 (Appendix C). A comparison of Figures 3 and 4 (Appendix C) suggests that, regardless of the differences between the entire sample and reduced sample results, there is a certain similarity in the pattern of results which cannot be overlooked. On both graphs, a high GPA tends to negate any marked differential effects between instructional methods while a low GPA tends to widen anxiety score differences between the lecture and PSI techniques. For this low GPA level, the advantage lies with the lecture technique as far as association with more facilitative F-D anxiety scores; but, the advantage was not enough to be significant.

IV. The Third Study Problem

The final concern was that of investigating the effect of instructional method and initial anxiety on end-of-course anxiety. The entire sample and reduced sample two-way analyses of covariance both yielded a significant main effect of instructional method (see Tables 9 and 10, Appendix B). The comparison of adjusted means in Tables 11 and 12 (Appendix B) reflects a decided advantage in favor of the lecture technique over the PSI technique in facilitative effect on end-of-course anxiety. Also, Table 10 lists a significant interaction effect for instructional method X initial AAT. For this reduced sample consideration, the lecture technique produced far more facilitative effects on the low F-D anxiety type student than did the PSI technique.

CHAPTER V

DISCUSSION

An inspection of the comparisons between means, standard deviations, rankings, and frequency distributions of the two course sections on GPA and initial AAT scores suggested that the two independent sections could, indeed, have come from the same population regarding these two variables. The tested equalities tended to support the contention that the ad hoc method was capable of providing near-equal sections, at least insofar as the variables under study were concerned. From this perspective, differences between the two sections on the dependent variable scores were, then, attributed to the teaching method variable and not the GPA or initial AAT variables.

Concerning the first problem under study, the investigation utilizing results from all 88 students indicated that differences in achievement anxiety, previous academic achievement, and teaching method had a definite relationship with the students' ability to perform on a test designed to measure the knowledge and practical application of course content. Further, there were no interaction effects noted among the independent variables. A comparison of score means for PSI and lecture clearly showed an advantage in favor of PSI. Regardless of the comparative level combination of previous academic achievement/achievement anxiety considered (high GPA/high F-D, high GPA/low F-D, low GPA/high F-D, or low GPA/low F-D), the PSI instructional technique was associated with the higher achievement score. From the table of

entire sample means, it was also readily apparent that within teaching methods the scores decreased in a straightforward manner from the high GPA/high F-D level combination on through to the low GPA/low F-D level combination (PSI: 39.45, 35.45, 32.45, 31.18; Lecture: 33.73, 30.55, 29.82, 25.45). Similar findings were evident for the independent variables of GPA and initial AAT. High GPA and high F-D anxiety were associated with higher achievement scores than were low GPA and low F-D anxiety.

Regarding the investigation of results from the reduced sample, the variables of instructional method and GPA were, again, associated with the achievement score in the same manner as they were with the entire sample. The variable of initial AAT did not reflect this same relationship in the lecture section in that those high GPA students who were low F-D anxiety types actually outperformed the high GPA students who were high F-D anxiety types. However, the difference between the means of 33.33 and 33.00 was not found to be significant; therefore, it must be maintained that there was no real difference between the performance of these two anxiety types under the lecture technique. In examining the graph of these results (Figure 2, Appendix C), it can be observed that this slight reversal under the lecture technique, although not sufficient enough to cause a significant interaction, did prevent a main effect for initial AAT.

The two analyses seem to reflect that considered separately, method of instruction and GPA affected, or were at least associated with, performance on a test of knowledge and practical application of course content. With regard to the relationship between initial AAT

and the measure of academic achievement, the results, although slightly different for the two analyses, suggested that there was a direct relationship between the two variables and certainly not an inverse one.

The next problem investigated concerned the effect of instructional method and GPA on end-of-course anxiety. The results of the entire sample and reduced sample two-way analyses of covariance suggest both different and yet somewhat similar findings. With the entire sample, both main effects were significant, and, thus, indicated that those in the lecture section and those with a high GPA became more facilitative in achievement anxiety than did those in the PSI section and those with a low GPA. This advantage for high GPA parallels that found with the academic achievement issue. But, the significant difference in favor of the lecture technique in its association with end-of-course anxiety is quite opposite from the findings with academic achievement. Here, PSI did not seem to create the better systematic desensitizing effect some may have thought it should. Unfortunately, the results of this analysis did not repeat themselves with the reduced sample. With that analysis, there were no significant effects, main or interaction. Still, the interaction F in Table 8 (Appendix B) is considerably high and the graph in Figure 4 (Appendix C) does depict a disordinal interaction which suggests that there may well be an interaction which approaches meaningfulness. Interpreted from Figure 3 (Appendix C), and confirmed to a great extent by Figure 4 (Appendix C), the lecture technique tends to be associated with more facilitative end-of-course anxiety scores for students with low GPA than does the PSI technique.

The last problem under study was that of the effect of instructional method and initial AAT on end-of-course AAT. The two-way analyses of covariance for both the reduced and entire sample indicated a main effect of instructional method. The lecture technique was clearly superior to the PSI technique in producing a climate for more facilitative anxiety scores. However, since there was a significant interaction with the reduced sample analysis, the main effect of instructional method should either not be considered or should, at best, be interpreted with extreme caution. In explaining the interaction, it appears that the differential effectiveness of the methods of teaching 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 teaching method showed any clear advantage in relation to a more facilitative end-of-course AAT. However, with the low F-D anxiety student, the lecture technique proved most beneficial in its relationship with more facilitative end-of-course anxiety scores. An inspection of the graphs in Figures 5 and 6 (Appendix C) reveals these main and interaction effects quite clearly. Both figures indicate the greatest score differences to be between teaching methods at the low F-D level of initial AAT. This finding in favor of the lecture method is equally unique and suggests the same interpretation as the instruction method X GPA problem when the criterion of success is a more facilitative end-of-course anxiety score.

CHAPTER VI

SUMMARY AND CONCLUSIONS

Accumulated evidence has clearly indicated that the successful result of any learning effort is dependent on a host of variables involving the student, the instructor, the learning setting, the content to be learned, and the criterion of learning itself. Recently, a new instructional technique has increasingly been used on many college campuses to cope with this problem of individual differences in the ability to handle new material. The technique, called PSI, was developed to help students realize their full potential by providing a more individualized, systematic, and less threatening learning experience.

The results of numerous studies with PSI all point to its effectiveness in raising students' course grades considerably above the level of similar students taught via other methods, especially the lecture method. However, very little has been reported on PSI's success in reducing anxiety in the learning situation.

The main thrust of this study, then, was to examine both academic achievement and achievement anxiety differences between students taught by the PSI method and students taught by the lecture method of instruction. The study was conducted in a Textiles and Clothing course, in the College of Home Economics, at The University of Tennessee, during the Fall Term, 1973. The course was comprised of two sections, one having been identified as PSI in the Fall Timetable. Since random assignment was not possible, the sections were studied intact and this

fact must suggest caution in interpretations and generalizations. Although an ad hoc method of section assignment seemed to achieve near equivalent course sections on the variables of GPA and initial AAT, replication of this study utilizing formal randomization appears warranted for proper experimental procedure and to verify the findings which were not always in the direction that PSI advocates would believe.

The finding which was most consistent with other reports on PSI was the one concerning the effect of method of teaching when the dependent variable was knowledge and practical application of course content. Overall, PSI was found to be superior to the lecture technique and the difference in results was statistically significant. Further, regardless of the combinations of high or low GPA with high F-D or low F-D anxiety studied, those students within these combinations who were in PSI out-scored their counterparts in the lecture section on the measure of academic achievement. This result can, therefore, be added to the long list of testimonials for PSI.

Some minor indications reaffirmed were those dealing with achievement differences between high and low GPA types and between high F-D and low F-D anxiety types. The study was consistent with the reported literature in that students who had achieved a high GPA previous to the course did better on the academic achievement measure than did the students who had a low GPA. Likewise those students with high F-D anxiety did better than those with low F-D anxiety. These confirmations, although expected, were nevertheless gratifying.

The PSI advocates might be somewhat dismayed with the remaining conclusions concerning the effect of instructional method and GPA and

the effect of instructional method and initial AAT on end-of-course AAT. And, it is these particular investigations which would prove most worthy of replication for verification purposes.

In the case of instructional method and GPA, the results seem to indicate that the lecture method has a higher association with more facilitative F-D anxiety scores than does the PSI method. Moreover, it seems that the greatest difference in AAT between the two teaching methods is at the low GPA level. Although most entire sample findings did reach statistical significance, those with the reduced sample did not meet this significance. Nevertheless, it would seem that this study suggests that far from producing a less threatening environment for students, the PSI technique is not as effective as the lecture technique in creating a learning climate which fosters more facilitative changes in end-of-course AAT. And, this result is especially true for students with low GPAs.

With the instructional method and initial AAT problem, there was a statistically significant difference in favor of lecture which suggests that, again, the PSI technique is not as effective as the lecture technique in allowing for more facilitative anxiety changes by course ending. Also, the noted significant interaction effect suggests that, concerning the student with initial low F-D anxiety, the lecture method of instruction is more highly associated with facilitative anxiety changes by course ending than is the PSI technique.

Future research in this area could include not only a repeat of this study with random assignment but also other related issues. This study was accomplished with an all female sample. Would males perform

differently? The course content of this investigation might have yielded far different results than would a math, engineering, business, or physics course. Most of the students were in their junior year in college. Results with beginning freshmen might prove more useful for instructional decisions. Lastly, what are the long-range retention and anxiety benefits of various instructional methods? These concerns are surely relevant in view of the ever-growing college enrollments and dropouts.

In conclusion, this researcher feels that perhaps more studies on the effects of PSI are in order before the method gets further publicity as "the method." Hopefully, this research will stimulate others to take a more critical look at PSI and its effects on things other than course grade alone.

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APPENDICES

APPENDIX A

THE ALPERT-HABER ACHIEVEMENT ANXIETY TEST ITEMS

1. Nervousness while taking an exam or test hinders me from doing well.
 - (a) Always
 - (b) Often
 - (c) Sometimes
 - (d) Rarely
 - (e) Never
2. I work most effectively under pressure, as when the task is very important.
 - (a) Always
 - (b) Usually
 - (c) Sometimes
 - (d) Hardly ever
 - (e) Never
3. In a course where I have been doing poorly, my fear of a bad grade cuts down my efficiency.
 - (a) Never
 - (b) Hardly ever
 - (c) Sometimes
 - (d) Usually
 - (e) Always
4. I keep my grades up by doing well on the big exams rather than on the day-to-day coursework.
 - (a) This is true in almost all of my courses.
 - (b) This is true in quite a few of my courses.
 - (c) This sometimes happens.
 - (d) Usually this is not the case.
 - (e) This is very rarely true.
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.
 - (a) This never happens to me.
 - (b) This hardly ever happens to me.
 - (c) This sometimes happens to me.
 - (d) This often happens to me.
 - (e) This practically always happens to me.

6. The more important the examination, the less well I seem to do.
 - (a) Always
 - (b) Usually
 - (c) Sometimes
 - (d) Hardly ever
 - (e) Never
7. When I feel confident about my ability to do well on the test,
 - (a) anxiety does not bother me at all.
 - (b) anxiety bothers me very rarely.
 - (c) anxiety may still bother me sometimes.
 - (d) I still often feel somewhat anxious.
 - (e) I still feel very anxious.
8. Under pressure, I am able to organize my thoughts more clearly than usual.
 - (a) Definitely not true.
 - (b) This is hardly ever true.
 - (c) Sometimes.
 - (d) This is often the case.
 - (e) This is true most of the time.
9. While I may (or may not) be nervous before taking an exam, once I start, I seem to forget to be nervous.
 - (a) I always forget.
 - (b) Usually.
 - (c) Sometimes.
 - (d) I often feel some nervousness.
 - (e) I am always nervous during an exam.
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.
 - (a) This always happens to me.
 - (b) This often happens to me.
 - (c) This sometimes happens to me.
 - (d) This hardly ever happens to me.
 - (e) I never block on questions to which I know the answer.
11. Nervousness while taking a test helps me to do better.
 - (a) It never helps.
 - (b) It usually doesn't help.
 - (c) Now and then it helps.
 - (d) It generally helps me a little.
 - (e) It often helps.

12. When I start a test, nothing is able to distract me.
- (a) This is always true of me.
 - (b) This is often true of me.
 - (c) This is sometimes true of me.
 - (d) This is hardly ever true of me.
 - (e) This is not true of me.
13. During an exam or test, I tend to perspire
- (a) lots.
 - (b) quite a bit.
 - (c) some.
 - (d) very little (unless there is extreme heat or humidity).
 - (e) not at all (unless there is extreme heat or humidity).
14. In courses in which the total grade is based mainly on one exam, I seem to do better than other people.
- (a) never
 - (b) Hardly ever
 - (c) Sometimes
 - (d) Quite often
 - (e) Almost always
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.
- (a) I almost always blank out at first.
 - (b) I usually blank out at first.
 - (c) I sometimes blank out at first.
 - (d) I hardly ever blank out at first.
 - (e) I never blank out at first.
16. I look forward to exams.
- (a) Never
 - (b) Hardly ever
 - (c) Sometimes
 - (d) Usually
 - (e) Always
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.
- (a) I never feel this way.
 - (b) I hardly ever feel this way.
 - (c) I sometimes feel this way.
 - (d) I often feel this way.
 - (e) I almost always feel this way.

18. Time pressure on an exam causes me to do worse than the rest of the group under similar conditions.
- (a) Time pressure always seems to make me do worse on an exam than others.
 - (b) Time pressure often seems to make me do worse on an exam than others.
 - (c) Time pressure sometimes seems to make me do worse on an exam than others.
 - (d) Time pressure hardly ever seems to make me do worse on an exam than others.
 - (e) Time pressure never seems to make me do worse on an exam than others.
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.
- (a) I am always able to use the "crammed" material successfully.
 - (b) I am usually able to use the "crammed" material successfully.
 - (c) I am sometimes able to use the "crammed" material successfully.
 - (d) I am hardly ever able to use the "crammed" material successfully.
 - (e) I am never able to use the "crammed" material successfully.
20. When I find a question on an exam that I did not expect, I get upset, and I don't do as well on the question as my preparation should allow me to do.
- (a) Always
 - (b) Usually
 - (c) Sometimes
 - (d) Hardly ever
 - (e) Never
21. I enjoy taking a difficult exam more than an easy one.
- (a) Always
 - (b) Often
 - (c) Sometimes
 - (d) Rarely
 - (e) Never
22. When I lack confidence in my ability to do well on a test,
- (a) I begin to feel very anxious.
 - (b) I begin to feel slightly anxious.
 - (c) I sometimes feel mildly anxious.
 - (d) It hardly ever upsets me.
 - (e) It doesn't bother me.

23. I find myself reading exam questions without understanding them, and I must go back over them so that they will make sense.
- (a) Never
 - (b) Rarely
 - (c) Sometimes
 - (d) Often
 - (e) Almost always
24. The more important the exam or test, the better I seem to do.
- (a) This is true of me.
 - (b) This is true of me much of the time.
 - (c) This is sometimes true of me.
 - (d) This is rarely true of me.
 - (e) This is not true of me.
25. During an exam or test, I become conscious of my heartbeat.
- (a) Almost always
 - (b) Frequently
 - (c) Sometimes
 - (d) Hardly ever
 - (e) Never.
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 on even easy questions later on.
- (a) This never happens to me.
 - (b) This very rarely happens to me.
 - (c) This sometimes happens to me.
 - (d) This frequently happens to me.
 - (e) This always happens to me.
27. Relative to other students, I seem to have more (or less) than the average amount of harmful nervousness about tests and exams.
- (a) Much more
 - (b) A little more
 - (c) About average
 - (d) A little less
 - (e) Much less
28. I feel that if I were not surrounded by competitors in an exam situation,
- (a) I would do much better.
 - (b) I would do a little better.
 - (c) It wouldn't make much difference.
 - (d) I wouldn't do quite as well.
 - (e) I wouldn't do anywhere near as well.

APPENDIX B

TABLE 1

ACADEMIC ACHIEVEMENT MEANS FOR THREE-WAY ANOVA,
ENTIRE SAMPLE

Initial AAT	GPA	INSTRUCTIONAL METHOD			
		PSI		Lecture	
		High	Low	High	Low
	High F-D	39.45	32.45	33.73	29.82
	Low F-D	35.45	31.18	30.55	25.45

TABLE 2

ACADEMIC ACHIEVEMENT MEANS FOR THREE-WAY ANOVA,
REDUCED SAMPLE

Initial AAT	GPA	INSTRUCTIONAL METHOD			
		PSI		Lecture	
		High	Low	High	Low
	High F-D	40.33	34.00	33.00	24.67
	Low F-D	36.50	31.00	33.33	23.83

TABLE 3
THREE-WAY ANOVA SUMMARY TABLE, ENTIRE SAMPLE

Source	df	Sum of Squares	Mean Square	F
Instructional Method	1	496.38	496.38	20.11*
GPA	1	565.10	565.10	22.89*
Initial AAT	1	225.92	225.92	9.15*
Instructional Method X GPA	1	7.10	7.10	0.29
Instructional Method X Initial AAT	1	7.10	7.10	0.29
GPA X Initial AAT	1	3.28	3.28	0.13
Instructional Method X GPA X Initial AAT	1	21.01	21.01	0.85
Residual	<u>80</u>	<u>1975.09</u>	24.69	
TOTAL	87	3300.98		

*p < .05.

TABLE 4
THREE-WAY ANOVA SUMMARY TABLE, REDUCED SAMPLE

Source	df	Sum of Squares	Mean Square	F
Instructional Method	1	546.75	546.75	23.71*
GPA	1	660.08	660.08	28.63*
Initial AAT	1	40.33	40.33	1.75
Instructional Method X GPA	1	27.00	27.00	1.17
Instructional Method X Initial AAT	1	30.08	30.08	1.30
GPA X Initial AAT	1	0.08	0.08	0.01
Instructional Method X GPA X Initial AAT	1	3.00	3.00	0.13
Residual	<u>40</u>	<u>922.33</u>	23.06	
TOTAL	47	2229.65		

*p < .05.

TABLE 5
ACHIEVEMENT ANXIETY MEANS FOR THE FIRST TWO-WAY ANALYSIS OF
COVARIANCE, ENTIRE SAMPLE

		INSTRUCTIONAL METHOD			
		PSI		Lecture	
GPA	High	$\overline{\text{Cov } \bar{X}}$	-2.82	$\overline{\text{Cov } \bar{X}}$	-6.68
		\bar{X}	-3.04	\bar{X}	-4.91
		\bar{X}_{adj}	-7.90	\bar{X}_{adj}	-6.80
	Low	$\overline{\text{Cov } \bar{X}}$	-13.27	$\overline{\text{Cov } \bar{X}}$	-13.82
		\bar{X}	-14.59	\bar{X}	-11.68
		\bar{X}_{adj}	-11.43	\bar{X}_{adj}	-8.10

TABLE 6
TWO-WAY ANALYSIS OF COVARIANCE SUMMARY TABLE,
ENTIRE SAMPLE

Source	df	Sum of Squares	Mean Square	F
Instructional Method	1	106.03	106.03	4.40*
GPA	1	100.98	100.98	4.19*
Instructional Method X GPA	1	27.03	27.03	1.12
Error	<u>83</u>	<u>2000.37</u>	24.10	
TOTAL	86	2234.41		

*p < .05.

TABLE 7

ACHIEVEMENT ANXIETY MEANS FOR THE FIRST TWO-WAY ANALYSIS OF
COVARIANCE, REDUCED SAMPLE

		INSTRUCTIONAL METHOD			
		PSI		Lecture	
GPA	High	Cov \bar{X}	-0.08	Cov \bar{X}	-4.08
		\bar{X}	0.00	\bar{X}	-3.83
		\bar{X}_{adj}	-7.48	\bar{X}_{adj}	-8.05
	Low	Cov \bar{X}	-15.17	Cov \bar{X}	-17.67
		\bar{X}	-16.50	\bar{X}	-13.67
		\bar{X}_{adj}	-11.67	\bar{X}_{adj}	-6.80

TABLE 8

TWO-WAY ANALYSIS OF COVARIANCE SUMMARY TABLE,
REDUCED SAMPLE

Source	df	Sum of Squares	Mean Square	F
Instructional Method	1	52.89	52.89	2.21
GPA	1	13.15	13.15	0.55
Instructional Method X GPA	1	88.64	88.64	3.71
Error	<u>43</u>	<u>1028.51</u>	23.92	
TOTAL	46	1183.19		

TABLE 9
TWO-WAY ANALYSIS OF COVARIANCE SUMMARY TABLE,
ENTIRE SAMPLE

Source	df	Sum of Squares	Mean Square	F
Instructional Method	1	132.42	132.42	5.42*
Initial AAT	1	18.90	18.90	0.77
Instructional Method X Initial AAT	1	77.73	77.73	3.18
Error	<u>83</u>	<u>2026.40</u>	24.41	
TOTAL	86	2255.45		

*p < .05.

TABLE 10
TWO-WAY ANALYSIS OF COVARIANCE SUMMARY TABLE,
REDUCED SAMPLE

Source	df	Sum of Squares	Mean Square	F
Instructional Method	1	135.98	135.98	4.41*
Initial AAT	1	75.39	75.39	2.45
Instructional Method X Initial AAT	1	190.48	190.48	6.18*
Error	<u>43</u>	<u>1324.92</u>	30.81	
TOTAL	46	1726.77		

*p < .05.

TABLE 11

ACHIEVEMENT ANXIETY MEANS FOR THE SECOND TWO-WAY ANALYSIS OF
COVARIANCE, ENTIRE SAMPLE

		INSTRUCTIONAL METHOD			
		PSI		Lecture	
Initial AAT	High F-D	$\text{Cov } \bar{X}$	-0.09	$\text{Cov } \bar{X}$	-2.45
		\bar{X}	-1.55	\bar{X}	-3.05
		\bar{X}_{adj}	-9.68	\bar{X}_{adj}	-9.06
	Low F-D	$\text{Cov } \bar{X}$	-16.00	$\text{Cov } \bar{X}$	-18.05
		\bar{X}	-16.09	\bar{X}	-13.54
		\bar{X}_{adj}	-9.94	\bar{X}_{adj}	-5.56

TABLE 12

ACHIEVEMENT ANXIETY MEANS FOR THE SECOND TWO-WAY ANALYSIS
OF COVARIANCE, REDUCED SAMPLE

		INSTRUCTIONAL METHOD			
		PSI		Lecture	
Initial AAT	High F-D	$\text{Cov } \bar{X}$	3.08	$\text{Cov } \bar{X}$	1.67
		\bar{X}	1.58	\bar{X}	-0.58
		\bar{X}_{adj}	-12.52	\bar{X}_{adj}	-13.10
	Low F-D	$\text{Cov } \bar{X}$	-20.75	$\text{Cov } \bar{X}$	-21.92
		\bar{X}	-21.42	\bar{X}	-15.33
		\bar{X}_{adj}	-8.76	\bar{X}_{adj}	-1.37

APPENDIX C

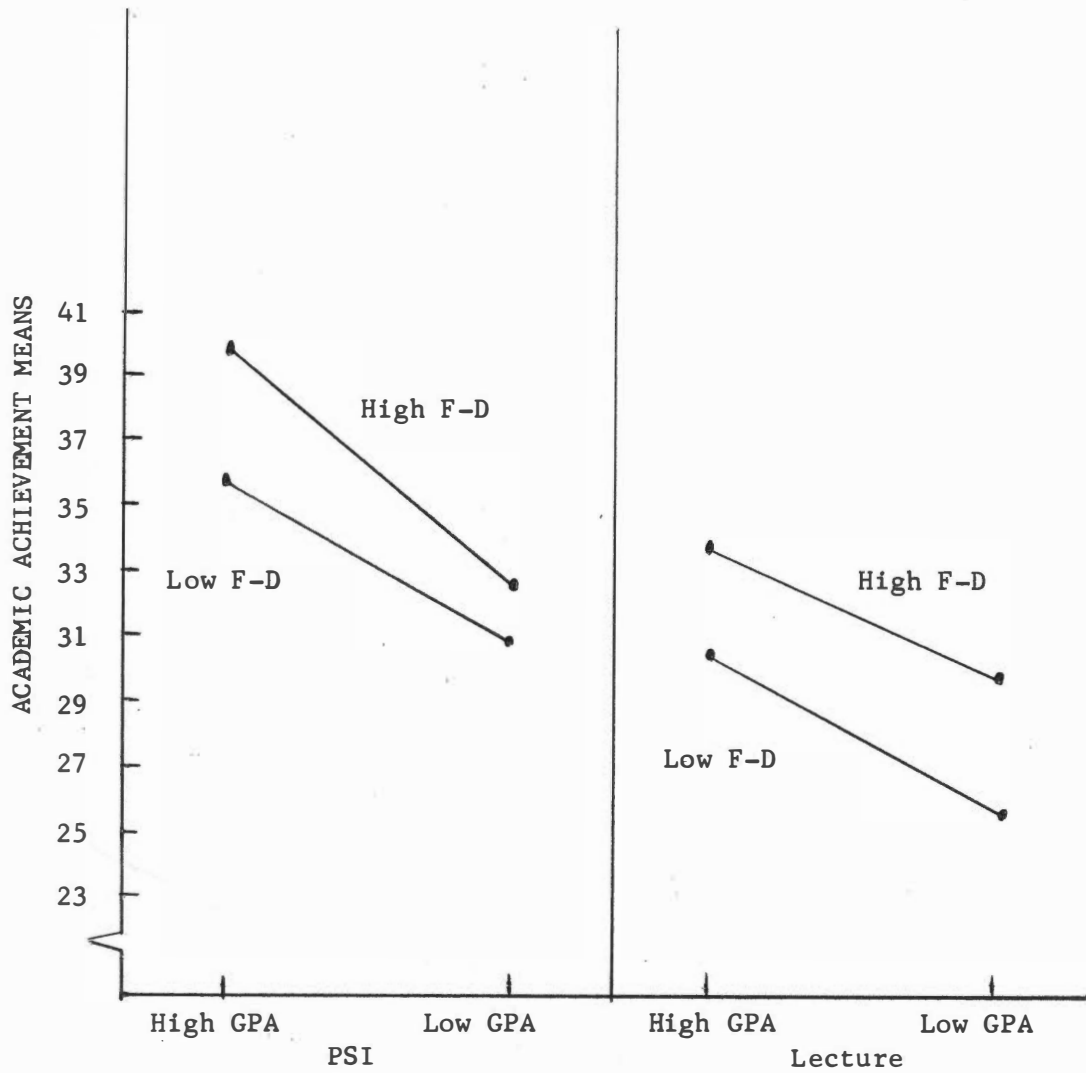


FIGURE 1. Academic achievement means for the levels of instructional method, GPA, and initial AAT, entire sample.

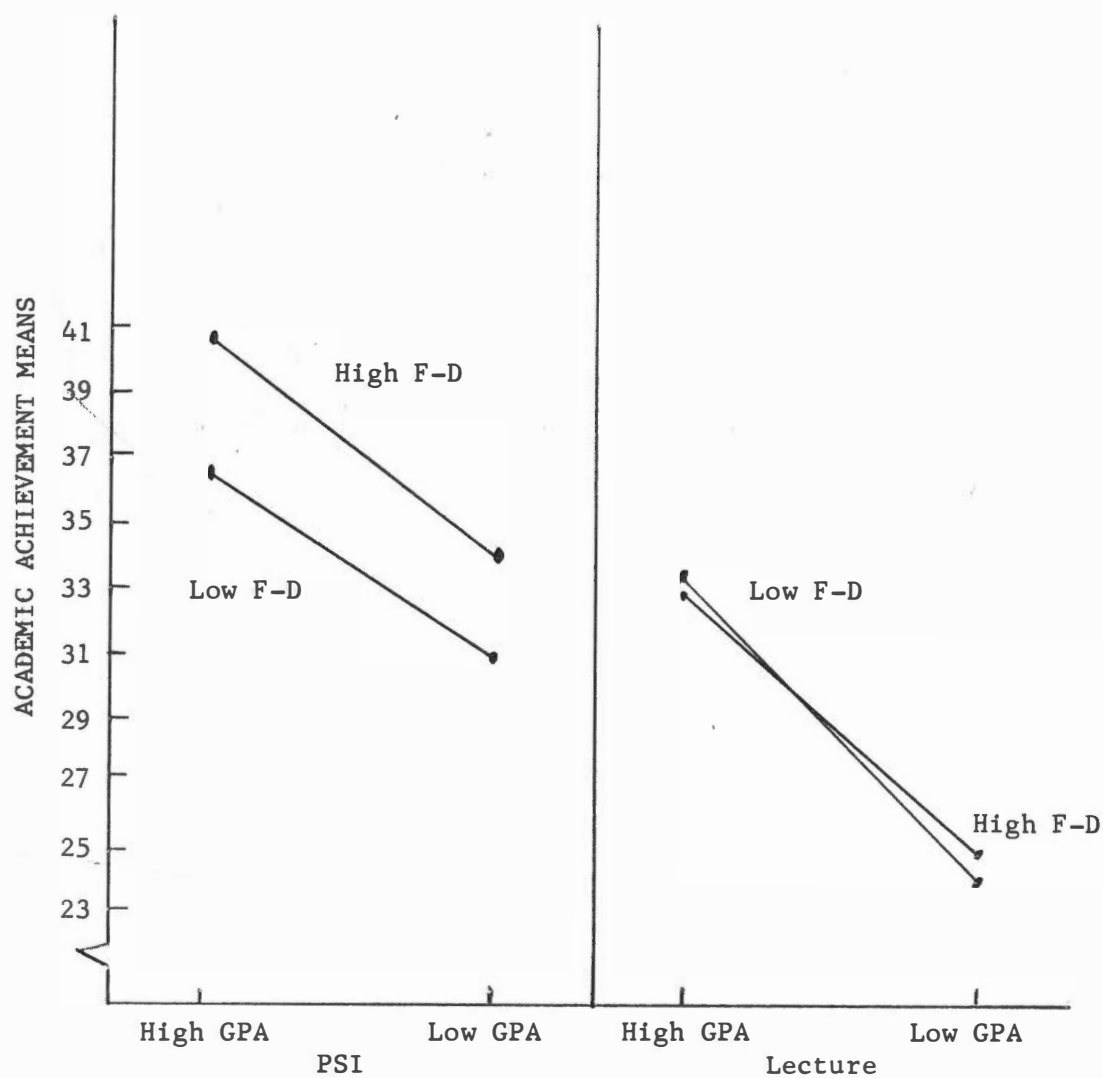


FIGURE 2. Academic achievement means for the levels of instructional method, GPA, and initial AAT, reduced sample.

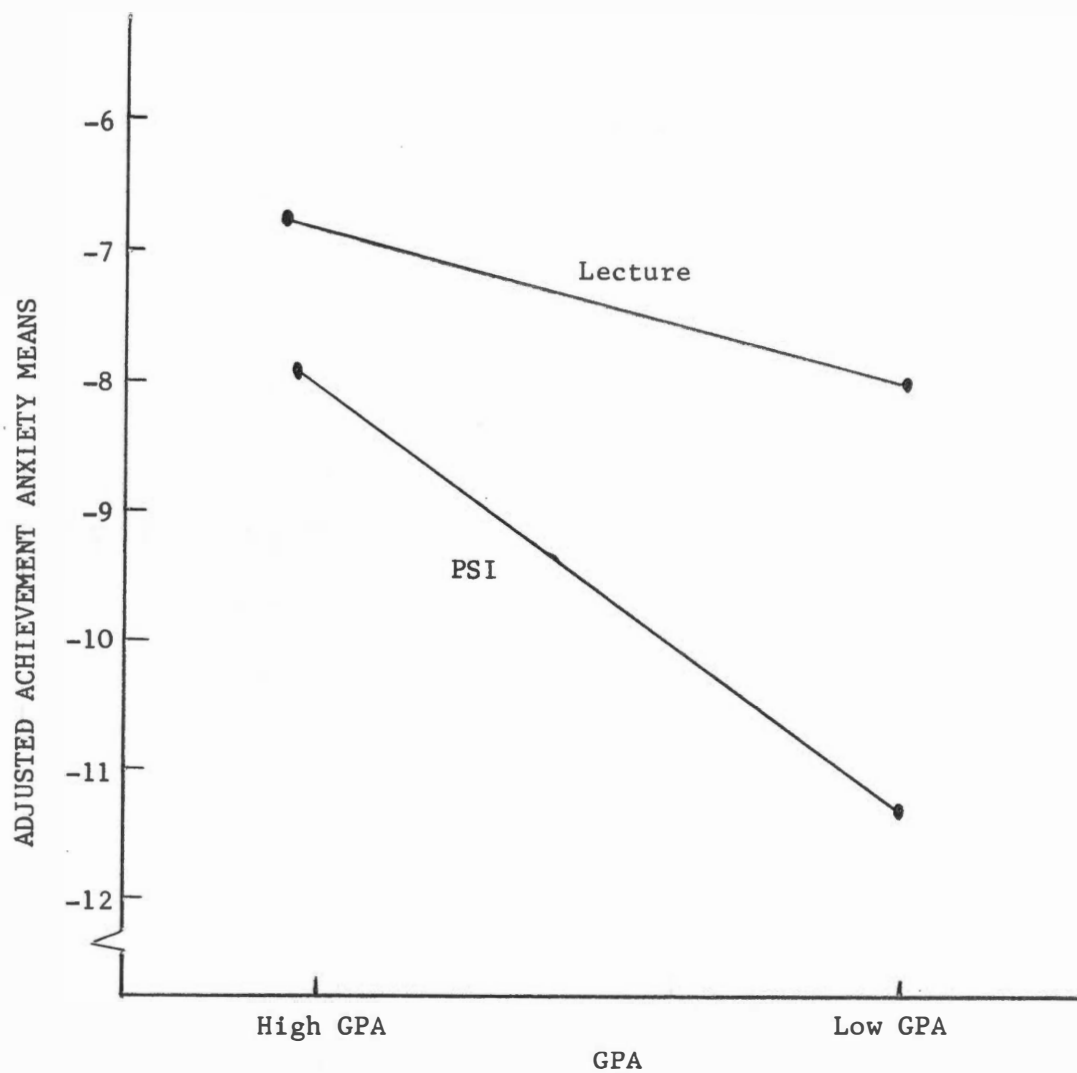


FIGURE 3. Adjusted achievement anxiety means for the levels of instructional method and GPA, entire sample.

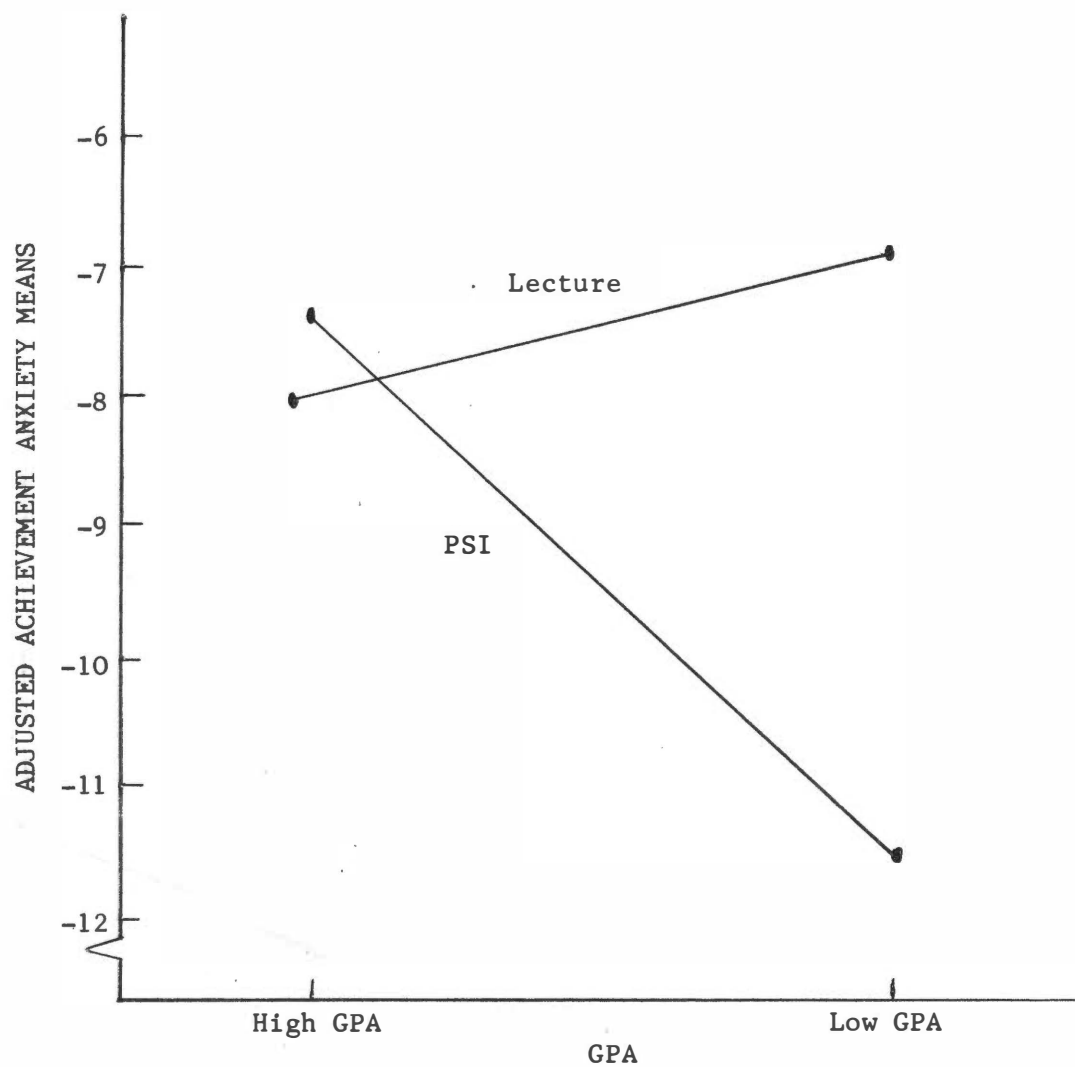


FIGURE 4. Adjusted achievement anxiety means for the levels of instructional method and GPA, reduced sample.

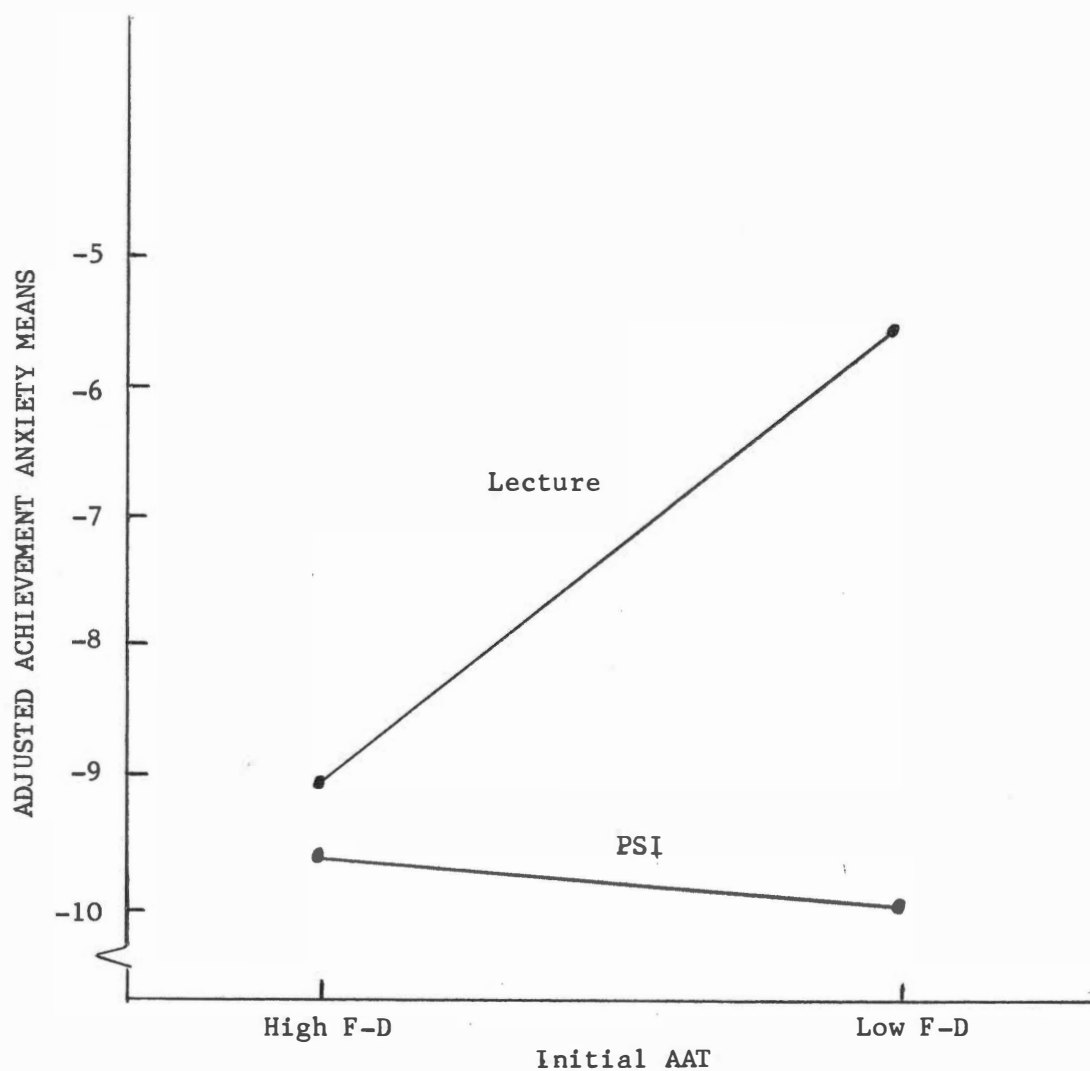


FIGURE 5. Adjusted achievement anxiety means for the levels of instructional method and initial AAT, entire sample.

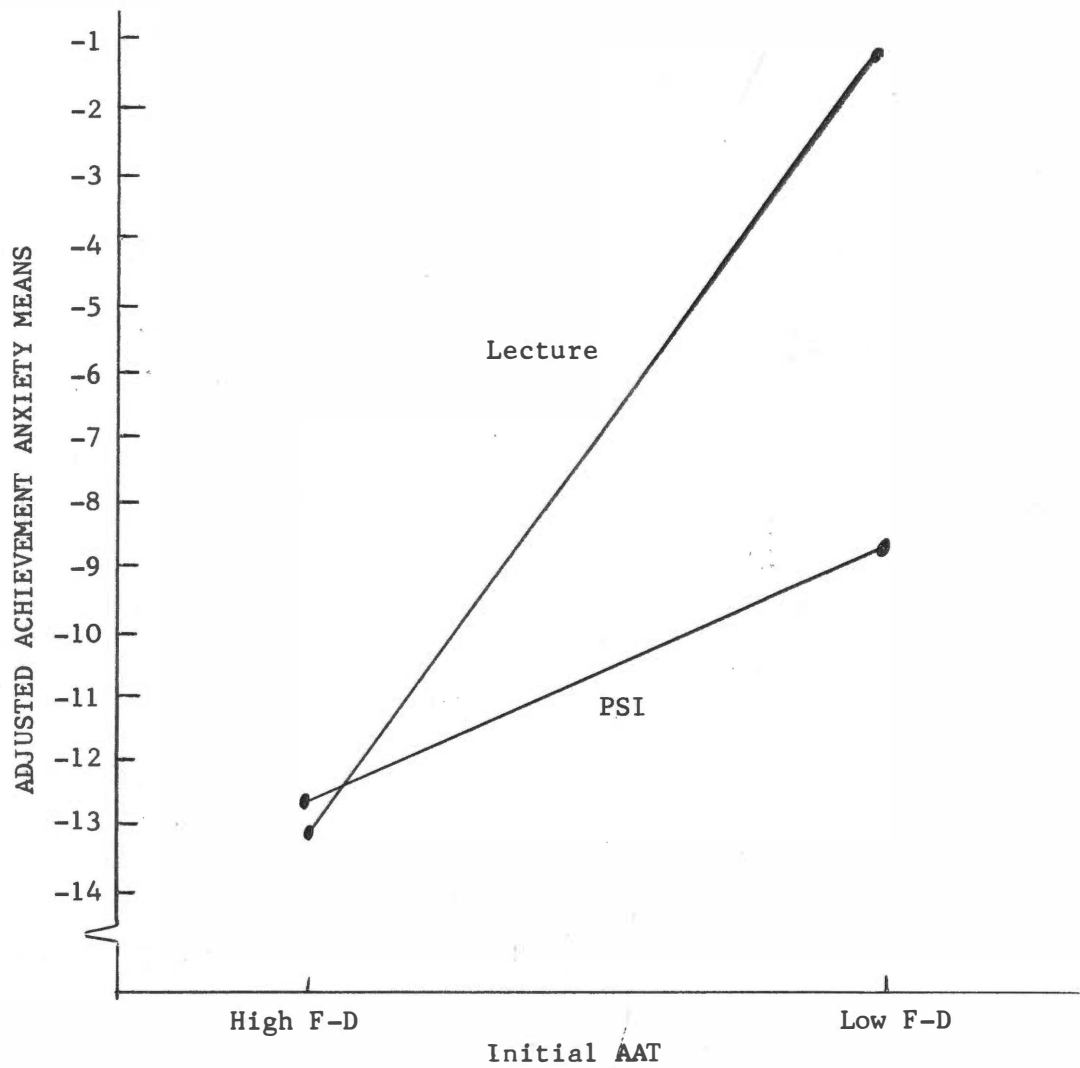


FIGURE 6. Adjusted achievement anxiety means for the levels of instructional method and initial AAT, reduced sample.

VITA

Edward Joseph Jacko was born in Winton, Pennsylvania, May 20, 1934, to Mr. and Mrs. Joseph Jacko. He graduated from Duquesne High School, Duquesne, Pennsylvania. Majoring in Psychology at Pennsylvania State University, he received a Bachelor of Science degree in 1955.

The author entered the Air Force in November of 1955 and completed flight training in 1956. From 1957 to 1961, he served as a navigation instructor and personnel officer. A Master of Science degree in Psychology followed in 1962 while on an Air Force sponsored educational program at Purdue University.

He worked as a human performance engineer at the Rome Air Development Center from 1963 to 1966, moving on to positions of behavioral scientist and Chief, Personnel Subsystems Branch, Aeronautical Systems Division, Wright-Patterson Air Force Base, Ohio, during the period 1966 to 1970. The author was then transferred to the Washington, D. C. area where he served as a Personnel Research and Planning Officer in the Systems Command Headquarters from 1970 to early 1971. An assignment as Psychological Operations Research and Analysis Officer in the Headquarters, Military Assistance Command Vietnam followed in 1971.

Returning from South Vietnam he was again offered an Air Force sponsored educational opportunity to work toward the Doctor of Education degree with a major in Educational Psychology and Guidance. He began his studies at The University of Tennessee in January, 1972 and received his degree in June, 1974. The author was accepted as a member of Phi Kappa Phi (scholastic) during this time.

Presently a Lieutenant Colonel in the U. S. Air Force, he has been assigned to the Evaluation and Research Directorate, Deputy Chief of Staff/Education, Headquarters Air University, Maxwell Air Force Base, Alabama.