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I am submitting herewith a dissertation written by Janice Joyner Maclin, entitled "Analysis of the Proctor and Self-Paced Components of the Personalized System of Instruction." I recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Education, with a major in Educational Psychology and Guidance.

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B

ANALYSIS OF THE PROCTOR AND SELF-PACED COMPONENTS
OF THE PERSONALIZED SYSTEM OF INSTRUCTION

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

Janice Joyner Maclin

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ABSTRACT

The primary purposes of this study were to determine the effect of modifying the proctor and self-paced components of the Personalized System of Instruction (PSI). Research has shown that students in Personalized courses score higher on final exams and rate the course higher than those enrolled in lecture courses. The components of the system have not been manipulated to determine the effect on student performance, progress or attitudes. The first purpose of this investigation was to examine the effects of the independent variable of proctors' grades being contingent upon the final examination performance of students assigned to them upon the three dependent variables of student performance on the final exam, student progress through the course, and student attitude; the second, to investigate the effect of the independent variable of giving bonus points for completing unit one the first week of the quarter, and unit two the second week of the quarter on the three dependent variables.

The study was conducted at the University of Tennessee, Knoxville, Spring Quarter 1973. The subjects were 66 students who were enrolled in Textiles and Clothing 3420, Textiles I.

Each student was assigned to one of twelve student

proctors. Proctors spent five hours each week in the room reserved for the course during which time they worked with the students assigned them. Using a study guide, students studied the assigned reading and, when they were ready, scheduled a conference with their proctor during which they took an oral unit test. If the student answered all questions correctly or could clarify incorrect answers, she was passed on the unit test and was given the study guide for the next unit. Students who did not pass unit tests were required to restudy the material and take an alternate form of the test.

The twelve proctors were randomly divided into two groups of six students each. One of the groups was randomly assigned to the grade-contingent condition and the other to the grade-not-contingent condition. For the grade-contingent group, the grades of the student proctors were contingent upon the final examination grades of the students assigned to her. Each of the two groups of proctors was randomly divided into two groups. One group became the bonus group while the other group was designated the no-bonus group. Students assigned to proctors in the bonus group were given five bonus points for completing unit one during the first week of the quarter and five bonus points for completing unit two during the second week of the quarter.

A final examination designed to test performance at four points along a continuum of complexity of thought was given to all students at the end of the quarter. The four parts of the examination were: multiple choice questions which tested the recall of facts, multiple choice questions which tested the application of facts in solving simple problems, application questions which tested the application of concepts in solving simulated problems related to the subject, and multiple choice questions on new material, i.e., information included in portions of two articles on more advanced material than that included in the course.

Progress was measured according to the time at which students completed unit tests. Attitudes were measured by a four-part attitude scale which consisted of: (1) a comparison of the students' attitudes toward this course with other courses of a more general type; (2) an assessment of attitude toward the course; (3) an assessment of attitude toward the teacher; and (4) an assessment of attitude toward the proctor.

The withdrawal of 9 of the 66 students enrolled in the course resulted in a total of 57 subjects. The average grades on the final examination for the students assigned to each proctor were calculated. The students assigned to one proctor in the grade-contingent group did

not make the minimum of 80 necessary for the proctor to make an A. The students assigned to only two proctors in the grade-not-contingent group exceeded the average grade of 80.

A two x two fixed factor analysis of covariance with cumulative grade point average (GPA) as the covariate was utilized to analyze the data for each of the four parts of the final examination. The results indicated that regardless of whether the proctor's grade was contingent upon the final examination grade of the students assigned to them, there was no effect on student performance on the final examination. The results of the analysis of covariance for each part of the final examination showed no significant differences for the grade-contingency factor. The grade-contingency factor also had no effect on progress through the course or on student attitude.

Students who received bonus points scored significantly higher than students who did not on the multiple choice simple application portion of the final examination. There were no significant differences in the scores of the two groups on the other three parts of the examination.

The data for determining progress were analyzed by a 2 x 2 x 8 Lindquist Type III analysis of variance with

points earned each week as the repeated measures factor. The between-subjects main effects (grade contingency and bonus points) were not significant. The repeated measures factor, points, was significant at the .01 level. A Newman-Keuls Multiple Comparison test showed that points earned the last week of the quarter were significantly higher than each of the other weeks.

A 2 x 2 fixed factor analysis of variance was utilized to analyze the data from each of the four parts of the attitude scale. The main effects of grade contingency and bonus points and the interaction for the four parts of the attitude scale attitude toward the course, toward the teacher, toward the student proctor, and for comparing the course with other courses were not significant.

Making the proctors' grades contingent on the final examination grade of their students did not affect student performance on the final examination, student progress through the course, or student attitudes. Proctors worked effectively with students regardless of whether their grade was contingent on the final examination grade of their students. Bonus points for units completed the first two weeks of the quarter affected student performance on only one portion of the final examination and did not affect progress or student attitudes.

Recommendations for further research were provided.

TABLE OF CONTENTS

CHAPTER	PAGE
I. INTRODUCTION	1
Personalized System of Instruction	2
Description.	2
Effectiveness of the personalized system of	
instruction.	5
Self-pacing.	7
Student proctors	.10
Statement of the Problem	.12
II. METHOD	.13
Setting and Subjects	.13
Procedures	.13
Method of instruction.	.13
Independent variables.	.16
Dependent variables.	.18
Statistical design	.20
III. RESULTS.	.22
Proctor Grades	.22
Achievement.	.24
Multiple choice fact questions	.24
Multiple choice simple application questions .	.27
More difficult application questions	.27
New material	.29

CHAPTER	PAGE
Total final examination.	.29
Progress	.32
Attitudes.	.38
IV. DISCUSSION	.44
Grade Contingency.	.44
Bonus Points	.49
Conclusions.	.52
Recommendations for Further Research	.52
REFERENCES	.54
APPENDIXES	.58
Appendix A	.59
Appendix B	.71
VITA	.73

LIST OF TABLES

TABLE		PAGE
I.	Average Grades of Students Assigned Each Proctor	.23
II.	Final Examination Means	.25
III.	Analysis of Covariance Multiple Choice Fact Questions	.26
IV.	Analysis of Covariance Multiple Choice Simple Application	.28
V.	Analysis of Covariance More Difficult Application Questions	.28
VI.	Analysis of Covariance New Material	.30
VII.	Analysis of Covariance Total Final Examination.	.31
VIII.	Analysis of Variance for Points	.33
IX.	Newman-Keuls Procedure for Differences in Means for Points.	.35
X.	Average Points Per Week	.37
XI.	Means for Attitude Scale.	.42
XII.	Analysis of Variance for Attitude Scale	.43

CHAPTER I

INTRODUCTION

There has been little change through the years in the manner in which instructional material is presented in higher education with the lecture being the predominant method used. There is some evidence that the lecture method may be rarely motivating, unpopular and a poor way to disseminate information (Johnston and Pennypacker, 1970). An approach to teaching that is different from traditional methods and that is based on the knowledge of learning principles derived from the experimental analysis of behavior has been described by Keller (1968b). First developed in the early 1960's by Fred Keller, J. G. Sherman, and other psychologists, the system was called the Keller Plan, but is now more frequently referred to as the Personalized System of Instruction (PSI). The Personalized System of Instruction is described and studies comparing the performance and attitudes of students in PSI courses with those taught by traditional lecture are reviewed. Studies pertaining to two components of special interest, self-pacing and student proctors are reviewed.

I. PERSONALIZED SYSTEM OF INSTRUCTION

Description

Essential components. The essential components of PSI, as outlined by Keller (1968a), are as follows:

1. Self-paced. Students work through the course at their own pace. There are no time contingencies, rather, the student responds when he is ready to respond. Students who do not complete the course by the end of the term are given an incomplete.

2. Written assignments. Students are clearly told what to study and what they should know when they have finished studying. This is achieved through the use of a written assignment which contains both a reading assignment and study questions and/or behavioral objectives.

3. Mastery of small units of work. The course material is divided into small units. Progress in the course is contingent upon mastery of successive units. Students demonstrate mastery of a unit by passing unit readiness tests with perfect or near perfect scores. The unit tests may be written (McMichael and Corey, 1969; Born, 1970; Keller, 1968b) or oral (Johnston and Pennypacker, 1971; Sheppard and MacDermot, 1970; Maclin and Cormier, 1974). They are immediately scored by the proctor, and, if the student passes, the student is congratulated by the

proctor and his/her progress is recorded. There are no penalties for not passing a unit test. If a student fails a unit test, he/she is told to restudy the material and take an alternate form of the test when he/she is ready to do so.

4. Student proctors. Students, usually undergraduate students who have recently completed the course, work with students enrolled in the course. They administer unit tests, score the tests, congratulate students who do well, and discuss with the student any questions he may have about course content. If a student does not pass the unit test, the proctor discusses with the student areas of the unit he should restudy before taking another unit test. Proctors also maintain records of student progress.

5. The use of lectures and demonstrations as motivational devices. Lectures are given at various times during the term. Students earn the right to attend lectures by having completed a certain number of units of work. Lectures are not used to dispense knowledge, but rather, they are designed to be helpful and interesting.

Course personnel. The personnel recommended to administer the course include an instructor, a course assistant, and one proctor for each ten students enrolled in the course. The instructor is considered a manager of learning. He/she selects the material to be learned,

divides the material into study units, writes the study questions for the written assignments, writes the test items for the unit readiness tests, and arranges the contingencies of reward. In addition to assisting with proctors' meetings, the course assistant is also usually in charge of progress charts, and materials and supplies.

The proctor serves as an intermediary between the student and the teacher. Because his/her knowledge of the course subject matter is at an intermediate level between that of the teacher and that of the student, he/she can work with the student in a unique way to help him better understand the subject matter. He/she also provides a personalized aspect for the course (Keller, 1968a).

The system can be one of mutual reinforcement. Each person may receive his reward through the behavior of others (Keller, 1968a). The student is rewarded for learning and the proctor is rewarded by the learning of the student, by the close working relationship with other outstanding students, and the instructor; the course assistant is rewarded by working individually with students as needed, by working with the course assistant and the proctors, by being aware at all times of each student's progress, and of any problems the students are having.

The Personalized System of Instruction is one in

which the student is recognized as an individual, is allowed to proceed at his/her own pace, receives immediate knowledge of results, and is rewarded for his/her work. One question is how effective is the system in facilitating learning in comparison to the traditional lecture method and what are student attitudes toward the system? Studies which compare performance and attitudes of students in PSI courses with those of students in lecture will be reviewed. Literature pertaining to two components of the system, self-pacing and proctors will be reviewed.

Effectiveness of the Personalized System of Instruction

Several studies have compared the performance of students on final examinations in PSI with the performance of students who were enrolled in a course which was taught by a traditional lecture method. McMichael and Corey (1969) reported that students in the PSI group scored significantly higher on a multiple choice final exam than students in the lecture oriented course. Some studies have investigated achievement on different types of test items. Born, Gledhill, and Davis (1972) found no differences in the scores of students in PSI and of students in a lecture course on multiple choice items, but they did find that students in PSI scored significantly higher than those in lecture courses on fill-in and essay items. Morris and Kimbrell (1973) reported that students in the

PSI course scored higher, but not significantly higher, on recognition portions of final examinations and significantly higher on recall and application portions of the exam than students enrolled in a lecture-oriented course did. Maclin and Cormier (1974) found that students in PSI scored higher, but not significantly higher, on multiple choice items on the final examination, significantly higher on application questions on the final examination than students in a lecture oriented course. Sheppard and MacDermot (1970) found that students in PSI scored significantly higher on multiple choice and essay items on a final exam. Alba and Pennypacker (1972) found significantly greater changes from pre- to post-test stages with the PSI group on both multiple choice and fill-in items compared to a lecture group. The greatest changes were in fill-in items.

On attitude scales, students in PSI have been reported to rate the courses significantly higher than students in lecture groups (Morris and Kimbrell, 1972; McMichael and Corey, 1969; Sheppard and MacDermot, 1970; and Witters and Kent, 1972). Some researchers have indicated features students especially like. Born, Gledhill, and Davis (1972) reported that students in the PSI section judged the course to require a great deal of work, to be virtually free of cheating, and to demand a

higher level of mastery than that required in a similar class taught by the lecture method. In a study by Myers (1970), students indicated that the features of the class they liked most were the self pacing, the receiving of positive reinforcement, and the immediate knowledge of results. Sheppard and MacDermot (1970) found that more students in the PSI group rated the course as more organized, as allowing more opportunity to proceed at their own pace, as providing more stimulation to work, and as stimulating more interest in taking more courses in the area than did lecture oriented courses. Green (1971) stated that the specific feature which received the most comment was freedom of pace.

The studies cited show that students in the Personalized System of Instruction score significantly higher on final examinations than students in a lecture-oriented system. Students in PSI courses rate the courses significantly higher on attitude scales than students in lecture courses. One might ask which components of the system were most responsible for the superior performances and better attitudes of students.

Self-Pacing

The self-paced feature of PSI, as previously reported, is well liked by students (Myers, 1970; Sheppard and

MacDermott, 1970; Green, 1971; Born, 1970).

Leidecker (1969) has found self-pacing to be a fairly stable characteristic in an individual. He has classified self-pacers into three categories: successful self-pacers, non-self-pacers, and those who would be self-paced if they had the opportunity to learn how to do so. Students in the third category, in a PSI course, do not start to respond at the beginning of the term. They sometimes wait until it is quite late in the term to begin working. Leidecker (1972) and Lloyd and Kuntzen (1969) have indicated that once students begin working, they perform at a high rate. Lloyd and Kuntzen (1960) noted a direct relationship between the time at which students began to work in the course and their final grades in the course. Students who began work earlier earned higher grades.

Some researchers (Witters and Kent, 1972; Cooper and Greiner, 1971; and Chapman, 1972) have reported on modifying the self-paced feature by adding time contingencies. Students performed at a high rate, and, in two of the studies (Witters and Kent, and Cooper and Greiner), they scored significantly higher than in the traditional lecture format. Time contingencies can be aversive, and students do not like the aversive control which is provided by strict pacing contingencies (Leidecker, 1972;

Witters and Kent, 1972).

Sherman (1972) has indicated that speed is subject to reinforcement, but that if we choose to program speed, we should not involve punishment, we should not produce a fast rate to the point where quality suffers, and we should avoid very complex contingencies.

Lloyd (1971) tried two procedures to determine their effect on the rate of progress. The first procedure involved offering bonus points on a percentage basis which was dependent upon when assignments were completed during the term. Work completed early in the term received a higher percentage of points than work completed later in the term. More students in the bonus section began work earlier, while students in the non-bonus section paused at the beginning of the course. Once students began to turn in work, they continued to do so throughout the term. In the second procedure, which utilized as its subjects two sections of introductory psychology, different amounts of work were required for grades of D, C, B, and A. An attempt was made to determine if making it easy to earn a D would induce students to begin to work early and to continue working steadily. Most students began work early in both sections, but in the class with the lower point requirements, many students paused at mid-semester and then turned in large amounts of work at the end of the

semester. The authors thus concluded that response rates of students can, in fact, be changed by a change in contingencies.

Student Proctors

Proctor performance is essential to PSI. One important function of proctors is that of scheduling reinforcing events immediately following the desired student behavior, i.e., the student is praised for correct answers and passed on the unit test. Another function is that of increasing the chances that the desired behavior will appear in the student's repertoire of behavior. This is done by "explaining the course material and detailing the cues on which correct differential responses depend" (Farmer, Lachter, Blaustein and Cole, 1972). Born (1970) and Johnston and Pennypacker (1971) have emphasized the importance of selecting outstanding students who not only understand the subject matter, but who are also mature, responsible individuals sincerely interested in their work.

Proctors may be paid for their work with the course, but more often they are given academic credit. Some might question the wisdom of giving academic credit for this kind of activity. Born (1970) has indicated that remuneration to proctors takes many forms in addition to academic credit. Proctors learn the course material very

thoroughly, and they have the opportunity to use some of the skills they have acquired in their undergraduate training.

Some might question the wisdom of entrusting such responsibility to undergraduate students, as well as the degree of their effectiveness in carrying out their responsibilities. Student ratings of proctors are usually high. Born and Herbert (1971) indicated that students evaluated proctors very highly on fairness in grading tests, and knowledge of course material. Proctors were also rated highly on willingness to help students who had difficulty and on encouraging independent thinking. Maclin and Cormier (1974) indicated that students rated proctors very high on being fair and impartial, helpful when they had difficulty, sensitive to feelings and problems, and making them feel free to ask questions, disagree, and express their ideas. No research has been reported which evaluates the effectiveness of proctors in carrying out their responsibilities. Johnston and Pennypacker (1971) stated that proctors took their duties seriously and devoted much effort to their students. They indicated that there was some evidence that this interest in their students was related to the fact that the proctors' grades were based on the performance of the students assigned to them.

II. STATEMENT OF THE PROBLEM

The study had two purposes. The first was to examine the effects of the independent variable of proctors' grades being contingent upon the final examination grade of the students assigned to them upon the three dependent variables of student performance on the final examination, rate of student progress through the course, and student attitude toward the course, the teacher, the proctor, the PSI course in comparison with other courses in general. The second was to investigate the effect of the independent variable of giving bonus points for students completing unit one the first week of the quarter, and unit two the second week of the quarter on the three dependent variables of achievement on the final examination, student rate of progress through the course, and student attitude toward the course, the teacher, the proctor, and the PSI course in comparison with other courses in general.

CHAPTER II

METHOD

I. SETTING AND SUBJECTS

The subjects chosen were 66 students who were enrolled by computer in Textiles and Clothing 3420, Textiles I, at The University of Tennessee, Knoxville, Spring Quarter 1973. Textiles I is a junior level course and all students were female. Only those students who attended class the first day were included in the study.

II. PROCEDURES

Method of Instruction

A modification of the Personalized System of Instruction had been used in teaching Textiles I for five previous quarters. Prior to Spring Quarter 1973 the materials were revised and reorganized. The course material for the quarter was divided into eight units, one for each week of the quarter. A study guide was developed for each unit that included a reading assignment in the textbook, behavioral objectives, and an outline of the material to be read.

Each student enrolled in the course was assigned to a student proctor who had been selected to work with the

course. Students who had been recommended in the previous quarter, by their proctor and who had made an "A" in the course were asked if they were interested in being proctors. Twelve students indicated an interest and became the proctors for Spring Quarter 1973. Each proctor was assigned five or six students. Students working as proctors registered for an honors course and received three hours credit as well as a grade. Students were assigned to a proctor who had similar free time in her schedule. Each proctor spent five hours each week in the room reserved for the course. During this time, she worked with the students assigned to her. She was also responsible for helping students with the self-instructional laboratory.

Students studied the material on their own, and when they were ready, scheduled a conference with their proctor. At the time of the conference, the student and proctor met in a room which had been reserved for the course. The student was given a stack of 4" x 6" cards with questions that covered the material for that unit. The questions consisted primarily of fill-in-the-blank items, but they also included some short discussion questions. The student read the questions orally and supplied the answer orally. The student then read the correct answer which was on the back of the card. After all questions had been

completed, the proctor and student discussed any questions the student had concerning the subject matter. The proctor also asked questions about answers the student had given which were not clear, and she discussed other topics pertaining to the subject matter which the student might wish to discuss. If the student passed the test, she was congratulated, her progress was recorded on the wall chart, and on her individual progress chart, and she was given the materials for the next unit. The criterion for passing a unit was either correct answers to all questions or evidence in the discussion portion of the conference that the student could clarify incorrect answers. Students who did not pass a unit test were required to review the material and to schedule another conference with their proctor. At this conference, the student was given an alternate set of questions and the same procedure was followed.

Students completed weekly laboratory assignments in the self-instructional laboratory. One or more student proctors were available to answer questions and help students at all times that the laboratory was open. (The room was open from 9 a.m. until 4 p.m., Monday through Friday.)

The grade in the course was determined by the number of points the student accumulated. Points could be earned

in the following ways: completion of the eight unit tests, 10 points each; two laboratory tests, 50 points each; the final examination, 100 points; and enrichment activities, 50 points maximum. Thus it was possible to earn a total of 330 points. Ninety percent, or 297 points, constituted a course grade of A; 80 percent, or 264 points, B; 70 percent, or 221 points, C; 60 percent or 198 points, D. Enrichment activities were designed to supplement units and laboratory assignments. These included compiling abstracts of xeroxed articles, viewing filmstrips and completing self tests, conducting market surveys, conducting consumer surveys, and writing term papers. Students could select the enrichment activities in which they wished to participate. Criteria for acceptable enrichment activities were given in the course policy statement which was given to students at the beginning of the quarter. Students were instructed to discuss any questions they had with their student proctor and/or the instructor. The Course Policy Statement appears in Appendix A.

Independent Variables

Grade contingency. By use of a table of random numbers, the twelve student proctors were randomly assigned to two groups of six proctors. One of the groups was

randomly assigned to the grade-contingent condition and the other to the grade-not-contingent condition. For the grade-contingent group, the grades of the student proctors were contingent upon the final examination grades of the students assigned to them. The average grades of students assigned to each proctor during previous quarters were calculated. The top one-third was decided upon as the criterion for superior work. On this basis it was decided that an average grade of 80 or above for all students assigned to them, as well as the fulfillment of other duties and responsibilities which had been assigned, would earn the proctor a grade of "A" for the quarter. The other duties and responsibilities included being in the room designated for the course for five hours each week, attending a weekly one hour seminar with the instructor, keeping student records, and assisting students in the self-instructional lab. The grading procedure was explained to the proctors at the second meeting of the quarter, and the proctors contracted for a grade. All of the proctors contracted for an A. This group of proctors met with the instructor each week separate from the grade-not-contingent group of proctors, and as part of the grade contract agreed not to tell the students assigned to them or the other proctors about the grade contingency.

Proctors in the grade-not-contingent group also contracted for a grade. The fulfillment of duties and responsibilities which had been assigned resulted in the grade of "A". These duties and responsibilities were identical to those of the grade-contingent group, except for the grade contingency. The grade contract for both groups of proctors is shown in Appendix B.

Bonus points. Each of the two groups of proctors was further divided into two groups by use of a table of random numbers. One group became the bonus group, while the other group was designated the no-bonus group. Students assigned to proctors in the bonus group were given five bonus points for completing unit one during the first week of the quarter and five bonus points for completing unit two during the second week of the quarter. This procedure, which was included in the course policy statement, was explained to these students on the second day of class when they were given their proctor assignments. The students were asked not to tell other students in the class about the bonus point system. The bonus points counted as part of the enrichment points in determining the course grade.

Dependent Variables

Final exam scores. A final examination was given

to all students at the end of the quarter. It was designed to test performance at four points along a continuum of complexity of thought. The first part of the examination consisted of 40 points for multiple choice questions which tested the recall of facts. The second part consisted of 10 points for multiple choice questions which tested the application of facts in solving simple problems, i.e., simulated problems in the selection and/or use of textile products where only one fiber property was considered. The third part consisted of 46 points of more difficult application questions which tested the application of concepts in solving simulated problems related to the subject. Some of the questions included fabric samples and students were asked to identify the fabrics and select the one most suitable for the use described. The fourth part consisted of giving students portions of two articles on more advanced material than that included in the course. After reading the material students were given eight multiple choice questions over that material which counted four points of the total examination grade.

Progress. When students completed a unit test successfully, the progress was recorded on a wall chart and on an individual chart. Both charts contained the dates of the weeks of the quarter, and the number of the unit completed was recorded. The points earned by each

student each week were totaled.

Student attitudes. On the last day of class, students completed an attitude scale. This consisted of four parts: (1) a comparison of the course with other courses of a more general type, (2) an assessment of attitude toward the course, (3) toward the teacher, and (4) toward the proctor. Students indicated their attitude on a seven point Likert-type scale.

Statistical Design

To assess the effect of the independent variable bonus points for students completing work the first two weeks of the quarter and the independent variable proctor grade being contingent upon the final examination grade of the students assigned to them on the dependent variable of achievement on the final examination, a two x two fixed factor analysis of covariance with cumulative grade point average as the covariate was utilized for each of the four parts of the final examination: multiple choice fact, multiple choice simple application, more difficult application, and new material. To determine the effect of the same two independent variables on the dependent variable student progress through the course a 2 x 2 x 8 Lindquist Type III Analysis of Variance was used with points earned each week as the repeated measures factor.

To assess the effect of the two independent variables on student attitude a 2 x 2 fixed factor analysis of variance was used to analyze the data from each of the four parts of the attitude scale: attitude toward the course, toward the teacher, the proctor, and a comparison of the course with courses in general.

CHAPTER III

RESULTS

The findings obtained in this investigation are presented in four parts: (1) Proctor grades, (2) Achievement, (3) Progress, and (4) Attitudes.

I. PROCTOR GRADES

The average grades on the final examination for the students assigned to each proctor in the grade-contingent group were calculated so that the proctor's course grade could be determined. The highest grade on the final examination was 88.50. Because of the difficulty of the examination, eight points were added to the grades of all students in calculating the mean grade for proctors and in calculating the course grade. The average grades for the students assigned to each proctor are shown in Table I. The students assigned to one proctor in the grade-contingent group did not make the minimum of 80 necessary for the proctor to make an A, while the students assigned to four proctors in the grade-not-contingent group did not achieve an average grade above 80. The proctor in the grade-contingent group whose students made an average of less than 80 did not fulfill other conditions of the

TABLE I

AVERAGE GRADES OF STUDENTS ASSIGNED EACH PROCTOR

Group	Proctor	Average Grade
Grade Contingent - Bonus Point	1	81.25
	2	78.14
	3	81.10
Grade Contingent - No Bonus	1	81.23
	2	81.90
	3	81.60
Grade Not Contingent - Bonus Point	1	79.25
	2	85.00
	3	76.80
Grade Not Contingent - No Bonus	1	75.50
	2	75.88
	3	83.30

contract, i.e., did not attend all the proctors' meetings. The two proctors in the grade-not-contingent group whose students scored above 80 expressed much interest in their students and were very personable individuals.

II. ACHIEVEMENT

A 2 x 2 fixed factor analysis of covariance with cumulative grade point average (GPA) as the covariate was utilized to analyze the data for each of the four parts of the final examination--multiple choice fact, multiple choice simple application, more difficult application, new material--and the total final examination as well. Means of each treatment group for GPA, obtained means and means adjusted for the covariate for each part of the examination and the total examination are given in Table II.

Multiple Choice Fact Questions

A test for homogeneity of regression for the multiple choice fact portion of the examination was made prior to the analysis of covariance. This resulted in an F of 1.026 which was not significant at the .10 level (Winer, 1971). The results of the analysis of covariance are shown in Table III. The main effects of grade contingency and bonus points were not significant, thus indicating that these variables did not affect scores on the multiple

TABLE II
FINAL EXAMINATION MEANS

Groups	n ¹	GPA	Multiple Choice Fact ²		Multiple Choice Simple Application ³		More Difficult Application ⁴		New Material ⁵		Total Examination	
			Obtained	Adjusted	Obtained	Adjusted	Obtained	Adjusted	Obtained	Adjusted	Obtained	Adjusted
Treatment Group:												
Grade Contingent-Bonus	15	2.69	30.17	30.29	6.97	7.20	31.82	31.95	2.60	2.61	71.85	72.18
Grade Contingent-No Bonus	14	2.75	30.28	30.36	5.79	5.94	32.93	32.87	2.86	2.85	72.03	71.90
Grade Not Contingent-Bonus	16	2.70	31.44	31.55	6.81	6.86	32.38	32.40	2.94	2.94	73.46	73.76
Grade Not Contingent-No Bonus	12	2.81	31.54	31.29	6.09	5.98	30.70	30.42	2.50	2.47	70.81	70.15
Main Effect Means:												
Grade Contingent	29	2.72	30.22	30.27	6.48	6.50	32.35	32.40	2.72	2.73	72.33	72.05
Grade Not Contingent	28	2.75	31.48	31.44	6.50	6.48	31.61	31.56	2.75	2.75	71.93	72.21
Bonus	28	2.70	30.82	30.94	6.89	6.94	32.06	32.19	2.77	2.78	72.68	72.99
No Bonus	26	2.78	30.86	30.72	6.02	5.96	31.90	31.74	2.69	2.68	71.47	71.09

¹9 of the 66 students enrolled withdrew.

²Total possible points 40.

³Total possible points 10.

⁴Total possible points 46.

⁵Total possible points 4.

TABLE III
ANALYSIS OF COVARIANCE MULTIPLE CHOICE
FACT QUESTIONS

Source	df	SS	MS	F
Grade Contingency	1	1960.00	1960.00	2.45
Bonus Points	1	33.40	33.40	.04
Grade Cont. X Bonus	1	14.20	14.20	.02
Error	52	41482.67	797.743	
Total	55	41530.27		

choice fact portion of the examination. The interaction was also not significant, indicating that the main effects did not differentially affect scores on the multiple choice examination. The reliability of the test as determined by Kuder Richardson Formula 20 was $r = .79$.

Multiple Choice Simple Application Questions

The test for homogeneity of regression for the multiple choice simple application portion of the examination yielded an F of 1.28 which was not significant at the .10 level. As shown in Table IV, the main effect for grade contingency was not significant, indicating that this independent variable did not affect scores on this portion of the examination. There was a significant difference at the .01 level for the main effect of bonus points. Examination of the adjusted means showed that the group which received bonus points for work completed early in the quarter scored significantly higher on this portion of the examination which tested the application of facts to solve simple problems. The interaction was not significant. The reliability of the test was $r = .66$. Kuder Richardson Formula 20 was used to determine reliability.

More Difficult Application Questions

Table V shows the results of the analysis of data for the more difficult application portion of the

TABLE IV

ANALYSIS OF COVARIANCE MULTIPLE CHOICE
SIMPLE APPLICATION

Source	df	SS	MS	F
Grade Contingency	1	.480	.480	.003
Bonus	1	1347.04	1347.04	9.43*
Grade Cont. X Bonus	1	13.4	13.4	.09
Error	52	7381.06	141.94	
Total	55	8741.939		

*p < .01.

TABLE V

ANALYSIS OF COVARIANCE MORE DIFFICULT
APPLICATION QUESTIONS

Source	df	SS	MS	F
Grade Contingency	1	100924.25	100924.250	.80
Bonus	1	33974.50	33974.50	.272
Grade Cont. X Bonus	1	294778.75	294778.75	2.36
Error	52	6495127.000	124906.25	
Total	55	6924805.45		

examination which tested the application of concepts to more difficult problems. The test for homogeneity of regression resulted in an F of 1.06 which was not significant at the .10 level. The main effects for grade contingency and for bonus points, as well as interaction, were all non-significant. The reliability of the test as determined by Kuder Richardson 20 was $r = .20$.

New Material

The results of the analysis of data for the new material portion of the final examination in which students were given portions of two articles and tested over the material are shown in Table VI. The F -ratio for the test for homogeneity of regression was 1.45 which was not significant at the .10 level. The F -values for the main effects (grade contingency and bonus points) and for interaction were not significant.

Total Final Examination

Since proctors' grades had been contingent on the grades of students assigned to them on the total final exam, an analysis of covariance was carried out on the total exam scores. The results are shown in Table VII. The F -ratio for the test for homogeneity of regression was 1.64 which was not significant at the .10 level. The F -values for the main effects (grade contingency and bonus

TABLE VI
ANALYSIS OF COVARIANCE
NEW MATERIAL

Source	df	SS	MS	F
Grade Contingency	1	48.2	48.2	.009
Bonus	1	11513.191	11513.197	.300
Grade Cont. X Bonus	1	17805.291	17805.291	3.53
Error	52	262287.625	5043.992	
Total		281654.307		

TABLE VII

ANALYSIS OF COVARIANCE TOTAL
FINAL EXAMINATION

Source	df	SS	MS	F
Grade Contingency	1	1065.7086	1065.7086	.003
Bonus Points	1	528427.2374	528427.2374	1.68
Grade Cont. X Bonus	1	390761.3316	390761.3316	1.24
Error	52	16270597.2021	2451791.0941	
Total	55	17190761.4797		

points) and for interaction were not significant. Although Table I, page 23, had shown that students assigned to all the proctors except one in the grade-contingent group had achieved an average grade of greater than 80 and the students of only two proctors in the grade-not-contingent group achieved an average grade less than 80, when individual students scores were analyzed, the differences between the two groups were not significant. The grades of the students assigned to two proctors in the grade-not-contingent group were high enough to cause the means of the grade contingent and grade-not-contingent group to be not significantly different.

III. PROGRESS

The data for progress were analyzed by a $2 \times 2 \times 8$ Lindquist Type III Analysis of Variance (Lindquist, 1953) with points earned each week as the repeated measures factor. The other two factors were grade contingency and bonus points. In order to have proportional cell sizes, two subjects were randomly discarded from level two of the grade-contingency, no-bonus cell, and one subject was discarded from the grade-not-contingent, bonus cell.

The results of the Analysis of Variance are shown in Table VIII. The F-values for the between-subjects main effects (grade contingency and bonus points) were not

TABLE VIII
ANALYSIS OF VARIANCE FOR POINTS

Source	df	SS	MS	F
Between Subjects	(53)	(821.297)		
Grade Contingent (A)	1	23.145	23.145	1.49
Bonus (B)	1	2.961	2.961	0.19
A x B	1	18.523	18.523	1.19
Error (b)	50	776.668	15.533	
Within Subjects	(378)	(40575.000)		
Points (C)	7	7799.994	1114.285	12.40*
A x C	7	136.118	19.445	0.22
B x C	7	898.336	127.619	1.42
A x B x C	7	302.208	43.173	0.48
Error (w)	350	31443.343	89.838	
Total	431	41396.297	96.047	

*p < .01.

significant, thereby indicating that these variables did not affect points earned. The between subjects interaction was also not significant. The repeated measures factor, points, was significant at the .01 level, indicating that there were differences from week to week in the rate unit tests were completed and points were earned. The Greenhouse-Geisser procedure (Winer, 1971) was used in determining the critical value used in testing the significance of the within-subjects F-ratios. As can be seen in Table VIII, the main effect for points was significant with the Greenhouse-Geisser procedure, as well as with the usual critical value.

A Newman-Keuls Multiple Comparison test was carried out to determine where the significant differences were among the points earned. The results are shown in Table IX. As can be seen, points earned in the last week of the quarter were significantly higher than those earned in each of the other weeks.

The average points per week for each treatment group were calculated. The means are shown in Table X and have been graphed in Figure 1. As can be seen from the graph, the average number of points earned by the four groups was approximately the same during the first two weeks of the quarter with the grade contingent, no bonus group being slightly higher. There was a decrease

TABLE IX

NEWMAN-KEULS PROCEDURE FOR DIFFERENCES IN MEANS
FOR POINTS

Ordered Means	4.37	6.85	7.96	9.07	9.26	10.18	10.18	20.37	r	SSR ^a
Weeks	3	4	6	1	2	5	7	8		
3		.48	2.59	3.70	3.89	4.31	4.31	15.00*	8	4.52
4			1.11	2.22	2.41	3.33	3.33	13.52*	7	4.39
6				1.11	1.30	2.22	2.22	12.41*	6	4.23
1					.19	1.11	1.11	11.30*	5	4.04
5						.92	.92	11.11*	4	3.79
7							0	10.19*	3	3.44
8								10.19*	2	2.86

* $p < .05$.

^aShortest significant range.

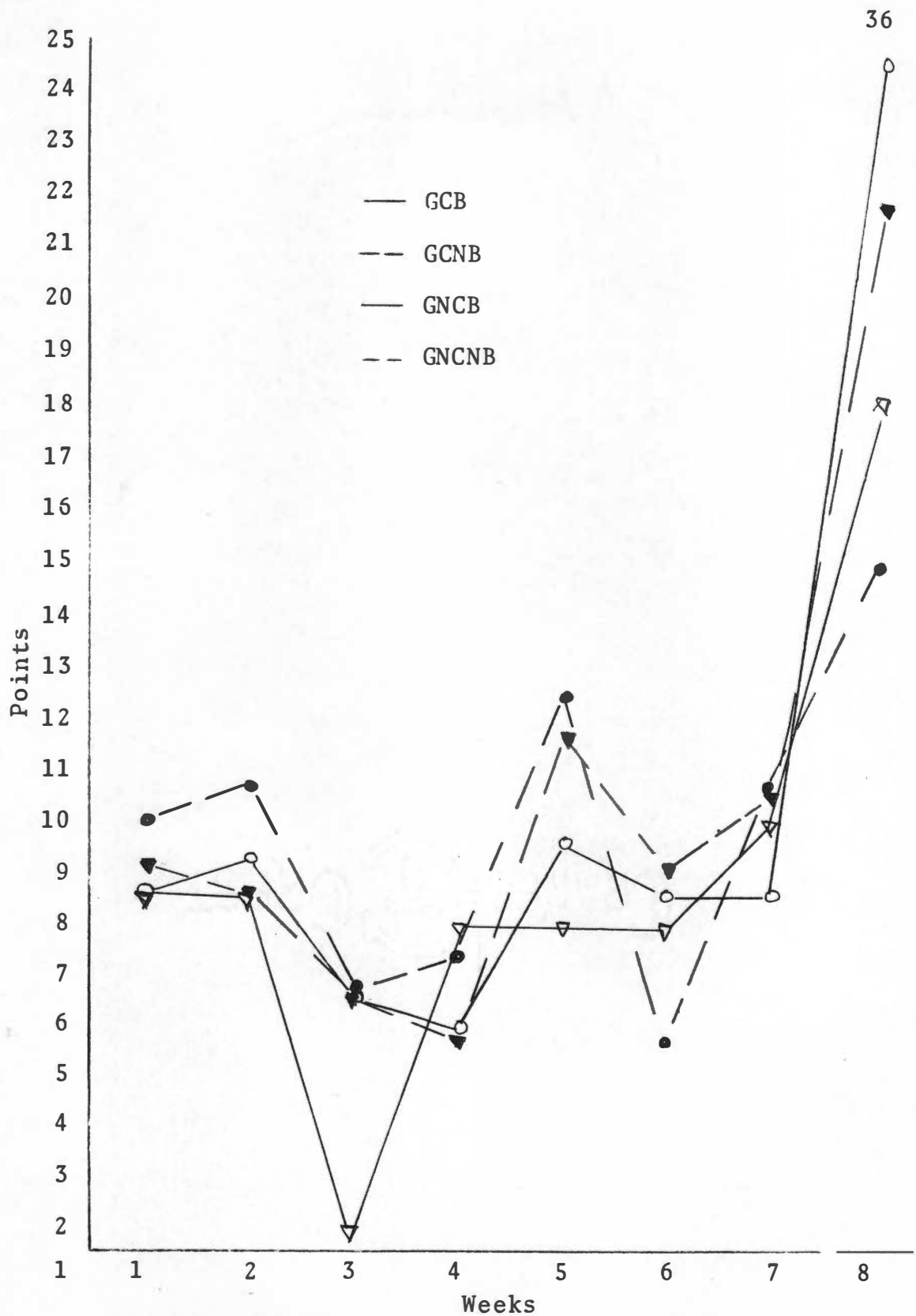


Figure 1. Mean points earned each week by each treatment group.

TABLE X

AVERAGE POINTS PER WEEK

Group	Weeks							
	1	2	3	4	5	6	7	8
Grade Contingent- Bonus	8.67	9.33	6.67	6.00	9.33	8.67	8.67	26.67
Grade Cont. No Bonus	10.00	10.83	6.67	7.50	12.50	5.83	11.67	15.00
Grade Not Cont.- Bonus	8.67	8.67	2.00	8.00	8.00	8.00	10.00	22.00
Grade Not Cont.- No Bonus	9.17	8.33	6.67	5.83	11.67	9.17	10.83	18.33
Bonus	8.67	9.00	4.33	7.00	8.67	8.33	9.33	22.33
No Bonus	9.58	9.58	6.67	6.67	12.08	7.50	11.25	16.67
Grade Contingent	9.26	10.00	6.67	6.67	10.74	7.41	10.00	20.37
Grade Not Contingent	8.89	8.52	4.07	7.04	9.63	8.52	10.37	20.37

in points earned by all groups during the third week with a marked decrease for the grade-not-contingent bonus group. Approximately the same number of points was earned by the four groups for most of the quarter. The sharp increase in number of points earned the last week of the quarter can be seen. Data for the two levels of each main effect were graphed. The average points for each week for each of the two levels of the bonus point factor have been graphed in Figure 2. There are only slight differences in the points accumulated during the first two weeks of the quarter with the no-bonus group slightly higher. During the third week both groups decreased in points accumulated with the bonus group decreasing the most. During the remainder of the quarter the bonus group earned an average of 7 to 9.5 points each week with an average of 22.33 the last week. The no-bonus group worked at a more irregular pace than the other groups.

The graph for the two levels of the grade contingent factor show that the two groups earned approximately the same number of points each week. There is a decrease in points earned in weeks three and four. There was a sharp increase in points earned the last week. (Figure 3).

IV. ATTITUDES

A 2 x 2 fixed factor analysis of variance was

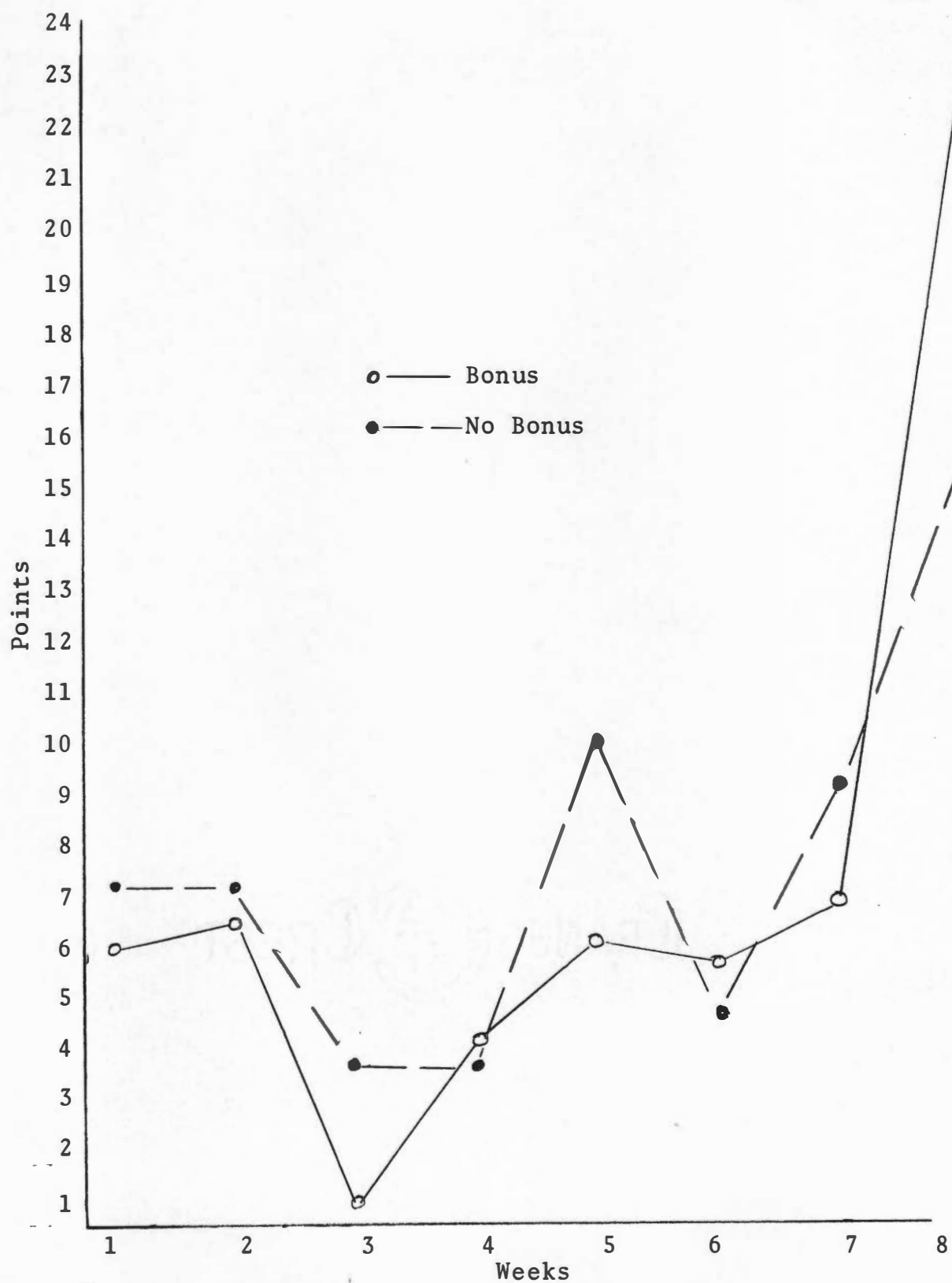


Figure 2. Mean points per week for bonus and no bonus.

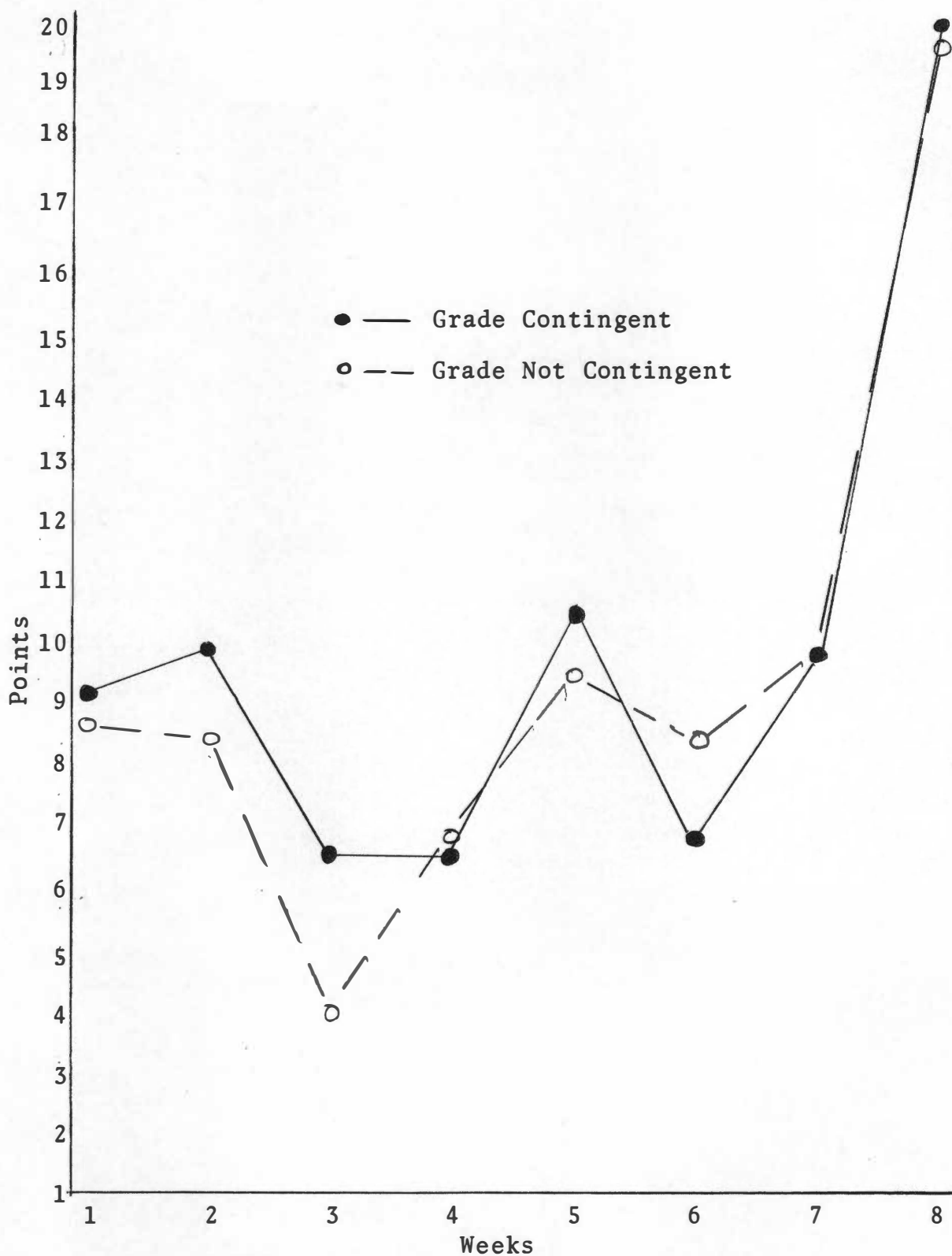


Figure 3. Mean points earned each week for grade contingent and grade not contingent group.

utilized to analyze the data from each of the four parts of the attitude scale: attitude toward the course, toward the teacher, toward the proctor, and a comparison of this course with courses in general. Means for each group on each part of the attitude scale are given in Table XI. One subject did not complete an attitude scale and seven other subjects omitted portions of the scale which resulted in an N of 49. As shown in Table XII the main effects of grade contingency and bonus points and the interaction for all dependent variables were not significant. This indicates that the independent variables grade contingency and bonus points had no effect on the attitudes of the students toward the course, toward the teacher, toward the proctors, and toward the course as compared with other courses in general.

TABLE XI
MEANS FOR ATTITUDE SCALE

Treatment Groups	n	Mean Attitude Toward			Comparing Course ⁴
		Course ¹	Teacher ²	Proctor ³	
Grade Contingent - Bonus	15	75.13	35.27	48.33	44.87
Grade Cont. - No Bonus	11	74.64	35.64	50.10	47.00
Grade Not Cont. - Bonus	13	73.23	37.23	48.46	45.85
Grade Not Cont. - No Bonus	10	71.10	36.10	50.40	43.90
Main Effects					
Grade Contingent	26	74.92	35.42	49.07	45.77
Grade Not Contingent	23	72.30	36.74	49.30	45.00
Bonus	28	74.25	36.17	48.39	45.32
No Bonus	21	72.95	35.86	50.23	45.52

¹Total possible points 84.

²Total possible points 42.

³Total possible points 56.

⁴Total possible points 56.

TABLE XII
ANALYSIS OF VARIANCE FOR ATTITUDE SCALE

Source	df	Attitude Toward						Course	
		Course		Teacher		Proctor		Comparison	
		MS	F	MS	F	MS	F	MS	F
Grade Contingency	1	83.69	1.17	21.1374	.58	.6312	.02	7.22	.19
Bonus	1	19.25	.27	0.54	.27	40.75	1.33	0.54	.01
Grade Cont. X Bonus	1	7.98	.11	6.73	.18	.09	.003	49.75	1.35
Error	45	71.77		36.10		30.57		36.72	
Total	48								

CHAPTER IV

DISCUSSION

The present investigation examined the effect of the two independent variables of proctors' grades being contingent upon the performance of their students on the final examination and of bonus points being given for completing unit one the first week of the quarter, and unit two the second week of the quarter upon the three dependent variables of achievement on the final examination, of progress through the course, and of student attitudes. The results will be discussed under the headings grade contingency and bonus points. Conclusions and recommendations for further research will be given.

I. GRADE CONTINGENCY

The results of the present study indicated that when the proctors' grades were contingent upon the final examination grade of the students assigned to them, the students assigned to only one proctor in the group did not make the minimum of 80 necessary for the proctor to make an A, while the students assigned to four proctors in the grade-not-contingent group did not achieve an average grade above 80. The results of the analysis of

covariance for each part of the final examination and for the examination as a whole showed no significant differences for the grade-contingency factor. The grade-contingency factor also had no effect on progress through the course.

All proctors and students had been informed that the criterion for passing unit tests was that questions be answered correctly or that the student prove her ability to explain answers that were unclear. With the oral unit tests there was the possibility that the proctor might not strictly adhere to the criterion. With the proctor's grade contingent on the performance of students on the final examination, it was expected that proctors would be sure all students reached the criterion before they were passed on the unit test.

A possible explanation for the ineffectiveness of this variable on performance and progress is that proctors were all working at an optimal level whether they were in the grade-contingent group or in the grade-not-contingent group. Examination of the records showed that only one student failed to pass a unit test and she was in the grade-contingent-group. It would appear from the number of students passing unit tests and the absence of significant differences on examination scores between the two groups that the proctors in both groups were requiring

an equal level of proficiency before passing students on unit tests. Proctors in the grade-contingent-group expressed concern in the weekly proctors' meetings about the grade contingency. They indicated that they were sure their students thoroughly understood the material before they were passed on a unit test. It would appear that proctors in the grade-not-contingent group also required that students reach the criterion level before they were passed on unit tests. Students had been selected as proctors on the basis of having earned an A in the course and on their proctors' recommendations that they understood the material and were responsible people who were interested and could work effectively with the students.

Since all students were aware that the criterion for passing unit tests was to answer all questions correctly or demonstrate the ability to explain answers, it is likely that all students in the class were working to achieve that criterion level, irrespective of proctor performance. Johnston and O'Neill (1973) reported that when the minimum performance criteria that had to be attained in order to progress to the next unit were varied, there were resulting changes in student performance with students working to attain the criteria in effect. A study by Farmer, Lachter, Blaustein and Cole (1972) showed

that the amount of proctoring did not differentially affect final examination performance. Students who were proctored scored significantly higher than non-proctored students; but there were no significant differences in the performance of students who were proctored on 25 percent, 50 percent, 75 percent and 100 percent of the units.

If the proctor is to fulfill the function of giving reinforcement for correct answers, of explaining the course material and of detailing the cues on which correct responses depend, the proctor must be accurate and effective. However, if students do as well with proctoring on a small number of units as with all units, and if students are working to achieve the criteria set for passing the unit, and if adding a contingency which would be expected to cause proctors to perform effectively did not affect students' grades, perhaps the real issue is how effective a proctor must be to perform his/her role in the PSI system. Since the system places the responsibility for learning on the student (Keller, 1968a), perhaps the student will work to achieve the criteria which has been set if the proctor works at least to some degree of effectiveness. Observational data of proctors interacting with students would give information as to the behaviors which make a proctor effective. All proctors in the

present study were selected on the basis of the characteristics of knowledge of the course material, responsibility, and an interest in working with students. Perhaps such students will work to the degree of effectiveness necessary without grade contingencies being added.

Other studies (Born and Herbert, 1971; Johnston and Pennypacker, 1971; and Maclin and Cormier, 1974) have indicated that proctors were rated high on performance by students enrolled in the class. Johnston and Pennypacker stated there was some indication that the high degree of interest of proctors in their students was related to the fact that the proctors' grades were based on the performance of students assigned to them. The results of the present study indicate that student performance and progress are not significantly different for students assigned to proctors whose grade is contingent upon the final examination grade of their students from that of students assigned to proctors whose grade is not contingent upon the performance of students assigned to them.

There were no significant differences in attitudes of students assigned to proctors in the grade-contingent group and those assigned to proctors in the non-grade-contingent group.

II. BONUS POINTS

The results of this study indicated that giving students bonus points for unit tests completed during the first two weeks of the quarter had little effect on scores on the final examination. Students who received bonus points scored significantly higher than students who did not on the multiple choice simple application portion of the final examination, but there were no significant differences in the scores of the two groups on the other three parts of the examination.

In previous quarters many students did not begin taking unit tests at the beginning of the quarter. It was therefore desirable to determine the effect of giving bonus points for work completed early in the quarter on progress through the course. In the present study most students completed the first unit test the first week and the second unit test the second week of the quarter. This dissimilarity in performance from previous quarters was discussed with the proctors. Some proctors expressed the belief that students were working in the course because the weather was rainy and they wanted to get a lot done so they could have time later to be in the sun. The proctors in the grade-contingent group were encouraging students to begin work early so they would not get behind.

The group which received bonus points for work completed during the first two weeks of the quarter worked at approximately the same pace for those two weeks as the group which received no bonus points. Both groups decreased in the number of points earned during the third and fourth weeks which could partially be the effect of hour examinations in other courses. The week after the bonus points ceased, the group which had received bonus points decreased more than the group which did not receive bonus points. This decrease in behavior is often observed after reinforcement is stopped. This group worked at a slower rate than the no-bonus group for most of the remainder of the quarter, but showed a marked increase in points earned during the last week of the quarter. These results are not in agreement with those of Lloyd and Kuntzen (1969) who found that once students began working they continued to do so at a high and steady rate. It had been expected that bonus points early in the quarter would induce students to begin working, and once they began to do so they would continue to work at the same pace. The ten points which could be earned as bonus points were a small portion of the total 330 points it was possible to earn for the quarter. With the enrichment activities there were optional ways of earning points. It is possible that in this study the number of points given was not great

enough to have an effect on student performance. It is also possible that the significance of the bonus points was not clear to the students since they were, in those first two weeks of the quarter, getting accustomed to a new system of instruction. Points spaced throughout the quarter, contingent upon the number of units completed, might be a more effective way of controlling progress than points given early in the quarter.

The Personalized System of Instruction is considered to be personalized in that students work at their own pace and work personally with a proctor. These are, however, the only aspects which are personalized. Perhaps another type of personalization to be considered is that of individual differences in learning styles. PSI requires that all students learn the material in the same way. This is usually accomplished by reading and studying with the aid of the written assignment. Another way to personalize learning is to give students choice in the way they might reach the objectives. This aspect has been neglected in PSI courses. When there is a specific body of written knowledge to be learned by the student, PSI is an efficient method to use. For other types of courses, such as those in which the students could learn from diverse situations, the student might benefit from having a choice in the way to reach objectives. For example, some students

might learn more effectively through field experiences, others might learn more effectively through instructor-led, small-group interactions, while others might prefer pursuing their own individual method.

III. CONCLUSIONS

From this investigation it appears that proctors worked effectively with students regardless of whether their grade was contingent on the grade of their students on the final examination. Making the proctors' grades contingent on the final examination grades of their students did not affect student performance on the final examination, student progress through the course or student attitudes.

Bonus points for units completed the first two weeks of the quarter had little effect on student performance on the final examination and did not affect progress or student attitudes. It is quite likely that the amount of bonus points was not great enough to be effective in affecting student behavior.

IV. RECOMMENDATIONS FOR FURTHER RESEARCH

1. Replicate the study to see if the same results will be obtained with another group of subjects.
2. Replicate the study and monitor proctor behavior

to see if there is a difference in the behavior of proctors in the grade contingent group.

3. Replicate the study with a higher number of bonus points given for work completed during the first two weeks of the quarter.

4. Replicate the study with bonus points given for work completed by certain deadlines during the quarter.

REFERENCES

REFERENCES

- Alba, E., and Pennypacker, H. S. A multiple change score comparison of traditional and behavioral college teaching procedures. Journal of Applied Behavior Analysis, 1972, 5, 121-124.
- Born, D. G. Instructor manual for development of a personalized instruction course. Salt Lake City: Center to Improve Learning and Instruction, University of Utah, 1970.
- Born, D. G., 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.
- Born, D. G., and Herbert, E. W. A further study of personalized instruction for students in large university classes. Journal of Experimental Education, 1971, 40, 6-11.
- Chapman, R. F. Production of specified terminal performances in every student in undergraduate psychology courses. Dept. of Health, Education and Welfare, U. S. Office of Education, 1972.
- Cooper, J. L., and Greiner, J. M. Contingency management in an introductory psychology course produces better retention. The Psychological Record, 1971, 21, 391-400.
- Farmer, J., Lachter, G. D., Blaustein, J. J., and Cole, B. K. The role of proctoring in personalized instruction. Journal of Applied Behavior Analysis, 1972, 5, 401-404.
- Green, B. A. Physics teaching by the Keller plan at MIT. American Journal of Physics, 1971, 30, 764-775.
- Hollen, Norma, and Saddler, Jane. Textiles. New York: The Macmillan Company, 1968.
- Johnston, J. M., and O'Neill, G. The analysis of performance criteria defining course grades as determinant of college student academic performance. Journal of Applied Behavior Analysis, 1973, 6, 261-268.

- Johnston, J. M., and Pennypacker, H. S. A behavioral approach to college teaching. American Psychologist, 1971, 26, 219-244.
- Keller, F. S. "Good-bye teacher" Journal of Applied Behavior Analysis, 1968, 1, 79-89.
- Keller, F. S. A programmed system of instruction. In Sayre, J. L., and Knightly, J. J. (Eds.), The personalized system of instruction in higher education: Readings on PSI--the Keller plan. Enid, Oklahoma: Seminary Press, 1972.
- Leidecker, H. The removal of time constraints. In Sayre, J. L., and Knightly, J. J. (Eds.), The personalized system of instruction in higher education: Readings on PSI--the Keller plan. Enid, Oklahoma: Seminary Press, 1972.
- Lindquist, E. F. Design and Analysis of Experiments in Psychology and Education. Boston: Houghton Mifflin, 1953.
- Lloyd, K. E., and Knutzen, N. J. A self-paced programmed undergraduate course in the experimental analysis of behavior. Journal of Applied Behavior Analysis, 1969, 2, 125-133.
- Lloyd, K. E. Contingency management in university courses. Educational Technology, 1971, 11, 4, 19-23.
- Maclin, J. J., and Cormier, W. H. Personalized system of instruction: procedure for individualizing college instruction. Unpublished manuscript, the University of Tennessee, 1974.
- 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.
- Morris, C. J., and Kimbrell, G. McA. Performances and attitudinal effects of the Keller method in an introductory psychology course. The Psychological Record, 1972, 22, 523-530.
- Myers, W. A. Operant learning principles applied to teaching introductory statistics. Journal of Applied Behavior Analysis, 1970, 3, 213-220.

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.

Sherman, G. PSI: some notable failures. In Sayre, J. L., and Knightly, J. J. (Eds.), The personalized system of instruction in higher education: Readings on PSI--the Keller plan. Enid, Oklahoma: Seminary Press, 1972.

Winer, B. J. Statistical Principles in Experimental Design. (Second Edition). New York: McGraw-Hill, 1971.

Witters, D. R., and Kent, G. W. Teaching without lecturing: evidence in the case for individualized instruction. The Psychological Record, 1972, 22, 169-176.

APPENDIXES

APPENDIX A

TEXTILES AND CLOTHING 3420 SPRING QUARTER 1973 COURSE POLICIES

Maclin
3420
Section 1

Introduction:

This course is designed to help you learn the basic concepts of textiles. The study of textiles is concerned with fabrics and the materials from which they are made. Everyone uses textiles in many ways, for example clothing, carpeting, sheets, blankets, etc. By the time you have completed this course you should be able to:

1. Identify commonly used fabrics, fabric constructions and finishes by name.
2. Describe the characteristics of the various finishes and explain how they affect fabric performance and appearance.
3. Describe the characteristics of the various fabric constructions and how they affect cost, performance and appearance.
4. Describe the characteristics of the various yarn types and how each type affects fabric appearance and performance.
5. Explain the properties of each fiber family and the unique properties of each fiber.
6. Describe information required by legislation in labeling of textile products.
7. Apply knowledge of care in cleaning and caring for textiles.
8. Apply knowledge of fiber properties, yarns, fabric constructions, and finishes in selecting textile products for specific uses.

Course Organization

The organization of this course is probably different from other courses you may have taken. The subject matter has been divided into eight (8) units. For each unit your instructor has prepared a handout which gives the topic, the pages in the textbook dealing with this topic, the objectives of this unit, and an outline or study guide which points out the important points in this unit.

Assisting with this course will be undergraduate students who have taken the course before. These students, called student managers, have been selected to assist with the course because they are familiar with the subject matter of the course and because they are willing to help you learn the material. You will be assigned to one of these students and will work with this person throughout the quarter.

The instructor is very interested in you and in helping you learn the material. In this course the role of the instructor has changed from that of dispenser of knowledge to one of manager of the course. The responsibilities of the instructor are to select study materials for the course; prepare study guides, prepare lab materials, to act as a clearinghouse for requests and complaints, and to be available to help you. The instructor will be working directly with the student managers and will be available to discuss material with you or assist you in any way. Office hours will be posted and you may come at those times or call to schedule an appointment.

A student coordinator and a graduate student coordinator will also be assisting with this course. They will be working with the instructor and with the student managers. They will be available in the classroom to answer questions and assist you as needed.

The general format of the course will be as follows:

1. You will not attend lecture except for the last lecture of the quarter. You will study the material on your own using the unit study guide and the textbook. You will sign up for an appointment with your student manager for a discussion session to go over the material. At the time of that appointment you will sit down with the student manager who will hand you a stack of 4X6 cards. The cards will have a series of questions covering the material in the unit. These will primarily be fill-in the blank questions.

The questions have been made up from the objectives and the study guide so if you have studied properly you should be able to answer the questions without trouble. Do not think of this as a test. You will not be graded and you will not be penalized for incorrect answers. When you have completed the stack of questions you may then go back and study again the questions you missed. The student manager will discuss with you any points you do not understand and possibly make suggestions concerning ways to study to gain more.

If you are able to answer most of the questions smoothly and correctly, the student manager will tell you that you have successfully completed that particular unit and will then give you the materials for the next unit. If some of your answers have not been clear, the student manager may ask questions about these. It is possible that you will be asked to review the unit material and make another appointment to answer questions on the unit. You will not be penalized in any way for not passing the unit. It just means you have not learned the material and you must go back and review. You will receive 10 points for each unit successfully completed. See the grading policy of the next page for an explanation of the number of points needed for each letter grade.

2. You will not attend lab at the time listed in the schedule book. Instead you will attend a self instructional lab at your own convenience. Room 230 will be used for the lab. One of the student managers or the instructor will be in the lab at all times it is open. It will not be possible for the lab to be open every hour of the day so you will need to consult the schedule posted by the door to find a time you can come. The lab topic for each week is listed in the course assignment sheet. Those are the materials that will be out for that particular week. It will be possible for you to work ahead if you wish to do so or if you get behind you can catch up by working extra. It will greatly facilitate the operation of the lab to come in each week if at all possible. The Laboratory Manual explains the objectives and procedure for each lab.

3. You are free to progress through the course at your own pace. The attached schedule suggests that you complete one unit each week.

Grading Policy

Points may be earned in the following ways:

	total possible points
Successful completion of unit 10 points each unit	80
Lab Test No. 1	50
Lab Test No. 2	50
Exam	100
Enrichment Points*	50
Total	<u>330</u>

Minimum points needed to achieve course grade:

- A = 297 (90% of total possible points)
- B = 264 (80% of total possible points)
- C = 231 (70% of total possible points)
- D = 198 (60% of total possible points)

*Enrichment Points: Minimum Points - 30
Maximum Points - 50

1. Abstracts: Xeroxed copies of articles are located in Room 230. 2.5 points for each article. Maximum of eight articles may be used.

2. Consumer Survey: You may develop a short questionnaire on some aspect of textiles and give it to at least ten people. The questions must be checked by Mrs. Maclin before the questionnaire is given. This must be turned in no later than May 21, 1973. After you have given the questionnaire you should summarize the results and turn in to your student manager the summary and the completed questionnaires. Ten points may be earned for each questionnaire. A maximum of 20 points may be earned.

3. Interview buyers: You may have an interest in some particular area of textiles and wish to obtain information from buyers in department stores about their concern with this topic or consumer concern with it. You may earn 10 points for this project. A maximum of 20 points may be earned.

4. Market survey: You might survey stores of two different price levels to gain information on kinds of textiles used for certain products, for example, what kind of fabrics, what fiber content is primarily used, what the prices are, and an evaluation of quality of workmanship. An example would be to select one item of sportswear such as shorts and survey two different stores at two price levels. You would check all the shorts and record the information. You would then summarize your survey. A survey could also be done on upholstery fabrics or draperies. You may earn 10 points for this project. A maximum of 20 points may be earned.

5. Term paper: You may wish to read more about one area of textiles. You may earn 10 points for a term paper with at least 10 references.

6. Slide tape presentations. There will be in room 230 slide tape presentations as follows:
"Textiles for Today" - an introduction to textiles.
"Man-Made Fibers"
"Fiberglas"

You may view these and complete a self test for each. Five points may be earned for each, and a maximum of 15 points may be earned.

All enrichment point projects should be placed in the box labeled ENRICHMENT POINTS in room 230. Your instructor will read them and if you will not receive full credit on the project, it will be returned to you in the out box. If you have done a good job and will receive full credit, the project will be placed in your folder and the points will be recorded.

All projects should be placed in the box no later than Monday, May 21, 1973, if you are to receive credit.

If you have any questions about the enrichment point projects, you may discuss them with your student manager, the graduate assistant, or with your instructor.

Textiles and Clothing 3420
Spring Quarter 1973

<u>DATE</u>	<u>TOPIC</u>	<u>LAB NUMBER</u>
March 29	Introduction to Course	
April 2-6	Unit I	Lab. No. 1
April 9-13	Unit II	Lab 2
April 16-20	Unit III	Lab 3
April 23-27	Unit IV	Lab 4
April 30-May 4	Unit V	Lab 5
May 7-11	Unit VI	Lab 6 Lab Test No. 1 (Test may be taken Tue., May 8, 8:55 A.M., rm 243 or Thurs., May 10, 8:55, rm 243
May 14-18	Unit VII	Lab 7
May 21-25	Unit VIII	Lab 8
May 29	Lab Test No. 2 8:55 A.M., rm 114	
May 31	Test - covering unit study guides 1-8	
June 5	Test - continued	

Special notice: All Enrichment Points are due in room 230 no later than May 21. See Course Policy statement for explanation of Enrichment Points. Communication is a problem. Please check the pegboard bulletin board just inside the door in room 230 for notices that will be posted.

TEXTILES AND CLOTHING 3420
COURSE POLICIES
SPRING QUARTER 1973

Maclin
3420
Section 2

Introduction:

This course is designed to help you learn the basic concepts of textiles. The study of textiles is concerned with fabrics and the materials from which they are made. Everyone uses textiles in many ways, for example clothing, carpeting, sheets, blankets, etc. By the time you have completed this course you should be able to:

1. Identify commonly used fabrics, fabric constructions and finishes by name.
2. Describe the characteristics of the various finishes and explain how they affect fabric performance and appearance.
3. Describe the characteristics of the various fabric constructions and how they affect cost, performance and appearance.
4. Describe the characteristics of the various yarn types and how each type affects fabric appearance and performance.
5. Explain the properties of each fiber family and the unique properties of each fiber.
6. Describe information required by legislation in labeling of textile products.
7. Apply knowledge of care in cleaning and caring for textiles.
8. Apply knowledge of fiber properties, yarns, fabric constructions, and finishes in selecting textile products for specific uses.

Course Organization

The organization of this course is probably different

from other courses you may have taken. The subject matter has been divided into eight (8) units. For each unit your instructor has prepared a handout which gives the topic, the pages in the textbook dealing with this topic, the objectives of this unit, and an outline or study guide which points out the important points in this unit.

Assisting with this course will be undergraduate students who have taken the course before. These students, called student managers, have been selected to assist with the course because they are familiar with the subject matter of the course and because they are willing to help you learn the material. You will be assigned to one of these students and will work with this person throughout the quarter.

The instructor is very interested in you and in helping you to learn the material. In this course the role of the instructor has changed from that of dispenser of knowledge to one of manager of the course. The responsibilities of the instructor are to select study materials for the course; prepare study guides, prepare questions for the discussion sessions, prepare lab materials, to act as a clearinghouse for requests and complaints, and to be available to help you. The instructor will be working directly with the student managers and will be available to discuss material with you or assist you in any way. Office hours will be posted and you may come at those times or call to schedule an appointment.

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The general format of the course will be as follows:

1. You will not attend lecture except for the last lecture of the quarter. You will study the materials on your own using the unit handout and the textbook. You will sign up for an appointment with your student manager for a discussion session to go over the material. At the time of that appointment you will sit down with the student manager who will hand you a stack of 4X6 cards. The cards will have a series of questions covering the material in the unit. These will primarily be fill in the blank questions. The questions have been made up from the objectives and the

study guide so if you have studied properly you should be able to answer the questions without trouble. Do not think of this as a test. You will not be graded and you will not be penalized for incorrect answers. When you have completed the stack of questions, you may then go back and study again the questions you missed. The student manager will discuss with you any points you do not understand and possibly make suggestions concerning ways to study to gain more.

If you are able to answer most of the questions smoothly and correctly, the student manager will tell you that you have successfully completed that particular unit and will then give you the materials for the next unit. If some of your answers have not been clear, the student manager may ask questions about these. It is possible that you will be asked to review the unit material and make another appointment to answer questions on the unit. You will not be penalized in any way for not passing the unit. It just means you have not learned the material, and you must go back and review.

You will receive 10 points for each unit you successfully complete. In addition you may earn an extra 5 points if you complete Unit I during the first week of the quarter, April 2-6, and an additional extra 5 points for completing Unit II during the second week of the quarter, April 9-13. These extra points will be added in with grades on tests and enrichment points in computing your grade for the quarter. They will count in the enrichment point category. See Grading Policy on the next page for an explanation of the number of points needed for each letter grade.

2. You will not attend lab at the time listed in the schedule book. Instead you will attend a self instructional lab at your own convenience. The lab will be set up in Room 230. One of the student managers or the instructor will be in the lab at all times it is open. It will not be possible for the lab to be open every hour of the day so you will need to consult the schedule posted by the door to find a time you can come. The lab topic for each week is listed in the course assignment sheet. Those are the materials that will be out for that particular week. It will be possible for you to work ahead if you wish to do so or if you get behind you can catch up by working extra. It will greatly facilitate the operation of the lab to come in each week if at all possible. The Laboratory Manual explains the objectives and procedure for each lab.

3. You are free to progress through the course at your own pace. The course schedule suggests that you complete one unit each week.

Grading Policy

Points may be earned in the following ways:

	total possible points
Successful completion of units 10 points each unit	80
Lab Test No. 1	50
Lab Test No. 2	50
Exam	100
Enrichment Points*	50
See explanation below. You can earn 5 points for completing Unit I during the week of April 2-6, and 5 more points for completing Unit II during the week of April 9-13	

Minimum points needed to achieve course grade:

- A = 297 (90% of total possible points)
- B = 264 (80% of total possible points)
- C = 231 (70% of total possible points)
- D = 198 (60% of total possible points)

*Enrichment Points: Minimum Points - 30
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1. Abstracts. Xeroxed copies of articles are located in Room 230. 2.5 points for each article. Maximum of eight articles may be used.

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"Fiberglas"

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Textiles and Clothing 3420
Spring Quarter 1973

<u>DATE</u>	<u>TOPIC</u>	<u>LAB NUMBER</u>
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APPENDIX B

TEXTILES AND CLOTHING 4978 RESPONSIBILITIES

Maclin
4978

1. Attend a student manager meeting each week - be informed so you can answer questions.
2. Five (5) hours per week in room 230 in conferences and assisting with the lab.
3. Be responsible for the students assigned to you. Give unit tests, etc.
4. Record progress of individual progress chart and wall chart.
5. Read abstracts, file and record.
6. Check self tests on filmstrips.

To receive an A in the course you must satisfactorily carry out all the responsibilities outlined and in addition the average grade on the final examination of all students assigned to you must be 80 or above.

You must also agree not to tell other student managers or students enrolled in Textiles and Clothing 3420 or any other students that your grade is dependent on the grade of your students on the final exam.

If you understand the terms of this contract and agree to them, please sign this contract.

I understand the terms of this contract. I agree to these terms and I agree not to tell other students or student managers about these terms.

(Signature)

TEXTILES AND CLOTHING 4978
RESPONSIBILITIES

Maclin
4978

1. Attend a student manager meeting each week - be informed so you can answer questions.
2. Five (5) hours per week in room 230 in conferences and assisting with the lab.
3. Be responsible for the students assigned to you. Give unit tests, etc.
4. Record progress of individual progress chart and wall chart.
5. Read abstracts, file and record.
6. Check self tests on filmstrips.

To receive an A in the course you must satisfactorily carry out all the responsibilities outlined above. If you understand the terms for earning an A and agree to these terms, please sign below.

I understand the terms of this contract and agree to these terms.

(Signature)

VITA

Janice Joyner Maclin was born in Brownsville, Tennessee. She attended elementary and secondary schools in Brownsville and was graduated from Haywood High School. Her higher education includes a Bachelor of Science Degree from the University of Tennessee at Martin and a Master of Science Degree from the University of Illinois.

Prior to enrolling at the University of Tennessee to work on the doctorate in the field of Educational Psychology she taught Textiles and Clothing in the College of Home Economics at the University of Tennessee where she was an Assistant Professor.

She is married to Warren H. Maclin and has three daughters, Laura, Becky, and Janet.