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A Comparison between Self-Paced and Instructor-Paced Instructional Systems

Laura Lee Winter
Western Michigan University

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A COMPARISON BETWEEN SELF-PACED AND INSTRUCTOR-PACED
INSTRUCTIONAL SYSTEMS

by

Laura Lee Winter

A Thesis
Submitted to the
Faculty of The Graduate College
in partial fulfillment
of the
Degree of Master of Arts

Western Michigan University
Kalamazoo, Michigan
August 1973

A COMPARISON BETWEEN SELF-PACED AND INSTRUCTOR-PACED
INSTRUCTIONAL SYSTEMS

Laura Lee Winter, M.A.

Western Michigan University, 1973

Two college level systems of instruction derived from basic behavioral principals were compared. Community college students enrolled in two sections of an introductory psychology course served as subjects. Students in one section experienced a self-paced system of instruction. Students in the second section went through the course under an instructor-paced system of instruction. Students in the self-paced section received higher course grades and performed better on unit quizzes. However, the final examination performance for the two groups was about the same. Suggestions for further research are given.

ACKNOWLEDGEMENTS

I wish to thank several individuals who have assisted in the development and preparation of this thesis. I am particularly grateful to Professor Jack L. Michael for his advice, encouragement, and helpful suggestions and to Dr. Bradley E. Huitema for many hours of patiently guiding me through the statistical analysis used in this study. I also wish to thank Stephen E. Lousell for allowing me to use his introductory psychology classes for a subject population. And, I would like to express my sincere appreciation to my husband, Stanley D. Winter, for his unending help and support.

Laura Lee Winter

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INTRODUCTION

Traditional views of education have been challenged by the development of teaching methods based on operant psychology. Skinner (1968) describes a theory of learning, derived from basic experimentation, which can be applied in the classroom to increase the effectiveness of teaching and thus, the efficiency of learning. This theory states that behavior is developed and maintained by the consequences which follow. Homme, C'de Baca, Cottingham, and Homme (1968), using the term "contingency management", describe the necessity of arranging the environment so that when operant behaviors occur specific consequences will be scheduled to follow and thus, affect behavior in a desired direction. This deliberate management of behavior and its consequences is the basis of the innovative educational techniques derived from operant psychology.

Keller (1968) incorporated the laws of behavior into an educational system for college students. This system has been termed self-paced instruction or, more formally, a Personalized-Proctorial System of Instruction (PSI). By breaking the content of a course into "small packages", providing frequent checks on academic achievement, positive reinforcement for success, requiring that all students master one unit before going on to the next and allowing the student to pace himself throughout the course, Keller found that students achieve higher course grades than students learning from traditional educational systems. MacMichael and Corey (1969) and Witters and Kent (1972) found, when they compared self-paced instruction to

traditional methods, that students in self-paced sections received better scores on examinations and described the course as being more enjoyable. Hoberock, Koen, Roth and Wagner (1972) found that unless suggested schedules of pacing were given, some students had difficulty with procrastination, however, none of the students complained about or were frustrated by having to pace themselves.¹ Also, they reported liking the course more and they received higher grades than students enrolled in traditionally taught sections of the course. Morris and Kimbrell (1972) found that recall and application processes were more facilitated by the Keller system than by traditional modes of instruction.

Another type of instruction, also based on principles of learning was first described by Cooper and Greiner (1971). In this system, the instructor meets regularly with the class and requires a weekly quiz schedule for all students. Because the instructor schedules the students' activities throughout the course, this method of teaching has been termed instructor-paced instruction. Studies comparing instructor-paced courses to traditional lecture courses have found that students learning under the instructor-paced system performed better on final examinations, received higher course grades and gave higher ratings to the course than did students in tradi-

¹Professor F. S. Keller, in an address before Behavior Modifiers of Southwest Michigan, June 1973, stated that if a self-paced course is set up correctly procrastination would not be a problem.

tionally taught sections of the course (Mallot and Svinicki, 1969; Stalling, 1971; and Bostow and Blumenfeld, 1972).

As implied in the statements above, self-paced and instructor-paced systems of instruction are more effective than traditional lecture courses with infrequent quizzes. Both the instructor-paced and self-paced methods allow for successful shaping of new behavior. They both (1) break the course content into small study units; (2) require frequent quizzes in order to provide feed-back on the students performance throughout the semester; (3) provide almost immediate and frequent reinforcement for academic achievement; and (4) have a remediation feature which allows the student who does not perform adequately on an initial quiz to restudy and try again.

The self-paced system has some intrinsic advantages over the instructor-paced system in that it allows the student to be ill or busy with other activities, to study when and until he is sufficiently prepared for a quiz and to receive more personal and individualized contact with the instructional staff. This system demands that the student display a high level of achievement over the material in one unit before going on to the next one, minimizing cumulative failure. It also frees the instructor to develop and perfect study objectives and quizzes for the course.

The instructor-paced system on the other hand, allows students to have regular and direct contact with the instructor, requires fewer test forms and less staff time than self-paced courses, leaves remediation up to the instructor who presumably has a higher level of

proficiency with the course material, and requires the student to take regular weekly quizzes, thus preventing any long-term procrastination problems.²

Bostow and Reder (1973) made a general comparison of the self-paced and instructor-paced instructional systems. One major difficulty encountered while doing this research was that the teaching assistants assigned to the self-paced group appeared to vary with respect to grading criterion. Although students in the instructor-paced group scored slighter higher on the final examination, the authors did not feel a definite statement about the two groups was appropriate because of the differences in T.A. performance.

The purpose of the present study was to make a broad comparison between the instructor-paced and self-paced instructional technologies. Students enrolled in an introductory psychology course were given either instructor-paced or self-paced instruction. Differences between the two treatment conditions were evaluated on the basis of final examination scores, course grades and student evaluations of the course.

²The advantages of self-paced and instructor-paced systems were taken from a lecture delivered by Dr. Jack Michael, Western Michigan University, May 1973.

METHOD

Subjects

Students. The students enrolled in two sections of an introductory psychology course at Kalamazoo Valley Community College served as subjects in this investigation. Before class registration, it was decided that students in the morning section would be assigned to the instructor-paced instructional system and students in the afternoon section to the self-paced system. The students had no prior knowledge that the two sections would receive differential treatment and they were never formally told that they were involved in the experiment.

Initially, 32 students enrolled in the instructor-paced section and 24 in the self-paced section. Seven Ss from the instructor-paced group and six from the self-paced group dropped the course before the final exam. High school grade point averages for the students remaining in the course were gathered ($\bar{X}_1 = 2.53$ for the instructor-paced, $\bar{X}_2 = 2.28$ for the self-paced group). The difference between the two groups was nonsignificant ($t = 1.46$).

Teaching assistants. Ten students who were enrolled in an educational psychology course served as teaching assistants (T.A.). Four T.A.'s were assigned to the instructor-paced section and six to the self-paced section. These students had received an "A" in the introductory psychology course during the preceding semester. To insure that the T.A.'s still understood the course material they

were required to take a quiz over each unit before grading quizzes for that unit.

Procedure

All students were required to pass a quiz over the course syllabus before being allowed to continue in the course. This requirement ensured that students, in both sections, understood exactly what was expected of them in order to receive a passing grade in the course.

Readings from Holland and Skinner (1969), Whaley and Malott (1971) and Skinner (1948) were divided into 15 units of study. The students in both sections received the same reading assignments and were required to take a 24 point (20 multiple choice questions and 1 short answer essay) quiz over each unit. The instructor prepared three forms of the multiple choice section of the quiz (Quiz A, B, C) and five essay questions (Essay A, B, C, D, E). For each unit the instructor tried to construct comparable quiz forms.

The class activities in the instructor-paced group went as follows (See Table A): On Monday the instructor delivered a 45 minute lecture. This lecture was followed immediately by a two point quiz over the material which had just been presented. The points earned on this quiz were called "score points". They did not count towards the students final grade but, they could be saved and applied to the unit quiz which was given on Tuesday. Therefore, if a student lost 4 points on the unit quiz, giving him a raw score of 20, he could add in his 2 "score points" from the Monday lecture quiz and end up with 22 points on the unit quiz (see Table B).

TABLE A

Instructor-paced Section Weekly Activities Schedule

<u>MONDAY</u>	<u>TUESDAY</u>	<u>WEDNESDAY</u>	<u>THURSDAY</u>
Lecture	Quiz A	Remedial lecture	Quiz B
Two "score point" lecture quiz		Two "score point" lecture quiz	
		Small group discussions	

TABLE B

Passing Score Point Combinations for Instructor-Paced Students

Lecture Points Earned	Unit Quiz Points Needed to Pass	Cumulative Quiz Score*
2	20	22
1	21	22
0	22	22

*A cumulative quiz score of 22 was called a "Pass" and was worth 10 grade points.

On Tuesday, Quiz A (with Essay A) was administered to all of the students. The quizzes were collected and immediately graded by the T.A.'s assigned to the instructor-paced section. The grading was supervised by a graduate student in psychology from Western Michigan University. Grades were posted an hour later. Students who passed Quiz A were not required to attend class for the remainder of the week. The grading scale is shown in Table C.

All of the students who did not receive 10 grade points on Quiz A were required to report to class on Wednesday for remediation. Remediation consisted of a 20 minute lecture presented by the instructor, a 2 "score point" lecture quiz and small group discussions conducted by the T.A.'s. The content of the lecture was determined by an error analysis which was run on Quiz A. The instructor discussed those areas where the students had performed poorly. In the small group discussions, the T.A.'s answered questions and tried to clear up any remaining problem areas.

Quiz B (Essay B) was administered on Thursday to all students who had not passed Quiz A. Quiz B was graded immediately by the T.A.'s and grades were posted within an hour. Table C presents the grading scale. After Quiz B, students in the instructor-paced section were required to move on to the next unit.

The activities of students enrolled in the self-paced section went as follows: After the second class meeting (syllabus quiz) the self-paced section did not have formally scheduled class activities. Instead, the students were responsible for pacing their own study and test sessions.

TABLE C

Unit Quiz Grade Scale Instructor-Paced Section

<u>QUIZ A</u>		<u>QUIZ B</u>	
Total "score points" (Monday lecture quiz + raw score on Quiz A)	grade points	Total "score points" (Wednesday lecture quiz + raw score on Quiz B)	grade points
22-24	10	22-24	8
21-17	2	21-20	6
16-0	0	19-18	4
		17-0	0

These are the instructions that the self-paced students received on the first day of class:

"You will receive a Unit Assignment which consists of a reading assignment accompanied by a set of instructional objectives. The objectives are meant to guide your study so that you will give attention to the topics the instructor considers important. You work on this assignment at home until you feel confident that you can answer all of the instructional objectives without having to refer to the text. If at any time you experience difficulties while preparing for a quiz you may receive individual assistance from the instructor or a T.A. in the Learning Lab. When you feel you are ready to take the unit quiz, present yourself at the Learning Lab and an assistant will give you a quiz over the appropriate material."

T.A.'s were available in the Learning Laboratory for approximately 30 hours a week. When a student arrived an available T.A. checked his file to determine what unit quiz was to be given. He then asked the student to pick two letters (one from a container marked multiple choice questions, the other from a container marked essay questions). These letters determined which multiple choice quiz form and which essay the student would take. Therefore, unlike a student in the instructor-paced section who took Quiz A, Essay A, a student in the self-paced section, attempting a unit quiz for the first time may have taken, Quiz B, Essay D or some other combination. This procedure was implemented to prevent self-paced students from teaming up and telling one another about the quiz content. If a student came in to retake a quiz and drew the letter of a quiz or essay he had already taken, he was asked to draw again.

After completing the quiz the student took it to one of the T.A.'s. The T.A. immediately graded the quiz in the presence of the

student. All errors were pointed out and explained at this time. This was the only form of remediation unless the student requested more by making an appointment with the instructor or a T.A. The student passed the quiz and received 10 grade points if he achieved a score of 20/24 (85% correct).

A student who did not pass a unit quiz was required to return later so that he could be retested on that same unit. The self-paced students were required to continue studying and taking quizzes over a unit until they passed a quiz. When a student did succeed in passing a unit quiz whether it took one, two, three, or even four tries, he received full credit (10 grade points) and was allowed to move on to the next unit.

In order to discourage procrastination, the self-paced students received "friendly reminder" letters which were sent when students were not passing an average of one unit quiz per week. Also, in some cases students were asked to sign contracts with the intention of helping them schedule their test dates.

At the end of the semester a 100 point (84 multiple choice questions and 4 essay questions) comprehensive final exam and a 27 item course evaluation³ were given to students in both sections. The multiple choice and essay questions were the same for both groups. The final examination was worth 20 points (12% of the final course grade) for students in both sections.

³Portions of the course evaluation were taken from a questionnaire developed to aid in the evaluation of self-paced courses by Susan Hereford at The University of Texas at Austin.

RESULTS

The frequency distribution of raw scores on the final examination for both groups is shown in Figure 1. The mean score out of 100 possible points was 73.9 for the instructor-paced group and 70.4 for the self-paced group. An analysis of variance (ANOVA) was applied to the data. The results were nonsignificant ($F=1.12$).

To reduce within group variance and thus increase the power of statistical analysis an analysis of covariance (ANCOVA), with high school grade point average as the covariate, was applied to the data. The adjusted means on the final examination for the instructor-paced and self-paced groups were ($\bar{Y}_{adj. I} = 73.45$, $\bar{Y}_{adj. II} = 70.91$, respectively). When this test was applied the results remained nonsignificant ($F=.54$).

Figure 2 shows the total number of grade points earned by students in both groups. A total of 170 grade points could be earned during the semester. The mean number of grade points accumulated by the instructor-paced students was 136 and by the self-paced students was 153. When ANOVA was applied to the data the difference was nonsignificant ($F=3.43$). However, the difference between groups was found to be significant when ANCOVA was applied to the data ($F=5.04$, $p<.05$). The adjusted means on the total number of grade points earned for the instructor-paced group was $\bar{Y}_{adj. I}=135.14$ and for the self-paced group $\bar{Y}_{adj. II}=155.45$. The ANCOVA test results adjust for lower high school grade point averages which were found in the self-paced group.

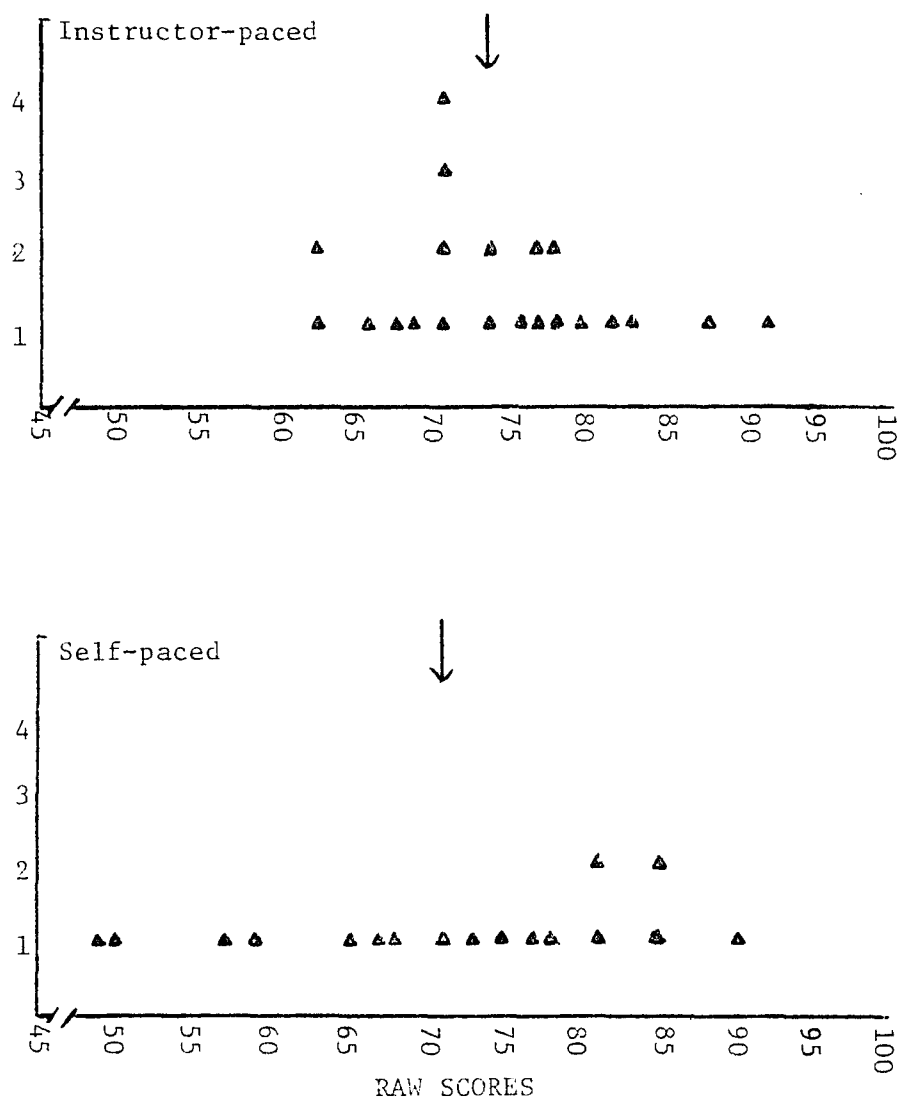


Figure 1: Raw score distribution on the final examination.

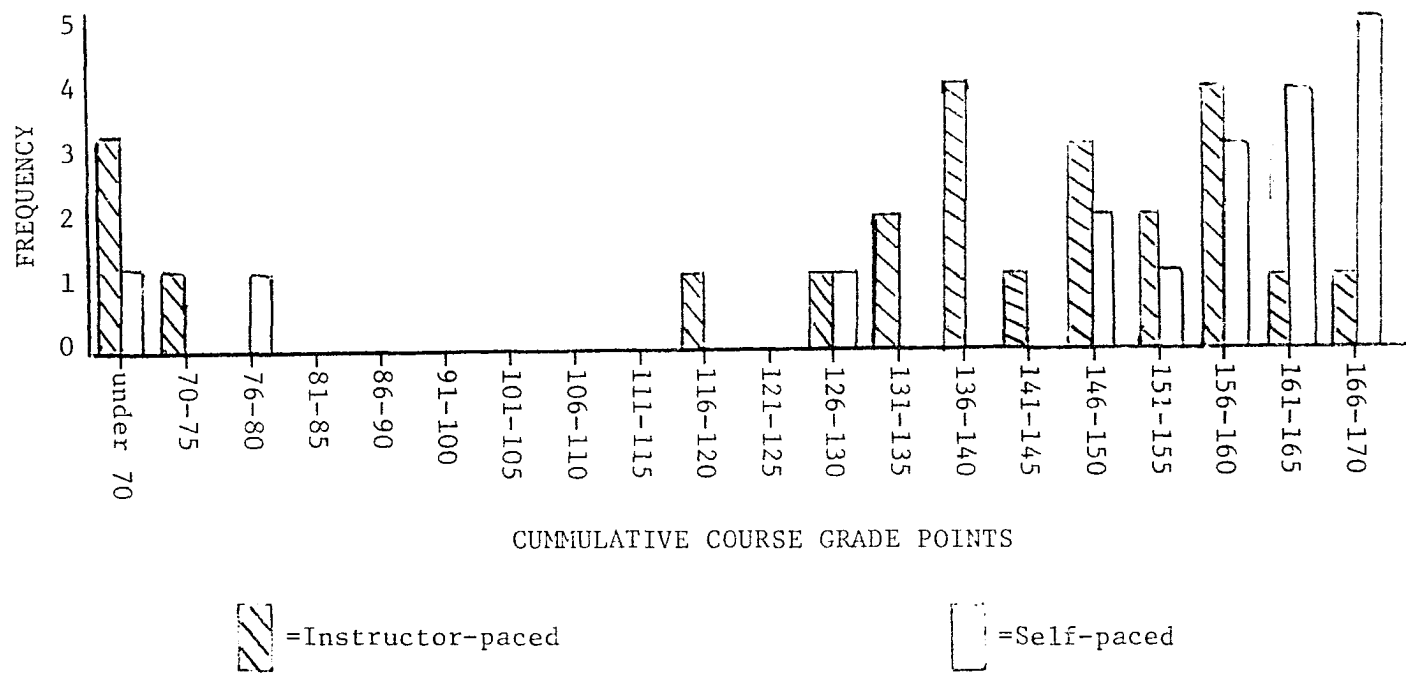


Figure 2: Cumulative course point distribution for students in the self-paced and instructor-paced courses.

Figure 3 shows the course grades assigned to students in both groups.

When unit by unit quiz scores were inspected it was found that in most cases self-paced students achieved higher raw scores on the initial unit quiz than did instructor-paced students. These data are presented in Figure 4.

In general, student evaluations of the course were high and did not vary much between the two sections. Students in the self-paced section looked forward to their course activities slightly more than did the students in the instructor-paced course. Self-paced students also said more frequently that they got more out of the course than they expected. Students in both groups thought the mode of instruction used in their section was far better than traditional methods of instruction. However, students in the instructor-paced section gave slightly higher ratings to this question. These and other data are presented in Figures 5-10.

As shown in Figures 11-18, students in the self-paced section gave higher ratings to questions concerning the T.A.'s. However, students in both sections gave high ratings to questions concerning the T.A.'s. Also, students in both groups said that they understood what was expected of them and that they put more effort into this course than usual (see Figures 19-21).

Self-paced students were asked, "Did it disturb you that your achievement in this course was not evaluated in the usual way?" (79% said "No", 21% said "Definitely no"). When asked if they found pacing themselves frustrating (0% said "Definitely yes", 21.5% said

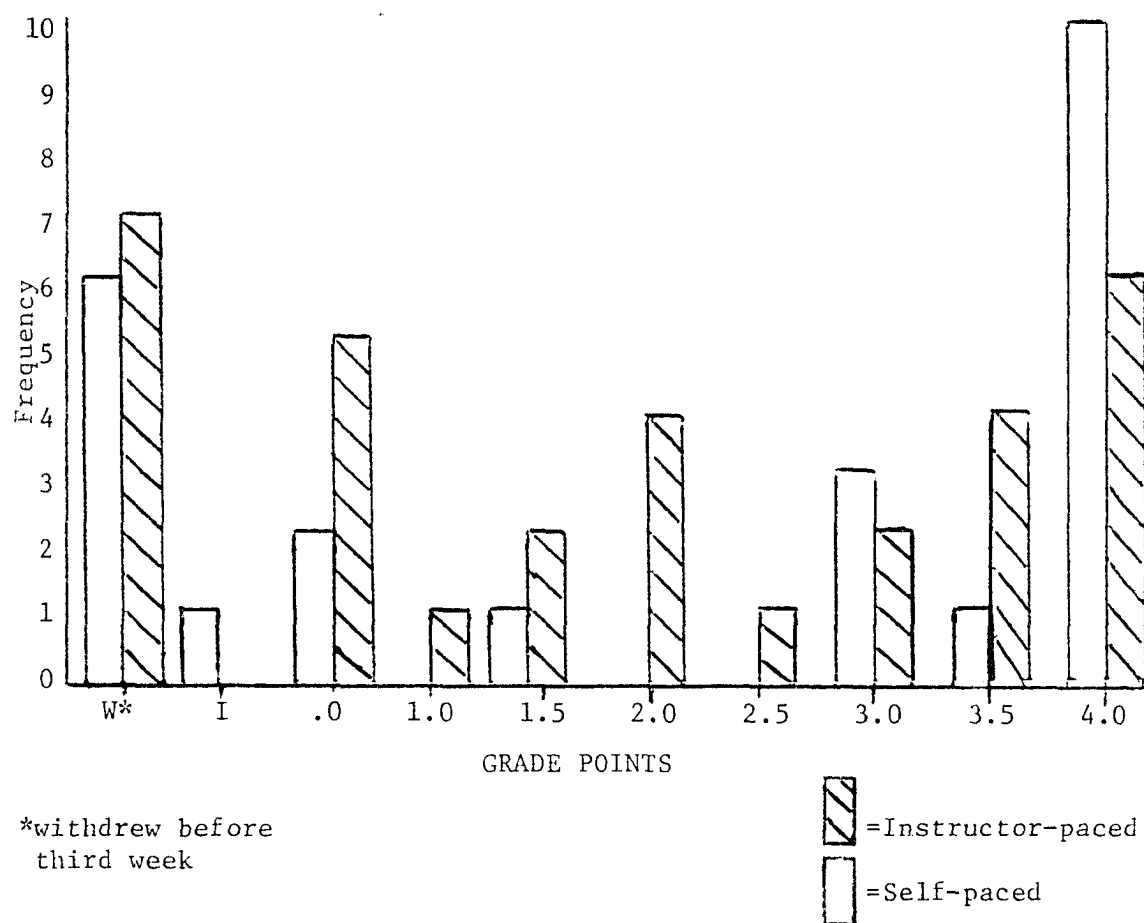


Figure 3: Course grades (in grade points) assigned to students in the self-paced and instructor-paced groups.

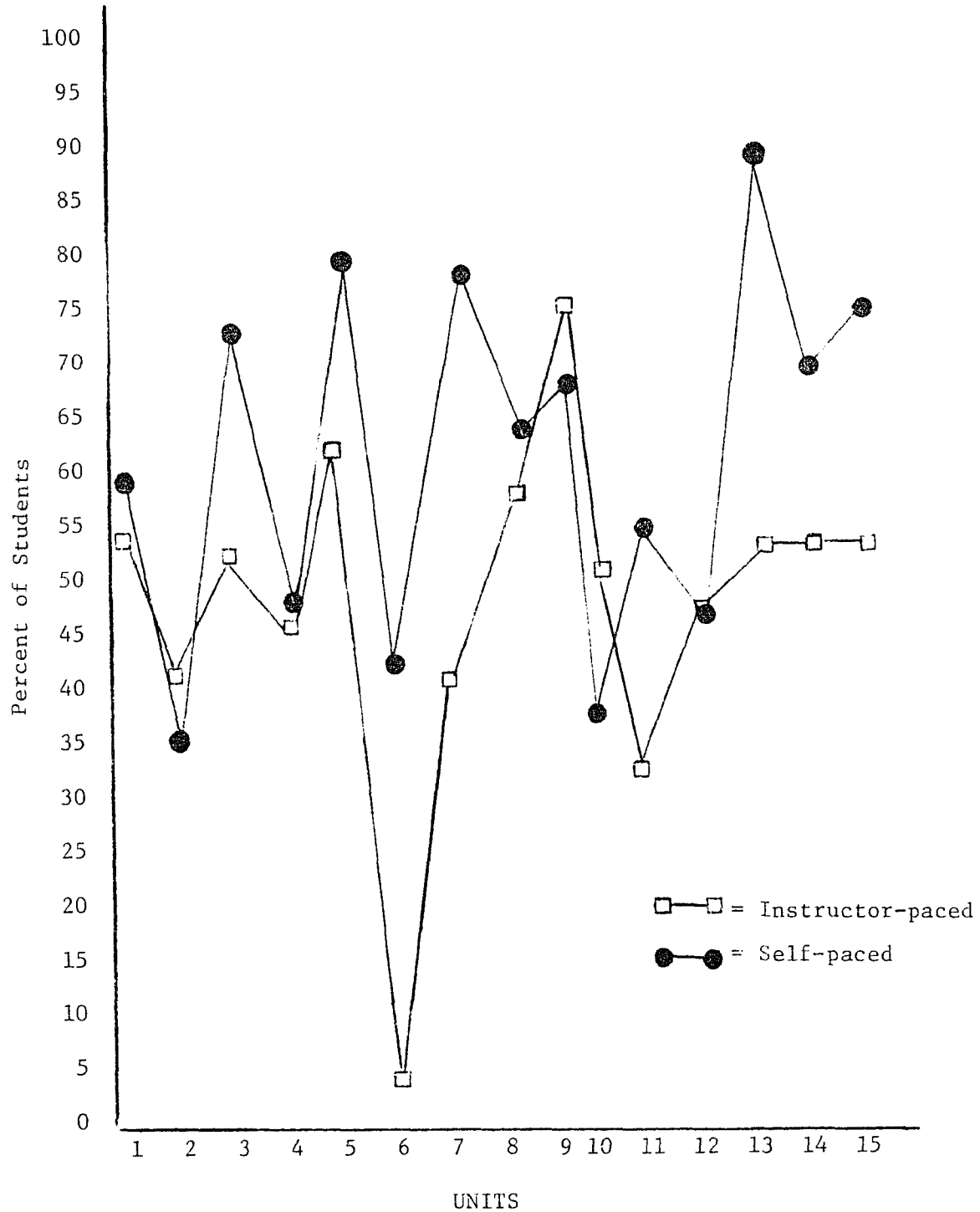




Figure 4: Percentage of students achieving an initial quiz score of 20 points or above. Note: Raw scores are shown here, the 2 point lecture quiz does not confuse this data.

Figure 5: Compared with all the classes I have had, I looked forward to the activities in this course:

Instructor-paced = 

Self-paced = 

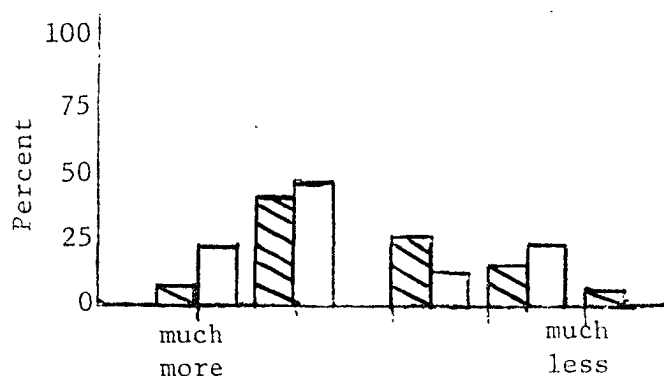


Figure 6: Compared with all the courses I have had, I consider this course:

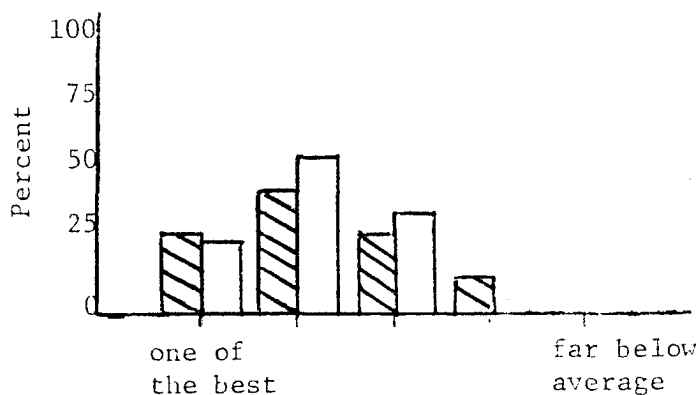


Figure 7: For purposes of stimulating new ideas, I considered this course, when compared with other courses I have had:

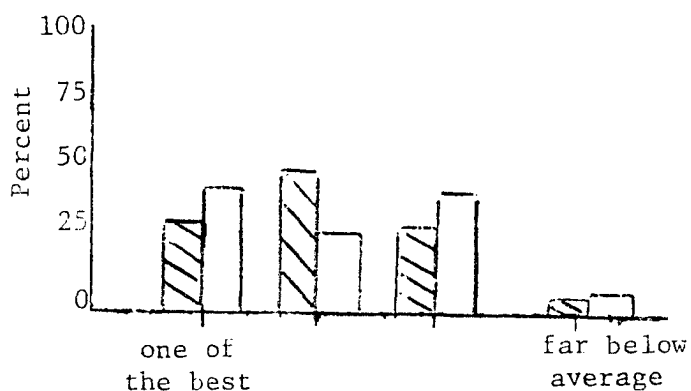
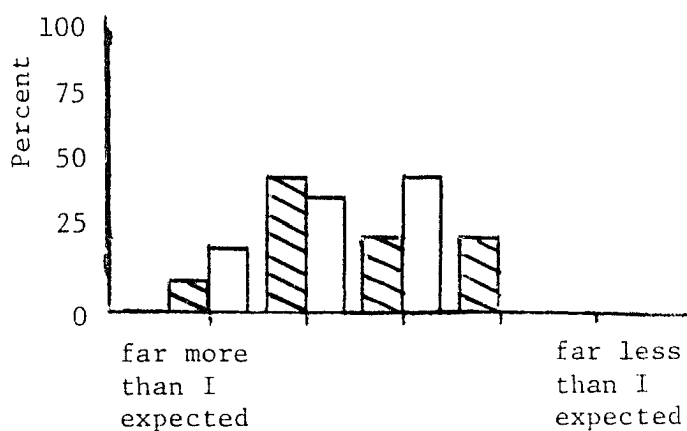


Figure 8: Compared with what I hoped I to get from the course I feel I got:



Instructor-paced=

Self-paced=

Figure 9: If I had the opportunity to take another course taught by a similar method, I would do so.

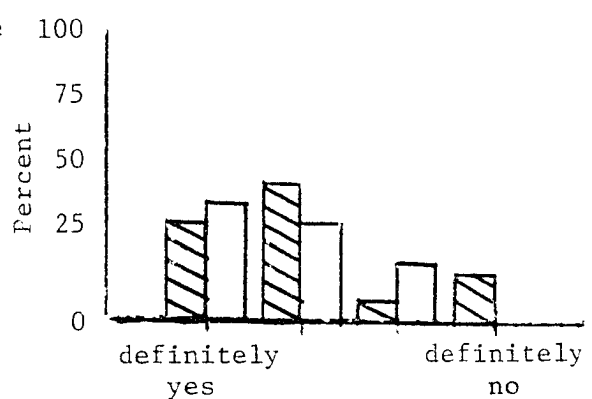


Figure 10: In general, I consider the mode of instruction used in this course to be:

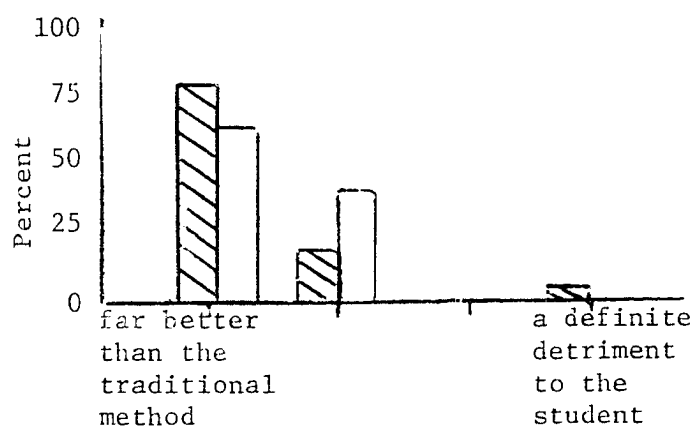
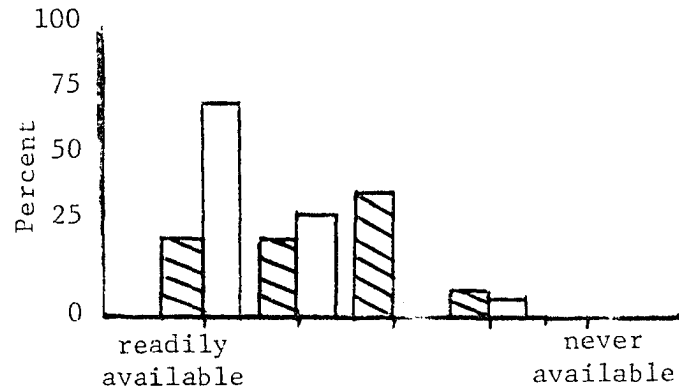


Figure 11: For individual conferences, the staff was:



Instructor-paced=



Self-paced=



Figure 12: With respect to the information that the course was attempting to teach, the T.A.'s were:

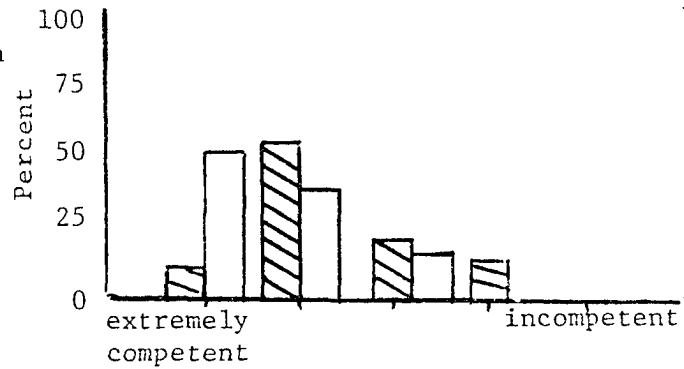


Figure 13: Individual conferences with the T.A.'s were:

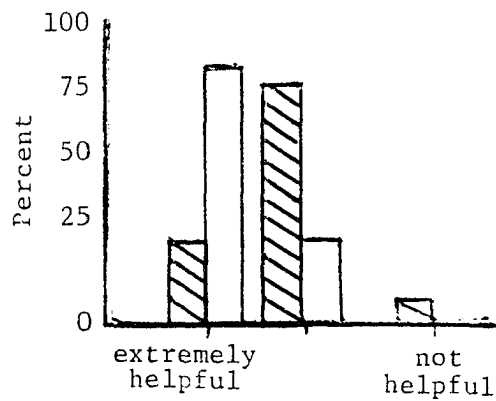




Figure 14: The T.A.'s were sensitive enough to listen to me in such a way as to know whether or not I was understanding the ideas and concepts being considered.

Instructor-paced= 
Self-paced= 

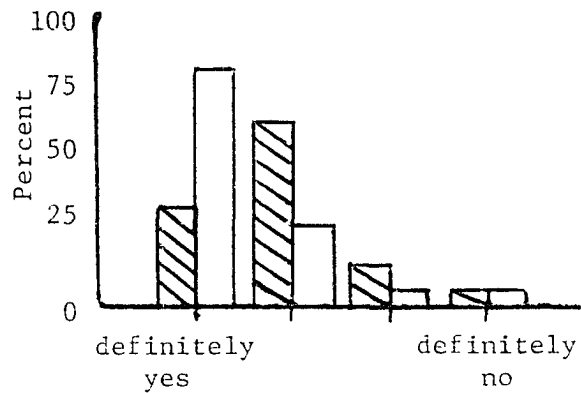


Figure 15: When I was having difficulty in understanding the material the T.A.'s were able to explain the concepts to me in such a way that I left the discussion with a better understanding.

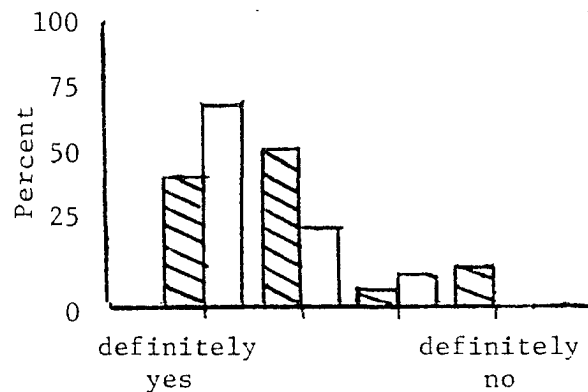


Figure 16: The staff made the material covered in the course meaningful to me.

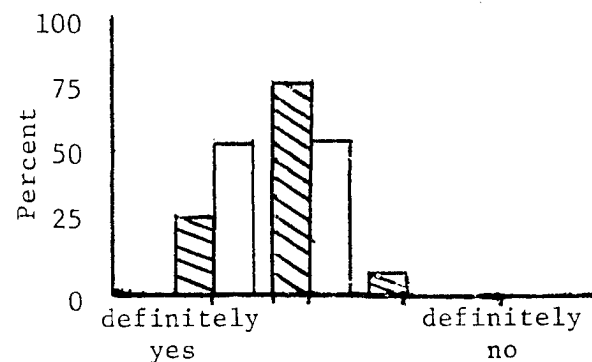


Figure 17: I felt free to ask question, disagree, and express my ideas with the staff.

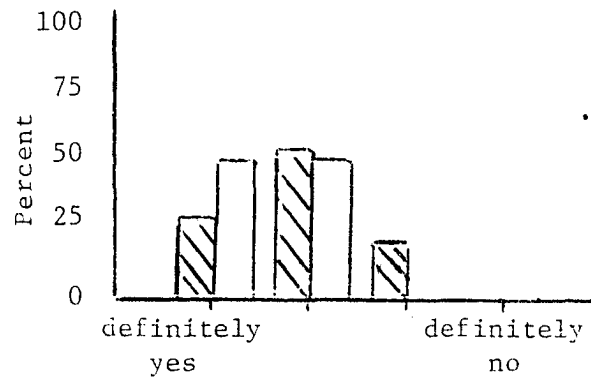
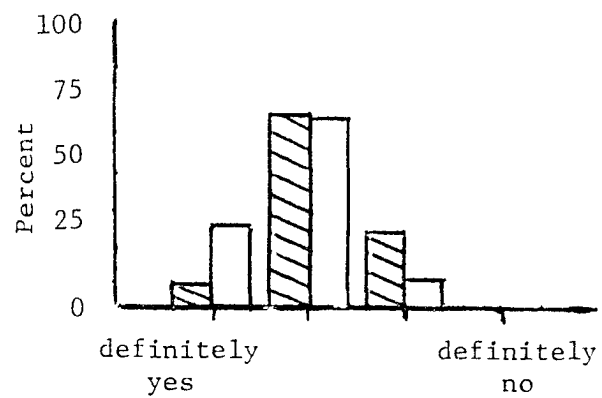



Figure 18: The T.A.'s and staff showed enthusiasm about their work with the course.



Instructor-paced= 


Self-paced= 

Figure 19: Compared with the effort I usually put into a course, my effort in this course was:

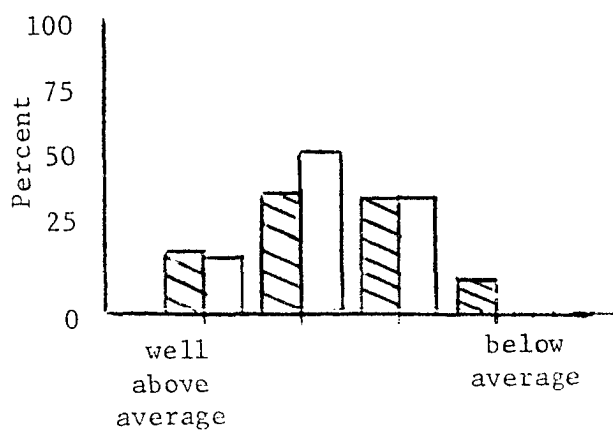
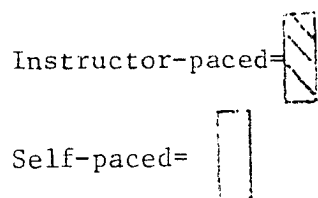


Figure 20: When I had to take a remedial quiz I usually:

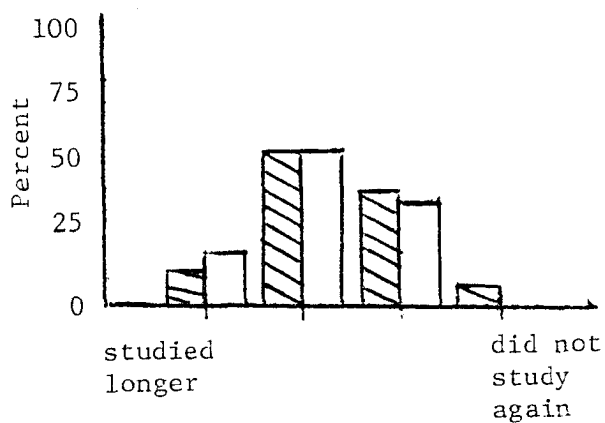
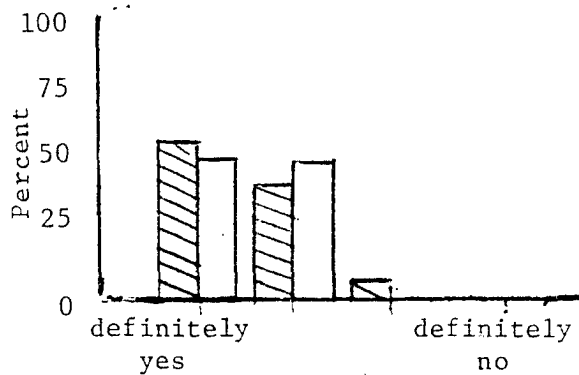


Figure 21: I understood what was expected of me in this course.



"Yes", 57% said "No", and 21.5% said "Definitely no"). Fourteen percent (14%) of the self-paced students said that in some cases, rather than taking quizzes until they mastered the unit material, they would have preferred to receive less than 10 points for that unit (see Figures 22-24).

All of the students in the instructor-paced section thought that the Monday lecture helped them understand the reading material. Also, most instructor-paced students thought that the Monday lecture quiz served as an effective motivator for studying the material early and 80% felt that the remedial lectures covered the areas where they were having the most difficulty (see Figures 25-27).

Figure 22: It disturbed me that my achievement was not evaluated in the usual manner.

Self-paced= ☐

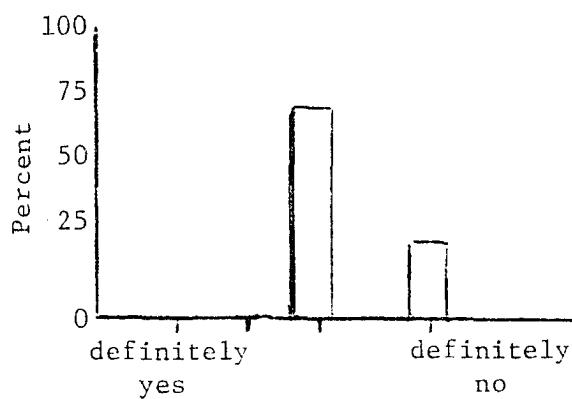


Figure 23: I found it frustrating to have to pace myself through this course, with the result that I had to hurry over large amounts of material toward the end of the semester.

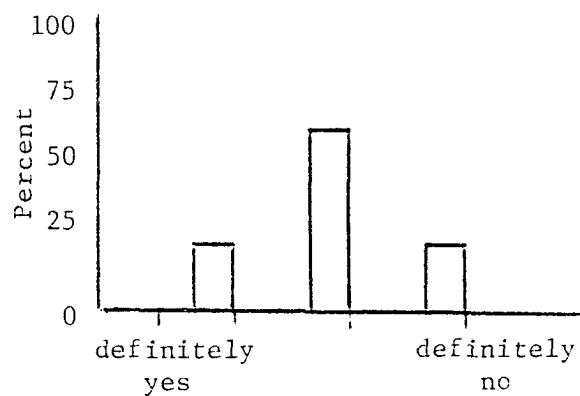


Figure 24: On some of the harder units, rather than taking two or three quizzes until I passed, I would have preferred taking less than ten points for the unit.

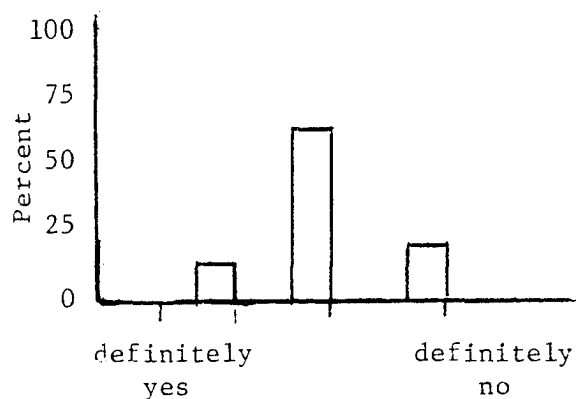
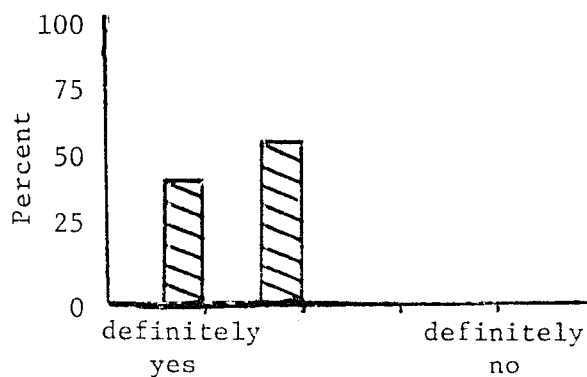


Figure 25: The Monday lecture quiz served as an effective motivating device so that I studied the material before Monday evening.



Instructor-paced=



Figure 26: The Monday lecture helped me understand the reading material.

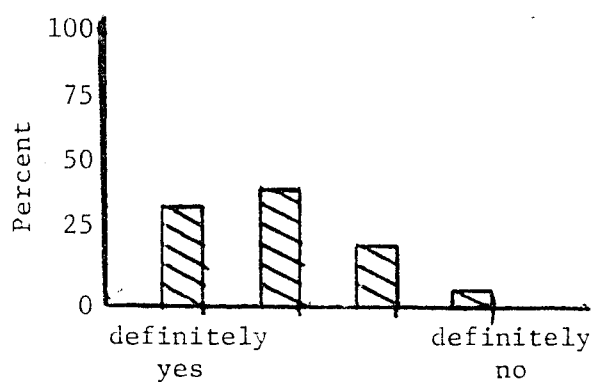
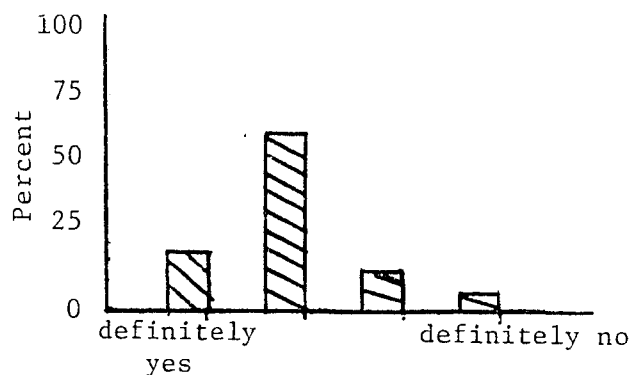


Figure 27: The Wednesday remedial lectures covered the areas where I was having the most difficulty.



DISCUSSION

The purpose of this study was to detect differences in performance and attitude of students taught under instructor-paced and self-paced instructional systems. Students in the self-paced section received significantly higher course grades. However, these results do not necessarily indicate that self-paced students learned more than students in the instructor-paced group. As discussed in the Method Section, a student in the self-paced group was required to take quizzes over a unit until he passed. At this time he received full credit for that unit. The self-paced method does not allow the student to accumulate lost points. Self-paced students who did loose points did so by a poor performance on the final examination or by not completing all of the unit quizzes. The incomplete, 1.5 and .0 course grades assigned to the self-paced group (shown in Figure 3) indicated those students who did not complete the course or who failed to withdraw. A student in the instructor-paced group was not required to achieve a criterion level of proficiency over one unit before going on to the next and could receive less than full credit. Therefore, a student in the instructor-paced section could complete all of the unit quizzes and receive a low grade because he lost a few points on each unit. One student in the instructor-paced group who received a .0 course grade took the final exam. Others who received a .0 course grade stopped coming to class for one reason or another and failed to withdraw from the course.

Seven students from the instructor-paced group withdrew from the course. Three of these students said that they dropped the course because they took jobs and were carrying too heavy of a course load. Two reported being dissatisfied with the course content and structure. The final two students could not be reached. Six students from the self-paced section withdrew. Three said that they had taken jobs (two indicated that they would re-enroll next semester) and one was extremely dissatisfied with the course structure. Two students could not be reached. These statements suggest that the instructional systems produce about the same rate of withdrawals and that the reasons for student withdrawal are about the same.

Because of the high level of proficiency required for unit advancement, it would be expected that students in the self-paced group would be "forced" to learn more and therefore show higher final examination performance. However, the final examination, which was the major dependent measure for academic achievement in this study, gave nonsignificant results. This suggests that the examination performance over the content of the course was about the same for students in both groups.

The results of this study may have been complicated by several unexpected variables. Rather than mastering the unit assignment, students in the self-paced group may have become "test wise" due to taking three or four quizzes over the same material. By taking a quiz, students became aware of the types of questions which would be asked over a unit assignment. Although the quiz forms differed, the student's sample grew with each attempt to pass. Also, in some

cases the instructor failed to prepare a third form of a unit quiz. As a result, a student taking a unit quiz over one of these units for the third time received a multiple choice question quiz form on which he had previously been tested. Likewise, students who required more than three attempts to pass a unit quiz always received a multiple choice question quiz form on which they had previously been tested. In these instances it is possible that students were able to recall correct answers rather than actually having mastered the unit assignment. This suggests that unmotivated self-paced students may have been reinforced for weak study behavior and that they were receiving 10 points for doing about the same amount of work as the instructor-paced students.

It should be noted that in Keller's own self-paced courses students are given essay quizzes only and six quiz forms are prepared for each unit. Under these conditions it would be unlikely that a student would become "test wise".

Because self-paced students had performed better on initial quizzes throughout the semester it was somewhat surprising to see their mean final exam score was 3.5 score points lower than the mean score in the instructor-paced group. An explanation for this might be that throughout the semester self-paced students were able to take unit quizzes at their convenience. However, on the final examination, self-paced students like instructor-paced students were required to come in on a scheduled day at a scheduled hour to take the test. Perhaps, under these conditions self-paced students were unable to study adequately and also meet the instructor's schedule.

A second problem encountered during the current investigation involved the grading performance of T.A.'s. To evaluate the quality of T.A. grading, a paid assistant was asked to re-grade all of the essay questions from both groups for three unit quizzes where major point differences had been detected. The points assigned to essay answers by the T.A.'s and the paid assistant were compared. The results indicate that the self-paced T.A.'s were more lenient than instructor-paced T.A.'s. This may be due to the fact that self-paced T.A.'s would be more likely to respond to "being a nice guy" than would instructor-paced T.A.'s. A lenient response on the part of the T.A. would be likely to occur if a student had already missed several points on the multiple choice section of the quiz and needed points from the essay question in order to pass.

The regrade results also showed that the instructor-paced T.A.'s gave fewer points for essay questions than the paid assistant. One explanation for these results might be that the instructor-paced T.A.'s, who were supervised by a Western Michigan University graduate student, may have been too meticulous. A second possibility would be simply that the instructor-paced T.A.'s simply did a better job. This is quite possible because they graded the quizzes together, in a group, and they used a checklist for correct and incorrect responses. These data are shown in Figures 28-30.

A further evaluation concerning grading equality was made by the students. The course evaluation asked if a T.A. on at least one occasion gave more or less credit than was deserved for an essay

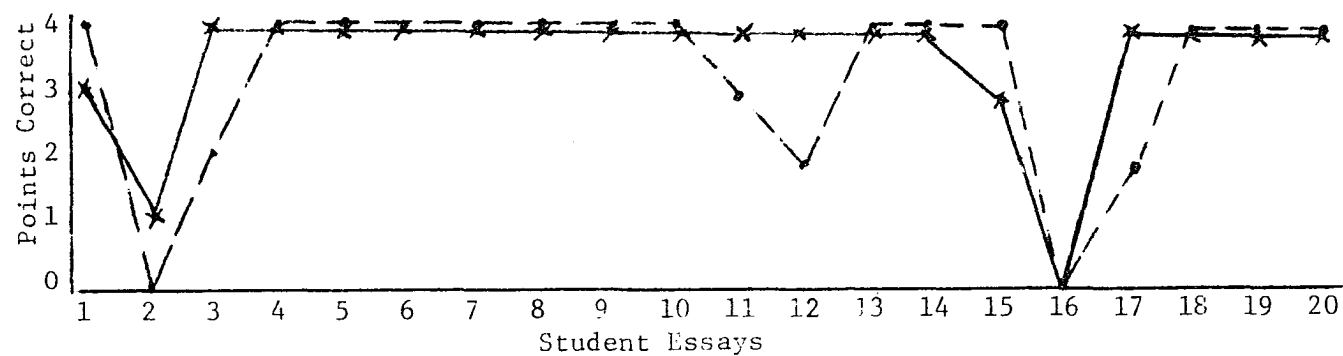


Figure 28.1: Unit 6 essay grading agreements for the self-paced section.

x—x =T.A.
o--o =Paid assistant

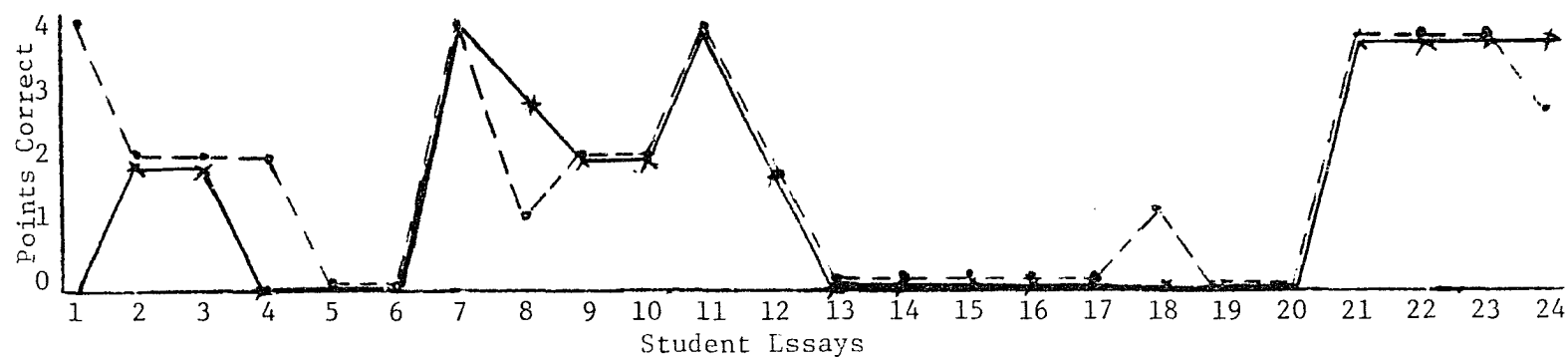


Figure 28.2: Unit 6 essay grading agreements for the instructor-paced section.

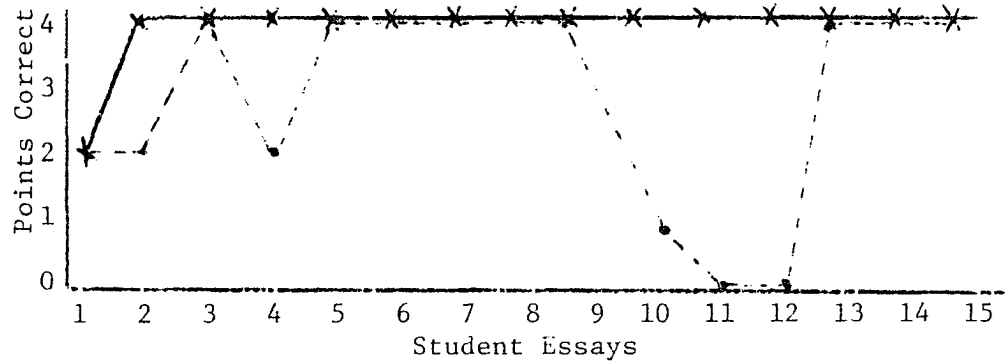


Figure 29.1: Unit 7 essay grading agreements for the self-paced section.

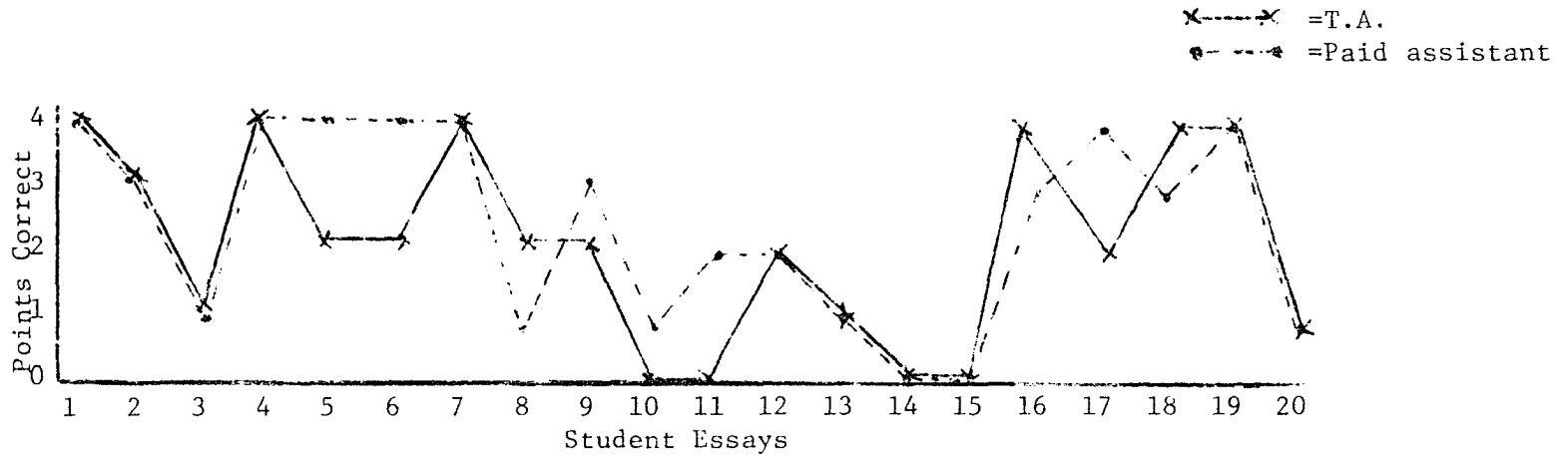


Figure 29.2: Unit 7 essay grading agreements for the instructor-paced section.

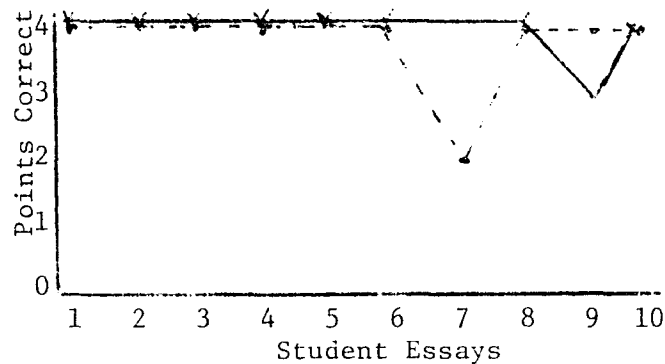


Figure 30.1: Unit 13 grading agreements for the self-paced section.

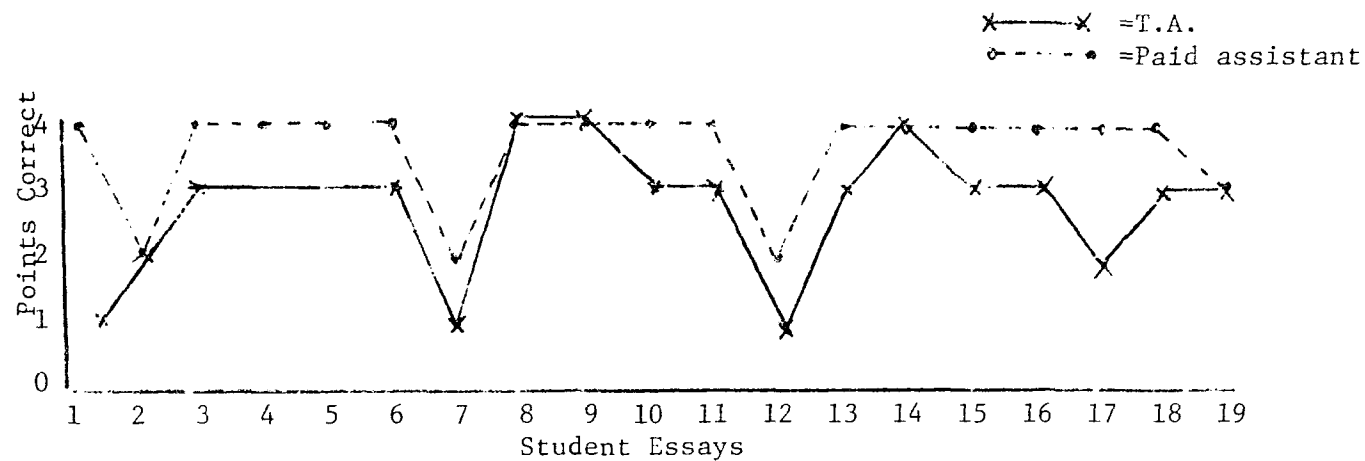


Figure 30.2: Unit 13 essay grading agreements for the instructor-paced section.

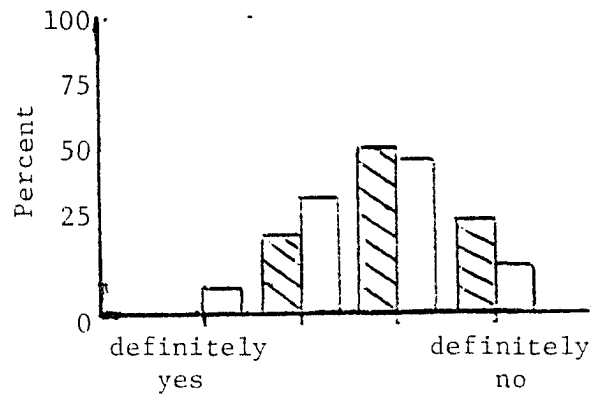
answer. The self-paced students indicated that they almost never received less credit than they deserved while 50% of the instructor-paced students felt that they did get less credit than they should have (see Figures 31 and 32). These data support the finding that self-paced T.A.'s were more lenient.

It was thought that the leniency on the part of the self-paced T.A.'s might explain why self-paced students achieved higher scores on initial quizzes. Therefore, the data were inspected further to determine how many students displayed an inadequate performance on the multiple choice section of the quiz alone. These data indicate that in most cases the essay question did not make a major difference in the percentage of students who passed the first unit quiz (see Figure 33).

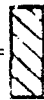
Instructor-paced students were required to take a unit quiz every Tuesday whether or not they were prepared. Self-paced students, on the other hand, could take the unit quiz at their convenience, presumably when they were confident that they understood the unit assignment. This is a more feasible explanation for why self-paced students passed the initial unit quizzes more frequently than instructor-paced students.

It appears that the grading scale used to assign points for unit quizzes was not equal for the two groups. Students in the self-paced section could miss up to 4 (20/24) and receive 10 grade points for the unit quiz. To receive 10 grade points in the instructor-paced group 22/24, points were required. Instructor-paced students could miss 4 points on a unit quiz and receive 10 grade points if they

Figure 31: On at least one occasion a T.A. gave me credit for an insufficient essay answer.



Instructor-paced=



Self-paced=

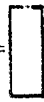
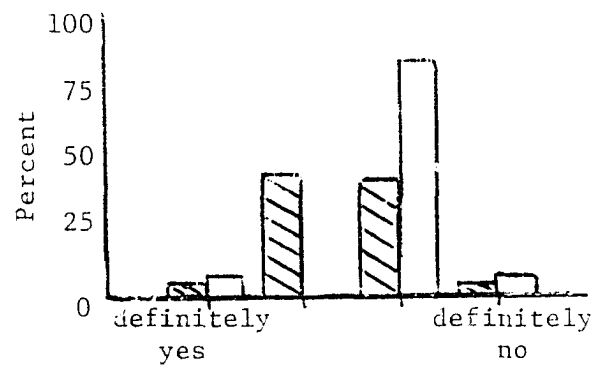


Figure 32: On at least one occasion a T.A. gave me less credit than I deserved for my essay answer.



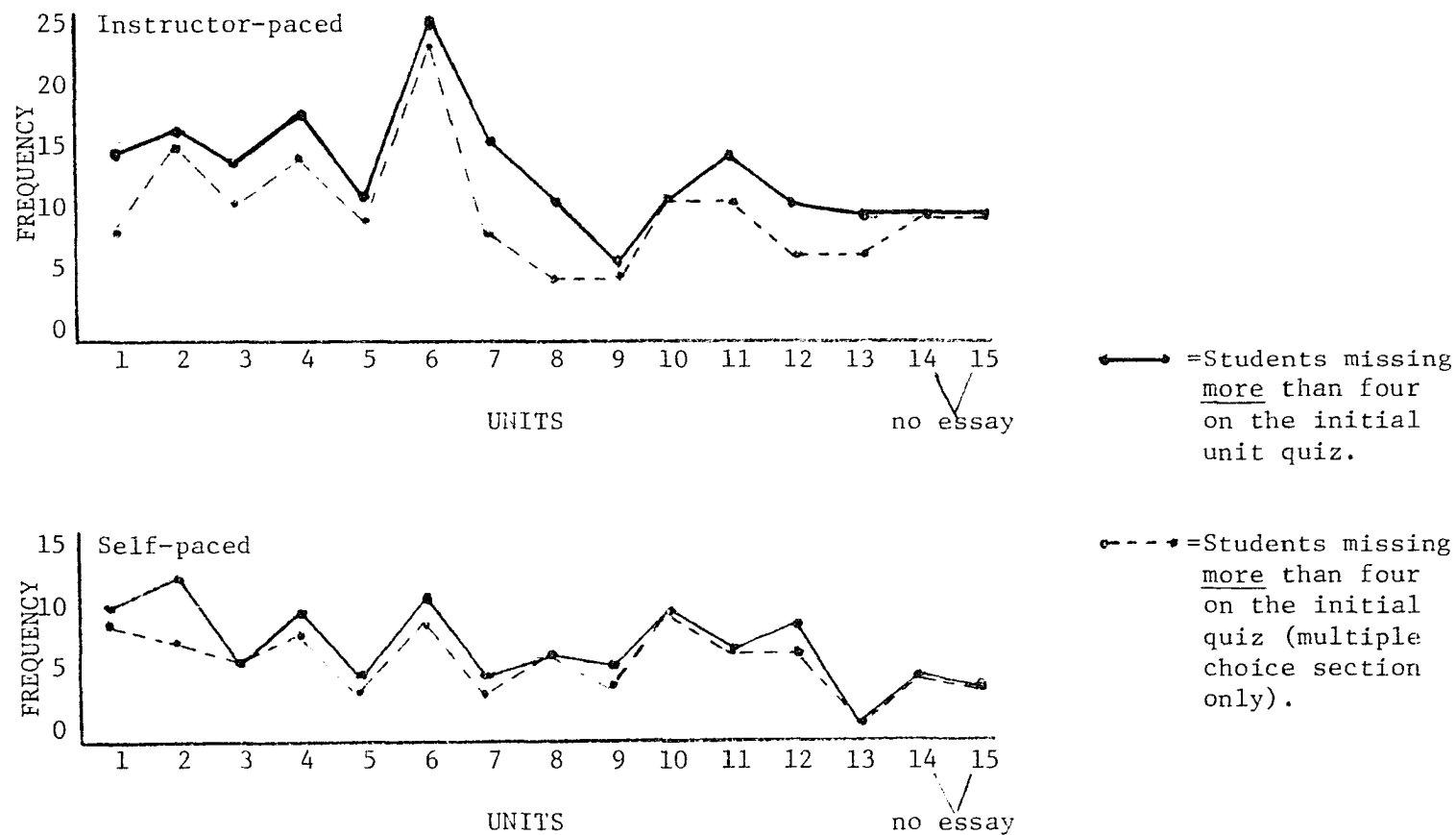


Figure 33: The space between lines represents those students who may not have passed the unit quiz because of the essay question.

were able to add 2 "score points" from the lecture quiz onto their raw score unit quiz. If a student did not earn "score points" on the lecture quiz he was operating under a tougher grading scale than instructor-paced students who did earn 2 lecture quiz "score points" and self-paced students (see Table B). The percentage of instructor-paced students who did not earn the two lecture quiz "score points" is shown in Figure 34.

Because the two point lecture quiz was an uncontrolled variable it may have been advantageous to have excluded it from the present study. However, as was said earlier, the purpose of this investigation was to make a broad comparison between self-paced and instructor-paced instruction. The two point lecture quiz is a technique which has been used to help pace students by bringing them in contact with the unit material prior to last minute studying before the quiz. Another pacing technique (which was not included in this study) used to motivate students so that they study early is a two "score point" quiz over the study objectives. This quiz is typically given before the Monday and Wednesday lecture.⁴

The effectiveness of instructor-paced techniques has been the subject of two recent studies. Hoehle (1972), researched the effectiveness of a preparatory quiz which was given about four days before major exams. The preparatory quiz covered the major points from the unit study material and counted towards 20% of the exam

⁴These techniques were developed and are currently being used in instructor-paced courses, by Dr. Jack Michael at Western Michigan University.

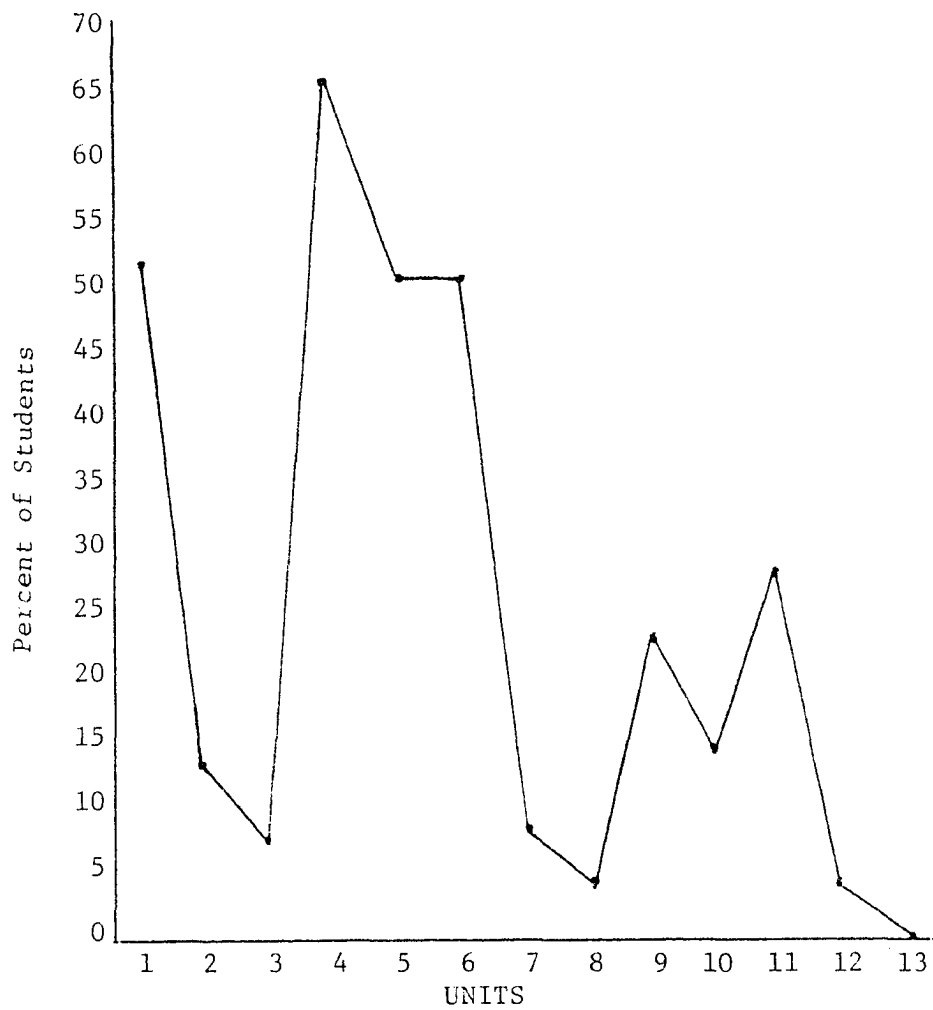


Figure 34: Percentage of instructor-paced students who did not earn two "score points" on the Monday lecture quiz and therefore, were operating under a tougher grading scale.

score. The results of this study showed only slight differences between groups. However, when an abridged statistical analysis was applied to the data there was some indication that a system which increases the probability that a student will come in contact with the course material leads to higher exam scores.

The second study, Williams (1973) compared the effectiveness of three preparatory quiz situations. Four groups were involved in the study. One group was required to take preparatory quizzes over the study objectives, a second group took quizzes over the lecture material, a third group took both preparatory quizzes and the fourth group did not take either of the preparatory quizzes. The results were nonsignificant, however, definite trends did show up in the data. When median results were compared, students who took both preparatory quizzes performed better on the major exam; students who took the study objective quizzes or the lecture quizzes displayed an intermediate performance; and all three preparatory quiz groups had higher exam scores than the group who did not take a preparatory quiz. This study also suggests that increasing the frequency that a student comes in contact with the material will increase exam scores. Both of these studies recommend further research.

Another uncontrolled variable in this study which needs investigation is the effectiveness of group remediation conducted by the instructor verses individual remediation used in a self-paced system. A study looking at remediation factors is currently in progress (Barton).

Instructor-paced evaluations suggested that remedial lectures covered the areas where students were having problems. However, there was no control variable implemented to detect whether the lectures were effective. In the self-paced group, students said that T.A.'s were able to explain the concepts in such a way that they left the discussion with a better understanding of the material. Again however, a control variable was not implemented to test this factor.

Student evaluations suggest that both the self-paced and instructor-paced instructional methods are superior to traditional instruction. Because the students were exposed to only one treatment it was not possible to ask them to compare the self-paced and instructor-paced systems.

The self-paced student reports indicated that they looked forward to the activities in the course slightly more than did instructor-paced students. This is probably due to self-paced students being able to schedule their own hours thus, allowing them more freedom with other courses and outside activities.

Students in both groups gave high ratings to the work done by T.A.'s, however, the self-paced students gave slightly higher ratings to T.A. related questions. This was probably the result of self-paced students having more direct and personal contact with T.A.'s.

The results of this study suggest that slight differences do exist between the self-paced and instructor-paced instructional systems. However, further research concerning grading scales and pacing techniques imposed by the instructor, remediation, unit

assignments and study objectives, and, grading reliability are needed before any statement of superiority of an instructional method over the other can be made.

CONCLUSION

1. Self-paced students received higher course grades than did instructor-paced students. An explanation for this result was given.
2. It appears that self-pacing leads to better performance on initial unit quizzes.
3. Students gave high evaluations to the activities imposed by both instructional systems.
4. This investigation did not find one system superior to the other.
5. A component analysis of the instructor-paced and self-paced systems was suggested for further research.

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