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ABSTRACT

This report presents results of Personalized System of Instruction (PSI) during the fall 1972 semester in an introductory Biology class at North Country Community College. Fifty-seven students were enrolled in the course at the beginning of the semester. Course content was divided into 20 units of study. A study guide was written for each unit containing introduction, behavioral objectives for the unit, and a suggested procedure for objective mastery. Five student proctors (tutors) assisted students to master course content. Of the initial group of 57 students, 22 were classified as withdrawals. Course evaluation by the students tend to indicate a favorable response to PSI. Progress charts, statistical data, and evaluation results are included. (MJM)

ED 089624

PSI ONE SEMESTER LATER

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Life Science Division
North Country Community College

April 1973

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INTRODUCTION

Many people stopped me in the hallway during the past semester to ask how the new course was going. My response was typically a hurried, "I don't know myself, but I'll let you know at the end of the semester." This paper is a response to those interested persons.

The report presents results of the use of Personalized System of Instruction (PSI or Keller Plan) during the fall 1972 semester, in what was formerly the lecture portion of Introductory Biology (Biology 101).

Individualized, self-paced, mastery-oriented learning was made possible with the assistance of undergraduate proctors (tutors). Critical information was presented in written form, and a variety of motivational devices were employed. (For more background information on PSI, see: Born, D. G., Instructor Manual for Development of a Personalized Instruction Course. Center to Improve Learning and Instruction, University of Utah, Salt Lake City, Utah, 1970., and Keller, F. S., 1968. Good-bye Teacher. Journal of Applied Behavioral Analysis. 1:79-86.)

Format for this paper is informal. Interpretive comments are minimal in recognition of the fact that in education we know little about where we have been, and less still about where we are going.

MATERIALS AND METHODS

Student Composition

Fifty-seven students were enrolled in the course at the beginning of the semester. The class included 44 (77%) freshmen, 11 (19%) sophomores, and 2 (4%) part-time students. All freshmen and sophomores were full-time, matriculated students.

Students were enrolled in the following college programs:

*Biological Laboratory Technology	7 (12%)
Liberal Arts - Business	3 (5%)
- General	9 (16%)
-*Physical Education	14 (25%)
- Social Science	4 (7%)
Mental Health	6 (10%)
Police Science	1 (2%)
*Secretarial Science (medical)	2 (5%)
*X-Ray Technology	9 (16%)
Part-time (*pre-nursing)	2 (3%)
	<u>57</u>

(*Programs requiring Biology 101)

A total of 40 students (70%) were enrolled in programs requiring Biology 101, and 17 students (30%) presumably chose the course as an elective.

Students had no prior knowledge that an unconventional instructional format would be used in the course.

Classroom

The course was held in Riverstreet 4 which contained 50 moveable, tablet-arm chairs. Through chair arrangement the room was divided into three areas. A portion to the rear served as a testing area. Proctor stations were arranged along side walls, and the forward center of the room served as a think-tank. The think-tank was used as a study area and holding pattern when the testing area became crowded. Classroom arrangement is illustrated in Figure 1.

No special facilities or equipment were required except for a classroom clock, cabinets and filing facilities for the large volume of paper materials. All course materials were maintained in a locked closet off R-4.

The classroom was open for tutoring and testing for one hour and 20 minute periods each week. The course was originally scheduled to meet two periods each week (10:00 - 11:20 Monday and Wednesday). When it was determined that the course would be offered on the PSI format two additional class periods were added, 4:00 - 5:20 on Thursday (Activity Period) and 1:00 - 2:20 on Friday.

Students were required to come to the classroom only when they desired tutoring or wished to take a unit test.

Course Materials

TEXT: The textbook for the course was Invitation to Biology by Helena Curtis, North Publishers, 1972. Since the text served as the primary source of critical information in the course, it was selected with greater than usual care from among many recent publications.

The following features made the text ideal for this PSI course:

- 1) Readability level of upper high school to lower college according to the Frye Readability Index;
- 2) short chapters accommodated well to the PSI unit format;
- 3) glossary with pronunciation aids;
- 4) clear illustrations.

UNITS: Course content was divided into 20 units of study. A study guide was written for each unit. A study guide typically contained an introduction (written in an informal and hopefully motivational style), explicitly stated behavioral objectives for the unit, and a suggested procedure for objective mastery. Suggested procedures included readings in the text, notes to specific illustrations, and references to reserve materials (written, visual) in the library. The study guide also included appendices when needed to present or expand concepts not adequately covered by the text. Length of the Study Guides varied from 2 to 9 pages.

TESTS: Three forms of a test were written for each unit. Questions tested every objective included in the Study Guide and were of multiple choice, true-false, matching, fill in the blank, and short answer varieties. Tests were designed to be completed in 15 to 20 minutes.

Personnel

PROCTORS: Five student proctors¹ (tutors) assisted in the course. Proctors were chosen on the basis of previous performance in the course and willingness to help other students master course content. They performed three important classroom functions. They: 1) tutored students who experienced difficulty with course content (objectives); 2) evaluated

¹Proctors: Dave Fregoe, Dom Poscillico, Larry Riley, Phil Smith, Joan Thompson.

student tests as soon as the tests were completed. Evaluation included scoring tests and engaging students in conversation concerning their written responses; 3) attempted to motivate students by ending proctoring sessions with updating the student's progress chart and discussing his status relative to the red line (Figure 2).

An initial proctor/student ratio of 1:11 converted gradually, as a result of attrition, to a more ideal 1:7 by the close of the semester. Students were randomly assigned to proctors, though some cross proctoring occurred.

Proctors met with the instructor outside of class 2 - 3 hours each week for the purpose of discussion and testing on course content. Proctor meetings also provided a forum for discussing problems associated with proctoring, e.g., how to motivate particular students; how to respond to a student who tries to misuse PSI; applications of learning reinforcement theory; et cetera.

Proctors were paid with work study funds for their services. Four proctors, considering careers in teaching, also undertook proctoring as a Personal Study Project; they received 3 credits.

COURSE ASSISTANT: The course assistant¹ stapled, filed, and generally maintained order of the large volume of paper materials associated with the course. She also dispensed unit tests and accumulated a variety of information on student performance on a Master Chart. Attendance was monitored daily and the purpose of attendance was indicated (tutoring, testing, or both). Tests dispensed to each student were

¹Course Assistant: Gloria Amanzio.

recorded, including form of the test. When a test was returned, the student's fate on the test was also indicated on the Master Chart with a + (satisfactory) or a - (unsatisfactory). The Master Chart provided immediate information on each student's status in the course at any point in the semester.

The course assistant was also a work study student.

INSTRUCTOR: The instructor's responsibilities prior to the beginning of the semester included dividing the course content into units of study, writing a study guide and three test forms for each unit.

Classroom duties included ensuring that student flow through the classroom was smooth and efficient. He served as a clearinghouse for disagreements between proctor and student, proctored students when a crush developed or a proctor was ill. The instructor was expected to respond equally well at any time to questions on Unit 2 or Unit 12. The instructor also spoke individually with students, offering encouragement and understanding. He is the engineer and manager of the system, and this makes him responsible for making the system work.

The instructor must guarantee responsiveness from the system. Errors and ambiguities in study guides and tests were recorded as they were identified by students and proctors, and were corrected before the following semester. More serious problems required a dash to a typewriter and preparation of appendices or modification of tests before the next class period.

The instructor reviewed all tests corrected by proctors daily. When discrepancies occurred, immediate feedback was provided to the proctor to reduce chances of the error recurring.

Self-pacing

Students were informed that they could satisfy course requirements at their own rate provided the course was completed by the end of the semester. A student wishing to spread the work uniformly throughout the semester had to complete roughly 1.5 units each week.

The only time contingency, other than completing the course by the end of the semester, was that students complete Unit 1 no later than one week into the semester. There is a tendency for certain students to overstudy initially in PSI courses and for others not to begin work until weeks into the semester. This contingency was intended to help students get into the course immediately.

Motivational

The short unit approach was intended to make frequent success possible, the assumption being that feelings of achievement generated by passing unit tests are strongly motivational.

Each student also had a Progress Chart (Figure 2) on which he could monitor his own progress. Students were reminded frequently of the virtues of staying on or above the red line. Also, a large sign in the classroom indicated the number of units that should be completed by the end of the week to maintain minimum progress.

Throughout the semester, the instructor spoke with students who were behind in an effort to determine causes for lagging, and to provide encouragement.

Finishing the course early carried eligibility for taking an early final examination.

Students were explicitly informed that incompletes (INC) would be

very difficult to come by, and would be granted only in unusual circumstances.

Testing

When a student decided he was ready for testing, he came to the classroom and asked the course assistant for a test. Test forms were dispensed randomly.

The student entered the test area. When the test was completed, the student brought it to his proctor for immediate scoring. The proctor recorded the student's estimated study time on the test. As the student looked on, the proctor quickly scored the test, marking responses correct (✓), unclear (?), or incorrect (-). The only communication between proctor and student during this phase of correction were complimentary remarks from the proctor as he graded a correct answer.

Once graded, the proctor asked the student to clarify all unclear responses. If the clarification was correct, the student was asked to write the correct response, and on the basis of the written response the question mark was converted to correct (✓). If the student could not clarify his answer, the question mark was changed to incorrect (-). In all cases, students were graded only on the basis of a written response.

Mastery

Mastery of each unit at the 85% level was required for progressing to the next unit. If a student scored below 85%, the proctor referred the student to the corresponding, troublesome objectives in the study guide, with specific comments about how to approach them. The student was permitted to take a retest (alternate form) after 30 minutes. This time contingency was intended to prevent students from rushing to retest without adequate study.

A student who scored 85% or better was asked to correct all errors made on the test in writing on a separate sheet of paper. Corrections were brought back to the proctor who checked for accuracy, and then stapled to the test by the course assistant and filed.

When time permitted, a student scoring 100% on a test was asked to expand on responses to several test questions chosen randomly by the proctor. This technique was also employed in any situation in which proctors suspected cross feeding of information.

A student was not permitted to take a test if less than 30 minutes remained before the end of the period. This ensured adequate time for scoring tests and performing other clerical duties before the end of class.

There was no penalty for failing a test. A student received credit for a unit and was permitted to progress only upon demonstration of mastery of unit objectives. Testing therefore served a diagnostic function in the sense that it clarified for the student those objectives which had not been mastered.

Final Examination

Every student was informed in the syllabus that he would take a comprehensive final examination covering the entire course at the end of the semester. The examination was of an objective type (multiple choice), and was based equally on all 20 units. Students completing 20 units before the end of the semester were eligible to take an early final examination.

The final examination was given at three times: the last scheduled class day of the semester, one week before the end of the semester, and three weeks before semester's end. The final examination could be taken only once.

Grading

PSI GRADE: The PSI grade was based on a system totalling 400 points. Each completed unit contributed 15 points toward the 300 points possible with completion of all 20 units. The final examination was worth 100 points and accounted for 25% of the PSI grade.

The total points required to earn a given letter grade in the PSI portion of the course is shown below:

<u>Grade</u>	<u>Points</u>
A	380 - 400
B	360 - 379
C	340 - 359
D	320 - 339
NC	0 - 319

LABORATORY GRADE: Grading in the laboratory was based on performance on announced quizzes, seriousness, and thoroughness of student work. Absences from the laboratory lowered the grade as follows: one absence diminished the grade by a sign, e.g., from B to B⁻¹. Two absences lowered the laboratory grade a letter, e.g., from C to D, and three absences resulted in an NC in the course.

FINAL COURSE GRADE: The PSI grade was worth 2/3 toward the final course grade, and the laboratory grade accounted for 1/3 of the final grade.

The schemes for determining laboratory and final course grades are given here only for the purpose of general information. All references to grades which appear on subsequent pages of this report refer only to grades earned in the PSI portion, or formerly the lecture portion of the course.

¹ Signs are used only in internal course records.

Change in Course Requirements

A change in course policy was announced the day before the final examination to accommodate a contingent of conscientious students who could not complete the course by the end of the semester. It is essential to understand that students had no indication prior to the announcement that a contingency plan had been formulated. Since the contingency plan is irrelevant to student performance analysis conducted in this paper, it is not outlined here. For a complete statement of the plan, see Appendix A.

Important Announcements

A bulletin board was installed in the classroom and served as the primary link with students for important messages. Students were responsible for checking the board at least once a week. Announcements were also made in the laboratory.

RESULTS AND DISCUSSION

Data collected during the past semester on student performance follows. It is especially difficult to interpret educational data. Such data is diffuse at best, in that it attempts to quantify changes occurring within the minds of students. The only real evidence of such changes is expressed as changes in visible behavior,¹ and behavior can at least be monitored. Behavior changes probably provide one of the best bases available upon which to construct and modify pedagogic techniques.

As a result of the time extension offered students who could not complete the course, the class divides conveniently into three groups. The 23 (40%) students taking the final examination at the close of the semester are referred to as COMPLETERS. Twelve (21%) students who qualified to continue the course into the second semester are considered to be IN-PROGRESS. Twenty-two (39%) students withdrew from the course and are referred to as WITHDRAWALS. "Withdrawal" as used in this paper refers to any student who stopped attending class irrespective of whether he withdrew from the course formally.

Completers

Figure 3 shows the average rate of progress among course completers. Several features of the graph should be noted. It appears that completers required a break-in period of nearly half the semester to adjust to the freedom of self-pacing. For the first 7 - 8 weeks, the rate of progress

¹The term "behavior" is used here in a very broad sense. It includes test performance, frequency of attendance and tutoring, expressed attitudes (facial and verbal), or any other observable student response.

(slope) is below the minimum rate required (diagonal line) to complete the course. During the last half of the semester the average rate of progress (slope) was greater than the minimum completion rate.

Figure 4 illustrates rates of progress established by various completers. One student (curve a) completed all 20 units in ten weeks. Another student (curve b) uniformly maintained the minimum rate of progress. More typically (curve c), completers were characterized by a final burst of study and test taking during the last weeks of the semester.

The average number of units completed was 19.6 (range 16-20). Table 1 shows the number of units passed by each student completing the course. The average completer studied biology 4.4 hours each week (range 0.75-7.0 hours; median 4.5 hours), or 3.2 hours per unit completed. While only straw polls exist as a basis for comparison, the 4.4 hours spent on biology weekly represents a 2 - 3 fold increase over previous semesters.

Completers required 1.2 attempts (range 1.0-2.4; median 1.2) to successfully pass a unit.

Only one student took the final examination three weeks before the end of the semester. Only one of the six students who qualified, chose to take the final exam one week before the semester closed. All of these students completed their last unit during the week of the second final examination, three of them on the day before the examination.

Four students not meeting course prerequisites¹ completed the course. Three students took Basic English (Dev 001) concurrently; one of these also took Basic Reading (Dev 010). One student had no high school mathematics. All four students had adequate high school science backgrounds.

¹See Appendix B for Biology 101 course prerequisites.

In-Progress

Twelve students (21%) did not complete the course by the end of the semester. Group progress is illustrated on Figure 5, and shows a relatively uniform rate of progress throughout the semester, with a burst of activity immediately following Thanksgiving Recess (November 23-24).

Why these students progressed more slowly is not clear. It is conveniently simple to say that these students goofed away the semester, but the data suggests that certain students experienced real difficulty with course content. In-progress students studied biology 4.4 hours each week (range 2.0-7.75; median 4.0), which equals the study time of completers. Four and one-half hours of study were required by in-progress students to successfully master the average unit. This is nearly 1.5 hours more study per unit than that required by the average completer. The instructor felt that to the degree that in-progress students experienced difficulty with the course, they deserved whatever time was needed to successfully complete the course. Alternatives to granting additional time were compromising either course content or course mastery standards.

The average member of the group completed 13 units (range 10-15; median 13). See Table 1 for complete information on the number of units completed by in-progress students. In-progress students made 1.5 attempts (range 1.1-2.3; median 1.5) to pass a unit.

Seven in-progress students did not meet course prerequisites. Three did not have adequate high school science training. Three students were taking Basic English (Dev 001) concurrently; one student was enrolled in Basic Reading (Dev 010).

Withdrawals

Twenty-two (39%) students withdrew from the course. This attrition is 3.7 times greater than the lowest previous attrition (fall 1970) and 1.4 times greater than the previous high (spring 1971). Attrition was double the previous average (fall 1970 - spring 1972).

The high withdrawal rate is of major concern, and is interesting in view of various features of PSI which would seemingly place success within reach of most students desiring it, e.g., self-pacing, clearly stated objectives, availability of individual tutoring. PSI after all is intended to augment, not undermine, the educational process.

In only a few cases are the reasons for withdrawal apparent. One student withdrew during the first week because she thought she had registered for Anatomy (Bio 105). Another student withdrew after five weeks when North Country Community College granted transfer credit for a similar course taken at another institution. He had no difficulty with the course. One student withdrew following an extended illness. Another student, who on several occasions expressed enthusiasm with the PSI approach, and who performed well whenever he appeared in class, apologized for withdrawing toward the end of the semester; he conceded that he needed some time on the open road before becoming serious about school.

It is difficult to characterize the 18 remaining students, but some observations can be made.

1. Eleven students did not meet course prerequisites (neither did

the last two students described above). Nine students did not have adequate high school science backgrounds, and two of these had no high school algebra. Six of the eleven students were taking either or both (2 students) Basic English (Dev 001) and Basic Reading (Dev 010).

Obviously, course prerequisites have not been enforced. Only two of the remaining seven students appear to have gotten into the game at all. One completed seven units, the other eight units. The other five students completed no more than four units.

The instructor urged three students to withdraw who had not completed Unit 1 after two weeks. In addition to not meeting the one week time contingency, these students had inadequate high school backgrounds and did not meet course prerequisites.

2. The withdrawing student completed an average of 3.8 units (range 0-12; median 2.2; see Table 1), and studied biology 1.8 hours each week (range 0.75-5.25; median 1.5). This represents 2.6 hours per week less study than the average completer or in-progress student.

3. Based on GPA, the withdrawing student is generally less academically successful than the other two groups. The average cumulative GPA of the withdrawing student as of the end of the fall 1972 semester was 2.0 (range 0-4.0; median 2.15; N=8. The student with the 4.0 GPA is the individual who received transfer credit for Biology 101. The next highest GPA was 2.9). This compares with a cumulative average GPA of 2.45 (range 1.83-3.34; median 2.35) for students in-progress and 3.07 (range 1.74-4.0; median 3.10) for completers. See Table 2 for complete information on GPA scores for each group. A comparative study among the three groups

based on ACT scores was not possible as data was available on only 30% of the students. See Appendix E for comments on ACT.

4. The average withdrawing student does not appear incapable of successfully completing Biology 101.

a. Figure 6 shows an interesting relationship between the progress rates of withdrawing and in-progress students. It is important to understand that the average number of units completed each week by withdrawing students is based on the number of students still remaining in the course as of that time; therefore, points along the curve represent differing numbers of students. The graph shows that up until time of withdrawal, withdrawing students were progressing at a rate roughly equal to that of in-progress students. It is interesting to contemplate what 2.6 hours of additional concentrated study each week might have done for the withdrawing student. It would also be of interest to know how an open-ended semester might have affected withdrawal behavior.

b. Fourteen (64%) of the twenty-two withdrawees passed the last unit test taken. Additionally, the average 1.5 attempts to pass a unit is the same as that of in-progress students, and not significantly different from the 1.2 attempts of completers.

It appears as though withdrawal from the course was due primarily to some factor, or combination of factors, other than ability to master course content.

Grades

Table 3 provides a view of grade distributions each semester since the fall of 1970. The cumulative lecture grade distribution for the four

semesters is also shown, and is contrasted graphically with the PSI distribution in Figure 7. Cumulative lecture grades align roughly with a bell curve, though decidedly skewed toward the lower end.

The A through F PSI distribution for completers roughly approximates an inverted bell, although the left portion of the curve is disrupted by the relatively few number of A's received. It seems appropriate to point out that the frequency of A's earned is 3.3 times greater than the average number of A's received during the preceding four semesters, or the percentage of A's more than doubled the cumulative percentage of A's over preceding semesters.

The number of B's is also markedly increased from a previous cumulative average of 9.4% of the students to 15.8% under PSI. The percentage of students receiving C's (10.5%) is less than half the previous cumulative average of 24.4%. The number of D's (3.5%) diminished by 9 fold over the 32.8% of previous semesters.

Although the percentage of failures (F/NC) (40.3%) more than doubles previous semesters (18.3%), it should be noted that all but one of the 23 NC's received by PSI students were withdrawals. The exception was an intelligent student who completed only 16 units, and gambled by taking the final examination on the last day of classes. (She needed to score a 95% on the final examination to even pass the course with a low D, but had not taken the few minutes required to perform the calculation to determine that fact.) This was the only completer who did not pass the course.

Twelve students (20.9%) are in-progress and will return next semester to complete the course. This compares to 11.7% INC's of

previous semesters.

The over-all improvement in grades is encouraging. When in-progress students complete the course, essentially all students who chose to stick with the course will have passed it.

Attendance

Figure 3 illustrates average percentage class attendance each week of the semester, based on the number of students in the course as of the end of the week. Average attendance declined through the first five weeks of the semester, reaching a low on October 9 - 13. It appears that students spent this period of time enjoying a false sense of freedom provided by PSI. Attendance increased substantially throughout the remainder of the semester except for a two week period interrupted with Preregistration (November 13-17) and Thanksgiving Vacation (November 20-24).

An average of 43% (range 2 - 100; median 41) of the students came to the classroom each day for testing. The average number of students taking tests on days immediately preceding or following holidays was 38% (range 17 - 66; median 38), or 4% below the daily average attendance.

Data on number of students receiving tutoring assistance was recorded beginning October 30. The daily average number of students receiving tutoring was 14% (range 0 - 28; median 14).

Problems

Most problems tended to be of a logistical nature, and are considered soluble. The two greatest difficulties were student procrastination and attrition.

PROCRASTINATION: Most people are less than adept at planning life's activities so as to complete a project by a given deadline, particularly

when that deadline is three months in the future. Students are no exception, indeed, lack of experience with long range deadlines may aggravate the procrastination problem for students.

As indicated in the MATERIALS AND METHODS portion of this paper, the course employed several motivational devices. The value of these motivational devices is not entirely clear. 1) Provisions to take an early final examination was intended to serve as an incentive for early course completion. Only one student qualified for the earliest final examination (3 weeks before the end of the semester). Only one student of the six who qualified for the second final examination (1 week before close of the semester) took it early. The others chose to take the final examination offered on the last class day of the semester. 2) Beginning approximately six weeks into the semester, each proctor maintained a progress chart for each of his students. Proctoring sessions were terminated with updating the student's progress chart. The graph clearly indicated to the student his level of performance up to that moment relative to the red line. It also provided the information needed to help the student develop a realistic strategy for recovery. 3) A wall chart in the classroom indicated the number of units that should be completed by the end of that week in order to maintain the minimum progress required to complete the course by the close of the semester.

WITHDRAWAL: The problem of attrition has been discussed in some detail earlier in this paper. Appropriate responses to attrition are not clear; parameters of the problem are diffuse and poorly understood. Withdrawing students, whenever possible, were asked to complete a

questionnaire which attempted to extract cause/s of withdrawal.

Information obtained was not particularly helpful and, due to the total disappearance of many students, was fragmented. It was not even possible to determine in many cases whether the cause of withdrawal was course-related. The least that can be done is to open the end of the semester, thereby eliminating one potential cause of withdrawal for slower students who know they cannot complete the course by the end of the semester. See Appendix D for new college policy designed to accommodate slower students.

Strengths

EMPHASIZES WRITING: PSI places great emphasis on written materials.

All objectives, instructions, and critical course content is in written form. The test plays a central role in the course. Of equal importance is the writing required of the student. Students maintain a notebook of written responses to objectives. The notebook serves a valuable thought organizer and study function for the student, and also serves a diagnostic function. In the event a student has difficulty with a test question. In such a case the proctor reviews the student's written response to the corresponding objective to determine if the difficulty is one of recall or of misunderstanding of the objective itself.

Tests are scored on the basis of written responses. If an unclear answer is clarified verbally to the proctor, the clarification is not accepted until it is placed on the test in written form. Additionally, a student who successfully completes a test with a score of 85% or better is asked to correct all errors in writing before he receives the next unit.

HUMANIZES THE LEARNING SITUATION: The important function of the proctors in maintaining a humane learning atmosphere cannot be overemphasized.

They contributed substantially to the course by serving as extensions, of the instructor, thereby making individual instruction possible. Because of proctors, there was always someone available to provide for each student's immediate reinforcement for good performance, assistance if it was sought, and encouragement when the going was difficult. Their sense of responsibility in maintaining course integrity, together with mature dedication to their students established the basis for excellent instructor-proctor and proctor-student rapport. The level of proctor dedication and function far surpassed expectations, and appeared largely proportional to the level of faith and freedom (to be proctors) granted by the instructor.

The approach is also responsive to the student. Students are urged to defend and expand on test answers, to point out ambiguities in course materials. The approach permits each student to progress at a rate that allows for optimum learning.

NO CAPTIVE AUDIENCE: In a PSI course, the student knows what his responsibilities are if he wishes to succeed. Hopefully, the instructor can create course materials and a course atmosphere which are supportive enough that the student will choose to handle the course responsibly.

Every time the student enters the classroom he is there of his own will; he is there for a rather clearly defined purpose. A self-defined purpose it seems to me is a prerequisite to learning. Learning is not ladled out with a long-handled spoon. It is a process of the head, and when the head is ready, learning occurs, almost mysteriously.

EVALUATION

One week prior to the end of the semester the thirty-seven students remaining in the course completed an extensive, anonymous evaluation of PSI. The questionnaire was divided into four parts: 1) General Course Evaluation, 2) Proctor Evaluation, 3) Instructor Evaluation which is not included here, and 4) Miscellaneous questions about the course.

Most of the questionnaire is in multiple choice form for ease of tabulation. Responses are indicated as percentages of students completing the questionnaire (37). A number of reactions could be monitored only with open-ended discussion-type questions. Responses to these are summarized on pages 30 and 31. (A copy of verbatim responses to discussion questions is available on request.)

The questionnaire was assembled in haste at the end of the semester which accounts for certain redundancies.

BIOLOGY 101 EVALUATION 1972-73

PERSONALIZED SYSTEM OF INSTRUCTION

This evaluation form is my primary source of information about your reactions to the introductory biology course you just completed. Since changes in the course structure will be based on your answers, it is very important to me that your responses are entirely honest. Please notice that this questionnaire is anonymous. I will greatly appreciate your cooperation in helping me design a better course.

I. General Course Evaluation

1. Are the objectives of the course clear?

A 78.9%	B 15.7%	C 2.6%	D 2.6%	E 0%
CLEAR			UNCLEAR	

2. Are the tests fair?

A 76.3%	B 21.0%	C 2.6%	D 0%	E 0%
FAIR			UNFAIR	

3. Are grades assigned fairly?

A 63.1%	B 36.8%	C 0%	D 0%	E 0%
FAIR			UNFAIR	

4. How would you rate the contribution of the textbook to the course?

A 47.4%	B 47.4%	C 5.3%	D 0%	E 0%
EXCELLENT			POOR	

~~5. Considering that the "lecture" portion of this course carries three credits, I think the amount of work required for the "lecture" portion of the course (PSI portion) is:~~

A. far too much	D. too little
B. too much	E. far too little
C. about right	

6. In comparison with 3 credit lecture courses, I think that the amount of work required in the "lecture" portion of this course is:

18.4% A. much greater	2.6% D. less
47.4% B. greater	7.6% E. much less
23.6% C. about the same	

7. In comparison with lecture courses, the degree of pressure on me to do the work of this course was:

7.8% A. much greater	21.0% D. less
57.8% B. greater	2.6% E. much less
7.8% C. about the same	2.6% Other

8. In comparison with lecture courses you have taken, rank the difficulty of this course.

13.1% A. much more difficult	13.1% D. less difficult
39.4% B. more difficult	5.2% E. much less difficult
28.9% C. about the same	

9. In comparison with lecture courses, the percentage of my mastery of the material in this course was:
- | | |
|-------------------------|-----------------|
| 31.2% A. much greater | 9.3% D. less |
| 43.7% B. greater | 0% E. much less |
| 15.6% C. about the same | |
10. In comparison with lecture courses, the feeling of achievement generated by passing tests in this course was:
- | | |
|-------------------------|-----------------|
| 37.8% A. much greater | 5.4% D. less |
| 37.8% B. greater | 0% E. much less |
| 18.9% C. about the same | |
11. In comparison with lecture courses generally, my enjoyment of this course was:
- | | |
|-------------------------|-------------------|
| 21.0% A. much greater | 7.8% D. less |
| 47.4% B. greater | 2.6% E. much less |
| 21.0% C. about the same | |
12. In comparison with lecture courses generally, the frequency of cheating in this course was:
- | | |
|-------------------------|--------------------|
| 0% A. much greater | 29.4% D. less |
| 0% B. greater | 55.8% E. much less |
| 14.7% C. about the same | |
13. In comparison with lecture courses generally, my temptation to cheat was:
- | | |
|-------------------------|--------------------|
| 2.7% A. much greater | 25.0% D. less |
| 2.7% B. greater | 36.1% E. much less |
| 33.3% C. about the same | |
14. In comparison with other courses generally, my understanding of basic concepts and principles in this course was:
- | | |
|-------------------------|-----------------|
| 27.0% A. much greater | 0% D. less |
| 56.7% B. greater | 0% E. much less |
| 16.2% C. about the same | |
15. In comparison with lecture courses generally, my tendency to memorize details in this course was:
- | | |
|-------------------------|-----------------|
| 13.5% A. much greater | 5.4% D. less |
| 48.6% B. greater | 0% E. much less |
| 32.4% C. about the same | |
16. In comparison with lecture courses generally, the influence of the instructor on me in this course was:
- | | |
|-------------------------|-----------------|
| 10.8% A. much greater | 18.9% D. less |
| 51.3% B. greater | 0% E. much less |
| 18.9% C. about the same | |
17. In comparison with lecture courses generally, the recognition of me as an individual in this course was:
- | | |
|-------------------------|-----------------|
| 18.9% A. much greater | 5.4% D. less |
| 56.7% B. greater | 0% E. much less |
| 18.9% C. about the same | |

18. As the term went on, I found that my study habits in this course were:
 10.9% A. greatly improved. 8.1% D. harmed
 54.0% B. improved 2.7% E. greatly harmed
 16.2% C. unaffected

19. As the term went on, confidence in my ability to master the units:
 13.5% A. increased greatly 5.4% D. decreased
 64.8% B. increased 0% E. decreased greatly
 16.2% C. was unchanged

20. The size of the units in this course was:
 2.7% A. much too great 0% D. too small
 16.2% B. too great 0% E. much too small
 78.3% C. about right

21. As the term went on, my worry about my final standing in the course:
 16.6% A. increased greatly 19.4% D. decreased
 41.6% B. increased 2.7% E. decreased greatly
 19.4% C. remained about the same

22. Of your total study time per week, approximately what percentage of this time do you devote to studying material in this course?
 8.1% A. 0-15% 37.8% D. 45-60%
 10.8% B. 15-30% 13.5% E. more than 60% of the total study time
 27.0% C. 30-45%

23. Under what conditions do you study?
 59.4% A. in silence
 18.9% B. usually with a record player, or radio
 21.6% C. other

24. Do you frequently study the course material with someone else?
 82.8% A. no 6% D. yes, with 3 other persons
 17.1% B. yes, with 1 other person 0% E. yes, with 4 other persons
 2.8% C. yes, with 2 other persons

25. Would you recommend this course to your good friends?
 0% A. definitely not 62.1% D. yes
 10.8% B. maybe 8.1% E. no opinion
 18.9% C. probably

26. Would you recommend this type of instruction, i.e., PSI?
 0% A. definitely not 70.2% D. yes
 10.8% B. maybe 2.7% E. no opinion
 16.2% C. probably

27. Rate your learning in this course against all other courses you have taken so far.
 29.7% A. much greater 5.4% D. less
 54.0% B. greater 0% E. much less
 10.8% C. about the same

28. Specify what it is that made you learn in this course.
29. Specify what it is that interfered with your learning in this course.
30. What aspect(s) of this course did you especially like?
31. What aspect(s) of this course did you especially dislike?
32. If you could change one aspect of the course to improve it, what would you change?
33. General comments:
34. Considering all of the above qualities which are applicable, how would you rate this course?
- | | | | | |
|-----------|---------|--------|--------|----------|
| A 45.9% | B 48.6% | C 2.7% | D 2.2% | E 0% |
| EXCELLENT | | | | VERY BAD |

II. Proctor Evaluation

35. Did your proctor know the subject matter sufficiently well to do a good job of grading your tests?
- | | | | | |
|--------------------|---------|------|------|-------------|
| A 45.9% | B 54.0% | C 0% | D 0% | E 0% |
| VERY KNOWLEDGEABLE | | | | INCOMPETENT |
36. Did your proctor know the subject matter sufficiently well to provide adequate tutoring assistance?
- | | | | | |
|--------------------|---------|---------|------|-------------|
| A 45.9% | B 43.2% | C 10.8% | D 0% | E 0% |
| VERY KNOWLEDGEABLE | | | | INCOMPETENT |
37. Was your proctor helpful when you had difficulty?
- | | | | | |
|------------------|---------|------|------|-------------|
| A 64.8% | B 35.1% | C 0% | D 0% | E 0% |
| ACTIVELY HELPFUL | | | | NOT HELPFUL |
38. Did he appear sensitive to your feelings and problems?
- | | | | | |
|-------------|---------|--------|------|---------|
| A 48.6% | B 40.5% | C 8.1% | D 0% | E 2.7% |
| RESPONSIVE. | | | | UNAWARE |

39. Was he flexible?
 A 36.1% B 50.0% C 11.1% D 2.7% E 0%
 FLEXIBLE RIGID
40. Did he make you feel free to ask questions, disagree, express your ideas, etc.?
 A 59.4% B 29.7% C 10.8% D 0% E 0%
 ENCOURAGES STUDENT IDEAS INTOLERANT
41. Was he fair and impartial in his dealings with you?
 A 72.9% B 24.3% C 2.7% D 0% E 0%
 FAIR FAVORS SOME
42. Did he tell you when you had done particularly well?
 A 67.5% B 29.7% C 2.7% D 0% E 0%
 ALWAYS NEVER
43. Considering all of the above qualities which are applicable, how would you rate this proctor?
 A 51.3% B 45.9% C 2.7% D 0% E 0%
 EXCELLENT VERY BAD

III. Instructor Evaluation

IV. Miscellaneous

64. Your classification:

52.7% A. 1st semester

8.3% B. 2nd semester

33.3% C. 3rd semester

0% D. 4th semester

5.5% E. Part-time

65. Your cumulative GPA: (Applies only if this is not your first semester.)

0% A. 4.0

10.8% B. 3.00-3.99

27.0% C. 2.00-2.99

2.7% D. 1.00-1.99

0% E. 0.00-0.99

66. If this is your first semester at NCCC, how do you estimate your overall performance in all courses you are now taking?
- | | | | | | |
|-------|----|-----------|------|----|-----------|
| 4.0% | A. | A student | 0% | D. | D student |
| 64.0% | B. | B student | 4.0% | E. | NC |
| 28.0% | C. | C student | | | |
67. If you needed another science course and had the choice of taking that course with a PSI or lecture approach, would you choose PSI?
- | | | | | | | | | | | | |
|-------|----|-----|-------|----|--------------|------|----|--------------|----|----|----|
| 45.9% | A. | yes | 51.3% | B. | probably yes | 2.7% | C. | probably not | 0% | D. | no |
|-------|----|-----|-------|----|--------------|------|----|--------------|----|----|----|
68. If you had the choice of taking a non-science course with a PSI or lecture approach, would you choose PSI?
- | | | | | | | | | | | | |
|-------|----|-----|-------|----|--------------|-------|----|--------------|------|----|----|
| 35.1% | A. | yes | 48.6% | D. | probably yes | 13.5% | C. | probably not | 2.7% | D. | no |
|-------|----|-----|-------|----|--------------|-------|----|--------------|------|----|----|
69. How many units of this course did you complete? _____
70. If you did not complete all 20 units, would you like to suggest how the course could be run differently to prevent your falling behind (and still maintain self-pacing)?

A SUMMARY OF RESPONSES TO DISCUSSION QUESTIONS FOLLOWS. The number and percentage of students is shown for each response. Percentages do not total 100% as students frequently included several concepts in a response.

28. SPECIFY WHAT IT IS THAT MADE YOU LEARN IN THIS COURSE.

- | | | |
|----|-----|---|
| 16 | 43% | self-pacing aspect of course; personal responsibility for success |
| 9 | 24% | mastery requirement |
| 5 | 14% | helpfulness of study guides; objectives |
| 7 | 19% | other |

29. SPECIFY WHAT IT IS THAT INTERFERED WITH YOUR LEARNING IN THIS COURSE.

- | | | |
|----|-----|---|
| 12 | 32% | features of course, e.g. course pressure (22%); miscellaneous (11%) |
| 10 | 27% | non-academic matters, e.g., illness, death in family, noisy roommate, living with girl friend; soccer games |
| 8 | 22% | nothing |
| 3 | 8% | lack of maturity; laziness. |
| 3 | 8% | poor study habits |
| 3 | 8% | work requirements in other courses |
| 2 | 5% | memorization |

30. WHAT ASPECT(S) OF THIS COURSE DID YOU ESPECIALLY LIKE?

- | | | |
|----|-----|--|
| 16 | 43% | self-pacing; need to attend class only for testing/tutoring |
| 7 | 19% | sense of accomplishment generated by passing unit tests; sense of individual importance, e.g., "Wow, I completed this, and I am the one who did it!" "The triumphant feeling of passing a test without anyone's help." |
| 4 | 11% | personalization of approach, e.g., individual attention; 1:1 student-proctor relationship; always being able to get help |
| 3 | 8% | study guides; objectives |
| 3 | 8% | retesting without penalty |
| 2 | 5% | open, informal atmosphere of course |
| 4 | 14% | laboratory (N.B. laboratory portion of course was not self-paced.) |
| 7 | 19% | other, e.g., no lectures |

31. WHAT ASPECT(S) OF THIS COURSE DID YOU ESPECIALLY DISLIKE?

- | | | |
|----|-----|--|
| 12 | 32% | none |
| 11 | 30% | amount and difficulty of work required |
| 7 | 19% | proctors too busy scoring tests to provide tutoring help |
| 11 | 30% | other, e.g., ambiguities in course materials (3-8%); not having any lectures (1-3%); testing periods too short (1-3%); objectives too detailed (2-5%); miscellaneous (4-11%) |

32. IF YOU COULD CHANGE ONE ASPECT OF THE COURSE TO IMPROVE IT, WHAT WOULD YOU CHANGE?

- 11 30% fewer units
- 5 14% more, or longer testing periods
- 5 14% none
- 12 32% miscellaneous, e.g., add some lectures (3-8%); require rigid progress (2-5%); self-paced labs (1-3%); other (5-14%)

33. GENERAL COMMENTS:

- 26 70% favorable, e.g., "I feel that my study habits improved greatly..." "...It's a good feeling to know one has earned his grade, no matter what it is." "My retention of material in this course has been far greater than most."
- 7 19% critical; e.g., decrease number of units; more time for tutoring; room too crowded; longer testing periods; more proctors needed; should include occasional lectures
- 4 11% no comment
- 1 3% ambivalent, e.g., "Not bad if you worked."

70. IF YOU DID NOT COMPLETE ALL 20 UNITS, WOULD YOU LIKE TO SUGGEST HOW THE COURSE COULD BE RUN DIFFERENTLY TO PREVENT YOUR FALLING BEHIND (AND STILL MAINTAIN SELF-PACING)?

- 15 41% no response
- 8 22% my slow progress not due to course itself
- 6 16% more push from proctors and instructor, e.g., 1) "A boot in the pants." 2) "Perhaps aid the student in pacing themselves accordingly." This student also proposed an alternative, "As I suggested, lowering the number of units and/or perhaps extending the length of time to complete the course. A self-pacing course should be just that, without the end of the semester deadline. Pressure! ... PSI should eliminate the feeling of that dreadful D or NC. Nothing hurts more than failure and the loss of 4 credits!"
- 3 8% fewer units
- 3 8% more, or longer testing periods
- 2 5% require regular progress

No effort will be made at elaborate extrapolations from responses to the questionnaire. However, two items are of particular interest. The average weekly study time for in-progress and completing students was 4.4 hours. Just over half of the students (question 22) indicated spending better than 45% of their study time on biology. Perhaps our students spend even less time studying than we think.

Student preferences if free to choose between PSI and lecture format in future courses (questions 67 and 68) are interesting in view of student responses to questions concerning PSI course demands (question 6 and 8). The responses suggest that students generally are not the lazy people we tend to think. Rather if given an opportunity to work within a system which is responsive, which treats them as adults, and above all which makes success possible, students will rise to the level of maturity and faith inspired by that system.

CONCLUDING COMMENTS

The past semester has for me been the most demanding in time and energy of any in my three years at North Country Community College. It has also clearly been the most rewarding for me, and I believe, also for my students.

But, PSI is only one of many approaches to learning. Each of us must seek constantly for that instructional mode which best serves our personal style and the needs of our students. Without such efforts, we mythologize our open door policy. The educational process may not be permitted to handle people inhumanely. Nothing will likely be as effective in pushing us to think seriously about pedagogic techniques as threats of insolvency (the right response for the wrong reason). I suspect that those institutions which best survive the next several decades will be those who gain a sound reputation for serving the individual.

T A B L E S
And
F I G U R E S

Table 1. Number of Units Completed by Students in Biology 101.

UNITS	NUMBER OF STUDENTS		
	Completers	In-Progress	Withdrawals
0	--	--	4
1	--	--	1
2	--	--	3
3	--	--	3
4	--	--	6
5	--	--	1
6	--	--	--
7	--	--	1
8	--	--	1
9	--	--	--
10	--	1	--
11	--	2	1
12	--	1	1
13	--	3	--
14	--	2	--
15	--	3	--
16	1	--	--
17	--	--	--
18	2	--	--
19	1	--	--
20	19	--	--

Table 2. GPA Comparison of Withdrawing, In-Progress, and Completing Students in Biology 101.

	CUMULATIVE ¹ GPA THROUGH FALL 1972			FREQUENCY OF CUMULATIVE ¹ GPA THROUGH FALL 1972				
	Mean	Range	Median	NC 0-0.9	D 1.0-1.9	C 2.0-2.9	B 3.0-3.9	A 4.0
Withdrawals	2.00	0-4.00 ²	2.15	3	5	13	0	1 ²
In-Progress	2.45	1.83-3.34	2.35	0	3	6	3	0
Completers	3.07	1.74-4.00	3.10	0	1 ³	8	13	1

¹Cumulative GPA does not include grade for Biology 101.

²Student with GPA of 4.0 received transfer credit for Biology 101; next highest GPA was 2.9.

³Completion of course by this student is attributed to relentless encouragement from two roommates who took course concurrently.

Table 3. Comparison of Lecture and PSI Grade Distributions in Biology 101.

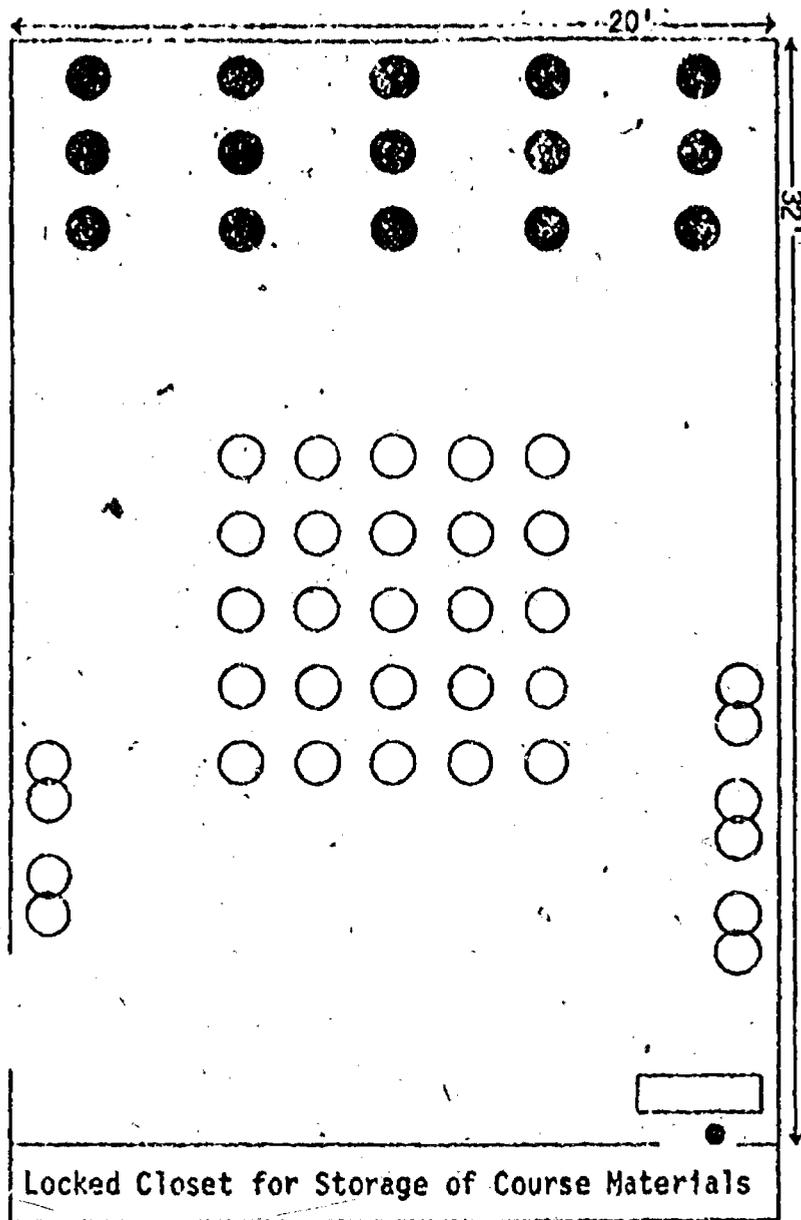
GRADE ¹	LECTURE										PSI	
	F1970		S1971		F1971		S1972		Cumulative		F1972	
	No	%	No	%	No	%	No	%	No	%	No	%
A	3	6.7	1	2.2	1	2.2	1	2.2	6	3.3	5	8.8
B	3	6.7	5	11.1	4	8.9	5	11.1	17	9.4	9	15.8
C	10	22.2	7	15.6	15	33.3	12	26.7	44	24.4	6	10.5
D	20	44.4	15	33.3	14	31.1	10	22.2	59	32.8	2	3.5
F/IC ²	3	6.7	8	17.8	10	22.2	12	26.7	33	18.3	23	40.3
INC/IP ³	6	13.3	9	20.0	1	2.2	5	11.1	21	11.7	12	20.9
TOTAL	45	100	45	100	45	100	45	100	180	100	57	100

¹Grade for lecture and PSI portion of course only; does not include laboratory grade.

²F-fall 1970 through fall 1971; IC-beginning spring 1972. The IC designation includes failures and withdrawals only.

³INC (no fee)-fall 1970 through fall 1972; IP (fee)-fall 1972 only.

Figure 1. Arrangement of PSI Classroom (R-4).



- Testing Area
- Think-Tank
- ○ Proctor Station
- ▭ Table with Master Chart
- Course Assistant

Figure 2. Example of Student Progress Chart Maintained by Proctor for each Student.

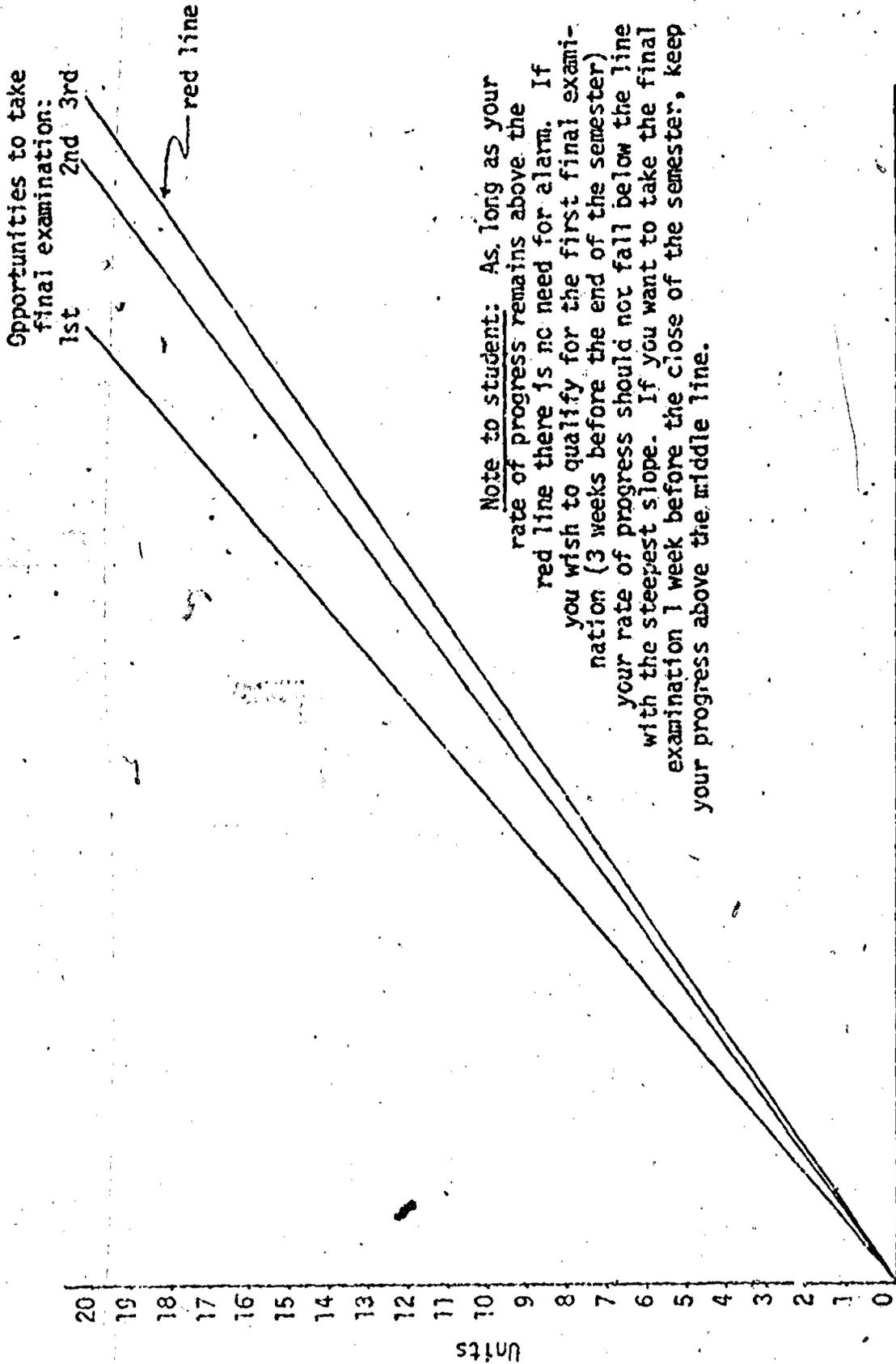


Figure 3. Average Progress Rate of Biology 101 Students Completing Course.

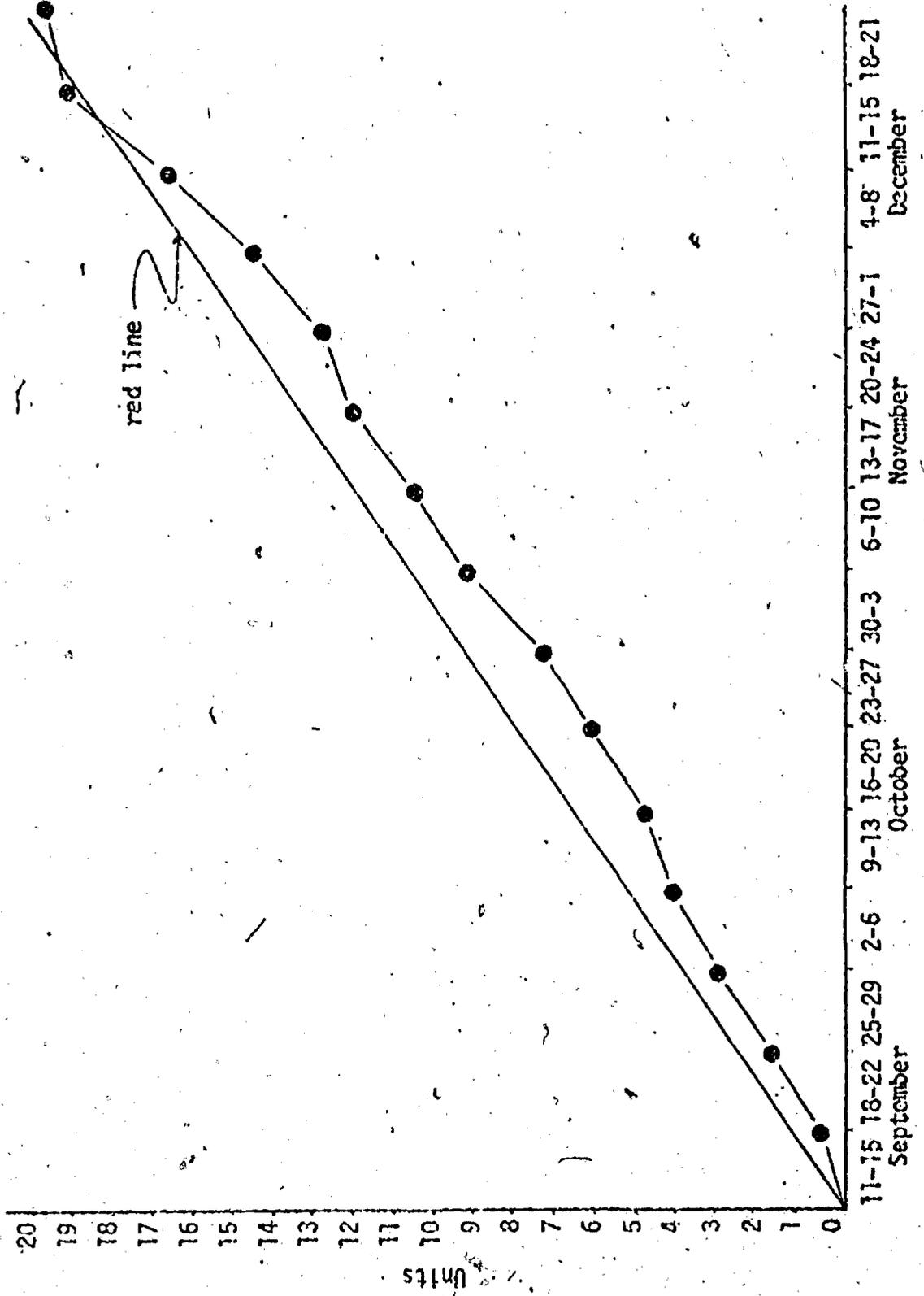


Figure 4. Progress Rates of Three Biology 101 Students Completing Course.

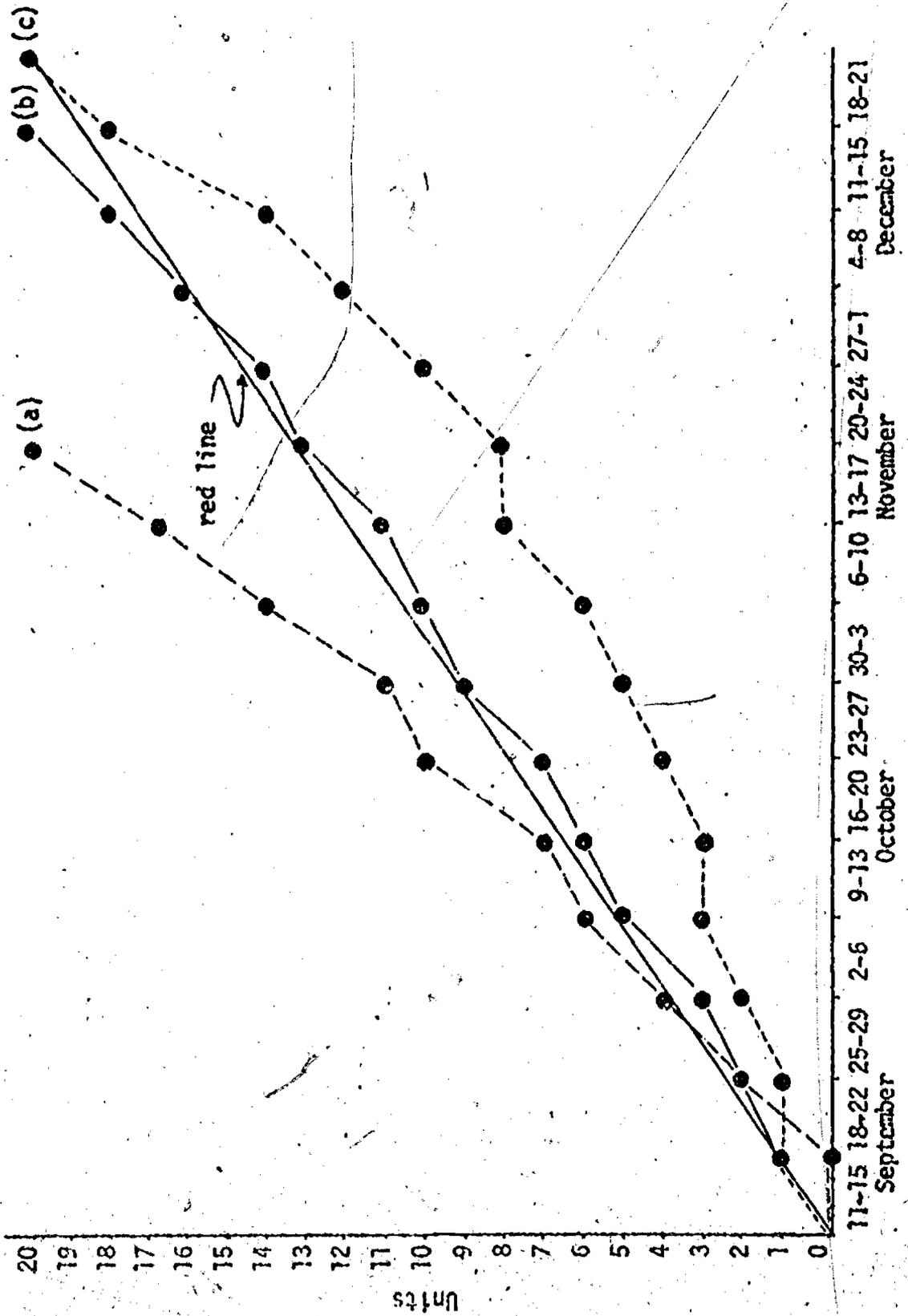


Figure 5. Average Progress Rate of In-Progress Biology 101 Students.

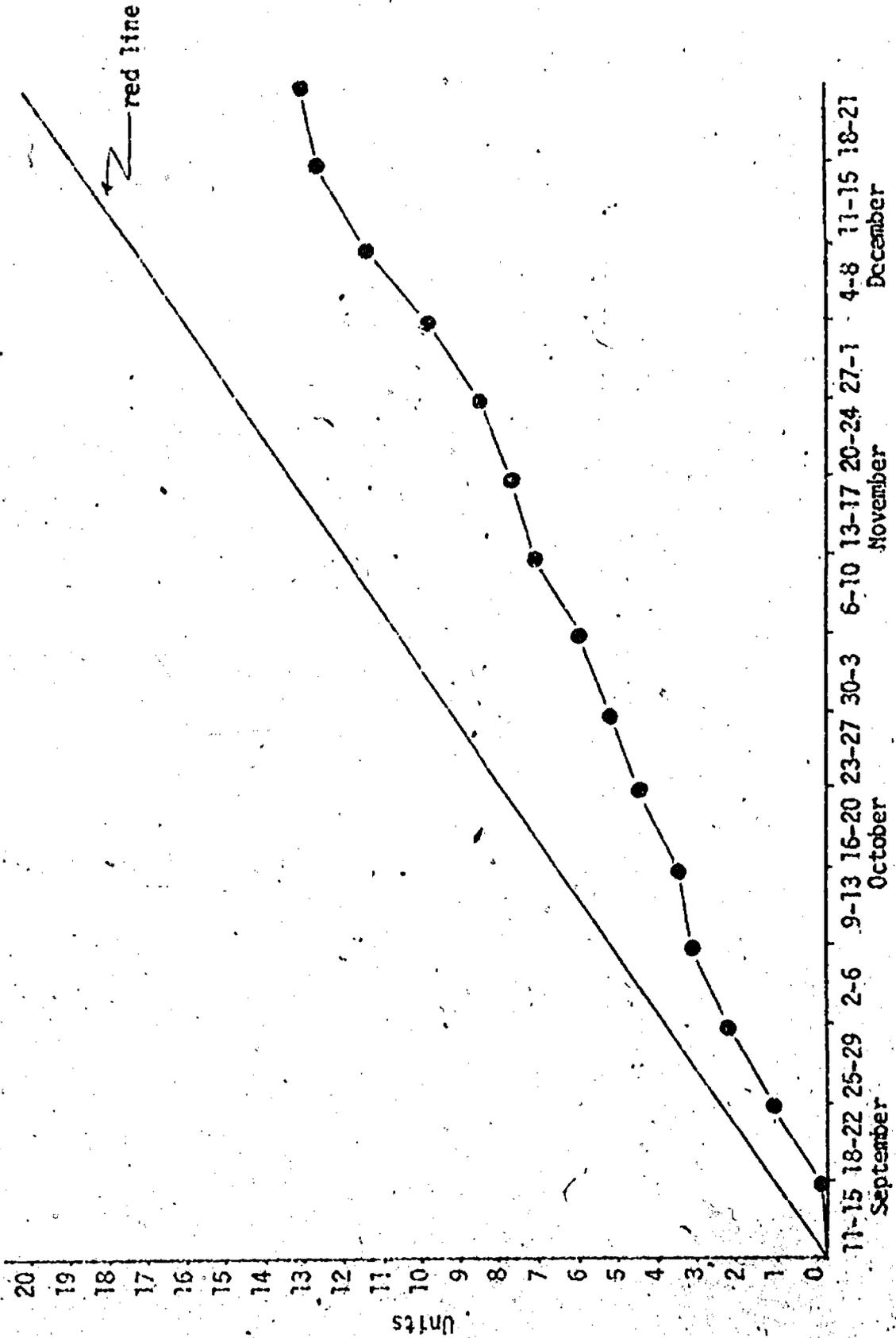


Figure 6. Comparison of Average Progress Rates of Withdrawing (●) and In-Progress (○) Biology 101 Students. N.B. Points along withdrawal curve represent the number of students still remaining in course at the end of each week.

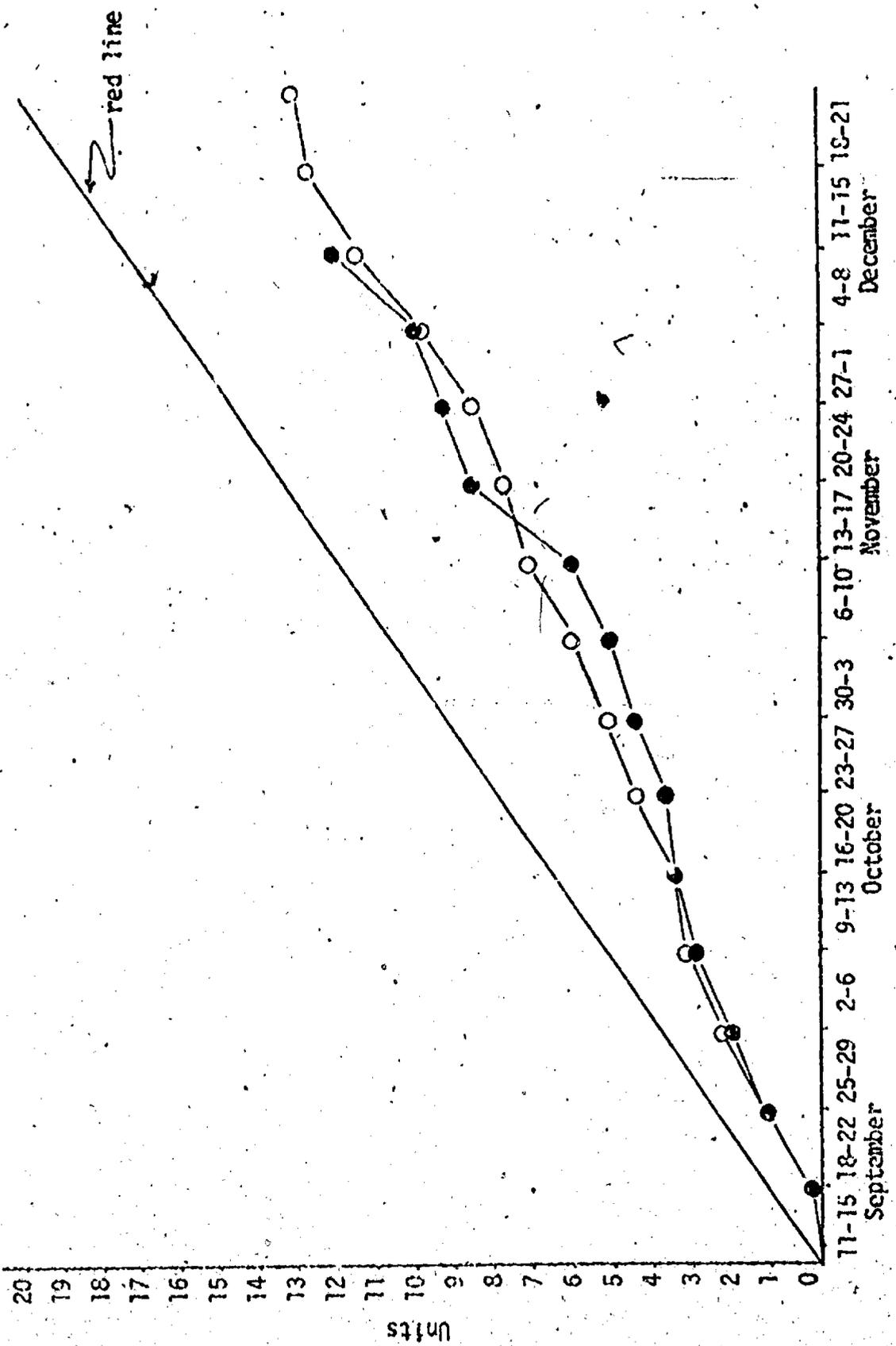


Figure 7. Comparison of Lecture and PSI Grade Distribution in Biology 101.

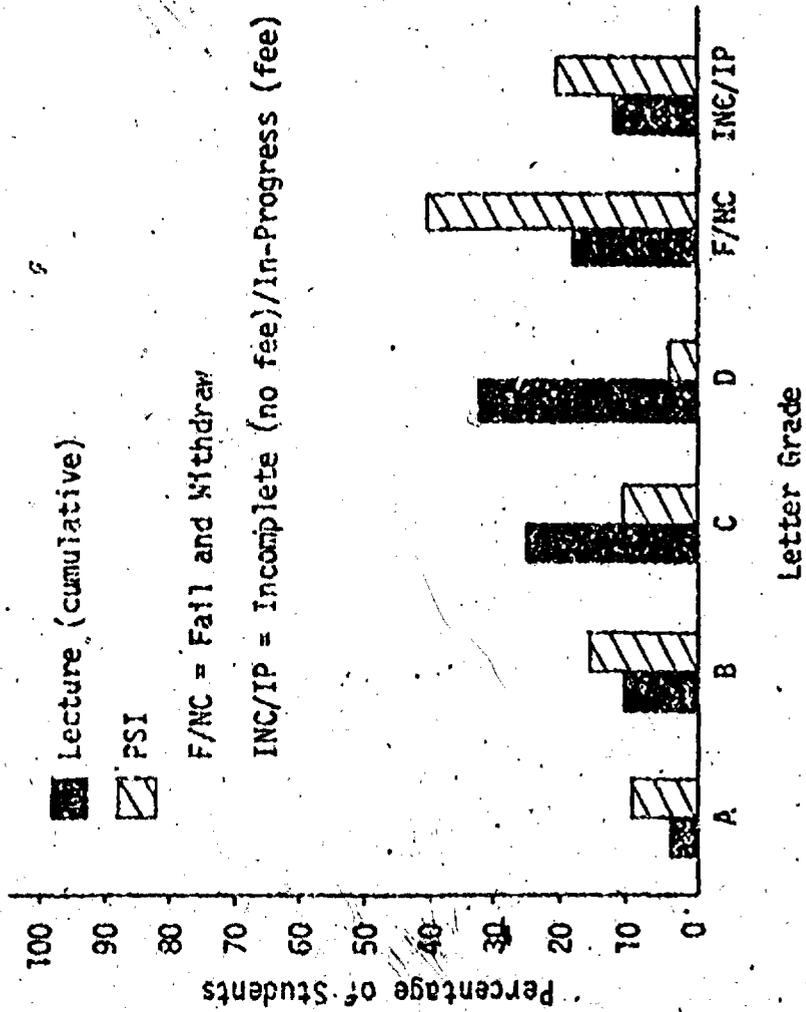
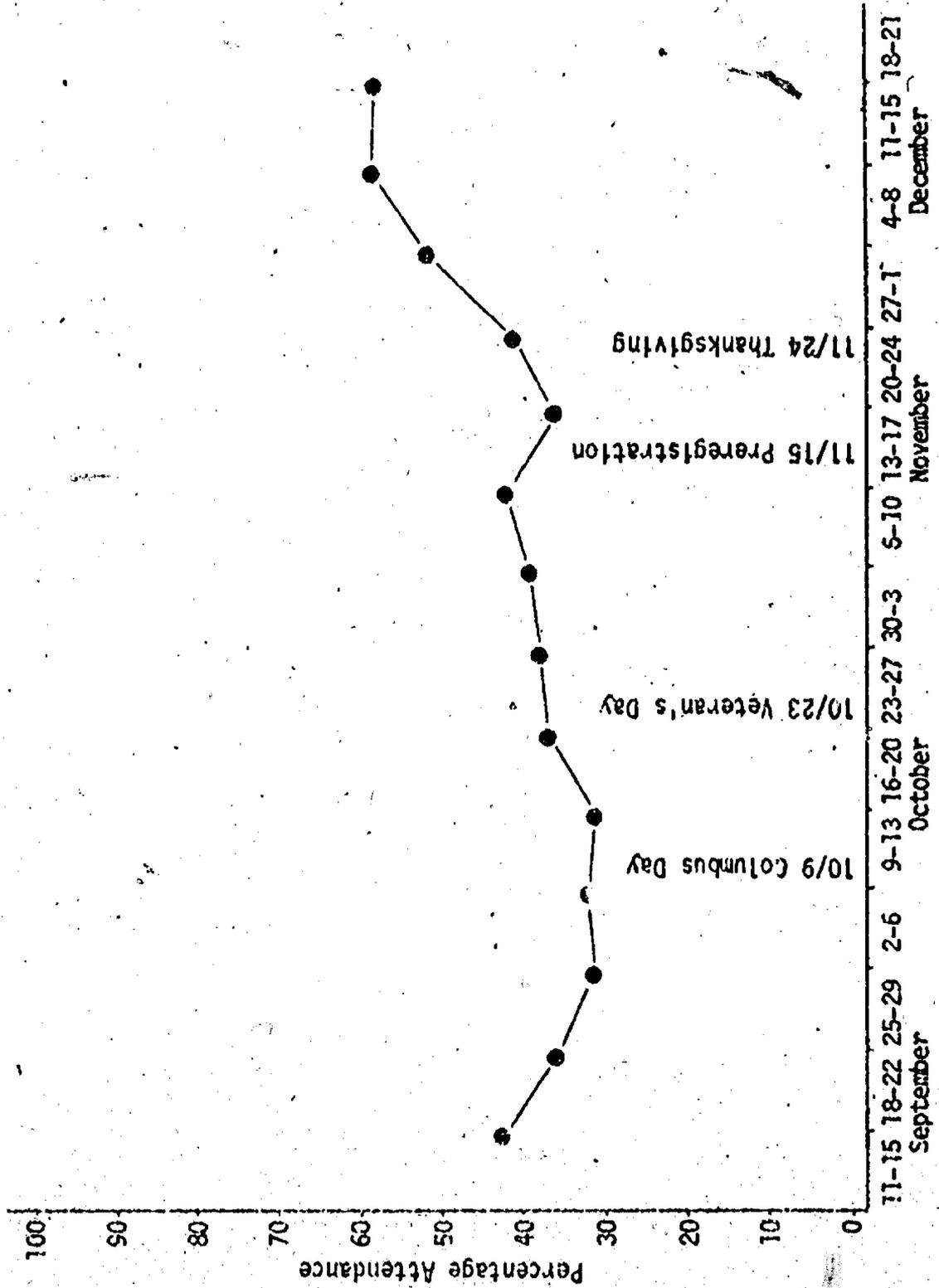


Figure 8. Average Daily Attendance for Testing for Each Week of the Fall 1972 Semester.



APPENDIX

APPENDIX A

Contingency plan for students not completing Biology 101 by the end of the fall 1972 semester. N.B. This was an interim plan announced one day before the final examination, pending development of an all college policy for handling slower learners in mastery type courses (see APPENDIX D for newly developed college policy regarding time extensions in PSI type courses).

Students not completing the course will receive no credit (NC). Such students may reregister for the course during the spring 1973 semester, taking up their work where they terminated. Course work must be completed during the spring semester.

Laboratory attendance is waived for any reregistering student who satisfied laboratory requirements.

Incompletes (INC) will be granted in only a few cases which involve unusual circumstances. INC's will continue course work during the spring semester. The course must be completed during that semester.

APPENDIX B

Biology 101 Course Prerequisites

1. Minimum of two years high school science with an average of 70% or higher.
2. Minimum of high school Algebra or DEV MAT 005 (Basic Concepts of Mathematics) concurrently.
3. DEV MAT 005 is only developmental course (DEV) to be taken concurrently.

APPENDIX C

Changes in Course Policy for the Second Semester

FOUR WEEK TIME CONTINGENCY: Based on student progress (Figures 3, 5, 6) and class attendance (Figure 8), it appears that early in the semester students are not aware of either the amount of work demanded by the course or of the personal management required to self-pace. In an effort to expose students to both early in the semester, a four-week time contingency was added. The new course syllabus states, "In an effort to help you discover the pleasure of being 'on top of things' early in the semester, you are asked to complete Unit 4 by the middle of the fourth week of the semester. If you do not meet this deadline you will be asked to withdraw from the course, unless you can show good cause for being behind the minimum rate of progress required to complete the course by the end of the semester." I believe the self-discipline developed in coping with this contingency outweighs possible negative aspects associated with the pressure applied to meet it.

RETESTS MAY NOT BE TAKEN BEFORE THE NEXT CLASS PERIOD: The relatively short class periods do not lend themselves well to retesting during the same period. As a result, students have on occasion attempted to manipulate the 30 minute study interval required between tests. It seems more educationally sound to have students retest the following day, since the delay provides time for adequate study before retesting. Hopefully, students will also discover that it is not wise to attempt to take a test before they are ready for it (as has occurred on occasion in the past,

when students have reasoned that they can squeeze in a retest during the same period), because not passing the test results in wasting valuable time.

A POLICY FOR STUDENTS REQUIRING ADDITIONAL TIME TO COMPLETE THE COURSE:

A scheme for handling slower students has been developed (See Appendix D). The policy is designed to stimulate students to complete as much of the course as possible during the first semester, without unreasonable penalty to the deserving student requiring additional time. The policy is subject to misuse by unscrupulous students, but the question seems to be, for whom do we create policy, for those who deserve it? or against those who might misuse it?

PRETEST: Students entering the course will take a comprehensive pretest, comparable in length and coverage to the final examination. Since the pretest is based on unit objectives, it will provide a valuable tool for measuring gain in mastery of course objectives when analyzed against performance on the final examination. It should provide some useful information on course effectiveness.

PROCTORS: A frequent criticism by students was that we were understaffed. The problem led to precedence being given to scoring tests over tutoring. An additional proctor will be added. Additionally, regulations governing appropriation of work study funds prevent future proctors from receiving both academic credit and work study funds concurrently for performing the same task.

APPENDIX D

Time-extension Policy for PSI-type Courses

Due to changes in Biology 101 and Biology 105, it is necessary to make some changes in allowing students to reregister for PSI-type courses in order to accommodate the philosophy of self-pacing.

The following changes are being made in order to stimulate the students to do as much as possible in their first semester but not to inhibit or over-penalize a student who finds it necessary to take more than one semester to complete a PSI-type course. In each situation, the student will need permission from the instructor to take advantage of these options.

- 1) If a student completes less than 1/2 the course, he must pay a fee equivalent to the normal course tuition.
- 2) If a student completes more than 1/2 and up to and including 3/4 of the course, he must pay a fee equivalent to 2/3 the normal course tuition.
- 3) If a student does not complete the course, but has completed over 3/4 of the course, he will pay a fee equivalent to 1/3 the normal course tuition.

In all cases, the student's transcript will only show one grade and in the cases where only the lecture portion of the course is a PSI-type course, the above would apply to only that portion (i.e., in Biology 101, only the lecture portion is PSI. This accounts for 3 credits of the course and fees would be adjusted accordingly.) In a course where a lab is required and is offered on a traditional basis, the lab portion must be completed or the student would have to repeat the course on the usual basis. (Having both grades recorded with the highest grade figured in the GPA.)

APPENDIX E

ACT Scores

The ACT score information on file for North Country Community College students was so inadequate as to be of no value in this study. The college must decide if ACT scores are useful to its research purposes, and if so, develop mechanics which insure that all incoming students take the tests. Without thorough attention to collecting ACT data, the college deals unfairly in terms of costs and time, with those students who do take the tests, for the data they provide has little general research value.

APPENDIX F

Follow-up on In-progress Students

A brief summary on the fate of in-progress students who intended to complete the course during the spring 1973 semester will be available during the summer of 1973.