A PROCEDURE FOR MAINTAINING STUDENT PROGRESS IN A PERSONALIZED UNIVERSITY COURSE[1]

L. KEITH MILLER, F. HAL WEAVER, AND GEORGE SEMB

UNIVERSITY OF KANSAS

Ten students in a personalized university course were given target dates for completing each of 26 lessons. The lessons could be completed before those dates, but not after. The first two failures to complete a lesson by the target date led to "warnings"; the next failure required the student to withdraw from the course. When each student's rate of lesson completion was compared with and without target dates, it was found that students completed an average of 1.0 lesson a day with the target-date contingency and 0.3 without it. Individual data indicated that most students did few or no lessons without the contingency. It was concluded that a target-date contingency is an effective method for maintaining student progress in personalized university courses.

Keller (1968) described a system of personalized instruction suitable for higher education that is now being widely used in many fields (PSI Newsletter, 1970). This system usually involves frequent testing of students over small portions of the course, the requirement that the student continue working on each section of the course until he demonstrates mastery, the use of students who have previously taken the course as proctors, and the possibility for the student to progress through the course at his own pace. A number of group-design studies have shown that this general methodology produces a higher average level of student performance on major exams (Alba and Pennypacker, 1972; Born, Gledhill, and Davis, 1972; Johnston and Pennypacker, 1971; McMichael and Corey, 1969; Sheppard and MacDermott, 1970).

There has also been some indication that the self-pacing feature of Keller's method may result in a high frequency of incomplete and postponed work by the students. For example, Keller reported "Incompletes", "C's", and "D's" (all indicating failure to complete all work),

ranging from 10 to 20% (Keller, 1968). Sheppard and MacDermott (1970) reported that about 70% of the students failed to complete all of the work in their course. Lloyd and Knutzen (1969) reported that less than 25% of their students completed all of their course work. Whaley and Malott (1971) reported that many students put off their work until toward the end of the semester. Thus, there is a large body of nonexperimental evidence that suggests that self-pacing produces a large amount of incomplete and postponed work by students.

In spite of these problems, the self-pacing aspect of personalized courses is highly rated (Nelson and Scott, 1972). One possible reason for the popularity is that it permits the student to attend classes at his own option. Another possible attraction is that a student can work very rapidly on his course and finish it before the final cramming period for his other courses. Because of this appeal, it may be desirable to retain some aspects of self-pacing.

This article reports an experiment with a modified form of self-pacing. Instead of permitting students to progress completely at their own pace, they were given target dates for each lesson in the course. They could complete a lesson before that target date, but they were given a "warning" for the first two lessons that were not completed by the target date; contingent on

the third failure they had the option of withdrawing from the course or receiving an F. The effectiveness of this method in maintaining student progress was examined in a single-subject analysis by scheduling target dates for each day of the initial and final conditions, and not scheduling any during a one-month period in between.

METHOD

Subjects

Ten students enrolled in an introductory behavior analysis course at the University of Kansas participated in the experiment. Eight of the students were sophomores, one a junior, and one a senior. The Grade Point Averages for seven students whose records could be located ranged from 2.04 to 3.52 (out of 4.00) with a mean of 2.52. The course is an elective course in the Department of Human Development. None of the students were majors at the beginning of the semester.

Procedure

The introductory behavior analysis course used as its textbook *Principles of Everyday Behavior Analysis* (Miller, *in press*). The book was divided into 26 lessons, each covering a basic behavioral concept. Students were provided with a study guide for each lesson. A sample of about 30% of those study guide items was given to them as the quiz over each lesson. Quizzes consisted of 10 fill-in-the-blank items. (By using different samples, three different forms of each test were developed to permit a different test if the student had to take a make-up quiz.)

Students obtained a grade based on the percentage of correct answers that they made on the first administration of the quizzes for each of the 26 lessons. An "A" was obtained by averaging 90% or more correct on the 26 "first" quizzes, a "B" by averaging 80% to 89% correct, a "C" by averaging 70% to 79% correct, and so on.

Students were required to take a make-up quiz any time that their initial score fell below 90% correct. They were required to take as many make-up quizzes as were necessary to reach the criterion, at which time they were considered to have completed that lesson. Students could not take a quiz for the succeeding lesson until they completed the prior lesson. All grading of quizzes was done from an answer key provided by the instructor.

Two proctors were assigned to this section of 10 students. Each student could ask the proctors questions before the quiz. They could take the quiz during any regularly scheduled class. However, they were given a list of target dates by which time they were required to take and pass the quiz on a particular lesson. They were told that the first two times that they failed to pass any quiz by that time, they would be given a warning; the third time they would be given the option of withdrawing from the course or getting an F.

Each student was given a schedule of target dates at the beginning of the semester. The schedule required them to complete one lesson a day for the first nine days (*i.e.*, a lesson a day). No lessons were then required for the next 13 days; and lessons 10 through 26 were targeted at the rate of one a day for the final 17 days. Thus, the design was a simple reversal design with target dates assigned for the first nine days, no target dates for 13 days, and then target dates were again assigned for the last 17 days of the semester.

RESULTS

Figure 1 shows the mean number of lessons completed by each student each day during the three experimental conditions. During the initial condition (target dates assigned), students completed a mean of 1.05 lessons per day. When no target dates were assigned, students completed a mean of 0.27 lessons per day. When target dates were again assigned, students completed a mean of 1.06 lessons per day. Thus, students
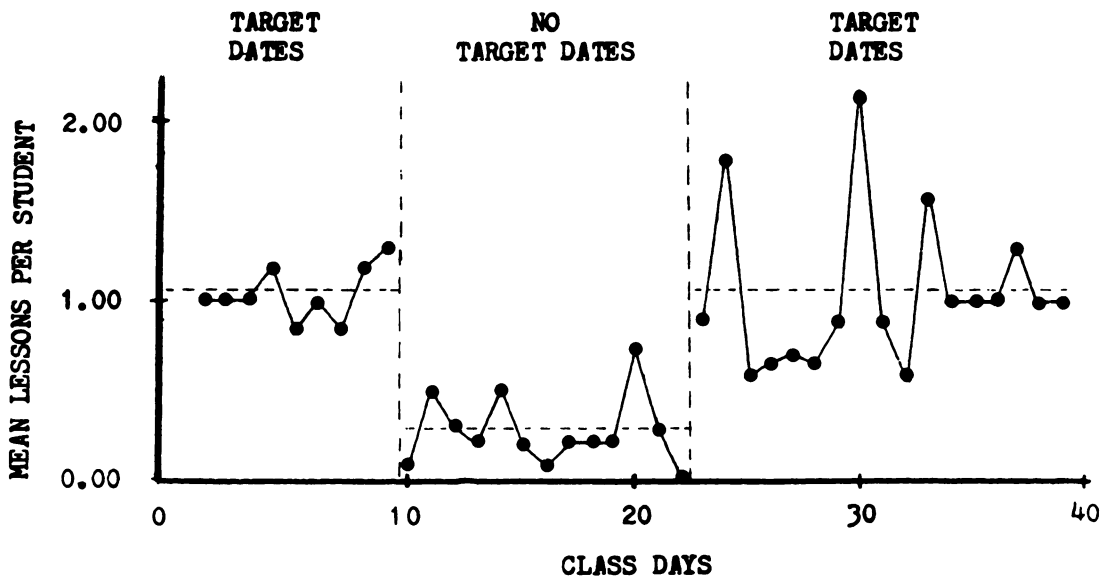
Fig. 1. The mean number of lessons completed by each student during each day of the semester. The horizontal dashed lines represent the mean lessons completed per day for each of the three experimental conditions.

completed lessons at a considerably higher rate when they had a target date assigned than when they did not.

The individual data show that each student worked at a minimum rate of 1.00 lessons per day during both target-date conditions. When target dates were not assigned, four students completed no lessons during those 13 class days. Two completed only one lesson, with a third completing three lessons during the same day. Only three students took quizzes on more than one day, completing an average of 10 lessons each. Thus, there was considerable variation in the rate at which students completed lessons when they were given no target dates. However, completion rates for nine of 10 students were greater during the initial period when target dates were assigned than when no dates were assigned; the rates for all students were greater during the second target-date condition than when no dates were assigned. All students completed the course on or before the last target date and received an A in the course. This indicates that the group effect described in Figure 1 is representative of the behavior of individual students.

DISCUSSION

The results clearly show that students progressed more rapidly through the course when they were assigned target dates for their work. The fact that students attained a rate of progress during the reversal that was comparable to their rate during baseline indicates that the assignment of a target date was responsible for maintaining their high rate. Thus, we can conclude that students maintained a more uniform and rapid rate of progress through the course when they were assigned target dates for completion of their work.

The individual data revealed that most students worked at a higher rate when target dates were assigned than when they were not. However, there was some variation in rate among subjects when no target dates were assigned. Of the three students who continued to work at a nearly comparable rate when no dates were assigned as when dates were assigned, one student had the highest Grade Point Average in the group, while the other two had the lowest and next to lowest Grade Point Average. The Spearman's Rho correlation between Grade Point

Average and number of quizzes taken when no target dates were assigned was 0.24, which is not significant.

One interesting outcome was the sudden and dramatic drop in student progress through the course when no target dates were assigned. If the average rate of 0.27 lessons completed per day was extrapolated for the entire semester, the results would indicate that only 10 lessons would be completed during the entire semester. This suggests that no student would have completed the course without the target dates—a result not found in other self-pacing courses. However, this extrapolation ignores the fact that three students worked during the no-target-date condition at rates high enough to complete the course by semester's end. The extrapolation also ignores the possibility that the progress of students through the course may follow a scalloping pattern in which an initially low rate accelerates as the end of the semester approaches. Thus, the present results suggest that 30% of the students would complete with little or no scalloping, and perhaps some additional students would complete by working at a high rate toward the end of the semester. These results are well within the range of completions found in self-pacing studies reviewed in the introduction to this paper.

The withdrawal contingency in the present experiment could have the effect of causing students to withdraw, rather than maintain a relatively uniform rate of progress. None of the 10 students withdrew from the course, although seven of the 10 were given warnings (two were given two warnings). One of the authors has taught a course of about 600 students with the same procedure in effect. Only 4% of the students were forced to withdraw because of the contingency. Thus, the assignment of target dates seems to maintain a uniform rate of progress without causing an undue number of withdrawals.

The target-date procedure seems to combine the best features of self-pacing and teacher-pacing. In the usual self-pacing feature, the student is permitted to work completely at his own rate, including the taking of an incomplete to be made up at a later time (Lloyd and Knutzen, 1969). Students, therefore, have the freedom to work on the course at times that are convenient to them. This procedure tends to result in an uneven rate of students completing the course. Few work at and complete it during the first and middle part of the semester, while most students wait until the end of the semester (Whaley and Malott, 1971; Nelson and Scott, 1972). This distribution of work is similar to "cramming" and may not be the best pattern for the student to follow. It also puts an uneven load on the teaching staff, thereby reducing their efficiency. Finally, it generates many "incompletes" that may burden the instructor after the end of the semester. Thus, self-pacing may be desirable for the freedom that it gives students, but it seems to generate patterns of study that are probably a disadvantage for both the teaching staff and the student.

In teacher-pacing, on the other hand, the student is required to take tests at times designated by the teacher. This procedure generates a uniform rate of progress through the course of all students and it permits the most efficient use of the teaching staff. Further, it does not generate a high percentage of "incompletes" to carry over to the next semester. However, the testing is at the teacher's convenience and not the student's. This may conflict with demands on the student's time from many other sources, courses, personal problems, and employment. And, of course, the student is not given the opportunity to work at a fast pace and complete the course early. Thus, teacher-pacing is desirable from an administrative point of view, but probably not from the point of view of most students.

The use of target dates seems to combine advantages of both methods of pacing. The student is permitted to work at his own pace as long as he does not fall too far behind. This tends to generate a relatively uniform rate of progress that may be an advantage for the student. The uniform rate means that the teaching

staff is confronted by about the same demands on its time throughout the semester, thereby probably increasing its efficiency. Thus, the use of target dates maintains a relatively uniform rate of progressing through the course while permitting the students considerable flexibility in their own scheduling of work.

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