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ABSTRACT

The research of this study is directed toward finding ways to change behaviors that interfere with education for disadvantaged children. Accordingly, some pilot research was done in a disadvantaged senior high school in Kansas City, Kansas, in 1969. During the subsequent two-year investigation, the researchers were able to develop an experimental academic reinforcement program in an English class. The implications of the research are held significant in guiding future research efforts. Perhaps the most important implication is that the primary problem of poverty area students may not be one of motivation, but rather one related to teaching procedures. (Author/JW)

EFFECTS OF SYSTEMATIC REINFORCEMENT PROCEDURES ON THE PERFORMANCE OF UNDERACHIEVING HIGH SCHOOL PUPILS

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Introduction

The most widely recommended solution to the social problems of our nation is more and better education.

Since it can be shown statistically that the least schooled have the lowest incomes, education is seen as a cure for poverty and thus, indirectly, for the slum and the ghetto.

The disabilities and handicaps of disadvantaged students make it very difficult, and almost always impossible for them to function in school at an acceptable level. Unless teachers are able to ameliorate learning problems, teaching does not produce desired results.

Thus, the daily teaching act, class periods after class period must focus on changing the behaviors of disadvantaged children. Our research is directed toward finding ways to change behaviors that interfere with education.

Using this as our premise, we began some pilot research in a disadvantaged senior high school two years ago.

This outstanding senior high school is located in the northeast section of Kansas City, Kansas. It has an enrollment of about 900, a staff of approximately 55, and is the hub of the community.

During our two-year investigation, we were able to develop an effective academic reinforcement program in a secondary school.

Obtaining Observational Data on Classroom Behavior

Early research carried out at the elementary level indicates that many underachieving students engage in disruptive and dawdling behaviors which interfere with classroom performance (e.g. Hall, Lund and Jackson, 1968; Hall, Panyan, Rabon and Broden, 1968). In these studies it was found that if pupils were reinforced for engaging in appropriate behaviors, disruptive behavior decreased and academic performance increased. Therefore, one of our initial strategies was to place observers in the classrooms of students who had been identified as underachieving. The subjects observed were 10 juniors who scored well on group I.Q. and achievement tests but who received average or below report card grades.

These pupils were observed by trained observers who recorded whether or not they attended appropriately in class. They also recorded disruptive behavior, participation in discussions, time spent reading, writing, working at the blackboard, etc.

Surprisingly, when the rates of engaging in these activities were compared to report card grades of the first two 9-week reporting periods, no high correlations between the behaviors observed and the report card grades could be established. Furthermore, the observational records indicated that the underachievers selected were not disruptive students. Therefore, the planned programs for decreasing overtly inappropriate behaviors and increasing overtly appropriate behaviors in class were not pursued. Extensive observations of pupils in class were abandoned. Thus, our first important finding was a negative one which indicated that behaviors, conditions and procedures applicable at the elementary level were not applicable (at least to this population of students) at the secondary level.

Figure 1. presents the daily observational records of classroom behavior of one pupil over a 16-week period. As will be pointed out later, although procedures for increasing behaviors such as participation in discussion were considered, our data indicated that such behaviors were not correlated with good grades and that in many classes there was little opportunity for discussion.

Fig. 1 goes about here

The observational procedures developed should prove useful in the future research outlined below which will be designed to increase the level of pupil responding as a result of revised teaching procedures. We now have extensive baseline data which indicate that pupil response levels are typically very low.

The Development of a System of Recording Teacher Ratings of Behavior on a Daily Basis

A second area of investigation was also aimed at defining and measuring classroom behaviors correlated with achievement as measured by teacher's report card grades. In this program the ten juniors selected were given a daily check card for each class period during the day. At the end of class the pupils took the cards to their teachers and asked them to check off the items listed and to sign the card. Initially the teachers were asked to designate the level of performance in four areas by checking boxes marked Yes or No as is shown in Fig. 2. After several weeks of compiling data under this system it became apparent that the cards needed to be modified. Consultation with the teachers resulted in a daily check card

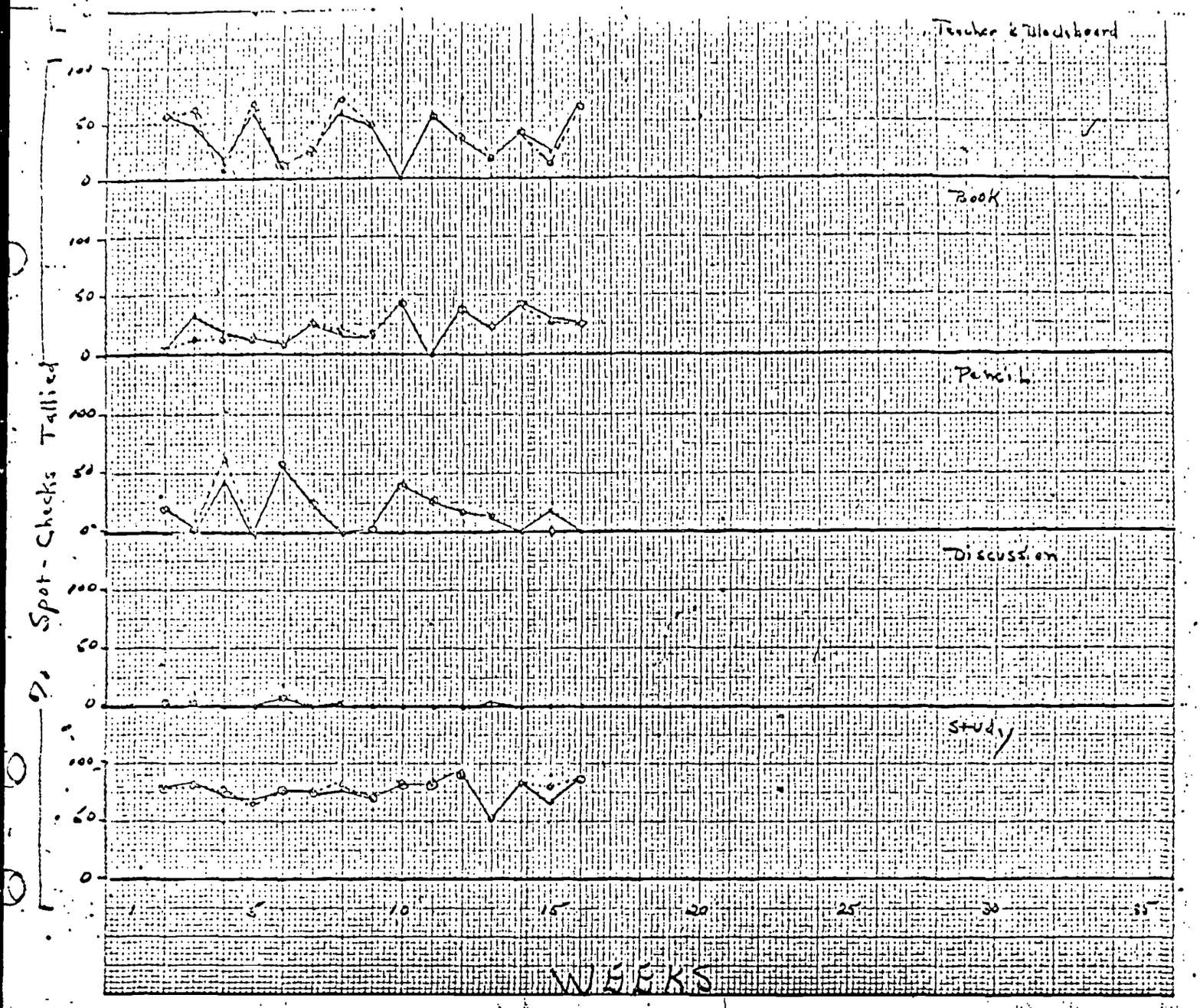

Fig. 1. An observational record of percent of time spent in various behaviors by an underachieving 11th grade girl during Algebra.

on which the teacher could indicate levels of performance corresponding to the school grading system (in which 1 = A and 5 = F). This card also made allowances for the fact that assignments and tests and quizzes were not given daily.

Fig. 2 goes about here

The revised cards enabled us to obtain baselines on daily teacher reports of classroom performance and provided the basis for experiments investigating the effects of providing monetary incentives for improved classroom performance.

Experiments Exploring the Effects of Incentives on Classroom Performance

Several pilot studies were designed to investigate the effects of monetary incentives on classroom performance. Once several weeks of baseline data were obtained from teacher ratings on the revised daily check card, experimental procedures were begun. An analysis of the baseline data indicated that teacher ratings of conduct and of participation and homework were not highly correlated to report card grades. Ratings on tests and quizzes and assignments on which pupils received grades did seem to be correlated, however. Therefore, several attempts were made to reinforce pupils for improving their ratings in these areas.

One series of experiments involved four students. A contingency contract was arranged with each pupil. The contract stated specific criteria for improvement in teacher ratings on the daily check cards. Under the terms of the contract pupils could earn incentive payments if they met the criteria. A typical contract for a student who had been

DAILY CHECK CARD

Student _____ Date _____

Academic Area _____

Yes	No	
☐	☐	Assignment was completed on time.
☐	☐	Class participation and/or homework was rated at ____ or better quality.
☐	☐	Most recent test or quiz performance was rated at ____ or better quality.
☐	☐	Student conducted himself acceptably.

Teacher's signature _____

Original Card

DAILY CHECK CARD

Student _____ Date _____

Academic Area _____

(Circle Daily)

1. Student conduct was rated 1 2 3 4 5
2. Class participation was rated 1 2 3 4 5

(Circle only when assignments and/or test and quizzes are recorded)

1. Assignment was rated 1 2 3 4 5
2. Most recent test or quiz performance was rated 1 2 3 4 5

Teacher's Signature _____
(pen only)

Revised Card

Fig. 2. Daily check cards used for obtaining teacher ratings of pupil progress.

receiving ratings of 4's and 5's on tests and quizzes in Algebra provided that for every 3 he received he would earn $.25, for every 2, $.50, for every 1, $1.00. The amounts were increased if they proved ineffective at the initial levels. This procedure produced very little change in performance on either the daily teacher ratings or in report card grades. Figure 3 presents the data for Lawrence M., a boy who could earn money by improving his teacher rating scores on tests and quizzes and in assigned work. As can be seen, there was little, if any, improvement under experimental conditions.

Fig. 3 goes about here

Two students not only received incentive payments for improvement on daily teacher ratings, but also were paid for staying after school to study their lessons. These pupils were paid 1 cent per minute of study in addition to the money they could earn by improving their teacher rating scores. This procedure also produced minimal effects although there was some indication that one of the students made some improvement under these conditions. Figure 4 presents the record of R.G. who was paid for studying and could earn extra incentive pay for 1 (A) grades on tests and quizzes in Geometry and for 2 (B) grades on electronic class assignments. (As can be seen in Fig. 4, one of the problems was that there were very few assignments and quizzes given after baseline).

Fig. 4 goes about here

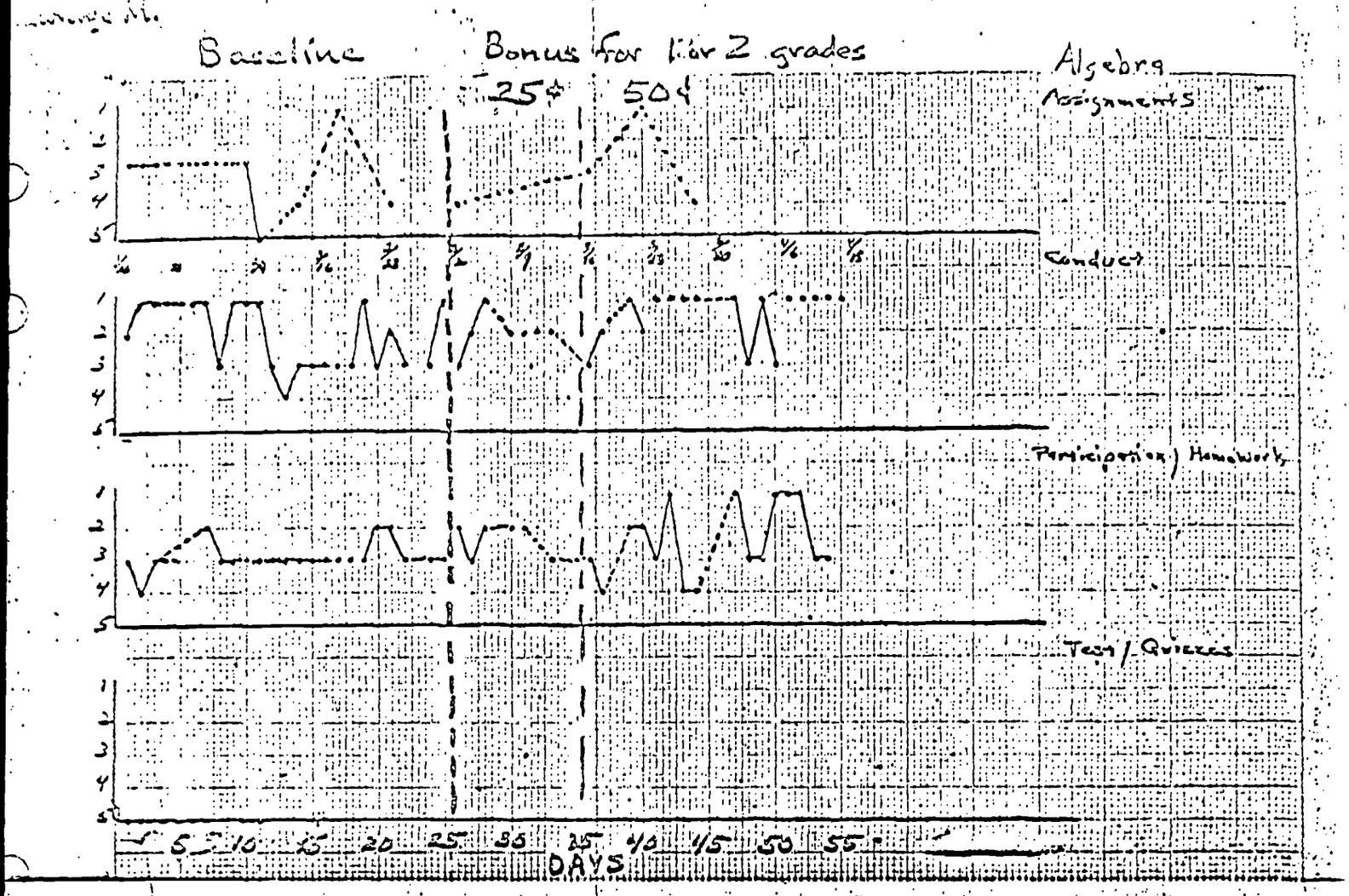

Fig. 3. A record of daily teacher ratings in Algebra for Lawrence M. during Baseline and Bonuses for 1 or 2 grades.

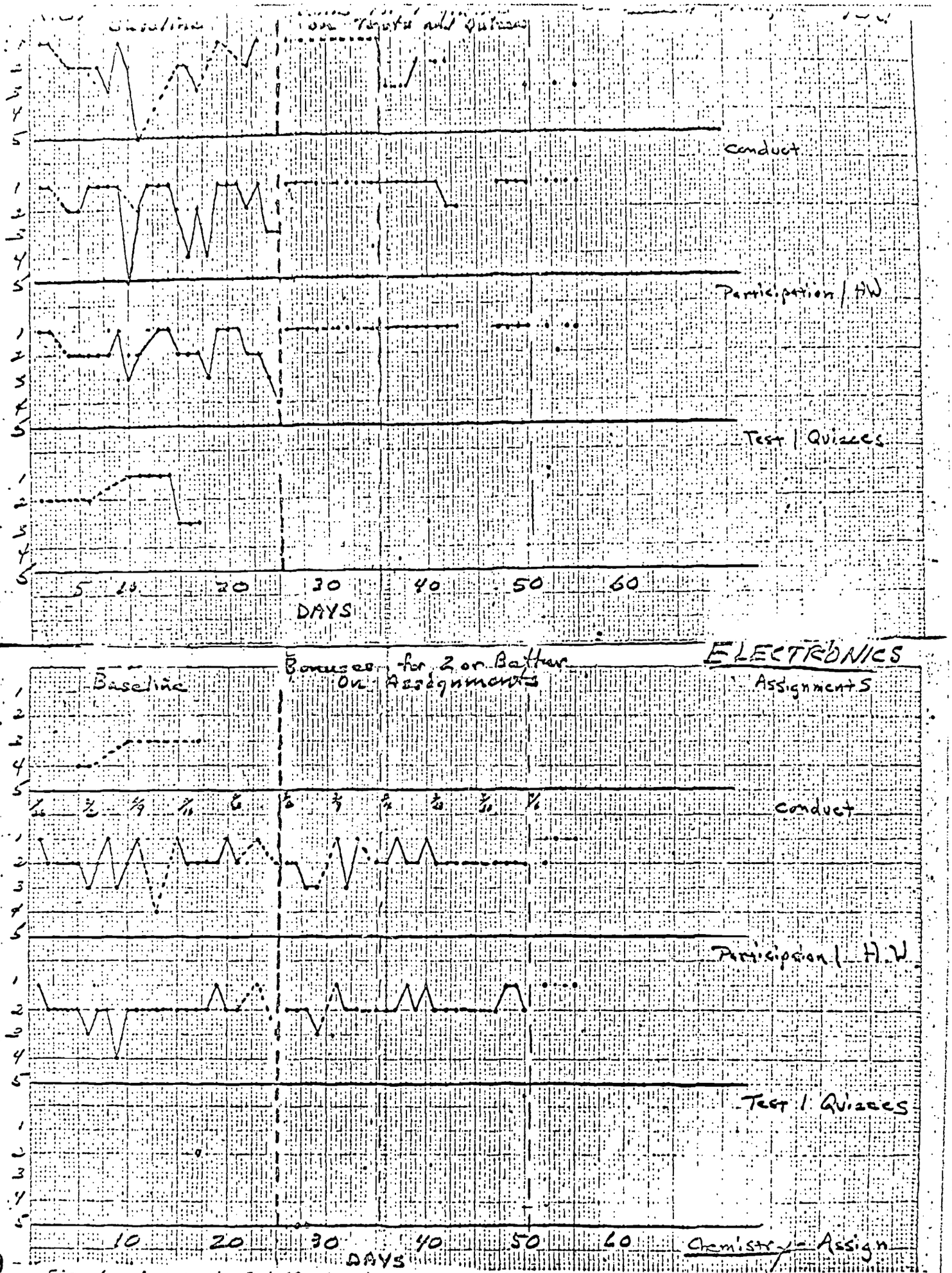

Fig. 4. A record of daily teachers reports for R.G. during Baseline and Bonuses for 1 or 2 grades on tests and quizzes in Geometry and 2 or

Another procedure tested was to contract to pay two of the students for improvements in their report card grades independent of any change in the daily teacher reports. Although one of the pupils showed a slightly increased grade point, there were no significant changes in either daily teacher reports or in report card averages.

Since the procedures outlined above had not produced positive gains, we decided to examine our task more closely in light of what we had learned. On examination of our data, we concluded that the key to our problem was directly related to teaching procedures. It had been observed that in many classes tests, quizzes and assignments were quite infrequent. In fact, in many classes very few students responses were required by teachers and there were therefore few responses to be reinforced.

We spent many hours observing in classrooms throughout most of the academic year so it was not difficult to identify teachers who were not requiring more than the average number of responses from their students.

We selected two English teachers and one mathematics teacher for our pilot research. One English teacher and the mathematics teacher, who required many student responses, followed the procedure below.

Six students were selected by each teacher whom the teacher felt could improve his/her grade by one or two grade levels, if they were motivated to work harder. These students met individually with the teacher and the researcher and the pilot program was explained to them.

Each student was given a written contract which outlined his individual "improvement needs" and was informed that a substantial bonus would be paid for the required achievement.

For the mathematics students, the contingencies were on improved homework and improved test and quiz scores. In English the contingencies

were for improved test and quiz scores and improvement on class projects, e.g. book reports, oral reports, compositions, etc. Thus, this procedure was essentially the same as that used in our original experiments except that it was carried out in selected classes in which pupils had the opportunity to emit more responses.

Although time would not permit us to carry out systematic replications, the preliminary results indicate that our approach is promising. We hope to pursue this design further next year..

Figure 5 presents the record of the daily quiz scores of one of the students enrolled in the geometry class of the mathematics teacher who gave frequent quizzes. As can be seen in Fig. 5 his quiz and homework assignment scores improved when he began receiving incentive pay for improved grades.

Fig. 5 goes about here

Experiments Investigating the Effects of Modifying Teaching Procedures

In a related project we began exploring the effects of modifying teaching procedures. Since we had observed that in many classes very few responses were required of pupils other than to sit quietly in class during lectures until a test was given every two weeks or so, we worked with a conscientious English teacher whose teaching followed this pattern.

During an eight-week baseline period the teacher lectured on selected literature or grammar material. A unit test was administered every two weeks and the grade of each student was recorded. This procedure was repeated for four, two-week periods encompassing four junior English units.

Roy B.

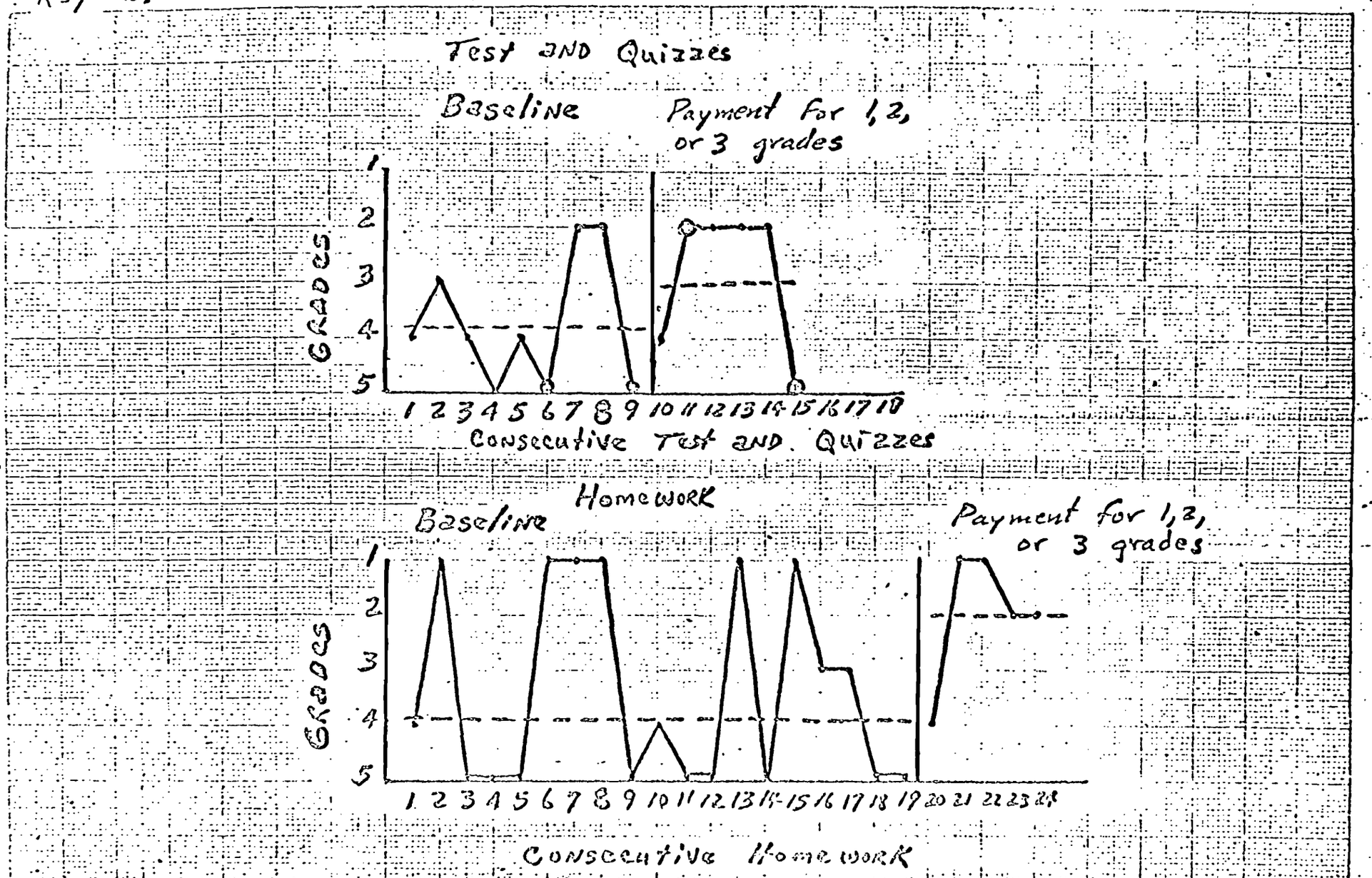

Fig. 5. A record of grades on tests and quizzes and homework assignments for Roy B. under Baseline and Payment for 1,2, or 3 grades conditions.

A two-week unit test consisted of 50 mimeographed short answer test questions over the unit of concern. Students were given 50 minutes to answer the test questions.

After baseline, delayed unstructured quizzes were administered. A delayed unstructured quiz is one that is given any three days of the week for a two-week period. The quiz could be given immediately after the "lecture" or the next morning, or two days later, or at any time as long as three quizzes were given in a week. A quiz was a five question short answer "test." Students were given 10 minutes to answer quiz questions. After a two-week period a unit test was given over the unit covered. The unit test construction was the same as the unit test construction during Baseline.

Following the unstructured quiz phase, immediate structured quizzes were administered. An immediate structured quiz was one that was given during the last 10 minutes of each Monday, Wednesday, and Friday class. The mimeographed quiz was a five point quiz over material that had just been covered in the "lecture." Before the 10-minute quiz was given the teacher went over all five questions and gave the answer and then administered the quiz. The quizzes were graded, returned, and discussed with the students the next day. The students were informed that a composite of the six quizzes administered over a two-week period would comprise the unit test for that unit. The exact quiz questions were used.

Those students who earned a grade of 2 or above were reinforced by having their name read aloud by the teacher and by being asked to stand beside their chairs for class recognition and praise.

The results of the quizzing program are graphed in Fig. 6. Baseline data (A) indicate that the class was achieving at a low level. An

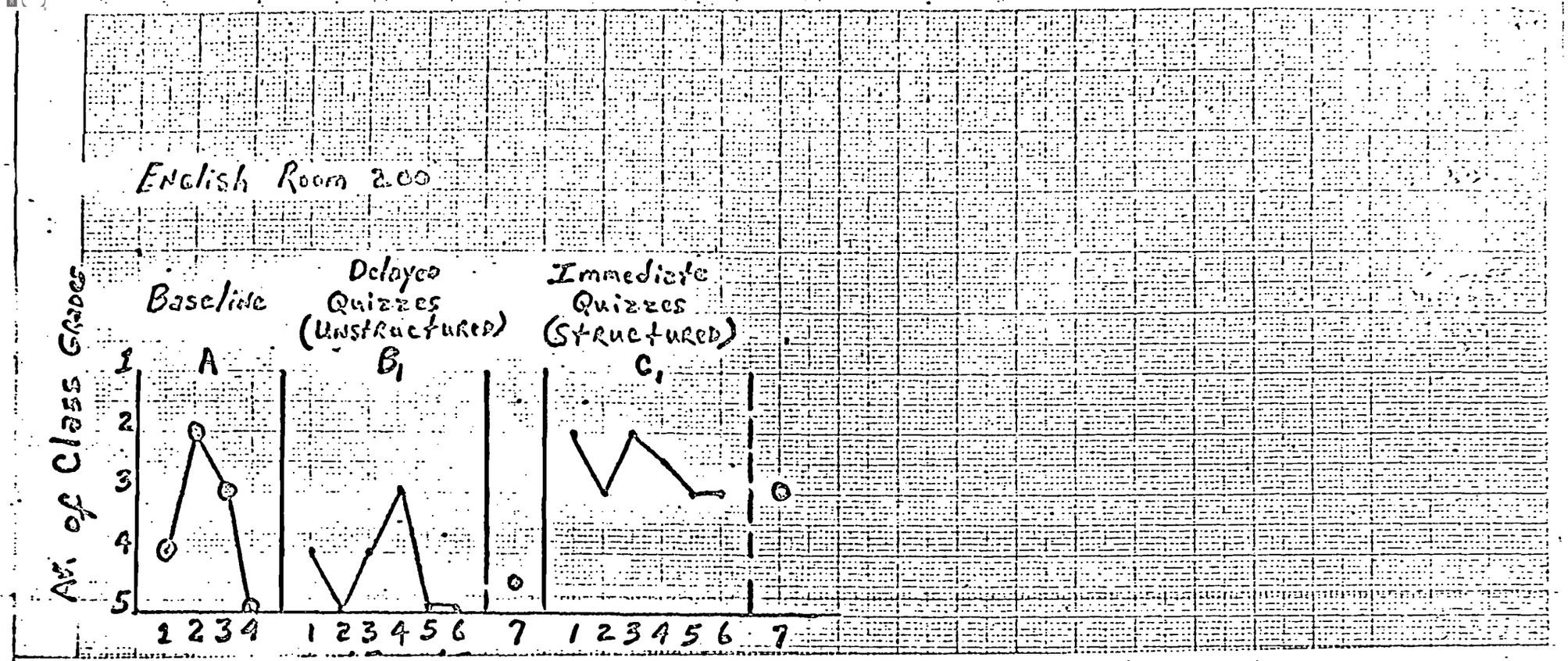

Fig. 6. A record of the average grades received by students in English room 200 during Baseline, Unstructured and Structured Quiz conditions.

average of class grades is shown on the ordinate and the number of sessions are shown on the abscissa. Unit test baseline data encompasses eight weeks, each session representing two weeks. Quiz sessions on the abscissa represent three-day sequences. The mean baseline unit test average is 3.2 for room 200.

Fig. 6 goes about here

The data for the delayed unstructured quizzes phase (Fig.6) show that there was no significant difference in the level of unstructured quiz scores or the unit test scores after these quizzes were given. When immediate structured quizzes were administered, however, the daily quiz grades improved and, the unit test administered after two weeks, showed a significant increase in the group class average (from a mean of 4, or "D" during the previous phases to a mean of 2.6 or "C+").

Time did not permit us to pursue our research design to completion. However, there is an indication from this preliminary data that the students benefited substantially from the immediate structured quizzes. Whether the improvement resulted from more clearly defined cues, the increase in the number of responses required of students or the fact that the students came into contact with the reinforcers of "praise" for a daily job well done remains to be analyzed. It does seem to be a promising approach, however.

The implications of the research carried out are extremely significant in guiding our future research efforts. Perhaps the most important implication is that it has provided some evidence that the primary problem of poverty area students (at least with students identified as capable

underachievers) may not be one of motivation, but rather one related to teaching procedures.

Therefore, although we will continue to explore the use of incentives designed to increase pupil motivation, greater emphasis will be placed on the analysis and development of teaching procedures which are effective in increasing pupils' performance.

During this past year, we have systematically investigated the effects of providing more opportunity for student responses, more teaching cues (discriminative stimuli), more student feedback, as well as increased reinforcement. As a result, we have definitive data (not shown here) that supports our hypothesis and early research efforts and which will further guide our research program next year.

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