JOURNAL OF APPLIED BEHAVIOR ANALYSIS 1971, 4, 77-87 NUMBER 2 (SUMMER 1971)

THE EFFECTS OF ACCESS TO A PLAYROOM ON THE RATE AND QUALITY OF PRINTING AND WRITING OF FIRST AND SECOND-GRADE STUDENTS[1]

B. L. HOPKINS,[2] R. C. SCHUTTE, AND KATHLEEN L. GARTON

SOUTHERN ILLINOIS UNIVERSITY AND ALTO PASS ELEMENTARY SCHOOL

The major dependent variable was the rate at which first and second-grade students printed or wrote daily copying assignments. Data were also taken on the percentage of letters scored as errors according to a set of scoring criteria. Initially, these data were collected during a baseline condition in which each child returned to his seat as soon as his completed work had been scored, to wait for the rest of the class to finish their assignments. When the children were allowed to go to a playroom after their papers had been scored, there was a reliable increase in the mean printing or writing rates. Subsequent introductions of the baseline and playroom conditions replicated the relative effectiveness of access to the playroom to produce higher work rates. Finally, the total amount of time allowed for children to complete their assignments and then play was progressively reduced from 50 to 35 minutes. A progressive increase in work rates was correlated with these changes. Throughout the experiment, there was considerable variability in the mean number of letters scored as errors but there was a clear trend towards fewer errors.

Much research (*e.g.*, Hall, Lund and Jackson, 1968) has focused on so-called social reinforcers of teachers. It is clear that several forms of a teacher's attention such as praise, compliments, and even instructions may serve as reinforcers that strengthen whatever student behaviors they follow. These variables are ubiquitous and powerful. Every classroom teacher should be thoroughly trained and perhaps even supervised in the effective and appropriate use of her attention.

A complementary motivational system, which can incorporate a broad range of reinforcers commonly available in schools, is the token economy (Wolf, Giles, and Hall, 1968; O'Leary, Becker, Evans, and Saudargas, 1969). A teacher using a token economy gives students marks, plastic discs, or other objects with little inherent value, whenever they emit appropriate academic or social behaviors. These tokens can then be later exchanged for any of a variety of reinforcers such as toys, play time, access to peers, special privileges, or even foods or beverages.

Limited research (Broden, Hall, Dunlap, and Clark, 1970; Reynolds and Risley, 1969) suggests that a general motivational system such as a token economy can be used to promote more efficient classroom work and social behavior than the simple use of attention. The potential advantage inherent in the use of the general motivational system is presumably that it employs a larger variety of reinforcers or more effective reinforcers. However, some problems inherent to token economies are now well understood. If the exchange ratios between tokens and back-up reinforcers are not carefully adjusted, children can be overpaid and become satiated with the available reinforcers; or they may be underpaid to the extent that the rewards will not maintain desirable behaviors. Precautions are necessary to prevent stealing and forgery. The close scrutiny and adjustment required of the teacher may demand that she have general training in behavior modification.

Any general motivational system should have at least the following six characteristics: (1) It should be easy to manage and require a minimal amount of a teacher's time. (2) It should require a minimal amount of specialized training for teachers. (3) It should be based on generalized reinforcement. A large

[1]The authors are indebted to Mr. Robert W. MacVicar, former Chancellor of Southern Illinois University, for his support and to the school board and staff of the Alto Pass Elementary School, Alto Pass, Illinois, for their encouragement and cooperation. Reprints may be obtained from B. L. Hopkins, Department of Human Development, University of Kansas, Lawrence, Kansas 66044.

[2]Now at the University of Kansas.

variety of reinforcers should be available to children who emit relatively desirable behaviors. (4) The system should be sufficiently inexpensive that it can be immediately established in any school. (5) It should be applicable to a variety of academic behaviors. (6) It should be generally effective to improve the skills of most or all of the children in a particular class. These characteristics are not listed in any order of importance.

A seventh characteristic is more equivocally relevant. It may be desirable that a motivational system decreases the range of student skills by benefitting less skillful children more than it benefits bright or fast working children. In contrast to the possibly desirable characteristic, it is likely that most educational improvements, except these aimed specifically at slow learners or problem children, benefit skillful children more than the less skillful. Such improvements will increase the range of skills with which the teacher must deal and ultimately increase the disparity of student's skills when they complete their public educations.

This research examines the effectiveness of a broadly applicable motivational system that possesses the first six characteristics and which might serve as an alternative to the token economy. This system simply allows a child access to enriched play after he has successfully completed an academic assignment. Conceptually, it is similar to those reported by Lovitt, Guppy, and Blattner (1969), Osborn (1969), and Jacobson, Bushell, and Risley (1969).

METHOD

Subjects

Fourteen first-grade and 10 second-grade children, who regularly attended the Alto Pass Elementary School, Alto Pass, Illinois, served as subjects. The school is located in a small village in rural southern Illinois. Much of the economy of the area depended on fruit farming. The school drew students from the village and the surrounding countryside and they included a proportion of children whose parents were migrant or seasonal laborers. Two of the children were repeating the first grade and one child was repeating the second grade. The children's teacher had correctly noted that they frequently worked very slowly and inefficiently during seat work assignments.

Setting

All experimentation was conducted in one classroom that ordinarily housed both the first and second grades. The first-grade children sat at individual desks facing a chalkboard on the south wall of the room. The desks of the second-grade students faced the west wall, which also contained a chalkboard. Windows lined the east wall of the room and a large bulletin board and bookshelves lined the north wall. An "L" shaped partition made of closet doors was located in the northeast corner of the room. This partition was 6.5 ft high and it separated an 8 by 13 ft area from the rest of the room. This area was to serve as the playroom for the children in both grades. All of the toys and games and other objects with which the children were observed to play were removed from the work area of the classroom and placed in the playroom. These objects included a television set, Lincoln logs, a box of wooden blocks, a few push toys, a partially functioning typewriter, a fish tank, assorted discarded hardware, two dolls, three sets of flash cards, a checkerboard and checkers, and several picture and story books. In addition, the children were allowed to bring toys and games from home if they were kept in the playroom.

General Procedures

On each of 54 successive school days, the first- and second-grade teacher wrote on their respective chalkboards a printing assignment for the first-grade students and a cursive writing assignment for the second-grade children. These assignments included any substantive material the teacher wished to present. First-grade assignments were typically composed of descriptions of current events or phonetic drills such as collections of words that began with particular sounds. Second-grade assignments were usually excerpts from stories or poems such as *Hiawatha.* The average length of the first-grade assignments was 194 letters and the average length of assignments for the second grade was 259 letters. The length of the assignments was not differentially correlated with the experimental conditions described below except incidentally as a result of the teacher's gradually but variably increasing the assignment lengths over days. The average length of assignments during the first 27 days of the study for the first grade was 187 letters and was 202 letters during the last 27 days. For the second grade, these averages were, respectively, 224 letters and 293 letters.

After the assignments had been written on the chalkboards, the teacher read the assignments with her pupils and they frequently engaged in general discussions about the substance of the assignments. The teacher then helped the children sharpen pencils and passed out sheets of copy paper. As soon as every child had received his copy paper, a stopwatch was started and the class was told to begin copying the assignment. When a child completed his printing or cursive writing assignment, he brought his copy paper to the teacher's desk for timing and scoring.

Response Measures

Two different behavioral measures were recorded daily for each subject. First, the time required to complete the assignment was defined as the time elapsing between the starting of the stopwatch and the child's bringing his paper to the teacher's desk or getting in line at the teacher's desk. This time was recorded to the nearest 15 sec. Second, each letter of the assignment was scored as being correct or as an error. Circles were drawn around each letter scored as an error and the total number of errors was written at the top of each child's paper.

Similar criteria for correctness were employed for the printing of the first-grade students and for the writing of second-grade students. The criteria for defining errors were as follows:

(1) All omissions of assigned letters
(2) Substitutions of letters in place of those assigned
(3) Reversals, *e.g.*, printing or writing ꓘ instead of K
(4) Omitting any part of a letter, *e.g.*, failing to cross a *t*
(5) A failure of any vertical stroke to be within 15 degrees of the perpendicular to the base line (printing), or failure of written letters to be consistently slanted about 60 degrees from the base line.
(6) Short lower case letters being less than half as tall as the distance between the baseline and the center line or being more than 50% taller than the distance between the base line and the center line.
(7) Tall lower case or upper case letters being less than 75% as tall as the distance between the baseline and the top line or being more than 25% taller than this distance.
(8) Lower case letters, which should extend below the base line, *e.g.*, *y*, failing to extend below the base line at least 50% of the distance between the base and center lines or extending further than 100% of this distance.

On four different days a second person timed and scored every child's paper to determine the extent of agreement between different observers. The second person used a stopwatch and independently recorded the time each child required to complete the assignment. Each child's paper was photocopied to allow the second observer to score the papers independently of the first observer. One such check on observer reliability was conducted during each of the first four experimental conditions.

The mean difference, averaged over all students and days of the experiment, in times recorded by the two observers, was 13 sec with a range over the four days of from 11 to 21 sec. The mean percentage of letters on which both observers agreed by scoring as either correct or as errors was 91 with a range from 84 to 94% over the four days.

Procedural Variations

The variables that were manipulated in this experiment were the consequences of a child's turning in his paper to the teacher. Seven experimental conditions were sequentially employed. These conditions are described below under titles also employed in the Results section.

Baseline I

During the first eight days of the experiment, each child was told to return to his seat and wait quietly after his paper had been scored. The children who had completed their writing assignments remained at their seats until the last child to complete the assignment had his paper scored. The teacher then went on to the next subject. The slowest child in the room, on the average, finished his assignments in about 50 min.

Playroom–50 I

From the ninth day through the twenty-first, each child was allowed to go to the playroom as soon as he had his paper scored. The children could stay in the playroom for the remainder of a 50-min period, which began when the teacher told the children to start work on their printing or writing assignments. In other words, the sooner a child finished his work, the sooner he got to go to the playroom and the longer he got to play.

One other contingency was in effect during this condition. If a child became particularly noisy while he was in the playroom, the teacher could have him leave the playroom and return to his seat for the remainder of the 50-min period. This penalty was invoked only one time for two different children during the entire condition.

Baseline II

Conditions like those described under Baseline I were reinstituted from Day 22 through Day 27; after a child's paper was scored, he was told to return to his seat for the remainder of the assignment period.

Playroom–50 II

During Days 28 through 31, Playroom–50 I conditions were again used; as soon as a student's paper was scored, he was allowed to go to the playroom for the remainder of the period. During this condition, it was necessary for the teacher to return one child from the playroom to his seat because he was excessively noisy.

Playroom–45, Playroom–40, Playroom–35

Conditions similar to those employed in the earlier playroom conditions were used again in these conditions. Generally, a student was allowed to go to the playroom for the remainder of the period as soon as his paper had been scored. However, the time allowed for a student to complete his work and play was progressively reduced over these conditions. Forty-five minutes were allowed during Days 32 through 34, 40 min from Days 35 through 37, and 35 min from Days 38 through 54.

Procedural Exception

The above described general procedures and systematic procedural variations were employed for every student in both grades with the following exception. The classroom teacher noted that during Sessions 40 through 46, three of the first-grade children had frequently turned in printing assignments on which there were much higher percentages of errors than they had been obtaining earlier in the experiment. Correlated with the decreases in the quality of their work there were considerable increases in the rates at which they were printing.

The teacher reasoned that quicker access to the playroom was reinforcing rapid work at the expense of quality for these three children and asked for some adjustment in procedures that might produce a decrease in the number of errors they were making. Therefore, during Days 47 through 54 special conditions were employed for only these three students.

Each day the mean number of errors made by each of the three children during the preceding two days was computed. If the child then made fewer than 80% as many errors as he had made on the last two days, he was allowed to go to the playroom as soon as his paper was scored. If he made more than 80% as many errors as he had made on the last two days, he was told that he had not done a good job on his printing and he was sent back to his seat to re-copy approximately one-third of the assignment. As soon as one of these three children had re-copied the given portion of the assignment and the work was scored, he was allowed to go to the playroom for the remainder of the period.

RESULTS

The main group results are displayed in Fig. 1 and 2. Figure 1 displays both the mean number of letters printed per minute and the mean number of errors per letter obtained each day during the experiment. Both of these sets of data are averaged over all of the students in the first grade. The mean number of letters per minute for each day, the major dependent variable of this study, was obtained by dividing the amount of time required to complete the assignment, summed over all first grade students, into the total number of letters printed by all first grade students that day. The mean number of errors per letter on each day was similarly obtained by dividing the total number of errors made by all first-grade students by the total number of letters printed by all first-grade students.

Throughout the first baseline condition, during which the children returned to their seats as soon as their papers were scored, the first-grade children averaged printing slightly fewer than six letters per minute. The day-to-day variation around this average was not great. The daily means never exceeded seven letters per minute nor fell below five.

When the children were allowed to go to the playroom for the remainder of the 50-min period as soon as they had their papers scored, the mean rate of printing quickly increased

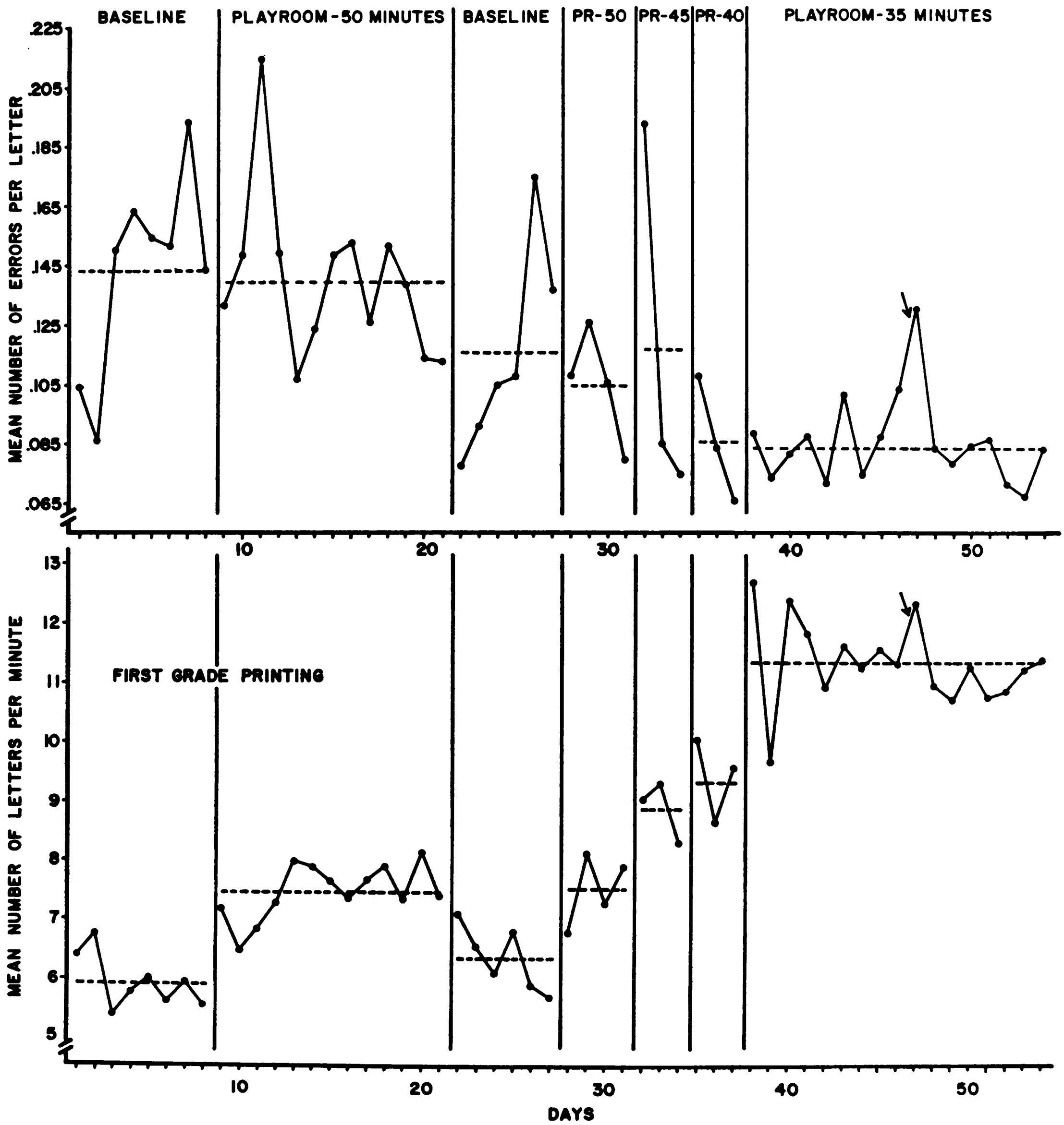

Fig. 1. The mean number of letters printed per minute by first-grade children are shown on the lower coordinates and the mean proportion of letters scored as errors are on the upper coordinates. Each data point represents the mean, averaged over all children for that day. The horizontal dashed lines are the means of the daily means averaged over all days within the experimental conditions noted by the legends at the top of the figure.

and apparently stabilized at an average of about 7.5 letters per minute.

During the second baseline condition, Days 22 through 27, the mean rate of printing gradually decreased through the first three days and it is not clear that it had stabilized by the twenty-seventh day of the experiment. The average of the daily mean rates of printing was about 6.3 letters per minute.

When the children were again allowed to go to the playroom for the remainder of the 50-min period as soon as their papers were scored, Days 28 through 31, the mean rate of printing quickly increased. The averages of the daily means for these four days was about 7.5 letters per minute. The average of the daily means during both of the playroom conditions was about 33% greater than the average of the mean number of letters printed per minute during the first baseline condition.

As the total amount of time allowed for the children to complete their assignments and then play was progressively shortened to 45 min, Days 32 through 34; then to 40 min, Days 35 through 37; and finally to 35 min, Days 38 to 54, the mean number of letters printed per minute increased systematically. The average of the daily means during the last 17 days of the experiment was about 11.25 letters per minute. This is about a 90% increase over the printing rate obtained during the first baseline period.

There were rather wide fluctuations in the mean number of errors per letter throughout the course of the experiment. However, it is clear that there were no systematic increases in the error rates during the five playroom conditions. Instead, there is a systematic decrease in the averages of the mean numbers of errors per letter over conditions, punctuated by a drastic increase in the mean number of errors on the thirty-second day of the experiment during the Playroom–45 condition. Terminally, the mean percentage of errors is about 42% of that obtained during the first baseline condition.

The results for the mean number of letters written per minute and the mean number of errors per minute for the second-grade, Fig. 2, generally replicate the results of the first grade. The average of the daily mean number of letters written per minute is about 7.25 during the first baseline condition and increases to about 10.25 during the first playroom condition. This represents about a 42% increase in the mean number of letters written per minute over the rate obtained during the first baseline condition. The writing rate decreased when the children had to return to their seats after their papers were scored, Days 22 through 27, and increased when they were again allowed to go to the playroom after their papers were scored, Days 28 through 31. As the time allowed for completion of writing assignments and playing was systematically decreased, Days 32 through 54, the writing rate progressively increased. It is not clear that the mean number of letters written per minute had stabilized by the end of the experiment. However, the average of the daily means was about 14 letters per minute during the last 17 days when the children went to the playroom as soon as their papers were scored but only 35 min were allowed for completing the assignment and playing. This average rate is about 93% greater than the rate obtained during the first baseline period.

Again, the mean number of errors per letter for the second grade varies considerably over days but decreases through the course of the experiment. Again, there is no general correlation between temporary increases in the mean number of errors and the introduction of experimental conditions during which the children were allowed to play after they completed their assignments and had their papers scored. During the last 17 days, the average of the daily mean number of errors per letter is about 0.021 or 45% less than the average of the mean number of errors per letter during the first baseline condition.

The group data for the two grades are quite representative of the individual students in each grade. The mean number of letters written per minute averaged over the first two playroom conditions was greater for every child in the second grade than was his mean of letters written per minute averaged over the two baseline conditions. Similarly, 13 of the 14 children in the first grade had higher average printing rates in the first two playroom conditions than in the baseline conditions. Every child in both grades printed or wrote at higher average rates during the last 17 days of the experiment, the Playroom–35 condition, than he had during the first playroom condition. With the exception of one

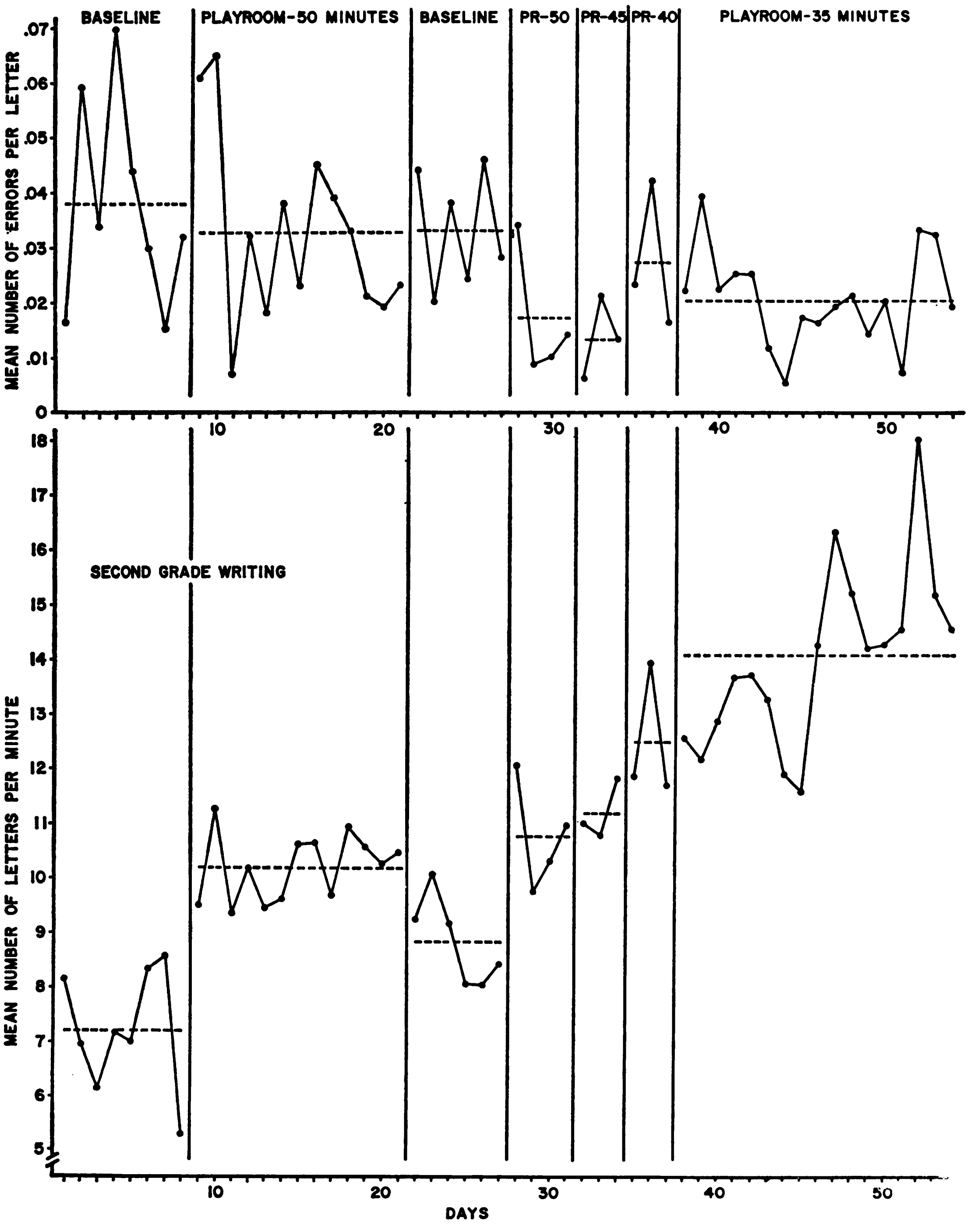

Fig. 2. The mean number of letters written per minute by second-grade children are displayed on the lower coordinates and the mean proportion of letters scored as errors are on the upper coordinates. Each data point represents the mean, averaged over all children for that day. The horizontal dashed lines are the means of the daily means averaged over all days within the experimental conditions noted by the legends at the top of the figure.

boy in the first grade, each of the children in both grades had lower average error rates during the last condition of the experiment than they had during the first baseline condition.

The second grade student who improved least during the course of the experiment had a 43% increase in the average number of letters written per minute from the first baseline condition to the Playroom–35 condition, while the second grade student who improved most had a 180% increase in writing rate. The first-grade student who advanced the least had a 70% increase in the average number of letters printed per minute, while the rate of the most improved first-grade student increased 420%.

Table 1 displays the distributions of printing and writing rates at five different points in the experiment. Each entry represents the number of students whose mean number of letters printed or written averaged over the days of the indicated condition fell within the indicated range.

At the beginning of the experiment, the mean work rates of first grade students extended from approximately three to approximately nine letters per minute. In other words, the fastest students were printing approximately five letters per minute more than the slowest student. By the time the second Playroom–50 condition was in effect, this range in work rate had increased to approximately 10 letters per minute and it was nine letters per minute during the last condition of the experiment.

Similarly, the range of work rates of second-grade students increased during the course of the experiment. The difference between the mean number of letters written per minute by the fastest and slowest students during the first condition was approximately five. This range had increased to approximately six letters per minute by the second Playroom–50 condition and to approximately eight letters per minute by the last 17 days of the experiment.

The changes in the distributions of the mean number of letters printed or written per minute reflect the overall improvements in work rates found in the class averages displayed in Fig. 1 and 2. In both grades, there is a progressive shift toward higher work rates across the conditions presented in Table 1.

Table 1

Distributions of the number of children whose mean number of letters printed or written per minute fall within the indicated ranges during five selected conditions of the experiment.

Number of Letters per Min	*BL-I*	*PR-50I*	*BL-II*	*PR-50II*	*PR-35*
FIRST GRADE					
3.0- 3.9	3	1	2		
4.0- 4.9	3	1	3	1	
5.0- 5.9	3	1	2	2	
6.0- 6.9	2	1	3	2	
7.0- 7.9	2	2	2	2	1
8.0- 8.9	1	2	1	1	2
9.0- 9.9		2	1	3	2
10.0-10.9		1		1	3
11.0-11.9		2		1	3
12.0-12.9					
13.0-13.9		1			1
14.0-14.9			1		
15.0-15.9					
16.0-16.9					2
SECOND GRADE					
5.0- 5.9	1				
6.0- 6.9	4		3		
7.0- 7.9	2	1	1	1	
8.0- 8.9	2	3	2	3	
9.0- 9.9		2	1		
10.0-10.9	1	1	2	1	2
11.0-11.9		2	1	4	2
12.0-12.9					1
13.0-13.9		1		1	
14.0-14.9					
15.0-15.9					2
16.0-16.9					1
17.0-17.9					1
18.0-18.9					1

Table 2 presents similar distributions of the mean number of errors per letter for both gades. In this table, each entry represents the number of students whose mean number of errors per letter averaged over the days of the indicated condition were within the indicated range. At the beginning of the experiment, the first-grade students who were making the fewest scored errors were averaging about 55% fewer errors than the child making the most errors. This range had decreased to 40% during the second Playroom–50 condition and during the Playroom–35 condition.

In the second grade the initial range is about 0.10 errors per letter. During the second Playroom–50 condition, the range was reduced to about 0.03 errors per letter. However, during the last 17 days of the experiment the range had increased again to about 0.07 errors per letter.

Again, Table 2 reflects the overall reduction in error rates seen in Fig. 1 and 2. However, both the first- and second-grade distributions in Table 2 indicate that some children were making a higher percentage of errors during the last condition than they had during the second Playroom–50 condition.

There are not sufficient data or appropriate controls to assess the effects of the procedural variation introduced during the last eight days for the three first-grade boys. However, the mean number of letters printed per minute averaged over Days 47 through 54 were lower for each of the boys than were the means for Days 38 through 46. The mean number of errors per letter also decreased for the three boys from Days 38 through 46 to Days 47 through 54.

Table 2

Distributions of the number of children whose mean number of errors per letter fall within the indicated ranges during five selected conditions of the experiment.

Number of Errors per Letter	*BL-I*	*PR-50I*	*BL-II*	*PR-50II*	*PR-35*
First Grade					
0.000-0.049	5	6	6	8	7
0.050-0.059	4	3	3	2	4
0.100-0.149	1			1	
0.150-0.199	1	1	2		
0.200-0.249					
0.250-0.299				1	2
0.300-0.349		1	1		
0.350-0.399					
0.400-0.449	1	2	2	2	1
0.450-0.499	1				
0.500-0.549		1			
0.550-0.599	1				
Second Grade					
0.000-0.009	1	2	1	3	2
0.010-0.019	2	3	3	3	2
0.020-0.029	4	2	3	3	3
0.030-0.039				1	
0.040-0.049			1		
0.050-0.059		1			1
0.060-0.069			1		1
0.070-0.079	1	1			1
0.080-0.089		1			
0.090-0.099	1		1		
0.100-0.109					
0.110-0.119	1				

DISCUSSION

The teaching technique employed during the baseline conditions, having each child once he has finished his work to wait for the rest of the class to complete their assignments, is frequently employed by elementary teachers. However, the present results strongly suggest that the technique develops relatively inefficient work skills for students. In contrast, allowing a child to play as soon as he finishes his work functions to reinforce higher work rates. This reinforcing effect was generally useful for just about all of the children in the present sample.

Contrary to the authors' expectations, there was not a general decrease in the quality of the children's work as they printed or wrote at higher rates. During the playroom conditions, when rapid work was differentially reinforced but there was no controlled reinforcement for relatively good work, the quality of most of the children's work continued to increase. It is possible that the teacher's praise or criticism of relatively good and poor work served as sufficient reinforcement and/or punishment to partially control the quality of the work. This possible effect would be consistent with the abundance of research that has demonstrated the importance of a teacher's interactions with her students as reinforcers that exert considerable effects on classroom behaviors (Hall, Lund, and Jackson, 1968; Schutte and Hopkins, 1970). Nevertheless, the present research was not done in such a way to clarify the importance of such a possible effect.

Although there is evidence of a general improvement in the quality of the work done by the students in both grades during the experiment, there is also some evidence that a prolonged use of the playroom conditions in the absence of any controlled reinforcement for work quality could produce a decrease in the quality of the work done by some children. The three first-grade boys who had to meet a certain quality criterion before they played during the last eight days of the experiment were previously doing progressively worse work as the playroom conditions were maintained. Similarly, Table 2 shows that a few of the second-grade children did poorer quality work during the last days of the experiment than they had during the second Playroom–50 condition. There are two obvious ways in which the procedures could be modified to simultaneously control work rate and work quality. One would consist of systematically employing teacher praise for quality control while using access to the playroom to control work rate. The other would be essentially similar to the procedural variations used for the three first-grade boys who started doing relatively poor work towards the end of the experiment. A child could be allowed access to the playroom as soon as he finished his work at a certain criterion of quality.

One possible source of confounded control of printing and writing rates was not systematically explored in the experiment. The teacher gradually increased the length of assignments during the course of the experiment. This could have had some effects to increase or decrease work rates. The changes in rate, which accompany the alternating baselines and access to play during the first four conditions, leave no doubt that they control work rate beyond any control exerted by the length of the assignments. However, length of assignments could have had some effect on the obtained overall changes in rate.

There is no intent to suggest an appropriate solution to the moral question implicit in an innovative classroom model that either increases or decreases the range of rates or qualities of work done by students. Nevertheless, data relevant to this question are a natural byproduct of any classroom experimentation. In the present research, the effects of the experimental procedures on the distributions of rate and quality of printing and writing are equivocal. For both grades, it appears that the procedures employed produced an increase in the range of rates at which students worked. However, it is likely that there would ultimately be a decrease in this range if even more effective procedures would be found. Assuming that there is some practical upper limit to the rate at which children print or write, it might be expected that the faster children would eventually cease to improve as much. The procedures then might be effective to still increase the work rates of relatively slow children. The ranges between the students who make the fewest errors and those who make the most errors apparently decrease during the course of the experiment. However, this apparent effect could again represent a "ceiling effect." The response measure is defined in such a way that a student cannot improve beyond zero per cent errors. Therefore, this fixes a limit beyond which the more skillful students cannot advance and allows the less skillful students to catch up. Practically, it seems likely that the well-designed classroom would have some provisions for advancing a student to some other activity once his rate of work and quality are both consistently above some criterion.

Practically, the motivational system used in this experiment seems useful. Indeed, it is probably successfully employed by many teachers. This research is unique only in the sense that it employs systematic experimentation and measurement that allows for an evaluation of the technique. The system is clearly inexpensive and makes efficient use of a teacher's time. The playroom contained only objects commonly available in schools. The partition that constituted the walls of the playroom would cost a school less than $100 in supplies and materials and many teachers could probably improvise a suitable partition from movable shelves or portable chalk boards. It is not even clear that the partition is a necessary part of the system. The teacher working under this system does have to grade papers as soon as children complete their assignments but this is probably a necessary ingredient in any satisfactory teaching system unless immediate grading can be done automatically or by other students. Terminally, the teacher in this experiment had an extra 15 min that could be devoted to work in other subjects or to productive play. Nevertheless, during the last condition of the experiment, the children still had more free play time than they did during the baseline conditions. This motivational system requires no special training for a teacher.

There was no indication that the noise level in the playroom ever served as a serious distracting stimulus for children who were still working at their seats. Casual observations suggested that the children, while working on assignments, engaged in far fewer disruptive or unproductive behaviors such as talking to neighbors or walking around the room, during the playroom conditions than they did during baseline conditions. It is possible that access to the playroom reinforced work-related behaviors at the expense of disruptive behaviors. Occasionally, a minor logistics problem occurred when four or five children finished their papers at about the same time and had to wait in line at the teacher's desk to have their papers scored.

There was good indication that both the children and teacher liked using the playroom as it was employed in this experiment. During the second baseline condition, the children frequently asked about possible future use of the playroom and no child ever refused to go to the playroom when he was given the opportunity. Since the experiment terminated, the teacher has continued to use this and similar kinds of motivational systems for a variety of classroom work.

REFERENCES

Broden, M., Hall, R. V., Dunlap, A., and Clark, C. Effects of teacher attention and a token reinforcement system in a junior high special education class. *Exceptional Children,* 1970, 37, 341-349.

Hall, R. V., Lund, D., and Jackson, D. Effects of teacher attention on study behavior. *Journal of Applied Behavior Analysis,* 1968, 1, 1-12.

Jacobson, J. M., Bushell, D., and Risley, T. Switching requirements in a Head Start classroom. *Journal of Applied Behavior Analysis,* 1969, 2, 43-47.

Lovitt, T. C., Guppy, T. E., and Blattner, J. E. The use of free-time contingency with fourth graders to increase spelling accuracy. *Behavior Research and Therapy,* 1969, 7, 151-156.

O'Leary, K. D., Becker, W. C., Evans, M. B., and Saudargas, R. A. A token reinforcement program in a public school: a replication and systematic analysis. *Journal of Applied Behavior Analysis,* 1969, 2, 3-13.

Osborn, J. G. Free time as a reinforcer in the management of classroom behavior. *Journal of Applied Behavior Analysis,* 1969, 2, 113-118.

Reynolds, N. J. and Risley, T. R. The role of social and material reinforcers in increasing talking of a disadvantaged preschool child. *Journal of Applied Behavior Analysis,* 1968, 1, 253-262.

Schutte, R. C. and Hopkins, B. L. The effects of teacher attention on following instructions in a kindergarten class. *Journal of Applied Behavior Analysis,* 1970, 3, 117-122.

Wolf, M. M., Giles, D. K., and Hall, R. V. Experiments with token reinforcement in a remedial classroom. *Behavior Research and Therapy,* 1968, 6, 51-54.

Received 25 June 1970.
(Revised 10 March 1971.)