*HOMEWORK ASSIGNMENTS, CONSEQUENCES, AND
CLASSROOM PERFORMANCE IN SOCIAL STUDIES
AND MATHEMATICS¹*

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Elementary school students who frequently answered questions incorrectly in class were given daily homework assignments in social studies and math, but they rarely completed the assignments accurately and their classroom performance in social studies and math was only slightly better than when they did not have homework assignments. However, consequences provided for accurate completion of homework assignments increased the number of students completing homework and the accuracy with which homework assignments were completed. Further, assignments of homework with consequences for accuracy were associated with more accurate classroom performance.

Students are often assigned homework on the apparent assumption that it will improve their academic performance and foster development of independent study skills. A number of articles have described the presumed advantages or disadvantages of homework assignments on the attitudes of students, teachers, and parents about homework assignments (*e.g.*, Check, 1966; Langdon and Stout, 1957; Maertens, 1968; Schiller, 1954). Although several authors have reviewed the experimental literature on the assignment of homework (*e.g.*, Goldstein, 1960; Otto, 1950; Swenson, Cost, and Taylor, 1955), there seems to be little agreement as to whether the assignment of homework is useful. Abramowitz (1937), Anderson (1946), Foran and Weber (1939), Hines (1957), Schain (1954), and Steiner (1934) found assignment of homework to be associated with improved academic performance; Baughman and Pruitt (1963),

Maertens (1969), McGill (1950), Rosenstengel and Turner (1936), Schneider (1953), and Teahan (1935), found assignment of homework to produce either mixed or no effects on academic performance.

The lack of consistent results is difficult to interpret for several reasons. First, the measures of academic performance vary greatly, ranging from measures on standardized achievement and intelligence tests, to scores on tests constructed by individual teachers, to overall course grades. Second, few of the studies specify the homework assignment. Third, and perhaps most important, the majority of the studies compare a condition in which homework was assigned to one in which no homework was assigned. No data are presented, however, on whether the homework was completed by the students and at what level of accuracy.

The purposes of the two present experiments, in social studies and math were: (1) to evaluate the effects of assigning homework on students' subsequent classroom performance, (2) to develop methods of increasing the number of students who completed homework assignments at a reasonable level of accuracy, and (3) to evaluate the effects of assigning homework on students' subsequent classroom performance, given that most of them completed the homework reasonably accurately.

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EXPERIMENT I

METHOD

Subjects

This study was conducted in two sixth-grade classrooms containing 25 and 27 students. Both teachers indicated that the students lacked motivation in social studies, as evidenced by their inability to respond correctly to questions posed during the social studies period.

Procedures

Each afternoon, the teachers gave a three-to-four page reading assignment in the sixth-grade social studies text (Follett Series, 1961) as homework for that evening. Students were instructed to read the assignment and be prepared to answer questions about it the next day. During several phases of the study, the teachers also passed out mimeographed sentence-completion items concerning the evening's assignment. The items were constructed by omitting key words of sentences taken from the reading assignment. When these items were handed out, the students were asked to complete the sentences in writing and turn in their answers on the morning of the next day. During social studies periods, each teacher asked the students to write answers to 15 sentence-completion items from that day's assignment within the context of a game (described below). When completion items were assigned as part of the homework, they were the same items given during the next day's social studies period.

Tic-tac-toe game. The questions asked during the social studies periods were answered within the context of a game. The class was divided into two teams on the basis of seating arrangement. If, due to absences, the number of members on both teams on a given day was not equal, the teams were equalized by asking for a student volunteer to keep score at the blackboard or by shifting one or more students from one team to another.

Fifteen sentence-completion questions from the previous day's reading homework assignment were presented in random order. The students

were instructed to write the answers to each question as quickly as possible, turn over their answer sheet, and raise their hand. The teacher read each question aloud twice to the class. The answering period for each question ended when the teacher said "stop". The teacher announced "stop" when she received a signal from an observer indicating that 30 sec had elapsed since the second reading of the item or when all members of one or both teams had their hands raised.

Students' answers were graded after each question by two graders, usually the teacher and an undergraduate observer, who each graded one team. The graders told each student whether each answer was "right" or "wrong". Then, the graders announced the total number of correct responses for each team. The team with the most correct answers on a question had a team member, chosen by the teacher, put an X or an O in one of the squares on a tic-tac-toe grid drawn on the blackboard and the next question was asked. When both teams had the same number of correct answers, no symbol was placed on the tic-tac-toe grid and the next question was asked. A team won the game when it acquired three Xs or three Os in a straight line. If, in the teacher's opinion, a student was cheating by looking up an answer in the social studies text or looking on another student's paper during the question-answering period, his answer sheet was removed and he was out of the game. If the game was incomplete at the end of the 15 questions, the team with the most Xs or Os "won". At the end of the day, both the game grid and the accumulated games won by each team were erased. The game was followed by a discussion of the assigned social studies material.

Homework questions assigned versus no homework questions assigned. The effects of the homework questions on the accuracy of question-answering in the social studies tic-tac-toe game was investigated in the first phase of the study.

Homework assignments of the 15 completion items were collected at 8:30 A.M., graded, and returned to the students at 9:00 A.M. Thus, a student completing a homework assignment re-

ceived feedback before the social studies period began. However, a student was not allowed to copy from his homework paper during the game. There were no scheduled contingencies for completing the homework assignment and the teacher did not assign social studies grades on the basis of homework performance. Next, the homework questions were no longer given out. In classroom A, these first two conditions were followed by a condition in which homework questions were again given out. In classroom B, only the first two conditions were used.

Consequences for accurate completion of homework questions. When consequences were first employed, the class was told that each student who answered 80% or more of the homework questions correctly would be allowed to leave school 10 min early on the day on which these homework sheets were turned in. The homework papers were turned in, graded, and passed back to the students as in previous conditions. Next, the consequences for answering 80% or more of the homework correctly was changed from permission to leave school 10 min early to permission to leave school 15 min early.

In the last condition of this phase, students who answered 80% or more of the homework questions correctly were allowed to leave school 15 min early as in the previous condition. Students below 80%, or who did not hand in a homework assignment, remained inside during the recess period preceding the tic-tac-toe game. These students were asked to work on their homework assignments during this recess. A grader was present to check any assignment corrected or completed during the recess period. If a student answered 80% of the questions correctly during the recess period, he was immediately allowed to join his classmates outside. Students who answered 80% of the homework questions correctly either before or during this recess period, were allowed to leave school 15 min early. The sequence of conditions described in this phase was used only for classroom A.

Consequences for accurate completion of the

homework questions versus no homework questions assigned. In this phase, the effects of the homework questions plus consequences for accuracy were compared to a condition in which the homework questions were not given. Students in both classes who correctly answered 80% or more of the homework questions were allowed to leave school 15 min early. In addition, the students in classroom A who scored less than 80%, or who did not turn in the questions, were required to work on the questions during the recess period preceding the social studies period. If these students answered 80% of the questions correctly during the recess period, they were allowed to go to recess and leave school 15 min early at the end of the day. Students in classroom B had the 15-min early dismissal for 80% performance, but they did not lose recess for less than 80% performance.

Consequences for winning the tic-tac-toe game, with and without homework questions assigned. In this phase, there were consequences only for winning the tic-tac-toe game. In classroom A, all members of the team that scored the most "victories" in the game were allowed to leave school 15 min early. A single victory was achieved by scoring more correct answers on a single question than the other team. If both teams scored the same number of victories, both teams left early. In classroom B, each member of the team that scored the most victories was allowed to choose three pieces of penny candy (from an assortment available) at the end of the school day.

In this phase, performance during days in which homework questions were assigned was compared to performance during days in which no homework questions were assigned. Table 1 lists the sequence of conditions and the number of days for each condition in each classroom throughout the study.

Measures of student performance. Throughout the study, the accuracy with which all students answered questions during the tic-tac-toe game was recorded. The absence of an answer was scored as an incorrect response. Periodically, two

Table 1
Sequence of Conditions for Each Sixth-grade Classroom

<i>Comparison</i>	<i>Condition</i>	<i>Classroom</i>	<i>Number of Days for Each Condition</i>
Homework questions <i>versus</i> no homework questions	Homework Questions	A	4
	No Homework Questions	A	4
	Homework Questions	A	4
	Homework Questions	B	5
	No Homework Questions	B	5
Consequences for accurate completion of homework questions	Homework Questions 80% = 10 min leave early	A	5
	Homework Questions 80% = 15 min leave early	A	5
	Homework Questions 80% = 15 min leave early	A	5
	No recess until reach 80%		
Consequences for accurate completion of homework questions <i>versus</i> no homework questions	No Homework Questions	A	5
	Homework Questions 80% = 15 min leave early	A	5
	No recess until reach 80%		
	No Homework Questions	A	5
	Homework Questions 80% = 15 min leave early	B	5
	No Homework Questions	B	4
	Homework Questions 80% = 15 min leave early	B	4
	Homework Questions 80% = 15 min leave early	B	4
	No recess until reach 80%		
	No Homework Questions	B	4
	Homework Questions 80% = 15 min leave early	B	5
	No recess until reach 80%		
Consequences for winning the tic-tac-toe game, with and without homework questions	Homework Questions Winning game = 15 min early	A	4
	No Homework Questions Winning game = 15 min early	A	4
	Homework Questions Winning game = 15 min early	A	3
	Homework Questions Winning game = 15 min early		
	Homework Questions Winning game = candy	B	3
	No Homework Questions Winning game = candy	B	3
	Homework Questions Winning game = candy	B	3
	Homework Questions Winning game = candy		
	Winning game = candy		

graders independently scored the written answers. This was done at least once during each experimental condition in each classroom. Reliability of scoring by the two observers on an answer-by-answer basis was 100% in both classrooms. When homework questions were assigned, the following measures were recorded: the percentage of completed assignments (*i.e.*, turned in by 8:30 A.M. and with answers to at least 12 of the 15 questions), and per cent correct over all students who had an opportunity to complete the homework assignment. Reliability measures on the homework assignments were also taken at least once during each experimental

condition in each classroom. On an answer-by-answer basis, the reliability between two graders was 100% in both classrooms.

RESULTS

Homework versus no homework. Figure 1 shows the measures of homework performance when homework questions were assigned (top two sets of axes) and the accuracy with which students answered questions during the tic-tac-toe game in social studies periods (bottom set of axes) for both classrooms. For calculation of accuracy, a student who did not hand in the homework was recorded as a zero. In both classes,

Fig. 1. Mean per cent of students completing the homework assignment, mean per cent correct on the homework assignment, and mean per cent correct in classroom A and classroom B when homework questions were assigned and when they were not assigned.

about one-half of the students did the homework when it was assigned and less than one-half of the homework was done correctly. When homework was assigned, about 30 to 40% of the

students' answers to the questions in class were correct. However, when no homework was assigned, correct answers to the questions in class were about 5 to 15%.

Fig. 2. Mean per cent of students completing the homework assignment, mean per cent correct on the homework assignment, and mean per cent correct in classroom A during the conditions with no consequences and various consequences for completion of homework questions at an accuracy level of 80%.

Consequences for accurate completion of homework questions. The data plotted for the first condition in Figure 2 are the same as those plotted for the last condition for classroom A in Figure 1. All measures of student performance were higher when there were consequences for completing homework questions than when there were no such consequences. Homework and classroom performances were highest when (a) students were allowed to leave 15 min early if the homework questions were correctly answered at an 80% level and (b) students were required to work on the questions during recess if they did not hand in their questions or were below 80% accuracy.

Consequences for accurate completion of homework questions versus no homework questions. The data shown in the first condition of Figure 3 are the same as those plotted in the last condition of Figure 2. When the homework questions were assigned and the early-out-of-school and recess consequences were employed, a high percentage of students completed the homework by 8:30 A.M. (mean of 67%) at a reasonably high accuracy level (mean of 70%). This condition also produced a markedly higher percentage of questions answered correctly in the classroom (mean of 74%) as compared to conditions in which no homework questions were assigned (mean of 12%).

Figure 4 shows the measures of homework and classroom performance for classroom B. When either of the consequence procedures were employed, a fairly high percentage of students completed the homework questions by 8:30 A.M. (mean of 73% over the four conditions where consequences were used) at a moderate accuracy level (mean of 67%, at the outset of class, over the four conditions). There were no obvious differences between the two consequence systems on these measures. Homework with consequences was associated with a high level of accuracy on classroom questions (mean of 66% over the four conditions where consequences were used). This contrasts to a mean of 13% accuracy over the two conditions

where no homework questions were assigned to students.

Consequences for winning the tic-tac-toe game with and without homework questions assigned. Figure 5 shows that homework and consequences for winning produced a high percentage of correct answers in both classrooms (mean of 69%), compared to conditions in which no homework was assigned, but consequences were still provided for winning (mean of 21%).

Over the entire study, students who completed the homework and met the 80% accuracy criterion answered 87% of the questions correctly in class. Students who did not meet the 80% accuracy criterion on the homework assignment or who did not hand in the assignment answered only 31% of the questions correctly in class.

EXPERIMENT II

METHOD

Subjects

Twenty-five sixth-grade students served. The instructor, a second-year intermediate teacher, described the students' overall performance in mathematics as deficient. At the outset of the sixth-grade academic year, the students had scored a mean of 4.8 yr on the two math components of the Iowa Test of Basic Skills. Attempts by the teacher to enhance performance in mathematics by encouraging completion of regular homework assignments had not been successful.

Procedure

Individual student performance in two separate 30-min math periods was recorded daily. The first math session (math₁) occurred at a regularly scheduled time in the morning. The second math session (math₂), occurred at regularly scheduled time in the afternoon. Each math session preceded a 20-min recess. Daily math assignments, consisting of one or two pages of math problems, drawn from a sixth-grade textbook (Addison-Wesley, 1968) were divided into two equal assignments. One assign-

ment was composed of all odd-numbered problems, the other of all even-numbered problems. This division provided two assignments each day of approximately equal difficulty. Thus, the effects of the various experimental conditions on classroom performance could be evaluated by

comparing student performances in math₁ and math₂ without the possibly confounding variables of problem difficulty that might have been present had performances been compared over different types of math problems. (A similar procedure was not used in Experiment I because

Fig. 3. Mean per cent of students completing the homework assignment, mean per cent correct on the homework assignment, and mean per cent correct in classroom A during the conditions when no homework questions were assigned and when homework questions were assigned and the early-out-of-school and recess consequences were employed.

the social studies assignments did not seem to vary as much in difficulty as did the math assignments.)

Before math₁, the teacher gave a brief lecture on that day's assignment and demonstrated problem solutions similar to those required of the students. The teacher then passed out answer sheets numbered to indicate which problems the students were to work during that math period. To counterbalance the problems assigned in math₁ and math₂, and to reduce the probability of cheating during math sessions, the teachers handed out the answer sheets in checkerboard

fashion, alternating the first and second assignments for students in each row. In this way, each student had a different assignment than the student sitting directly in front, behind, or to the right or left of him. The math work period began after every student had received an answer sheet.

After completing an assignment, the student handed his paper to a grader located at a table adjacent to the teacher's desk. The grader recorded the time taken for the student to complete his assignment, graded and recorded the correct and total number of problems worked,

Fig. 4. Mean per cent of students completing the homework assignment, mean per cent correct on the homework assignment, and mean per cent correct in classroom B during the conditions when no homework questions were assigned and when homework questions were assigned and the early-out-of-school and recess consequences were employed.

and returned the paper to the student. Throughout all conditions of the study, the student, if he chose, could work again problems that he missed on the first check and have his paper graded again, up to a total of three times. At the end of the math session, all papers that had not been scored by the grader were collected and graded for the first time.

Homework, with and without consequences for completion. Homework assignments, identical to the math assignment for one of the next day's math sessions for a particular student, were

given to the students each day. All homework assignments were collected at the outset of class each day. The assignments were graded and returned to the students at the end of the day. Anyone handing in homework with answers to each of the problems was allowed to depart for lunch 10 min early. The teacher informed the students daily of this contingency.

After six days, the teacher informed the students that the early-to-lunch consequence was no longer available for successful homework completion. However, she asked the students to con-

Fig. 5. Mean per cent of students completing the homework assignment, mean per cent correct on the homework assignment, and mean per cent correct in classroom A and classroom B when homework questions were assigned and not assigned and consequences were provided for winning the tic-tac-toe game.

tinue to complete and hand in the homework assignments. Except for removal of the homework contingency, all homework procedures were identical to those of the previous condition. Five days later, the early-to-lunch consequence for successful homework completion was re-instated and left in effect for five days.

To increase further the number of students completing their homework assignments, an additional consequence for homework completion was provided. A student completing his homework assignment with answers to each problem was allowed to leave school 10 min early in addition to the early-to-lunch consequence. After eight days, both consequences for homework completion were removed for a six-day period. Then, both consequences were re-instated for six days. Except for the consequences provided for homework completion, all procedures were identical across conditions.

Consequences for accurate completion of homework versus no homework. Next, the teacher stated that if a student completed the homework assignment (all problems answered) and had 60% or more of these answers correct, he or she would be allowed to leave school 10 min early at the end of the school day as well as depart for lunch 10 min early. Except for the accuracy criterion, all homework procedures were identical to those employed earlier. Initially, the homework assignment was the same as the math assignment scheduled for math₁ for each child. After 10 days, the homework assignment was changed to be the same as the math assignment scheduled for math₂ for 10 days. Finally, for 10 days, the homework assignment was again changed to be the same as the math assignment for math₁.

Homework, with consequences for accurate completion and consequences for accurate classroom performance. The two consequences previously described (*i.e.*, early to lunch and early to leave school) for 60% or better performance on the homework assignment were in effect throughout this phase. Initially, the homework assignment was the same as the math assignment

in math₂ for a particular child. In addition, during math₂ if a student's classroom math assignment was 90% correct or higher he was allowed to depart immediately for recess. Those students not scoring 90% or better during the math session (30 min) were allowed recess at the regularly scheduled time. The homework assignment and the immediate-recess consequence for classroom performance remained in math₂ for nine days, then were used in math₁ for nine days, and finally returned to math₂ for eight days.

To re-evaluate the effect of the homework procedures alone on math performance, the consequences for classroom math performance were removed from math₂, but the homework procedure with the two consequences for 60% performance on the homework assignment remained in effect. After nine days, the consequence procedure for classroom math performance was re-instated in math₂ so that both the homework procedure and the classroom consequence procedure for math performance were in effect for 10 days.

To evaluate the effect of the consequence procedure for classroom math performance alone, the homework assignment was removed from math₂, but the immediate-recess consequence for classroom performance remained in effect for math₂. After 10 days, the homework procedure with the two consequences for 60% performance on the homework assignment was re-instated to math₂ and left in effect for 10 days.

Measure of Student Performance

Throughout the study, the accuracy with which students completed problems and the rate of problem completion (problems completed per minute) in class were recorded, as well as the accuracy with which the homework assignments were completed. For calculations of accuracy, a student who did not hand in the homework was scored as a zero. To evaluate grading reliability, answer sheets and homework assignments initially graded by the classroom grader were periodically graded by a second observer at least once in each condition. The classroom grader and the

other grader agreed on 100% of the answers. Reliability measures were also recorded for the time taken (to the nearest 30 sec) to complete the assignment by a student at least once in each condition. The observers never disagreed by more than 30 sec on completion time.

RESULTS

Homework, with and without consequences for completion. The percentage of students handing in homework was highest (average of 85%) when both the early-to-lunch and the early-home consequences were employed together. Sixty-two per cent of the students handed in homework when only the early-to-lunch consequence was used and 16% of the students handed in homework when no consequences were employed. Although the consequences had systematic effects on whether homework was completed or not, the classroom performance of the students was not affected. Accuracy of classroom performance during those math sessions when the problems were assigned as homework was, on average, only 2% higher than during the comparison math sessions.

Consequences for accurate completion of homework versus no homework. Figure 6 shows the mean rate and accuracy at which students performed in the two daily math sessions with homework problems and consequences for 60% accuracy on the homework problems used in one of the math sessions. Accuracy and rate in the math sessions that used the homework assignments were consistently higher than the comparison (no homework) math sessions. Further, accuracy on the homework assignments was increased from a mean of 36% in the previous homework condition without an accuracy criterion to a mean of 57% during conditions with the 60% accuracy criterion. On average, 51% of the students in the classroom handed in their homework assignments.

Homework, with consequences for accurate completion and consequences for accurate classroom performance. Table 2 shows the mean rate and accuracy with which students performed in

the two daily math sessions under the various conditions of this phase of the study. When both homework and classroom consequences were employed, classroom accuracy was higher than in comparison math sessions. There was little difference in rate of problems completed. When just the homework consequences with the 60% accuracy criterion were employed, both accuracy and rate of problems completed were higher. When just the consequences for classroom performance with the 90% accuracy requirement was used, accuracy was higher in those math sessions but rate of problems completed was approximately the same in the two math periods. Thus, accuracy was consistently affected by all of the consequence procedures, but higher rates were produced only when there

Fig. 6. Mean per cent correct and mean number of problems worked per minute in the two daily math sessions with homework problems and consequences for 60% performance on the homework problems used in one of the math sessions. The first bar in each pair represents math₁; the second bar represents math₂.

Table 2

Classroom performance with consequences for completing homework accurately and/or consequences for accurate classroom performance *versus* no homework assigned.

	<i>Math Session with Homework</i>		<i>Comparison Math Session (No homework assigned)</i>	
	<i>Accuracy</i>	<i>Problems Worked per Minute</i>	<i>Accuracy</i>	<i>Problems Worked per Minute</i>
Consequences for 60% Homework Accuracy and 90% Classroom Accuracy	72%	2.05	51%	1.93
Consequences for 60% Homework Accuracy	36%	2.81	24%	2.48
Consequences for 90% Classroom Accuracy	58%	1.72	50%	1.59

were no accuracy requirements for classroom performance.

There were no consistent differences in the percentage of students handing in homework or accuracy of homework between the various conditions. Across all conditions, 63% of the students handed in the homework and accuracy was 55%.

Students who handed in homework meeting the 60% criterion versus those who did not. Over the entire study, when homework was assigned with consequences for completion, students who completed the homework assignment and met the 60% accuracy criterion scored, on average, 19% better in homework math sessions than in comparison math sessions. Students not completing the homework assignment or not meeting the 60% accuracy criterion scored, on average, only 6% better in homework math sessions than in comparison math sessions.

DISCUSSION

Past studies on the effects of homework have yielded conflicting results. Some investigations have shown homework assignments to be correlated with improved academic performance; others have found homework assignments to

have mixed or no effects on academic performance. One possible reason for these conflicting results is that none of these studies provided information indicating whether the homework assignments were completed by the students and, if completed, at what level of accuracy. In the present investigation, assigning homework alone had little effect on subsequent classroom performance in either social studies or mathematics. Even increasing the percentage of students completing the homework assignments in Experiment II had no substantial effect on classroom performance. However, in both of the present experiments the use of consequences for accurate completion of homework and/or accurate classroom performance produced relatively high completion and accuracy of homework and improved accuracy of classroom performance. As might be expected, homework assignments may enhance classroom performance only when the homework assignments have been completed at a reasonable accuracy level.

The results of Experiment II allowed for the only comparisons of rates of response in the classroom. When there were no accuracy requirements for classroom performance, consequences for accurate completion of the homework produced increased rates of problem completion in the classroom. Otherwise, there were no con-

sistent effects of the various manipulations on rate of problem completion.

Similar to other studies (Evans and Oswalt, 1968; Hopkins, Schutte, and Garton, 1971; Lovitt, Guppy, and Blattner, 1969), the present results indicate the use of free time to be a powerful consequence for the control of a variety of academic behaviors. Leaving school early at the end of the school day and leaving the classroom early for lunch were effective consequences for increasing the number of students completing the homework assignment and for increasing the accuracy with which students performed the homework assignment. Allowing students to obtain extra recess time contingent on accurate math performance also seemed effective for the control of classroom math behavior. Each of these free-time consequences was relatively easy to arrange with the co-operation of the school principal. However, the use of those consequences involved co-ordination with the teacher aides, who had responsibility for the students at recess and at noon, and with the safety patrol to ensure adequate supervision at crosswalks for those students who were dismissed early. In cases where these arrangements are impractical, it is possible that providing students with other "cost-free" consequences might also be effective, such as free time within the classroom (Osborne, 1969), being able to be first in line for lunch, or the opportunity to participate in special projects (Barrish, Saunders, and Wolf, 1969).

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