Homework-Does It Impact Student Performance?

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Homework -
Does It Impact Student Performance?

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Abstract:

This study examined the impact of homework on performance in the content areas of mathematics and science. The participants were a fourth grade, inner city classroom in Rochester New York. Data was collected over two semesters. The first semester data served as a baseline for the amount of homework completed and the resulting grade for each of the 19 students. Homework strategies were implemented in the second semester to increase the amount of homework completed by the students. The amount of homework completed in both subject areas increased overall. The overall semester grades increased in mathematics more than in the area of science. Findings suggest that homework completion contributes to higher performance in academics.
The homework debate has been around for a long time. Some argue that too much is given, others that there isn’t enough. Critics question the purpose of homework in general. The literature review shows ample evidence to support that homework has a positive effect on academic achievement. However, it is far from unanimous that this is the case.

The hypothesis tested in this study was that homework completion would impact the performance of students in mathematics and science. Each topic area was tested separately to document homework’s impact in each individual area. A secondary hypothesis was tested that implementation of homework strategies would increase the amount of homework completed by students.

Literature Review

The literature review will address many of the possible factors the play a role in the impact of homework on the performance of students. These factors include a brief history of the debate regarding what role homework should play in education, strategies used to improve homework completion, parental involvement, socio-economic status, motivation and student attitude, and the implications for educators.

History

In the 19th century, homework wasn’t seen as a problem issue. Schooling was basically optional after the age of 14. For students younger than 14 years of age, attendance was sporadic and classes were overcrowded, and included multiage students
Therefore, teachers usually assigned rote memorization tasks that encompassed the dreaded, drill and practice method. Parents were well aware of the high number of hours of homework that their children would be required to accomplish, so they would have to decide whether or not their child could continue schooling after the grammar school years. The beginning of the end of this time in education occurred when Rice (1897) concluded that drill and practice in relation to spelling was unrelated to their later spelling ability. This began the debate on homework and its effectiveness.

From the late 19th century to mid 20th century, the progressive education movement took over. Homework came under attack. They made claims that it affected both physical and mental health (Gill & Schlossman, 2004). It was depriving children of play that was essential to healthy development. One of the most serious charges against homework was leveled in 1930 by the American Child Health Association, which coupled homework with child labor as the “chief causes of the high death and morbidity rates from tuberculosis and heart disease among adolescents” (Gill & Schlossman, 2004). Though homework was getting this bad press from the scholars, many parents still saw homework as a beneficial thing, if not just for the fact that they could monitor what the schools were teaching their children (Gill & Schlossman, 2003a).

In the 50's and 60's, homework remained a major issue in our society. However, the message of the progressivist movement was being replaced with that of an academic excellence movement. The country was feeling as if the rest of the world was surpassing it in technological advances and military power. People feared that it was due to a downfall in academic standards. Homework was now viewed as an instrument of national defense (Gill & Schlossman, 2000). This was supported by findings of a
Stanford University professor, Avram Goldstein. Goldstein’s (1960) reanalysis of the data that scholars in the 1930’s had assembled, showed that homework positively influenced student achievement in the elementary and high school grades. In his view, homework should be required in all schools.

In creating this change, one positive side effect which came about was that reformers wanted to accept some of the ideas of the progressive movement, such as limiting the amount of drill and practice and, more importantly, seriously address issues of content and scheduling in homework (Gill & Schlossman, 2000). Homework was truly a hot topic, exemplified by a poll which showed a significant decline in the share of respondents who recorded no opinion: from 27% in 1954 to 12% in 1959 (Gallup, 1972).

From 1970 until present, homework again took the spotlight due to the rise of economic competitors around the world. *A Nation at Risk* explicitly brought homework back into the national discussion, calling for “far more homework” for high school students (Gill & Schlossman, 2004, p.179). William Bennett’s U.S. Department of Education published *What Works*, which endorsed homework completely and provided specific recommendations for educators (U.S. Department of Education, 1986). Its importance to the learner included teaching skills and giving the student practice in honing desired skills, work habits, and personal characteristics.

Recently, the big stir was that the overwhelming increase in homework had been negative to families and the amount of time they spent together. Looking beyond the statements made in numerous magazines, the statistics painted a clearer picture of how much work was asked of students. In the National Assessment of Educational Progress (NAEP), it was indicated that throughout the last two decades, the majority of students at
all grade levels averaged less than one hour of homework nightly (Gill & Schlossman, 2003b). In fact, the only age group where there has been a large increase during the same period, is the youngest, aged 6-8, who saw homework increase from 52 minutes weekly in 1981 to the moderate amount of 128 minutes weekly in 1997 (Hofferth & Sandberg, 2000).

**Homework and Academic Achievement**

The question remains, does homework affect academic performance? This question is not easily answered. Homework in itself isn’t meaningful. However, when combined with effective practice, thoughtful, authentic homework assignments can increase student achievement. Contrarily, poor motivation, ineffective teaching practice, negative parental attitudes, negative teacher attitudes, peer expectations, and other factors can make homework a meaningless endeavor for anyone to undertake.

The major reason homework is under fire is because parents believe that teachers are requiring students to spend too much time completing tedious, repetitious, and boring homework assignments that have little or no impact on their ability to learn (Simplicio, 2005). The fact is that some parents can recall times when they experienced anxiety trying to complete extremely difficult, time-consuming assignments with their children. In addition, research on the topic of homework has produced less than striking evidence of having impact on achievement, especially in the elementary level. Research involving thousands of students showed little correlation between homework and test scores in elementary school, but the relationship grows positive and strong in secondary school
Homework (Cooper, 1989). If, in the lower grades, homework contributes little or not at all to academic achievement, then why engage in a practice that can promote conflict between parents and children and interfere with development in other domains, such as athletics and the arts (Wildman, 1968)?

Cooper, Jackson, Nye, & Lindsay (2001) were the first to test a model of the influence of homework on classroom performance using a sample of elementary students. In the study, they hypothesized that different variables would account for the successful completion of homework assignments by the students. Their findings showed that students who completed homework assignments had a homework environment that was free of distraction; their parents’ help was viewed as facilitating homework completion, and held similar attitudes to the parent’s attitude toward homework. Classroom grade was positively related with homework. Finally, positive parent involvement in homework was the strongest predictor of grades and was directly related to student’s attitude toward homework (Cooper et al. 2001).

The purpose of one study, conducted by Keith, Diamond-Hallam, & Fine (2004), was to determine the relative influence on students’ grades of time spent doing homework in school as compared to doing homework out of school. Their results showed that out-of-school homework had a substantial effect on grades, whereas, in-school homework had no such effect. This study focused on secondary education students, but its implications may generally hold true for younger students as well. Their subsequent recommendations included that those who work with students, teachers, and parents have a hand in the development of school homework policies to support out-of-school homework activity. They also mentioned that frequent, shorter assignments may
be more effective for learning than infrequent, longer ones (Trautwein, Koller, Schmitz, & Baumert, 2002).

Vruwink and Otto (1987) studied the effect of accounting homework collection and quizzes on exam scores for one fourth of a semester. Their results did not provide evidence that collecting/grading homework assignments and giving quizzes had an effect on students' exam scores. However, the researchers suggested a longer period of time might have yielded different results because students would have had more time to adjust to the different teaching techniques.

Rayburn, L. and Rayburn J. (1999) also studied this area. They predicted that students who consistently completed their accounting homework assignments would learn the topic better than those who did not. Their results supported their hypothesis. Students completing homework earned more total exam points, points on exam problems, and points on multiple-choice exam questions than students who didn't complete the homework assignments. They conceded that a possible limitation to the findings is that students who consistently completed homework were more interested in the topic area or simply more intelligent to begin with.

Not all studies yielded results that supported the idea that homework completion improved performance or achievement. Simplicio (2005) discussed some of the problems with the homework strategy.

Simplicio (2005) identified that one major problem was consistency among teachers. Some gave little or no homework, while others gave a large amount. Since there are limited or no guidelines set in some school districts, the message of the importance of homework is confusing to the students. In addition, there is usually no
collaboration amongst the different content area teachers in middle and secondary education. This results in massive assignment loads for the students. A bit of communication and planning by these teachers could not only result in more manageable amounts of homework, but in more meaningful, cross-curricular assignments.

Another problem is that the assignments do not accomplish the educational goals they were designed to achieve. For example, if a student doesn't comprehend a basic concept, merely assigning more examples of the problem will not be effective. This will result in a level of frustration for the student. On the other hand, a student who has mastered a skill will also gain little by completing a homework assignment with a number of similar problems. This will result in boredom and possibly a dislike for the subject. Either scenario will result in students losing their enthusiasm for a particular subject (Simplicio, 2005).

A third problem is the reality that because the daily routines of students are overcrowded, they often complete these assignments in haste (Simplicio, 2005). Enhancing this problem is that some teachers either give credit for homework merely on the basis of completion or do not even collect the homework at all. Understandably, the main educational goal of assigning the homework in the first place is lost.

A study conducted by Peters, Kethley, & Bullington (2002) hypothesized that graded homework would have no impact in influencing the performance of students in an introductory operations management course. They were interested in whether this was true for both qualitative exam questions and quantitative exam questions. Their findings showed that students who were in the graded homework group had a lower overall mean score than students in the non-graded homework group. When looking at type of
questions, the study found that graded homework didn’t affect performance on quantitative questions, but resulted in lower performance for non-quantitative questions.

In their discussion, they mentioned some possible reasons for the results. In-class discussions about assigned problems and lectures could have prepared students as effectively as adding the requirement of handing in the problems for a grade when it came to the quantitative exam questions. As for the lower performance of students in the graded homework group on the non-quantitative exam questions, they were uncomfortable about the results. Students may have felt that the time they spent on working and preparing for the assigned homework problems was enough for preparation of the exam. These students may not have focused on studying the conceptual material. In addition, these students may have felt that they had adequate mastery of the material due to having prepared the homework. Conversely, the students in the other group may have spent most of their time studying the qualitative material.

Strategies to Improve Homework Completion Among Students

Approximately 28% of average-achieving students and 56% of students with learning disabilities have problems completing their homework (Polloway, Epstein, & Foley, 1992). Assuming that homework completion does result in an increase in academic achievement and performance, the question arises as to how to improve the chances that students will complete the assignments.

Three strategies that result in significant increases in homework completion are giving students real-life assignments (i.e., assignments that connect homework to events
or activities in the home) plus reinforcements, using homework planners, and graphing homework completion (Bryan & Sullivan-Burstein, 1998). The results of the study conducted by Bryan & Sullivan-Burstein (1998) indicated that students with learning disabilities and average-achieving students with homework problems benefited more from these interventions than average-achieving students with no homework problems.

The research discussed the importance of the teacher's role in implementing changes into practice. They referred to a study conducted by Allen, Combs, Hendricks, Nash, & Wilson (1988) which indicated that when teachers were intimately involved in the process that determines how to change practice, they did make the changes.

Some studies have identified the relationship of learner-centered homework approach to achievement and attitude toward homework. The educational benefits of understanding the wide range of individual differences among learners in how they prefer to do homework and encouraging them to match their preferences at home have been reported in the literature. Some students actually do their homework in their preferred ways, but for many others there is a gap between what they prefer to do and what they actually do (Hong & Milgram, 1999). The greater the gap between preferred and actual conditions resulted in lower the achievement. Contrarily, narrower gaps between preferred and actual conditions related to higher homework achievement, perceived or teacher-scored, and to higher achievement in subject matter such as mathematics (Hong, 2001; Hong & Milgram, 1999; Ohayon, 1999). These findings suggested that it was worthwhile for parents to increase their understanding of their child's homework preferences and to try to create such conditions at home. Even students, themselves, who used this strategy perceived themselves and performing better than those who did not.
Simplicio (2005) identified a strategy that dealt with the aforementioned problem of time pressures students and their families faced outside of school. It was suggested that time be set aside by educators at the end of the school day to coordinate and supervise homework activities in school. Some of the benefits of allowing students to complete homework in school were described. It provides a better possibility that homework will be completed properly. It gives teachers a chance to monitor and assess the skill levels and progress of students on an individual basis. This setting also provides an environment for peer tutoring, where students can help each other in completing their assignments and gaining a better understanding of the key ideas addressed in the homework. The end result is a better educated, better organized, and less harried student (Simplicio, 2005).

One strategy tested by Ostler (1997) involved secondary mathematics students in learning reading strategies for their mathematics textbooks. The value of conducting this research was exemplified by Merseth’s (1993) findings that more than 95% of twelfth-grade mathematics teachers surveyed indicated that the textbook was their most commonly used instructional resource. Students in the experimental group were taught four reading components to use during the reading of their textbook. These components included: 1) terminology, 2) eye patterns, 3) graph/text interaction, and 4) reading direction (students were shown that it was sometimes helpful to begin with the final step of a problem as opposed to the first step). The study resulted in the experimental group significantly improving the successful completion of homework assignments. In addition, more than half of the students verbally reported that they thought the reading strategy was generally helpful in reading the problems.
Two additional homework study methods were evaluated by Alber, Nelson, & Brennan (2002) in order to compare the effectiveness of each method in student acquisition and maintenance of social studies content. The study replicated the study by Hippler, Alber, & Heward, 1998) and involved two experiments being conducted. One method used was a standard review questions (SRQ) method that required students to write answers to four to six short answer questions that followed each reading selection. The other method was a structured reading worksheet (SRWS) method that required students to find and write twelve to twenty-four fill-in-the-blank items paraphrased from the assigned reading. Students in both experiments scored higher in next day quizzes when using the SRWS method. Also, students maintained more social studies content using the SRWS method as indicated by an end-of-unit test (Experiment 1), and four chapter tests (Experiment 2). These positive effects on classroom performance were observed for both general education students and students with learning disabilities.

Parental Involvement

Many studies have found that homework, combined with parental involvement, positively affects student achievement (e.g., Maertens & Johnston, 1972). Villas-Boas (1998) studied these effects in Portugal and Luxembourg. Referenced in the study, Epstein (1995) suggested that schools should reach out to families and provide guidance as to how to help students accomplish various homework and curriculum-related activities.
Parental involvement may take different forms. Their overt behavior (e.g., going to parent-teacher nights and other school events), personal investment (e.g., showing that they enjoy the child's school and their interactions with school personnel), and cognitive/intellectual support (e.g., helping with homework) serve to communicate to children that education is valued at home (Grolnick & Slowiaczek, 1994).

At all ages, children's attitudes about homework were positively associated with parents' attitudes. In higher grades, students' attitudes about homework were directly predicted by their parents' attitudes, which were positively and directly related to their children's school performance (Cooper, Jackson, Nye, & Greathouse, 1998).

It is also important to emphasize that parental and teacher attitudes influence the student's own beliefs about learning. Students can either be assisted in feeling confident about their ability to succeed or made to feel as if their effort will have no effect on their performance. To a great extent, this belief system is instilled in them very early through their experiences at home, school, and the broader culture (Rogoff, 1990).

By focusing on educating and equipping parents with the tools to assist the student, teachers can facilitate the growth of positive student self-esteem and an increased likelihood that student's will achieve. By working with parents to help ensure that the same message is being given to students at home as in school, there is a better possibility that homework will be perceived as important.

Parental involvement in children's education has been correlated with higher academic achievement, improved school attendance, increased cooperative behavior, and lower dropout rates (Ekstrom, Goertz, Pollack, & Rock, 1986; Epstein, 1992; Greenwood & Hickman, 1991). In today's society, parents are confronted with real-life problems to
deal with like lack of family time, both parents working, parents with little formal education, single-parent households, etc. Therefore, in some environments, parents may require some training (Hong, Milgram, & Rowell, 2004). Effort must be expended by educators to achieve a high level of parental involvement within their schools. In some environments, more effort will be required than in others. However, with ample research as a foundation, it is evident that this effort is certainly worthwhile.

*Socio-Economic Status (SES)*

Some educators believe that students from low economic family settings are less able to do as much homework as other students from more advantaged backgrounds. They feel sorry for these students, rather than challenge them, feeling that homework punishes students in poverty for being poor (Kralovec & Buell, 1991). These beliefs equate, at minimum, to a lower expectation, consciously or unconsciously, for students from these environments. In turn, these low expectations can decrease the academic performance of students.

Further, Rosenshine (1976) studied time on-task, and its effect on reading and mathematics achievement for primary grade students from low socio-economic backgrounds. His findings indicated that although total time in school was an important variable related to achievement, the actual time a student spent engaged in particular academic activities, such as reading and arithmetic, was more strongly associated with achievement gains in these particular subjects.
The fact is that many studies have shown that, across ethnic groups, low-income parents cared deeply about their children's intellectual development, and employed rich and varied means to encourage both a love of learning and a deep value for education (Ogbu, 1995). Teachers were less likely to hold to stereotypes of low-income parents as uninterested in their children's education when parents were involved in their children's schoolwork (Epstein & Van Voorhis, 2001). When teachers elicited parental involvement through well designed homework, even parents with little formal schooling made substantial contributions to their children's learning (Epstein & Van Voorhis, 2001).

Regardless of social class, teachers' standards for homework completion improved academic performance. Catholic educators have held this opinion for some time. Catholic schools were places where the poorest children in the United States did exceptionally well, as evidenced by lower dropout rates, higher GPA's and SAT scores, and greater college acceptance rates (Bryk, Lee, & Holland, 1993).

Studies suggested that all students, regardless of socio-economic status, could benefit from well designed homework. In particular, studies of migrant children's education and cultural development emphasize that homework was beneficial when it was supervised either by a teacher or a parent (Cetinsoy, 1983; Olmos, 1983). These results did not only hold true for low-achieving students. Even high-achieving students were more academically successful when they did homework (Organization for Economic Cooperation and Development, 1997).

Many middle-class parents also cared about their children's education. However, they sometimes complained about homework as being stressful on the whole family,
robbing parents and children of opportunities to pursue other family activities and interfering with children's extracurricular interests (Bempechat, 2004). In addition, some parents reported feeling resentful that their own limited time to relax is taken up by their children's homework (Xu & Corno, 1998). Some parents even sent in notes to teachers to excuse their children from an assignment because it didn't fit into their after school schedule.

According to Bempechat (2004), one possible side effect of wanting less stressful or no homework was that parents would send the message to their children that they did not feel their children had the ability to achieve the teacher's standards. This could have resulted in students taking on the negative attitudes of their parents (Epstein & Van Voorhis, 2001; Kralovec & Buell, 1991). Therefore, Salend and Gajria (1995) appropriately warned that teachers should exercise caution when encouraging parents to work with their children on academic tasks.

*Motivation and Student Attitude*

Singh, Granville, & Dika (1995) suggested that achievement in mathematics and science in secondary school was a function of many interrelated variables: students' ability, attitudes and perceptions, socioeconomic variables, parent and peer influences, school-related variables, and so forth. Evidence suggested that motivation, attitudes, interest, and academic engagement seemed to be critical constructs related to learning (Singh, Granville, & Dika, 1995). For example, Skaalvik (1994) and Skaalvik and Rankin (1995) found that motivation was correlated with achievement and academic
performance. In addition, positive cognitive outcomes were more likely to occur when learning was self-directed and intrinsically motivated (Ryan, Connell, & Deci, 1985).

Attitudinal and affective variables such as self-concept, confidence in learning mathematics and science, mathematics/science interest and motivation, and self-efficacy have emerged as positive predictors of achievement in mathematics and science (Singh, Granville, & Dika, 1995; Reynolds & Walberg, 1992; Thorndike-Christ, 1991). Besides previous achievement, family and home environment, motivational variables, and instructional time have had the largest effects on eighth-grade achievement (Fraser, Walberg, Welch, & Hattie, 1987; Reynolds, 1991).

The social cognitive approach to the study of achievement motivation relied heavily on attribution theory, which argued that students came to perceive that success and failure in school could result primarily from effort (or lack of it), ability (or lack of it), and external factors, such as luck or task ease/difficulty (Weiner, 1994). Therefore, a student who perceived their performance as being a result of effort believed that they controlled the outcome. However, a student who believed that their performance was a result of ability would not find value in adjusting their level of effort, determining that they were either competent or incompetent in the content area they were working in.

The promise of this approach was that negative student beliefs could be manipulated by careful intervention (Bempechat, 2004). Educators would undoubtedly prefer that every child viewed their performance as a result of effort. After all, the whole idea of education is to empower students to take an active role in their learning so that they can achieve high performance outcomes. By helping students view mistakes as a result of lack of effort, students will feel more positive when dealing with difficulty
academically, as opposed to developing a learned-helplessness attitude, where they simply feel that they do not have the ability to do well.

Hong, Milgram, & Rowell (2004) looked at the effects of homework motivation and preference. Post-intervention interviews showed that some students believed that homework motivation and preference information helped them look further into how they did homework, indicating that the intervention helped them acquire self-awareness of themselves as learners and some of the complexities of the learning process (Jonassen & Grabowski, 1993). As described in the aforementioned section of ‘Strategies to Improve Homework Completion Among Students’, the study found a high correlation between academic achievement and students who applied their preferences when doing their homework (Hong, Milgram, & Rowell, 2004).

Generally, it seems clear that student’s level of motivation and attitude toward education are positive indicators of academic performance. In addition, the affective and motivational factors have the potential of being enhanced and modified by new and innovative curricular and instructional approaches to teaching and learning (Singh, Granville, & Dika, 2002). In comparison to other factors of learning performance (i.e., parental involvement, home background variables, cognitive abilities, etc.), these motivational factors are changeable through an asserted effort on the part of educators.

Implications for Educators

Teachers want to help their students achieve. They work diligently to plan lessons and activities that promote learning. The subsequent task of assigning homework
is a natural step in today's classroom. Teachers feel that the completion of these homework assignments will reinforce and strengthen student proficiency in the specific content area. It follows, then, that they would be interested in learning of ways that they could help increase the consistency with which students complete these assignments. This section of the review is dedicated to giving suggestions, supported by evidence, which may assist in this endeavor.

Teacher training is a critical aspect of homework intervention programs (Hong, Milgram, & Rowell, 2004). In addition to thorough training, teachers need to buy-into the intervention and implement them completely. School effectiveness literature indicates that teachers are likely to adopt effective practices with administrative support and encouragement, opportunities to collaborate with other teachers, and a voice in setting policy (Bryan & Burstein, 2004). Failure to do so, makes it more difficult to expect teachers to fully adopt these interventions, regardless of the positive outcomes detailed in the research. Teachers should be encouraged by the findings of Callahan, Rademacher, & Hildreth (1998) that interventions can be beneficial even for students whose parents might be expected to participate minimally or not at all.

A major issue in homework is getting teachers to develop assignments that are developmentally appropriate in terms of their difficulty and length of time to complete (Bryan & Burstein, 2004). Teachers should estimate how long they feel the assignment will take their students. In addition, they should elicit student feedback as to how long it took them to complete their assignments and how difficult they found them to be. As needed, teachers should adjust their assignments, constantly refining them to make them more appropriate for their students.
Another problem in secondary education is that there is little integration of material and assignments among the different content area teachers. Instead of working in concert and designing homework projects that are multi-discipline in nature and which work to reinforce classroom lessons by providing more creative, in-depth, thought-provoking assignments, teachers instead act almost always as solo agents of learning (Simplicio, 2005). A possible solution would be for administrators to allot time for a common planning time for teachers. Though this may be extremely difficult to schedule, the potential gain seems worth the effort. If measures like these aren't taken, it would be inappropriate to contemplate that teachers will come out of their igloos.

Teachers should seek to involve parents. The aforementioned studies provide significant support for having parents involved in their children's learning. It may be more difficult to achieve parental involvement in some settings. Nonetheless, it is a task that is critical. Teachers are the professionals. They should view themselves as the key catalyst to helping parents understand how they can help their children achieve.

According to Bryan & Sullivan-Burstein (1998) teachers struggle with defining homework and its purpose, distinguishing practice from busy work, and determining what is fair and equitable in making adaptations for individual students. This fact is not surprising. Neither pre-service nor in-service professional development programs have tended to address the use of homework as an instructional tool (Bryan & Sullivan-Burstein, 1998). Therefore, teachers must be trained in order to expect any amount of significant improvement in regards to the use of homework and its effectiveness.
Method

The study was conducted over two semesters. The teacher collected and recorded the homework assignments turned in by each student. She also recorded final semester grades for each student. The first semester data served as a baseline for the study. Strategies were implemented and geared toward improving the amount of homework completed and turned in by students in the second semester. The first hypothesis was that those students who completed more homework attained higher semester grades in mathematics and science than those students who completed less homework. A second hypothesis was formed that implementing homework strategies would increase the amount of homework completed and turned in by students.

Participants

The study involves a class of fourth grade students, ages 9-11, in the Rochester City School District. There are 19 students, 12 males and 7 females, in the class. The students came from an area of very high poverty in the city of Rochester.

Apparatus

The materials used in this study were basic record-keeping materials: grade book and homework charts used by the classroom teacher.

Procedure

Data was collected for the marking periods prior to the study's start date. This served as a baseline for two things: a) The amount of homework completed and b)
grades achieved by the students. The relationship between homework completion and marking period grade was calculated as a percentage score.

Once the baseline data was collected, analyzed, and recorded, an incentive was introduced to the students. The incentive will be selected by the students through a vote. The incentives elected were a classroom auction with points earned for homework assignments completed and lunch with the teacher each Friday for those students who completed all homework assignments for the week.

The teacher kept records of homework completion in mathematics and science and final marking period grade for each student. Homework completion was tracked on a chart within the classroom for students to observe on an on-going basis. We analyzed the effect of homework completion on final grades in mathematics and science.

Results

Data was collected for first and second semesters. The amount of homework completed was tracked for each semester. Teacher collected and recorded homework on a daily basis. Semester grades were computed and recorded for report cards for each semester. Homework completion was calculated by adding the number of assignments turned in each semester and dividing that by the total number of assignments. This was translated into a percentage and graphed to observe the relationships described.

The hypothesis that homework completion impacts the performance of students was tested by comparing the two variables for each semester in the subject areas of mathematics and science. As illustrated in Figure 1 and Figure 2, there was a relative connection between homework completion and semester grade in mathematics.
As illustrated in Figure 1 and Figure 2, students who completed less homework scored lower in overall mathematics performance on the semester grade than those students who completed more homework.

Figure 1: Mathematics – First Semester

Figure 2: Mathematics – Second Semester
The second semester data, illustrated in Figure 2 was representative of implementation of a couple of homework strategies designed to increase the amount of homework completed by students. The teacher recorded the homework assignments turned in by the students on a daily basis. An incentive was instituted where students who turned in all of their homework would be able to have lunch with the teacher in the classroom at the end of each week. This was combined with a system where auction points were earned for each assignment turned in. At the end of each week, students used their points to bid for various prizes available for auction. The more points they earned, the better their chance for receiving the desired prize. Figure 3 & Figure 4 illustrate the impact of these incentives on both the amount of homework turned in and the semester grades earned by each student.

Figure 3: Mathematics Homework Completion
As shown in Figure 3, implementation of homework strategies in mathematics yielded an overall increase in the amount of homework turned in by students. 67% of students increased the amount of homework they completed and turned in.

Figure 4: Mathematics Semester Grades

As shown in Figure 4, 89% of the students' grades either remained constant or improved. Included in this finding, 53% of students improved their overall mathematics grade during the second semester. This finding is consistent with the hypothesis that student performance would improve with increased homework completion.

The results in science did not yield as strong a relationship between homework and overall performance. (See Figure 5)
As illustrated in Figure 5, in the first semester, student #5 earned the same grade as student #9. However, there was a drastic difference in the amount of homework completed by each student. Student #5 completed 55% of the homework assignments, while student #9 completed 87% of the homework assignments.

Similar results were observed for the second semester. (Figure 6)
Figure 6 shows that in the content area of science, the results were not as indicative that homework completion impacted the final semester grade for students. However, the strategies implemented did result in an increase in the amount of homework completed. (See Figure 7)

Figure 7: Science Homework Completion

As illustrated in Figure 7, 74% of the students increased the amount of homework completed in the second semester. This supports the secondary hypothesis that homework strategies increase the amount of homework completed. According to the primary hypothesis, however, this should have resulted in higher final semester grades. The data did not support this hypothesis. (See Figure 8)
Figure 8: Science Semester Grades

Figure 8 indicates that only 26% of the students showed an improved overall science grade in the second semester. Also, 68% of students earned the same overall grade in science in the second semester as they did in the first despite completing more homework.

Discussion and Conclusion

The importance and effects of homework on academic performance is a highly debated issue. The purpose of this research was to determine the impact of homework on students' grades in mathematics and science. An additional purpose was to observe whether or not the implementation of homework strategies would increase the amount of homework completed by students. First semester data was collected as a baseline for student performance and homework completion in both content areas. Homework strategies were implemented to improve the amount of homework completed by students.
It was hypothesized that an increase in homework completion would result in higher performance in overall content area grade for the second semester.

Overall, the findings of this study showed that homework completion positively impacted the overall performance of students in both content areas. This supported Goldstein (1960) and Rayburn, L. and Rayburn, J. (1999) findings that homework positively influenced student achievement.

However, the impact of the increased amount of homework completion on the overall grade was different in each area. There were more students that improved their semester grade in mathematics than in science, even though more students increased the amount of homework completed in science than in mathematics.

The findings of this research also suggested that implementation of homework strategies improved the amount of homework completed. This was observed to be the case in both mathematics and science. The results supported the findings of the study conducted by Bryan & Sullivan-Burstein (1998), where charting homework completion improved the amount of homework completed by students.

This study illustrated a much higher relationship between homework completion and overall performance in mathematics than in science. A possible reason for this would be that science has a higher level of hands-on instruction. This could mean that students, in science, gain more from the in-class lesson than from the subsequent homework assignment. The idea that homework impacts some content areas very little is supported by Vruwink and Otto (1987), where accounting students’ exam scores showed a lack of evidence that homework had an effect on performance. Peters, Kethley, & Bullington (2002), similarly found that graded homework didn’t impact student
performance in an introductory operations management course. In mathematics, however, the further practice at home allows for the cementing of concepts covered in class. This could mean that the completion of homework in mathematics has a stronger impact on performance because of its implied level of importance to gaining full understanding for the learner.

Conclusion

Many educators have varied opinions about homework. In many states, there are mandates as to the amount of homework to be assigned by the teacher. These mandates are meant to provide guidance to educators and parents in order to promote higher levels of student learning. However, we should not be misled to believe that merely assigning homework and student completion of the homework assignments will result in higher achievement.

As evidenced in this study, there is a difference in the impact of homework in different subject areas. Some areas, like mathematics, seem to be impacted to a larger degree by the completion of homework assignments. Other areas, like science, may be impacted more by the attendance and performance of in-class activities than by the completion of homework.

In all instances, however, it is suggested that assignments be made more thoughtfully and carefully by the educator. Parents should be informed and involved in the student’s learning throughout the process.
Students who complete homework assignments are, at the very least, exposed to the learning concepts more times than those who do not. They are forced to question their ideas and defend their answers. Through conversations with their teachers and their parents, students gain immeasurable ideas and concepts that add to their understanding of the topic at hand. Though this might not necessarily lead to higher grades on assessments in all circumstances, it makes the probability of learning the concepts much higher than if they are not exposed to further experiences with problems and questions in subject areas.

As students progress through schooling, it is important that they get into good habits. Higher attendance, completion of in-school and homework assignments, asking questions when unsure of content, and implementing strategies to improve learning will increase the likelihood that they will achieve at higher levels. Educational leaders, teachers, and parents should communicate and be committed to helping students maximize their potential. The results of such collaboration should be a greater amount of students achieving at higher levels in content areas, like mathematics and science.

Limitations

There were a number of limitations to this study. First, the sample size was small. It would have been desirable to conduct a longitudinal study on many different classes in different school districts to observe the impact of homework strategies on the completion of homework assignments. This would have given a more vivid idea of how these strategies impacted students. Additionally, by working with one classroom, only one
teacher's beliefs and systems were observed. This didn't allow for analysis of the role of the teacher and her techniques in instruction and designing of assignments.

The assignments, themselves, also play a role in how much impact they have on the overall performance of students. If the assignments are well developed, an extension of the lesson, and are representative of the assessments that will be utilized, then they play a larger role in effecting the overall grade, as opposed to assignments that are not aligned to the assessments. This requires more time and effort on the part of the teacher in preparing and assigning meaningful tasks for the students to complete at home.

Parent involvement could also have been an underlying factor in the results of this study. Previous research indicated that parent involvement has been correlated with higher academic achievement (Ekstrom, Goertz, Pollack, & Rock, 1986; Epstein, 1992; Greenwood & Hickman, 1991). Also, this could be influenced by the low socioeconomic background of the students. Callahan, Rademacher, & Hildreth (1998) indicated that the amount and quality of parent participation was possibly the most responsible for determining whether or not a program had a positive effect on homework performance.

For some of the students in this study, the lack of positive effect of homework completion on overall achievement may have been the result of their parents' own negative attitudes toward homework and education in general. Leone & Richards (1989) found that if students completed their homework in the presence of their parents, their achievement was higher.
Further research could center on the role of the teacher in utilizing homework. This would add to previous research by Bryan & Burstein (2004) in order to document how the teacher’s attitudes and beliefs impact the overall performance of students.

Similarly, the role of parental involvement in homework should be considered. Cetinsoy (1983) and Olmos (1983) emphasized that homework was beneficial when it was supervised either by a teacher or a parent. As mentioned previously, parental involvement in children’s education has been correlated with higher academic achievement, improved school attendance, increased cooperative behavior, and lower dropout rates (Ekstrom, Goertz, Pollack, & Rock, 1986; Epstein, 1992; Greenwood & Hickman, 1991).

Further research should encompass what affect SES has on student performance as well. This study involved students from a low SES background. SES, alone, doesn’t predict performance; however, stereotypes exist based on this factor. Teachers are less likely to hold stereotypes of low-income parents as uninterested in their children’s education when parents are involved in their children’s schoolwork (Epstein & Van Voorhis, 2001).
References


Homework 38


