

**EFFECT OF HOMEWORK ON STUDENT COMMITMENT, GROWTH AND
PERFORMANCE**

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B.Ed University of Alberta, 1993

A Project
Submitted to the Faculty of Education
Of the University of Lethbridge
In Partial Fulfilment of the
Requirements for the Degree

MASTER OF EDUCATION

Lethbridge, Alberta

June, 2000

Abstract

This study examined the effect of homework on student commitment, growth and performance over a period of six weeks. The sample included 22 Grade Eight students taking Math every day for 51 minutes. During the first half of the study, the students were assigned extra homework every night, and during the second half of the study the students were not assigned any extra homework. Questionnaires, journals, self-evaluations, records of incomplete assignments and a comparison of marks were used to determine changes in student attitude and performance. The study found that in some situations, homework proved to be a relevant and helpful tool for some students, in other cases, regular homework did not affect the students positively, and in some instances it proved to be a negative influence. As well, an increase in homework caused higher levels of stress among some students that negatively affected their attitude towards class as well as their performance in other subjects. On the other hand, the data could not provide conclusive evidence as to whether the amount of homework affects student marks. In all, it was concluded that the amount of homework was not necessarily as important as the quality of assigned homework and the ability of the students to internalize the experience and make it meaningful to them.

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Personal Background

Over the past year, several occurrences in my life inspired me to investigate the relevance and validity of homework. The first event occurred when a friend described the excessive amount of time her 8-year-old son spent on homework each night. At the same time, I was working on my M. Ed. degree and had spent several courses reviewing and reflecting upon my teaching practices. Throughout this period of reflection, I had isolated several factors that cause me stress as a teacher. I identified homework as being one of the most significant of these factors. At the same time, I was on a 15-month maternity leave which provided considerable time to explore these issues. Finally, I attended the 8th International Conference on Thinking in Edmonton where one of the speakers, John Edwards denounced homework as being one of the biggest mistakes teachers make. He suggested that homework is one of the main causes of familial aggravation as well as one of the most serious contributors to both student and teacher stress. Edwards' comments were probably the most influential in cementing the concept for this project.

The first incident that piqued my curiosity occurred in conversation with a friend when I discovered that her Grade Three son was completing two to three hours of homework each night. She was frustrated that he was already "stressed out" about homework at such a young age. She then referred me to a "Time" magazine article, *Crruunch! It's Time for Homework* (Rathnesar, 1999) that outlined some of the issues surrounding homework and kids. This article suggested that homework is one of the main causes of familial aggravation, and that students often spend more time on homework than on personal and familial growth. These items of information both

disheartened and intrigued me, thus starting the chain reaction that eventually led to this project.

At the same time, I was in the middle of a lengthy maternity leave, which provided considerable time to reflect on the teaching issues that were most frustrating and stressful to me. After much reflection, I eventually concluded that assigning, collecting, and marking homework comprised three of the biggest contributors to my personal frustration and stress. As well, as I progressed through my M. Ed. Degree, I focused on teacher development issues and had taken many courses dedicated to helping me become a better teacher. As a result of the further reflection opportunities provided by my courses, I eventually realized that less time spent on marking homework would mean more time for me to work on productive activities such as lesson planning and student consultation.

Finally, I attended the 8th International Conference on Thinking in Edmonton in 1999 and one of the presentations by John Edwards affected me profoundly and permanently. John Edwards was introduced as being internationally recognized for his research and consultant work in the area of “thinking”, particularly in the area of “lateral thinking”, popularized by Edward de Bono. At one low point in his teaching career, Edwards decided to complete a job analysis of the time he believed he should spend on his work outside of regular work hours. Edwards believes that if a teacher is to remain energetic and dynamic, then there is only a limited amount of time that should be spent on schoolwork when a teacher goes home. Edwards suggested “...what your children in class get from you, the most important thing they get from you, is a model of a lived life. That’s what they remember long after they’ve forgotten the content” (1998,

audiocassette). As a result of his job analysis, Edwards concluded that as a senior high teacher, twelve hours a week was not an unreasonable amount of time to spend working on his job at home. This translated to three hours, three times a week plus three hours on a “rainy Sunday.” After analyzing this time, Edwards suggested that he would have 24 hours each month for his individual lesson planning (ten minutes per lesson) and 24 hours for activities associated with his particular students such as marking, diagnosis and meeting individual needs. This translated to nine minutes per child per week for Edwards, and he realized that spending several hours marking the science assignments sitting on his desk was not a great use of his nine minutes per student. As a result, Edwards suggested “...don’t take home books and mark them. It is the single greatest waste of time of anything that teachers do and it is the single greatest killer of school teachers. It is also one of the single greatest sources of fights in families” (1998, audiocassette). Not only did Edwards suggest that too much homework will destroy teachers, but he believed that homework is one of the one main “enemies” of students and their families. He suggested that “...most families are very functional in their own way, but I believe many families have to deal with children coming home from dysfunctional schools. I believe we should abolish homework completely” (1998, audiocassette).

Edwards acknowledged that practice does help a student grow and develop, however he firmly maintained that schools could cut out one to two-thirds of the curriculum and complete all their work during the school day without causing undue failure rates among students. For example,

...I mean, [anyone] knows that if you spend more time doing work on something you get better at it. That’s no startling research finding. Anyone can tell you that.

But no one tells you what you miss out on when you spend all your time at home doing homework...homework interferes with family life in crippling ways (1998, audiocassette).

Thus, Edwards believed that both students and teachers should “have lives” and that school and work are only one part of those lives.

After these very personal and non-scholarly experiences, I decided to review the current literature involving research on the effects of homework in anticipation of an action research project for my M. Ed. Degree. The sources I reviewed revealed information both in support of and counter to the benefits of homework, which inspired me to conduct my own research on the effects of homework. In conjunction with a course for my M. Ed degree, I commenced the framework for the finalized study that follows.

Literature Review

The current literature reviewed for this study was somewhat inconclusive in correlating homework and student achievement. Four of the reviewed studies suggested that homework improves student achievement and most of these sources discussed student grades as a measure of the value and success of homework. Seven of reviewed studies could not support the correlation between homework and achievement, and seven of the reviewed sources raised questions about attitudinal issues such as familial involvement, types of homework and cheating. The deficiency of research into student attitudes combined with the lack of conclusive evidence in support of homework reinforced the relevance of this research question. It was hoped that this study would reveal important information concerning student growth and commitment to school as well as examining academic achievement in response to homework.

Positive Correlations

Of the fifteen studies reviewed, four positively indicated that homework increased student scores. For example, although Brender (1996) noted in his literature review that "there are many arguments both for and against homework," his study revealed that there are positive correlations between homework completion rates and test scores (p. 2). The study sample included 401 undergraduate students enrolled in an urban university-level Spanish course. Ninety-four percent of the sample consisted of African American students who participated in one of two levels of introductory Spanish. Seventy-three point three percent of the sample was female and twenty-six point seven percent of the sample was male. All results were collected from the same instructor. The study included five to six teacher-generated exams, and the researcher discarded the lowest test

score for each student. Homework was defined in this study as consisting of 8-11 page workbook assignments due the day of the chapter exam combined with shorter one page daily assignments. The instructor reviewed the homework at the beginning of every class, and the analysis examined the effects of this homework completion on the test scores. As a result, the researcher discovered that there was a positive correlation between the amount of homework completed and test scores.

Dudley and Shawver (1991) also suggested that their sample of 170 students who completed daily homework received higher grades than the sample of 110 who did not receive daily homework. This study took place at Eastern Illinois University where an instructor sought to improve teacher evaluations in his principles of marketing classes. This instructor was a 15-year full-time University veteran, and it was found that “greater teaching effectiveness was clearly associated with the use of homework assigned as an integral part of class” (Dudley & Shawver, p. 25, 1991). This study spanned two years, and during the first year, no unusual homework was assigned to the 110 participants in the study. In analyzing the teacher evaluations from the students, it was found that the instructor was rated below the University average on 8 out of 9 evaluation questions during this first year. During the second year, the 170 participants were given regular and relevant assignments generated by the instructor. An analysis of the teacher evaluations from this term revealed that the students rated their instructor above average on 7 out of 9 questions. As a result, it appeared that these University students believed that regular homework improved the effectiveness of their instructor.

As well, O’Rourke-Ferrara (1998) suggested that “homework has been proven to boost academic achievement” and that “all research showed that when homework was

graded and commented upon, it lead to higher achievement, good attitudes and was shown to raise the overall learning average (Turvey, 1986)” (p. 6). O’Rourke-Ferrara (1998) then described a survey of homework habits given to 40 parents and 60 students in the second grade in New York. In this survey, it was discovered that 83 percent of parents liked their children to receive homework, and 78 percent of the students themselves claimed to like homework. As well, on one question, students indicated that they believed that doing homework would help them to become smarter. In all, “...the results of this survey indicated that homework is beneficial in facilitating learning” (O’Rourke-Ferrara, 1998, p. 20).

Finally, Cooper, Lindsay and Greathouse of the University of Missouri-Columbia and Nye of Tennessee State University (1998) also supported the idea that homework positively affects student achievement. The psychologists created 709 “triads” consisting of a teacher, at least one of his/her students and one parent of that student throughout grades two through twelve in three different school districts. One was a large metropolitan public school district in Tennessee serving nearly 65 000 students, another included a suburban school district adjacent to the urban district containing about 12 000 students, and the third was a rural school district serving about 2200 students. Sixty-five triads were returned from the urban district, 369 triads returned from the suburban district, and 275 triads were returned from the rural district. This study related teacher, student and parent reports of the amounts of homework assigned and the proportion of completed homework to standardized test scores and class grades. In sum, “...the findings suggested positive relations between the portion of homework assignments students complete and their achievement” (Cooper, Lindsay, Greathouse & Nye, 1998, p.

80). The study also revealed that this correlation is strongest at upper grades and for teacher-assigned marks as opposed to standardized tests.

Inconclusive Studies

Seven of the fifteen sources reviewed could not provide conclusive evidence in support of homework and student achievement. For example, Easton and Bennett (1990) examined "...the relationship between the amount of homework time reported by sixth grade students in a January 1989 survey and their achievement gains on the Iowa Test of Basic Skills (ITBS) between the spring of 1988 and the spring of 1989" (p. 3). In their literature review, they acknowledged that "homework is generally credited with increasing student achievement" and as a result designed their own study to test this theory (Easton & Bennett, 1990, p. 3). The study involved thirty Chicago Public elementary schools, ten of which were magnet schools, ten of which were integrated/desegregated schools, and ten of which were predominantly minority schools. The sample included 52 sixth grade classrooms with a total of 1330 students. The researchers administered a questionnaire in January of 1989, and then compared the test scores for the ITBS for Math and Reading for 1988 and 1989. It should be noted that the researchers compared class averages, not individual student marks. After careful comparisons, Easton and Bennett (1990) finally concluded that "although the results strongly suggest that homework may be related to achievement gains in some classrooms, we have no evidence to suggest why these findings may hold true" (p. 7).

Further, Doyle and Barber (1990) composed a paper in an attempt to "...share current research-based evidence regarding appropriate home study practices" (p. 5). They did not conduct new research, but rather reviewed previously collected evidence,

and summarized some of the findings. Although they suggested that “there are some suggestions that homework, under certain conditions, does improve test scores and grades” (p. 15) they later proposed that “in terms of improving academic achievement, there is limited evidence that homework is very effective and enough negative research to raise doubt about its efficacy” (Doyle & Barber, 1990, p. 19).

As well, in a study conducted in the rural part of a southeastern state by Tuckman and Trimble (1997), 41 middle school students in two separate eighth-grade classes were taught the first five of their science chapters in the conventional manner with homework assignments, and the last five of their chapters by having short classroom quizzes on each unit. Approximately one half of the students were male and one half were female and all students were heterogeneous in their ability and prior performance indicators. “The purpose of the present study was to evaluate a strategy for increasing the potential incentive value providing an explicit cognitive strategy for performing the task” (Tuckman & Trimble, 1997, p. 3). The introduction of quizzes was intended to stimulate incentive motivation. Quizzes consisted of short seven-item recall questions on each of four or five subsections of each chapter. The quizzes were assigned after each subsection that had been assigned as reading homework. For the “no-quiz” portion of the study, the readings were still assigned, but quizzes were not given the next day. Chapter pairs were matched for difficulty (e.g. first no-quiz/first quiz = element one...) and the results indicated that students were “...initially disadvantaged by the quizzes...however by the fourth or fifth experience students were increasingly advantaged by the quizzes, indicating that they were enhancing the motivation to study” (Tuckman & Trimble, 1997,

p. 6). This suggested that quizzes may be a more efficient vehicle for self-regulatory behaviour than traditional homework assignments.

As well, Thomas (1992) suggested that “numerous studies have been conducted in an attempt to determine the effect of homework on academic achievement. Some studies indicate homework helps, others suggest it doesn’t” (p. 5). She then described several different studies and their findings. For example, a study of approximately 1000 Alabama students in grades 5-8 showed no statistically significant relationship between homework and achievement. A 20-week study of grades 5 and 6 in Troy, New York found that some of the slower students gained, but most of the students found the gain in marks negligible. Two 8th grade Oklahoma classes found that the brighter students who received homework gained more than the brighter students who did not receive homework. In all, Thomas (1992) suggested that “whatever educators believe about the benefits of homework, they agree that more research is needed” (p. 12).

Kazmierzak (1994) cited another study involving 13 high school students in a second-year German class in Indiana who completed one half of the year with daily homework checks, and the other half without homework checks. During the first and second quarters of the year, the teacher assigned 2 points for complete homework, 1 point for incomplete homework and a zero if the assignment was not attempted. During the first quarter of the second semester, homework continued to be assigned, but was not checked by the teacher. The results indicated that students’ quarterly grades were only one percentage point higher on average than those who did not undergo homework checks. Kazmierzak (1994) suggested that “since homework grades do not significantly

alter the final grades when both are computed together then the practicality of the time and effort on homework checking comes into question” (p. 18).

As well, Black (1996) wrote a research report for the *American School Board Journal* in which she suggested that “without doubt, the strongest argument for assigning homework, in the eyes of most teachers, is the assumption that doing homework raises students’ achievement” (p. 50). However, she also suggested that “...as research on the effectiveness of homework shows, sometimes homework is for the better, but oftentimes it’s for the worse” (Black, 1996, p. 49). Black (1996) then proposed that “Harris Cooper probably knows more about homework than anyone. For years, Cooper has studied the history and effectiveness of homework” (p. 49). Black (1996) then reported that “as you might expect, [Cooper] finds plenty of positive effects associated with homework...but...the negative effects associated with homework are ‘more interesting’” (p. 49). Black (1996) indicated that Cooper suggested that homework can be overwhelming for students and can interfere with after-school time for more active pursuits or may cause students to seek out shortcuts in an attempt to get the work done as quickly as possible. As well, Black (1996) reported that Cooper discovered that in junior high, homework raises students’ achievement only half as much in junior high as in senior high and in elementary grades, homework has no discernible effect on student achievement.

In further support of Black (1996), School District No. 38 (Richmond, B.C., 1998) suggested that “70% of published studies find a positive effect for homework, however the benefit is twice as large for secondary students as it is for middle school students and four times as large for secondary students as it is for elementary school

students” (p. 2). This was a summary from a paper presented by Jacquelyn Baker-Sennett of the Department of Educational Psychology and Special Education at UBC in May 1997 as part of the Robson Square Speaker Series.

Baker-Sennett noted that

...during the elementary school years there is no statistical relationship between the amount of time spent on homework and academic achievement. According to research, it is not until high school when the relationship between the amount of time spent on homework is significantly correlated with academic achievement. (School District No. 38, p. 2, 1998)

If homework has a reduced effect on achievement at the junior high level, and little to no effect on elementary students, it brings into question whether homework has any positive effect on my particular students. My school is only big enough for Grade Seven and Eight students, thus, the social dynamics of such a setting confuse the boundaries between “elementary” and “secondary”.

Other Issues

Jacquelyn Baker-Sennett also suggested that “very few studies have looked at the ways that homework affects students’ attitudes towards school” and that “very little research has looked at either the process of doing homework or outcomes other than academic achievement” (School District No. 38, Richmond, p. 2, 1998). The main focus of the studies I had reviewed to date had been student scores and grades, which reinforced the goal of examining the effect on attitudinal issues such as growth and commitment.

O'Rourke-Ferrara (1998), however, did address this concern by suggesting that "homework needs to be meaningful and compliment [sic] classroom learning," and that "too many teachers are still assigning useless, even counterproductive homework, work that duplicates without reinforcing material covered in class (Begley, 1998)" (p. 8). Although the study previously described under "Inconclusive Studies" suggested that homework can be productive, O'Rourke-Ferrara (1998) now raised an interesting issue, suggesting that perhaps it is not the *amount* of homework, but rather the *type* of homework that matters.

In further support of this, Kogan and Rueda (1997) suggested that "...in order for learning experiences to be motivating, the learner's interaction with the real world needs to be incorporated" (p. 2). They also suggested that student-centered homework is more effective than teacher-directed homework. Kogan and Rueda (1997) defined teacher-directed homework through the following examples: teacher chosen vocabulary, ready-made worksheets, or teacher initiated essay prompts. They further defined student-centered homework as any activities that are created by the student with or without adult help. It is suggested that these activities should represent authentic, meaningful activities. The researchers designed a study with 40 students with learning disabilities from a public high school in metropolitan Los Angeles. The sample included 87 percent African American students, 10 percent Hispanic students and 3 percent Caucasian students. The study commenced with a four-week baseline period of teacher-directed homework followed by 12 weeks of randomly assigned student-centered or teacher-directed homework conditions. The students were then provided with a homework survey, and writing prompts, and four student interviews and four parent interviews were

conducted. The results revealed that homework return rates increased 7 percent on average with student-centered homework, and homework return rates decreased 7 percent on average with teacher-directed homework. These results supported their earlier suggestion that "...children appear more motivated...when conditions are authentic, meaningful...and are within their reach (Rueda & Moll, 1994)" (p. 2).

Doyle and Barber (1990) further supported this theory by suggesting that "it is essential that classroom teachers make every effort to ensure that assignments are 1) necessary and useful, 2) appropriate to the ability and maturity of students, 3) well explained and motivated and 4) clearly understood by both child and parent" (p. 22). Otherwise, the authors suggested that "in terms of improving academic achievement there is limited evidence that homework is very effective and enough negative research to raise doubt about its efficacy" (Doyle & Barber, 1990, p. 19).

In further support of the importance of the type of homework assigned, Sullivan and Sequeira (1996) presented a summary paper concerning the importance of homework. The researchers suggested that "homework as busy work can be replaced with work that has a meaningful focus (Glasser, 1990)" (p. 347). They further suggested that homework should be stimulating to encourage creativity and enthusiasm, which should encourage greater and more valuable homework completion. Finally, Sullivan and Sequeira (1996) suggested that "the results for homework returned with teacher feedback are generally superior to assignments returned with little or no comment (Paschal, Weinstein, and Walberg, 1984)" (p. 347). Not only were they concerned with the *type* of homework assigned, but they also raised the issue of the importance of authentic and meaningful teacher interaction with students.

Another viewpoint was presented by Balli, Wedman and Demo (1997) who suggested that “doing homework is a nightly routine for most school-age children, and research suggest that parent involvement with their children’s homework is associated with improved academic performance” (p. 31). This study included 74 white sixth graders and their families. The students were part of one of three Math classes all taught by the same teacher in a midwestern middle school. Class grouping allowed for heterogeneous grouping of ability and background. The researcher provided “Teachers Involve Parents in Schoolwork (TIPS, Epstein, 1988)” assignments to the students (p. 35). The “TIPS assignments required that students gather information, explain and demonstrate concepts, and guide interactions with a family member in order to complete homework” (p. 35). The researchers altered the 20 assignments for two of the three groups as follows: Group 1 received specialized student and family prompts, Group 2 received student prompts and Group 3 received no prompts. Balli, Wedman and Demo (1997) also supplied a post-test, letters to families and a homework survey. The results indicated that “higher levels of family involvement were not associated with higher student achievement in this study; however, the telephone interviews suggested that some families experienced other benefits from being involved with homework, including companionship and an increased awareness of what their children were learning in mathematics” (p. 42).

Doyle and Barber (1990) also suggested that homework can ease time constraints on the amount of curricular material that can be covered. This is personally significant as the assignment of homework was primarily related to time constraints in my subject areas. For example, in Grade Eight Math this year, I had to cover ten chapters in ten

months. Most of my colleagues spent the fifty-one minute period explaining the concept and giving examples, then they assigned homework to practice the activity. If this procedure was not followed, it was possible that not enough material would be covered by the end of the year, and the students would not be properly prepared for the final exam.

Finally, Anderman, Griesinger and Westerfield (1998) from the University of Kentucky studied 285 middle school science students from an urban middle school in a southeastern state. The sample consisted of 123 Caucasians, 116 African Americans and 46 students of other ethnic groups. The researchers administered surveys to the participants in the fall of the 1995-1996 school year and examined the motivational variables behind cheating in science class. The surveys included measures of motivation, strategy use and worry, and cheating. The researchers found that those students who report having cheated tend to worry about school and perceive their school as being focused on grades and ability. As well, Anderman, Griesinger and Westerfield (1998) suggested that “it is possible that extrinsic and performance-focused environments may be more conducive to cheating than mastery-oriented environments” (p. 85). That is, when homework is used to focus on academic achievement, it is also likely to increase the occurrence of cheating.

Summary

In all, four of the studies suggested a positive correlation between homework and student achievement. Seven other sources could not positively correlate homework and achievement and seven sources addressed concerns with student growth and commitment by describing attitudinal issues surrounding homework. In all, the evidence collected to

date is somewhat inconclusive and I anticipated that this study would reveal further information about the effect of homework on student commitment and growth as well as achievement.

Description of Study

The Question

How will the amount of homework affect student commitment, growth and performance in Mathematics?

Definitions

For the purposes of this study, four terms should be defined: homework, student commitment, student growth and student performance. Homework in this study referred to any work that a student was not given time to complete in class. That is, homework included any assignments that were expected to be completed at home, or outside of class time.

Student commitment may be defined as the student's demonstration of working to capacity in most situations. A student who demonstrated commitment would have completed most assignments on time and participated willingly in class activities, including desk work. A committed student would get to work right away, and saved most socialization until after the work was complete. As well, a committed student would be interested in challenging him/herself, and would participate in discussions as well as asking questions when necessary to make sure he/she understood the concepts.

Student growth may be described as the development of a student's metacognitive and cognitive skills. A student who demonstrated growth would become more aware of his/her thinking process as well as his/her ability to think about this thinking process. For example, the student would start to recognize the ways in which he/she thinks, and may have learned to alter his/her learning or studying strategies in order to accommodate

his/her thinking strengths or weaknesses. Further, the student may have discovered ways to strengthen his/her thinking process by isolating weaknesses and working to improve them. This growth may be evidenced, for example, by the depth and quality of journal responses or self-evaluations or by a student's ability to recognize when help is needed.

Student performance referred to the student's achievement as evidenced by marks on assignments, tests and/or report cards.

Design

This research project consisted of both quantitative and qualitative data and was collected as a case study of the researcher's Grade Eight homeroom. The researcher compared student commitment, growth and performance with homework conditions to student commitment, growth and performance without homework conditions. The measures included questionnaires, journal responses, self-evaluations, records of late/incomplete assignments and student marks. Although the researcher taught this group of students both Math and Language Arts, she focused on Math homework for the purposes of this study. These students took Math every day for 51 minutes from September until June.

This study was conducted over a period of six weeks and included a sample of 22 Grade Eight students to whom Math was taught every day. The first half of the study covered topics 5.1 through 5.5 of the Math text, Interactions. These topics included finding equivalent ratios, solving proportions, finding equivalent rates and unit rates, estimating percents and finding actual percents. During this phase, extra nightly homework was assigned for each of the topics. The nightly homework consisted of one to two page worksheets related to each of the above-mentioned topics. The second half

of the study covered topics 5.6 through 5.9 of the same text, Interactions. These topics included finding numbers from percents, representing fractional percents and percents greater than 100, calculating combined percents and interpreting percent change. During this phase of the study, extra homework was not assigned as time was given in class to complete the assignments. As a result, the second half of the unit took longer than the first half because more class time had to be assigned to avoid sending homework home.

A pre-study questionnaire was administered at the beginning of the unit (see Appendix A), followed by two post-intervention questionnaires (see Appendix B): one after the homework phase of the study and one after the non-homework phase of the study.

Rationale for Design of Study

After completing the literature review, several components of the reviewed sources contributed to the design of this study. For example, the concept of completing half the study with homework and half the study without homework originated from Tuckman and Trimble (1997) and Dudley and Shawver (1991). Kogan and Rueda (1997) and Kazmierzak (1994) supported the recording of homework completion rates. Surveys were a popular tool among the research reviewed, and Kazmierzak (1994), O'Rourke-Ferrara (1998), Easton and Bennett (1990) and Cooper, Lindsay, Greathouse and Nye (1998) support the survey measure. Brender (1996), Cooper, Lindsay, Greathouse and Nye (1998), Easton and Bennett (1990), Tuckman and Trimble (1997) and Kazmierzak (1994) tracked student grades. The researcher created the journal measures and the self-evaluation measures in an attempt to individualize this study to collect specific information concerning student commitment and growth.

Rationale For Pre-study Questionnaire Development

In an attempt to keep the questions relevant to the teacher's particular classroom, the questions were designed specifically for this study. However, the questionnaires were loosely based on samples provided by O'Rourke-Ferrara (1998), Easton and Bennett (1990) and Kazmierzak (1994).

The first two questions established how the amount of Math homework fit in with the amount of homework students received in all subject areas. Please refer to Appendices A and B as necessary. Questions 3, 4 and 5 focused on the actual amount of Math homework received and how the students felt about that. The pre-study questionnaire results, when compared to the post-intervention questionnaire results, should reveal how homework affects the students' commitment to Math. Question 6 focused on performance, as the researcher tried to ascertain if students felt that Math homework affected their marks. Question 7 focused on both performance and growth as the researcher established a comparison between *awareness* of their marks in the pre-study questionnaire to the post-intervention questionnaire, after homework was a focus. Questions 8 and 9 also revealed information about student growth as initial student recall of recently covered material was compared to the post-intervention questions. Question 10 further revealed how important homework was to student commitment and enjoyment. Question 11 pursued the concept of student growth and commitment by establishing how the students believed homework affected their grasp of mathematical concepts.

Rationale For Post-intervention Questionnaire Development

The post-intervention questionnaires contained all eleven of the original questions so that results could be compared from pre-study to post-intervention conditions. Four

new questions were added that help clarify how important homework was to student commitment and performance. Specifically, Question 12 and 13 established, once again, how students felt about Math and whether or not homework affected this commitment. Question 14 focused on both performance and growth as it measured the student's grade and his/her self-awareness of that grade. Question 15 was a pure opinion question that directly asked students if they wanted to continue with the current amount of homework.

Assignment Of Measurement Instruments To Areas Of Study

Pre-study questions 4,5 and 10 and post-intervention questions 4,5,11,13 and 14 were used to measure student commitment. Pre-study questions 8,9 and 11 and post-intervention questions 9,10 and 12 were indicators of student growth, and pre-study questions 6 and 7 and post-intervention questions 6,7,and 8 supported the evidence of student performance. Not all percentages added up to 100 percent as not all students answered all questions. (See Appendices A and B).

After each of two quizzes, an Independent Reflection Sheet (see Appendix C) supplied by the Interactions textbook series was administered. One of these reflections occurred during the homework phase of the study while the other was assigned during the non-homework phase of the study. These self-evaluations aided in determining the level of student growth throughout the study.

At four different times during the study, journal questions were assigned to the students to collect data about commitment and growth. The questions were as follows:

1. Describe yourself as a Math student.
2. Would you change anything about Math or Math class? Explain.
3. How does Math relate to your "real world"?

4. How could you become a better Math student? Be specific.

This type of subjective data revealed issues surrounding commitment and growth through variations in the responses. This was most easily identified by comparing the length and content of each consecutive entry. As well, the specific content of some entries shed new light onto growth and commitment issues that had not been previously considered.

Daily records were kept on the completeness of assignments both during the homework and non-homework phase of the study. This accumulation of data was useful for determining the level of student commitment at different phases of the study.

Finally, records were kept of student marks at all phases of the study. The individual marks were combined to a final percentage before the study started, then again after the homework phase and one final time after the non-homework phase. The final unit test was not included in these results as this test covered material from both phases of the study, and would not have been an accurate indicator of performance for just the last phase of the study. These marks were used to determine an increase or decrease in student performance.

In all, five different methods of data collection were used ranging from less-subjective marks to extremely subjective data like journal entries. Although student performance was a necessary component of the study, the researcher was most interested in student commitment and growth.

Reflections/Comments

Possible Biases

There were several potential problems with the organization of this study. According to Berk and Ross (1990), validity represents a set of scientific criteria by which the credibility of research may be judged. This study may have encountered some difficulties with both internal and external validity. Each of these threats was carefully considered, and the researcher attempted to minimize their apparent threat to this study to the best of her ability.

Because this study was conducted in a fairly short period of time (six weeks), it was difficult to determine if the results were truly due to the homework conditions, or if the results were influenced by external variables. For example, it is possible that the difficulty of the unit, or parts of the unit, could have affected the results more than the amount of assigned homework. A longer study that spanned several months may have facilitated this isolation of variables.

As well, because of the need for informed consent, the students were very well informed of the details of the study. In response, they immediately expressed concern that this study could result in an increased amount of homework for them. Fink and Kosecoff (1978) suggested that several factors can threaten a design's internal validity because they may become confused with a program's influence. Further, Berk and Ross (1990) defined internal validity as a comparison between the outcome had the intervention been introduced compared to the outcome had the intervention not been introduced. One potential threat to the study's internal validity was the class's attitude towards homework.

For example, the students were very concerned that the teacher would tell their parents that the study had proven that they should be completing homework every night. Despite reassurances, it is likely that students may have tried to answer questions on the surveys, journals and self-reflections in such a way to reflect poorly on the impact of homework. The attempt to minimize this purposive manipulation of the data appeared in the arrangement and wording of the survey questions. The questions focused directly on student progress and growth and avoided emotionally sensitive, opinionated responses. As well, their journal entries focused on Math concepts rather than homework opinions. Finally, the researcher limited their answers to a Likert scale or checklist so that students were not as free to “rant and rave.”

The presentation of the pre-study questionnaire could also have affected the responses on the post-intervention questionnaires, according to Fink and Kosecoff (1978). However, the comparative answers between the pre-study questionnaire and the post-intervention questionnaires were one of the keys to the analysis, and it was believed that the wording of the pre-study questionnaire did not bias the students to think about homework in either a positive or negative fashion. The questions were worded to gather information about the students’ current homework situation and how that situation had affected them rather than leading the students to believe specific opinions about homework.

Even though this study took place over the course of one whole unit in Math, the students appeared to find the last topic of the unit to be the most challenging. This topic involved calculating percent increase and decrease and it occurred during the non-homework portion of the study. It is possible that the difficulty of this topic may have

influenced the results more than the absence of homework. A longer study that spanned several units would have helped to eliminate this uncertainty.

Finally, it cannot be overemphasized that, if findings cannot be generalized, they are useless (Berk & Ross, 1990). This is commonly referred to as the external validity of a study. This was the most concerning aspect of this study's validity. One of the greatest failings about this study was that the sample was not entirely unbiased. This group of students had been together for about four months before this study began. This meant that they had likely created their own "mini-culture" and may not have been as representative of the "average" student as they would have been at the beginning of the year. It is likely that they sensed the teacher's bias against homework, and this may have influenced both the interpretations of the results as well as the students' contributions to the results. It is important to note, however, that homerooms were chosen fairly randomly; students were grouped according to options. Therefore, these particular students should have been comparable to any other random sampling of the school.

Surprises/Successes

Most students were very helpful and willing to cooperate despite the controversial topic of the study. The teacher commenced this study with a bias against homework, and she discovered that it was very difficult to separate such educational issues into "right" versus "wrong". During the non-homework portion of the study, three to five students actually asked for extra worksheets on two different occasions. Although the researcher had made assumptions prior to the study that homework is counter-productive, these students indirectly reminded her that all students learn differently, and that very few methods are either all "good" or all "bad" for different individuals.

Analysis of Student Commitment

Overview

Student commitment was defined in this study as "...the student's demonstration of working to capacity in most situations" (p. 17). As this study attempted to answer the question, "How will the amount of homework affect student commitment, growth and performance in Mathematics," the researcher analyzed student commitment through a variety of measurements. After collecting data from questionnaires, journals, and records of late/incomplete assignments, the research indicated that homework appeared to have little effect upon student commitment as defined by this study. Surprisingly, homework incompleteness rates dropped slightly during the regular homework phase of the study. This did suggest that regular homework may have improved student commitment to homework completion. However, most journal responses requested a reduction in homework, but, in contrast, according to the questionnaires, most students liked the amount of homework and looked forward to Math during *all* phases of the study. These results proved somewhat inconclusive, and it was difficult to ascertain the true effect of homework on student commitment from these results.

Evidence

Questionnaire data.

A comparison of question 4 (see Appendices A and B) revealed that 71 percent of the students liked the amount of homework at the time of both the pre-study questionnaire and the first post-intervention questionnaire (Table 1). At the time of the pre-study questionnaire, the amount of homework had already been negligible, whereas

the first post-intervention questionnaire occurred during the homework phase. This steady response of liking the amount of homework despite the homework conditions suggested that homework may not have been a significant factor in determining student commitment. This may also be an example of how the students may have tried to answer the questions in an attempt to please the teacher, or to tell her what they thought she wanted to hear.

In contrast, however, 85 percent liked the amount of homework after the non-homework phase, indicating that more students preferred not having regular homework, despite earlier comparisons (Table 1).

Table 1

“Do you like the amount of Math homework you receive right now?”

Percentage who liked the amount of homework	
Pre-study questionnaire	71%
With Homework	71%
Without Homework	85%

Of the students who did not like the amount of homework, most wanted to see a decrease, regardless of the timing of the questionnaires (Table 2). It was interesting to note the high percentage of students who wanted a decrease in homework even when the amount of homework at the time was already negligible. This was one of the indications that some students were sensitive to the topic of the study and may have answered the questions in such a way to ensure that their homework levels did not increase. Further evidence of this occurred during the non-homework phase when only three students

wanted to see a change in the amount of homework, but of those three, two wanted a decrease even though homework had not been regularly assigned at that time.

Table 2

“If you do not like the amount of Math homework you receive right now what would you like to see change?”

Percentage who wanted decrease in homework	
Pre-study questionnaire	80% of those who answered question
With Homework	100% of those who answered question
Without Homework	67% of those who answered

An interesting development occurred with the question connecting homework and feelings for Math (pre-study question 10 and post-intervention question 11, Appendices A and B). In the pre-study questionnaire, most students did not feel that homework affected how much they liked Math class. In both post-intervention questionnaires, the focus shifted slightly, suggesting that some students *did* believe that the amount of homework affected how much they enjoyed Math (Table 3). Unfortunately, the results were somewhat contradictory as 19 percent thought the *increased* homework increased their enjoyment, and in the second questionnaire, 20 percent thought the *decreased* homework increased their enjoyment. It did not seem logical that a similar percentage of students claimed to like Math more both *because* and *in spite* of homework. What was most clear, however, was the consistent majority that claimed either that homework had no effect, or that it decreased their enjoyment of Math (Table 3). These percentages suggested that increased homework may have negatively affected student commitment, and in some cases may have even diminished student commitment to class.

Table 3

“How has the amount of Math homework affected how you feel about Math this year?”

Percentage whose enjoyment was not affected by homework	
Pre-study questionnaire	81%
With Homework	71%
Without Homework	75%
Percentage who thought the amount of homework increased their enjoyment	
Pre-study questionnaire	5%
With Homework	19%
Without Homework	20%
Percentage who thought the amount of homework decreased their enjoyment	
Pre-study questionnaire	N/A
With Homework	10%
Without Homework	5%

Questions 13 and 14 on the post-intervention questionnaire (see Appendix B) were the most revealing in terms of the effect of homework on student commitment. On question 13, the students revealed that 67 percent looked forward to Math class, even during the homework phase of the study, but 76 percent looked forward to Math during the non-homework phase of the study. This suggested that a reduction in homework may have increased student commitment to class (Table 4).

Table 4

“Do you look forward to Math class?”

Percentage who looked forward to Math	
With Homework	67%
Without Homework	76%

As well, in post-intervention question 14, 72 percent claimed that homework did not affect if they looked forward to Math even though they were completing nightly homework. As well, only 38 percent looked forward to Math during this phase of the study. In contrast, however, in the non-homework questionnaire, 71 percent looked forward to Math and 86 percent claimed that the amount of homework did not affect if they looked forward to Math. This shift in results strongly suggested that the decreased amount of homework may have increased student commitment to class (Table 5).

Table 5

“Has the current amount of homework affected if you look forward to Math class?”

Percentage whose feelings for Math were not affected by homework	
With Homework	72%
Without Homework	86%
Percentage who looked forward to math	
With Homework	38%
Without Homework	71%

Incomplete assignment data.

The incomplete assignment data demonstrated the difference between student commitment to work completion during both phases of the study. The results suggested a

two percent increase in commitment during the homework phase of the study, which was surprising, as it was expected that the number of incomplete assignments would *increase* during the nightly homework phase of the study (Table 6). It was a common occurrence for Junior High students to “forget” to complete homework, and it was expected that increasing the number of assignments would have translated into an increased amount of incomplete tasks. This was a faulty assumption, however, and one possible interpretation of these results was that the regular assignment of nightly homework helped to establish a routine for some students that may have resulted in greater homework completion commitment.

Table 6

Percentage of Late/Incomplete Assignments	
Pre-study questionnaire	6.8%
With Homework	4.8%
Without Homework	6.8%

Journal data.

Although four journal questions were used throughout this study, questions two and four were most useful in measuring student commitment:

2. Would you change anything about Math or Math class? Explain.
4. How could you become a better Math student? Be specific.

It was interesting to note that many students answered question two by suggesting “less homework”, but in answering question four almost all students suggested “studying more or harder, practicing more” and “staying on task”. It appeared as though the students believed that studying and practicing would help their marks, but did not necessarily

believe that homework contributed to a valuable lesson. For example, one student answered question four by stating that “[t]o become a better math student, you must ask for help when needed, pay attention in class and stay on task.” Two weeks earlier, he had answered question two with, “...I would change the math curriculum [sic] so it would be a lot easier and less work.” It is this type of constant contradiction that appeared repeatedly throughout the journal entries that brought into question which course of action was more beneficial; reducing or increasing homework? Reducing the amount of work appeared to benefit student commitment to class, however, increasing the amount of work facilitated the belief that working harder meant becoming a “better” student. Individual students and teachers should decide which goal is most relevant to each personal situation.

One student suggested that Math would be more meaningful if it was more fun. She stated, “I would change math class because it gets boring doing book work and sheets every day. I would make more games (math games).” Another student answered the question by suggesting that Math would be better if he could “... make it more fun. For example, play math games not just do work.” His friend also suggested that “...I would change the amount of work each day and make it a little funner [sic]. For example, play a math game to help people understand the work.” These students regularly completed their homework and were not disruptive in class, yet they suggested that the worksheet routine was counterproductive. Although they already appeared to be fairly committed to Math class, a variation in the routine could prove valuable in improving further commitment and appreciation for Math.

Another student suggested, “I think I would make every student in the class have their own teacher and to go at your own pace.” This was the only student who expressed the desire for individual attention and pacing. She felt that she would benefit most from being able to take her time to make each concept meaningful to her frame of reference, rather than rushing through to meet curricular deadlines. In institutionalized mass education, this type of individual care is difficult, but it supported the idea that increased amounts of homework may negatively affect student commitment. In fact, in cases such as this, decreased homework may actually have *increased* student commitment.

Further, another student wrote, “I would change the amount of homework we get and the work to be easier so I would want to come to math class and I would make bonus marks.” This student openly admitted that less homework would have encouraged him to come to class, rather than dread Math class. He suggested that a lighter workload would have made it easier for him to complete his work and perhaps even find a way to earn extra marks, if he had the time.

Separately, another student suggested that “[i]f we spent more time explaining then we got more time to work right away then we could have it fresh in our minds because when I get home for my homework I forget it all.” This student explored an aspect that had not been considered before reading her journal entry. This student suggested that the *timing* of the work was more crucial than the amount of homework. This student supported the idea that the practice *is* important, but only if it is given a chance to be meaningful. Taking regular homework home just for the sake of it was not helpful to her. She liked to get the instruction and then apply it right away. This practiced application of knowledge was what this teacher intended when homework was

assigned, but this student focused clearly on the need for more immediate application. Once she had taken the work home several hours later, the knowledge was no longer fresh, and the assignment altered from being one of application to one of necessity.

On the other hand, four students indicated that more work would actually be desirable for them. One student wrote, “[p]ractice helps me to understand how each topic works. I learned techniques to [sic] how to solve a math question.” Another student wrote, “I would maybe have more work on work sheats [sic] instead of the book because in the book I have an easy way to go over my work to check it, but on sheats [sic] I have to work at it to find the answer.” This student suggested that because the answers were in the back of the textbook, she did not have to think as carefully while she was working because she knew she could easily flip to the back to check her work. The worksheets, however, were marked in class and she did not have access to the answers until they were marked. Therefore she worked more carefully on the sheets to ensure a good mark.

Another student wrote,

To become a better math student I could come in twice a week for extra help at lunch. This would help me understand things better and if I was confused, I would understand them. Also, each week I could [take] home 1 or 2 extra study sheets. This would catch me up on practise [sic]. Also, for tests, I could start to study in advance. For example, as soon as I know there is a test, start to study.

A fourth student indicated that more work may be necessary in some cases, but not for the same reasons as cited above. She stated, “[t]his math topic right now is quite easy. It would be nice to make it harder because the math homework next year will be

harder I hear. It's really hard to do you usually get a low mark." This student was thinking ahead, and trying to ensure that she would be able to handle the pressures of the next year of school. This raised an issue that caused further concern. If only one teacher, such as the researcher, chose to eliminate homework from the regular classroom practice, was she doing a disservice to those students who would encounter it in heavy doses in future years from teachers with different values and beliefs? Although at this point this study it appeared that some students would be more committed to class if the amount of homework was reduced, this was where the concepts of commitment and performance blurred. "Without doubt, the strongest argument for assigning homework, in the eyes of most teachers, is the assumption that doing homework raises students' achievement" (Black, 1996, p. 50). If a student's commitment improved, it was not clear how this would affect her performance. A separate study examining this correlation would reveal crucial information on this topic.

In all, it appeared that at the very least, homework itself may not have negatively affected student commitment. In some cases, however, a decreased amount of homework actually increased student commitment. For example, 76 percent of students looked forward to Math class during the non-homework phase whereas only 67 percent looked forward to it during the homework phase. A majority of students requested a reduction in the amount of homework when asked if they would change anything about Math class. As well, several other students suggested that adding variety to the lessons would have improved the learning climate. Based on these findings, it appeared that regular homework may not have been beneficial to student commitment to Math class.

Analysis of Student Growth

Overview

Student growth was defined as "evidence that the student has developed his or her metacognitive and cognitive skills" for the purposes of this study (p. 17). In examining the question of "How will the amount of homework affect student commitment, growth and performance in Mathematics?", the data suggested that an absence of homework did not negatively affect this student growth. Questionnaires were used to gather information about student awareness of the unit theme and topic (see Appendices A & B), and self-evaluations required the students to think about their own thinking skills and progress (see Appendix C). Finally, journal responses were compared in terms of quality and depth of thought as well as for content. Even though an increased awareness of unit theme and topics was noted during the homework phase of the study, journal responses revealed that student growth actually can be harmed by too much homework in some cases.

Evidence

Questionnaire data.

In examining pre-study question 8 and post-intervention question 9 (see Appendices A and B), it was discovered that the students were far more aware of the unit theme during the homework phase of the study than either the pre-study questionnaire or the non-homework phase (Table 7). As well, based on pre-study question 9 and post-intervention question 10, the students were more aware of the number of topics (5.1, 5.2, 5.3...) in the unit during the homework phase of the study.

Table 7

“What was the topic of your last Math chapter?”
and
“How many topics were in your last Math chapter?”

Percentage who knew the unit theme	
Pre-study questionnaire	71%
With Homework	95%
Without Homework	76%
Percentage who knew number of topics in unit	
Pre-study questionnaire	48%
With Homework	76%
Without Homework	67%

This difference in awareness of their current unit could have been attributed to the regularity of homework assigned at the beginning of the unit. For example, it was possible that the routine of homework helped students remember the theme of the unit. In terms of the number of topics, however, the homework portion of the study only spanned the first five topics, therefore it seemed more likely that students would be aware of those particular topics, and not necessarily subsequent topics. Several students looked in the textbook for answers in subsequent questionnaires which may be a more plausible explanation for their awareness of the number of topics than the presence or absence of homework. As well, during the post-intervention questionnaires, the students were in the middle of the unit as opposed to the beginning, as in the case of the pre-study questionnaire. Because they were right in the process of completing the unit as opposed to just starting the unit, they may have been more aware of the number of topics and the unit theme. Finally, the non-homework questionnaire was administered after a week-

long break for the students, during which time students may have forgotten the focus of the unit.

More students claimed that homework did not affect their understanding of Math during the non-homework phase of the study than during either the homework or the pre-study phases (Pre-study question 11 and post-intervention question 12, Appendices A and B, Table 8). If homework affected growth, more students should have claimed that the lack of homework affected their understanding during the non-homework phase. As it stood, the majority of students denied that either the absence or presence of homework affected their understanding, which, at the very least, suggested that the decreased homework did not affect students' growth in terms of their perceptions of understanding Math.

Table 8

“Has the current amount of homework affected your understanding of Math lately?”

Percentage whose understanding of Math was not affected by homework	
Pre-study questionnaire	43%
With Homework	52%
Without Homework	62%

Self-evaluation data.

The responses on the self-evaluations (see Appendix C) changed very little from the homework to the non-homework phase of the study. The most noticeable difference was in the self-evaluation of their progress: During the non-homework phase, more students rated their progress as a mark between 80 percent and 90 percent, whereas during the homework phase, more students rated their progress as 90 percent or higher

(Table 9). This suggested that homework may have influenced the students' perceptions of growth and progress.

Table 9

Percentage who evaluated their progress at 90% or higher	
Independent Reflection #1	38%
Independent Reflection #2	25%
Percentage who evaluated their progress between 80% and 90%	
Independent Reflection #1	43%
Independent Reflection #2	55%
Percentage who evaluated their progress lower than 80%	
Independent Reflection #1	19%
Independent Reflection #2	20%

During both phases of the study, the students answered most short answer questions with one to two word sentences and most students admitted to taking the easy route whether they were in a homework routine or not (Table 10). That is, the length and quality of written answers did not fluctuate a great deal from the homework to the non-homework phase of the study. As well, one of the questions asked whether students felt they challenged themselves, or whether they took the easiest route to get their work done (see Appendix C). The percentage who chose the easy route altered five percent from the homework to the non-homework phase, indicating that the presence of homework may have slightly encouraged further self-challenge. It appeared that the presence or absence of homework did not affect student growth in terms of depth of written responses or the amount students challenged themselves.

Table 10

Percentage who gave 1-2 word answers	
Independent Reflection #1	57%
Independent Reflection #2	60%
Percentage who chose the easy route	
Independent Reflection #1	62%
Independent Reflection #2	57%

One of the short answer questions asked if the students felt they knew when to ask for help (see Appendix C). In both reflections, most students (90%) claimed to know when to ask for help. This correlation of answers from both phases of the study suggested that neither the presence nor absence of homework affected student growth in terms of self-awareness in relation to knowing when to ask for help.

Journal data.

No noticeable change was detected in the length and quality of the responses during either phase of the study. That is, the effort expended on answering questions remained fairly consistent throughout the study. For example, those students who wrote paragraphs for the first question continued to write paragraphs for the remaining questions. Conversely, those students who wrote one or two sentences continued this pattern throughout the study. From this perspective, the amount of homework did not affect student growth in depth of reflective writing related to Math.

Some individual responses, however, revealed growth issues that had not been considered before assigning the questions. For example, one student revealed that her growth and success had little to do with the amount she practiced, but rather, "...my major problem on my test was I was really worried! I had a Math & Science test on the

same day and I wasn't focused on Math! (That's when I make stupid mistakes!!)" This student's growth was not affected by how much she practiced, but by the fact that she *had* to practice in order to succeed. She was so worried about the final result in both subjects that the benefits of practicing were reduced.

Another student answered question three (see page 21 of this paper), by stating, "[t]he only way Math relates to my life is to buy stuff or to do taxes or bills. Most of the stuff we learn is useless." This student also described himself as being "...very smart and [I] like to do math because it is a [sic] easy pass." This student revealed that he is not developing very much personally in terms of Math. The structure of Math class did not appear to stimulate further growth for this student who liked Math merely because it was an "easy pass." This student's comments stimulated speculation on the number of students who felt that Math was "useless" despite contradictory surface appearances.

Another student suggested, "I wish we didn't have to take any math homework home and we just had to finish our work in class because it is dropping my other grades." Not only did this student appear to be sacrificing her potential growth in Math in order to keep up with the workload, but her growth in other subjects was declining because the amount of time she spent on Math reduced the amount of time she could spend on other subjects.

It appeared, once again, that neither the presence nor absence of homework necessarily affected student growth. The length and quality of written responses did not fluctuate a great deal from one phase of the study to the other, and more students (10%) actually claimed that the amount of homework did not affect their understanding of Math during the non-homework phase than during the homework phase of the study (Table 8).

The actual awareness of unit theme and the number of topics in the unit increased during the homework phase, which may have indicated that homework positively affects student growth in this area of awareness. It is also possible, however that this increased cognizance was caused by the timing of the questionnaires, anticipation of the questions on the post-intervention questionnaires, or by students who looked up the answers as they were answering the questions. The journal responses revealed that their Math-related stress correlated more with their desire to achieve high marks, or finding the content boring, regardless of the amount of homework. One student even suggested that the amount of Math homework was causing her to fall behind in other subjects. Based on these findings, it appeared that the relationship between homework and student growth is unclear, although in some cases student growth was inhibited by too much Math homework.

Analysis of Student Performance

Overview

This is the area of study that had been reported most often in the literature reviewed for this study, and the results of this study did not provide any further conclusive evidence. The data compiled to answer the question "How will the amount of homework affect student commitment, growth and performance in Mathematics?" was collected through pre-study questions 6 and 7 and post-intervention questions 6,7, and 8 (see Appendices A and B), as well as through a summary of student marks at three different points in the study. In general, it was discovered that the class average decreased 0.4 percent from the homework to the non-homework phase of the study, once again suggesting that the amount of homework may not have been a noticeable factor in affecting student achievement.

Evidence

Questionnaire data.

The questionnaire research suggested that students *believed* homework improved their marks, even though many of them took great pains to avoid supporting homework in other areas of research. Thomas (1992) supported this perception by suggesting that although controversy continues about the impact of homework on academic achievement, the belief in its effectiveness will remain a trend in educational thinking. In examining Table 11, it became apparent that many students believed that regular homework positively affected their marks. Therefore, it appeared that during the homework phase,

more students believed that the homework was helping their marks than during the other phases of the study.

Table 11

“How has the amount of homework affected your mark lately?”

Percentage who said that homework did not affect their mark	
Pre-study questionnaire	52%
With Homework	38%
Without Homework	65%
Percentage who said homework raised their mark	
Pre-study questionnaire	9.5%
With Homework	33%
Without Homework	5%
Percentage who said that homework lowered their mark	
Pre-study questionnaire	24%
With Homework	29%
Without Homework	30%

It was interesting that despite valiant efforts in other areas of the questionnaire to thwart the presence of homework, the students inadvertently acknowledged their belief that regular homework helped their marks. As well, Table 12 shows that more students indicated their marks improved during the homework phase than during the non-homework phase, once again suggesting that homework was an asset in performance.

Table 12

“Has your mark in Math improved since the last questionnaire?”

Percentage who said that their mark improved since the last questionnaire	
Pre-study questionnaire	N/A
With Homework	76%
Without Homework	53%

Closer examination revealed several other possible explanations, however. At the time of the pre-study questionnaire, students had just finished a difficult unit on fractions. It is possible that the students' marks improved during the first half of the next unit because of the content of the unit, not necessarily the amount of homework. This explanation was further supported by the fact that only 53 percent indicated that their marks improved during the homework phase. The actual comparison data revealed that the marks actually remained fairly steady throughout the study which explained why fewer students indicated a change in marks in the second half of the study: Their marks may have remained the same (Table 13 and Figure 1).

Marks comparison.

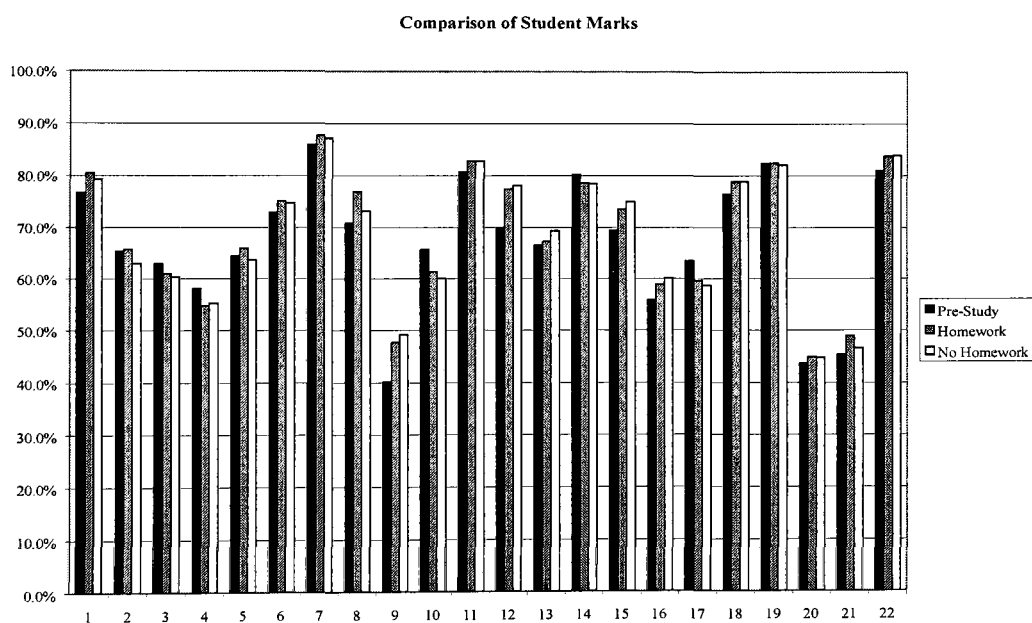
The class average improved almost 2 percent between the “pre” and the homework phase, which could indicate that homework actually did improve student performance. Further examination, however, revealed that the class average decreased by 0.4 percent during the non-homework phase of the study (Table 13). If homework is truly a factor in performance, then it is much more likely that the marks would have dropped more noticeably during the non-homework phase. From these results, it is unclear whether homework had any definite impact on student grades.

Table 13

Class Averages	
Pre-study	66.7%
Homework Phase	68.5%
Non-homework Phase	68.1%

Further, Figure 1 shows the relationship among individual grades during all phases of the study:

Figure 1



Examination of this bar graph revealed fairly steady individual performance, with inconsistencies between those who performed better *with* homework versus those whose average improved *without* homework. This demonstrated that the amount of homework positively affected some student's marks and negatively affected others (See Appendix

D for full table of individual marks). It appeared that this study was unable to conclude whether homework had a significant impact on student performance as the results demonstrated conflicting evidence.

Summary

In summary, the research question asked, "How will the amount of homework affect student commitment, growth and performance in Mathematics?" In some situations, homework proved to be a relevant and helpful tool for some students, in other cases, regular homework did not affect the students positively, and in some instances it proved to be a negative influence. Several times throughout the study, students indicated that they *believed* homework to be helping their marks, but the actual mark comparison revealed only a 0.4 percent decrease in the class average from the homework to the non-homework phase of the study (Table 13). Doyle and Barber (1990) suggested that classroom teachers should ensure that assignments are necessary and useful, suited to the ability and maturity of students and clearly understood. The results of this study supported this recommendation and further suggested that meaningful practice and application of knowledge is important and helpful, but that extra worksheets used to boost the number of marks or to keep students busy may not be effective. It is much more likely that those students who *chose* to make homework meaningful benefited more than those who just completed regular homework as purposeless "busywork". More importantly, it is possible that the regular assignment of homework may erode the potential for greater commitment and personal growth of students even though performance is often an important indicator to parents and the public about the growth and success of students and teachers (Black, 1996). If one takes into account the other qualities of learning that affect a student's achievement, then homework may not necessarily be the best means to an end. Learning is most meaningful when a student finds a way to internalize and relate the experience to his or her domain (O'Rourke-

Ferrara, 1998). Assigning regular busywork to students under the pretense of “practice makes perfect”, does not necessarily help all students become better learners. As a result, it is recommended that teachers examine their rationale behind their homework assignments, taking into account these summations and individual classroom goals.

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Appendix A

Homework Pre-Questionnaire

Name: _____

Date: _____

FOR THE PURPOSES OF THIS QUESTIONNAIRE, THE WORD HOMEWORK MEANS ANY WORK YOU HAVE TO COMPLETE OUTSIDE OF CLASS TIME. (IE. AT HOME, IN THE EVENINGS OR ON WEEKENDS)

PLEASE CIRCLE THE APPROPRIATE RESPONSE FOR EACH OF THE FOLLOWING QUESTIONS:

1. At this time, how much homework do you complete each night in total? (for all subjects)

- | | |
|---------------------|----------------------|
| a. Less than 1 hour | c. 2 hours |
| b. 1 hour | d. More than 2 hours |

2. What, in your opinion is the perfect amount of homework per night?

(In total for all subjects)

- | | |
|---------------------|----------------------|
| a. Less than 1 hour | c. 2 hours |
| b. 1 hour | d. More than 2 hours |

3. How much Math homework do you complete each night right now?

- | | |
|---------------------|----------------------|
| a. Less than 1 hour | c. 2 hours |
| b. 1 hour | d. More than 2 hours |

4. Do you like the amount of Math homework you receive right now?

- | | |
|--------|-------|
| a. Yes | b. No |
|--------|-------|

5. If you do not like the amount of Math homework you receive right now what would you like to see change?
 - a. I would like to see it increase
 - b. I would like to see it decrease
6. How has the amount of Math homework affected your mark this year?
 - a. It has not affected my mark
 - b. It has made my mark lower than usual
 - c. It has made my mark higher than usual
7. What is your Math mark right now?
8. What was the topic of your last Math chapter?
9. How many topics were in your last Math chapter?
10. How has the amount of Math homework affected how you feel about Math this year?
 - a. It has not affected how I feel about Math. I still do not like it.
 - b. It has not affected how I feel about Math. I still like it.
 - c. I have enjoyed Math more this year because of the amount of homework.
 - d. I have enjoyed Math less this year because of the amount of homework.
11. How has the amount of Math homework affected your understanding of Math this year?
 - a. It has not affected my understanding of Math. I still do not get it.
 - b. It has not affected my understanding of Math. I already get it.
 - c. It has helped me to understand Math more.
 - d. It has made Math more confusing

Appendix B

Homework Post-Questionnaire

Name: _____

Date: _____

FOR THE PURPOSES OF THIS QUESTIONNAIRE, THE WORD HOMEWORK MEANS ANY WORK YOU HAVE TO COMPLETE OUTSIDE OF CLASS TIME. (IE. AT HOME, IN THE EVENINGS OR ON WEEKENDS)

PLEASE CIRCLE THE APPROPRIATE RESPONSE FOR EACH OF THE FOLLOWING QUESTIONS:

1. How much homework do you usually complete each night in total? (for all subjects)
 - a. Less than 1 hour
 - b. 1 hour
 - c. 2 hours
 - d. More than 2 hours
2. What, in your opinion is the perfect amount of homework per night? (In total for all subjects)
 - a. Less than 1 hour
 - b. 1 hour
 - c. 2 hours
 - d. More than 2 hours
3. How much Math homework do you complete each night right now?
 - a. Less than 1 hour
 - b. 1 hour
 - c. 2 hours
 - d. More than 2 hours
4. Do you like the amount of Math homework you receive right now? (if yes, go straight to number 6)
 - a. Yes
 - b. No
5. If you do not like the amount of Math homework you receive right now what would you like to see change?
 - a. I would like to see it increase
 - b. I would like to see it decrease
6. How has the amount of Math homework affected your mark lately?
 - a. It has not affected my mark
 - b. It has made my mark lower than usual
 - c. It has made my mark higher than usual
7. What is your Math mark right now?
8. Has your mark improved in Math since the last questionnaire?
 - a. yes
 - b. no

9. What is the topic of your current Math chapter?
10. How many topics are in this Math chapter?
11. How has the amount of Math homework affected how you feel about Math lately?
 - a. It has not affected how I feel about Math. I still do not like it.
 - b. It has not affected how I feel about Math. I still like it.
 - c. I have enjoyed Math more this year because of the amount of homework.
 - d. I have enjoyed Math less this year because of the amount of homework.
12. How has the amount of Math homework affected your understanding of Math lately?
 - a. It has not affected my understanding of Math. I still do not get it.
 - b. It has not affected my understanding of Math. I already get it.
 - c. It has helped me to understand Math more.
 - d. It has made Math more confusing.
13. Do you look forward to Math class?
 - a. sometimes
 - b. usually
 - c. usually not
14. Has the current amount of homework affected if you look forward to Math class?
 - a. No. I look forward to Math anyway.
 - b. No. I do not look forward to Math anyway.
 - c. Yes. I look forward to Math more because of the amount of homework.
 - d. Yes. I look forward to Math less because of the amount of homework.

Appendix C

Independent Reflection Sheet

Name: _____ Date: _____

Project: _____

1. Circle the appropriate word, with 1 being low and 4 being high.

I would evaluate my progress as follows:

- | | | | | |
|--------------------------|---|---|---|---|
| a) staying on task | 1 | 2 | 3 | 4 |
| b) using resources well | 1 | 2 | 3 | 4 |
| c) organizing my work | 1 | 2 | 3 | 4 |
| d) preparing the product | 1 | 2 | 3 | 4 |

Total mark /16

2. Write about your experiences with this project. Here are some ideas to get you started:

What did I like the most?

When was I most frustrated?

How did I solve problems?

How did I challenge myself, or did I take the easiest route?

Do I know when to ask for help?

How well did I assume responsibility?

How did I build on my strengths?

How could I improve if I were to do it again?

How do I learn best?

3. a) I would evaluate my final product as: /100
 b) My reasons are:

Appendix D

Table of Individual Student Grades Throughout Study

Pre-Study	Homework	No Homework
76.7%	80.5%	79.3%
65.4%	65.8%	62.9%
63.0%	61.0%	60.4%
58.2%	54.8%	55.3%
64.5%	65.9%	63.7%
72.9%	75.1%	74.7%
86.0%	87.7%	87.2%
70.8%	76.9%	73.1%
40.2%	47.6%	49.1%
65.6%	61.4%	60.0%
80.7%	82.8%	82.8%
70.0%	77.4%	78.1%
66.5%	67.2%	69.4%
80.2%	78.6%	78.5%
69.5%	73.5%	75.0%
55.9%	58.9%	60.2%
63.5%	59.6%	58.7%
76.5%	78.9%	78.9%
82.5%	82.4%	82.0%
43.6%	44.8%	44.7%
45.3%	48.9%	46.6%
81.0%	83.8%	83.9%