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**Homework variables and academic achievement: An integrated
study**

Olson, Maura E., Ph.D.

City University of New York, 1988

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HOMWORK VARIABLES AND ACADEMIC ACHIEVEMENT:
AN INTEGRATED STUDY

by

MAURA OLSON

A dissertation submitted to the Graduate Faculty
in Educational Psychology in partial fulfillment
of the requirements for the degree of Doctor of
Philosophy, The City University of New York.

1988

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ABSTRACT

HOMEWORK AND ACADEMIC ACHIEVEMENT:
AN INTEGRATED STUDY

by

Maura Olson

Advisor: Professor Shirley Feldmann

The present study was undertaken to gain an understanding of the unique and combined contribution of the following variables to academic achievement: homework achievement, time on homework, student homework behavior, the structure of homework, student ability, feedback on homework, type of homework, parent-involvement, teacher communication with parents and student grade level.

Three homework questionnaires were developed to obtain data on the ten variables of interest. They were administered to third through sixth grade students, parents and teachers in a suburban public school district.

Seven hypotheses were formulated and tested by multiple regression and correlational analysis. Four variables accounted for 37% of the variance in CAT math. They were homework achievement, student ability, parent-involvement and preparatory homework. These same four variables accounted for 38% of the variance in CAT reading.

Correlational analysis revealed a significant

four variables accounted for 38% of the variance in CAT reading.

Correlational analysis revealed a significant positive relationship between math and reading homework grades with CAT math and CAT reading. Contrary to expectation, a significant positive correlation was not obtained between time on homework and student homework behavior with homework rating in math and reading. Parent-involvement in homework was significantly negatively correlated with homework achievement in reading.

Among the teacher variables, no relationship was uncovered between type of homework, structure of homework or amount of feedback with homework achievement in math and reading. As expected, with increasing grade level, parent-involvement in student homework declined and this decline was accompanied by a decrease in the number of homework suggestions offered to parents.

The findings of the study are integrated into a discussion which emphasizes the significance of the obtained results and suggests possible explanations for hypotheses which were not supported. Educational implications are discussed.

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CHAPTER I

INTRODUCTION

Educators have recently become increasingly concerned with the role that homework plays in academic achievement. Etzioni (1983) stated that, "If we want to improve the nation's schools we must pay more attention to homework, the disciplinary climate and other areas that help develop a student's own sense of self-responsibility." In reaction to the decline in the average level of student achievement the National Commission on Excellence in Education (1983) recommended an increase in the amount of homework assigned to high school students. Paschal, Weinstein and Walberg (1984) conducted a meta-analysis of educational research to show that homework benefits both achievement and student attitude.

Educators have suggested a number of ways in which homework can affect achievement. First, homework can extend time for learning and this increased time affects achievement (Keith, 1982). American students spend much less time on homework than do Japanese children and both groups spend significantly less time on homework than do Chinese students (Stevenson, 1983). On weekdays an American fifth grader spends an average of 46 minutes a day on homework while the corresponding averages for Japanese and Chinese students are 57 and 114 minutes respectively. The effect of this national difference in

terms of time spent on homework is evidenced by the fact that in recent international studies of school achievement few American children have scored on a par with their Chinese and Japanese counterparts.

Second, it appears that less able students can, in part, compensate for their lower ability through increased homework (Polacheck, Knieser and Harwood, 1978). Keith (1982) reported that low ability students who did ten or more hours of homework per week had grades commensurate with high ability students who did no homework.

Third, homework can foster student initiative, independence and responsibility. Hedges (1964) and Epps (1966) found that homework encourages children to work on their own with the support of the teacher withdrawn. Students learn to plan their time to reconcile homework with television and personal interests, to work to the best of their ability and to present completed assignments punctually.

Fourth, homework can reinforce and supplement school learning experiences (Boze, 1967; Boyer, 1968 and Beattie, 1978). Langdon and Stout (1969) reported evidence that homework enables the ideas, facts and skills presented during the school day to become more firmly established.

Fifth, homework can lead to increased communication between parents and the schools. Strothers (1984) suggested that homework gives parents insights into a

schools philosophy, curriculum and objectives. Through involvement in children's homework, parents can detect difficulties in their children's learning. When these difficulties are brought to the attention of the classroom teacher, remediation can be provided in a quick, efficient manner.

The findings of homework research generally support the conclusion that regularly assigned homework enhances school achievement (Coulter, 1979; Keith, 1982 and Keith and Page, 1985). Little is known, however, about the dynamics underlying the relationship between these two variables. For example, although we know that homework time extends learning, the following questions need to be addressed: (a) Does increased time on task account for gains in student achievement or does the type of assignment contribute to homework's effectiveness? and (b) How does homework benefit children of different ability levels?

Moreover, although it has been established that homework creates a closer bond between home and school, familiarizes parents with student learning, and invites parental help, the following questions also need to be addressed: (a) To what extent do teachers influence parents to assist their children with homework? In addition, (b) Does this assistance enhance academic achievement?

A final set of questions is addressed to the students

who are the recipients of homework assignments. There exists a need to ask: (a) How do students differ in their homework behavior? and (b) To what extent do these behavioral differences affect subsequent homework outcomes?

A number of issues raised by researchers in the field need to be addressed in an attempt to better understand the relationship between homework and academic achievement. Austin and Austin (1974), Coulter (1979) and Walberg (1984) have urged a consideration of teacher classroom behavior in the introduction, structuring and follow-up phases of homework. Bronfenbrenner (1974), O'Neil (1975), Becker and Epstein (1982) and Stevenson (1983) have stressed the importance of parental-involvement in student homework. The need to examine the relationship between student behavior and homework achievement has been raised by Coulter (1979) and Etzioni (1983). Coulter (1979) and La Conte (1981) have suggested the necessity of considering the interaction between structure of homework, student ability and academic achievement. Finally, Coulter (1979) has stressed the need to examine homework achievement as a variable in its own right.

As noted above, a number of issues need to be explored to gain an understanding of the dynamics underlying the relationship between homework and achievement. Although homework is an accepted part of

schooling, it has been the subject of surprisingly little research to date. Furthermore, the available research on homework has been limited to the study of important variables in relative isolation.

Purpose of the Study

The purpose of this study is to examine the manner in which specific parent, teacher and student behavior relates to homework achievement and academic achievement. In the process of this examination a model for homework research will be presented. This model is based on the findings and suggestions of researchers in the field.

Rationale for the Study

As indicated earlier, little is known concerning the dynamics underlying the relationship between homework and student achievement. Researchers have identified several variables, i.e., parent, teacher and student behavior, which bear on the relation between homework and academic achievement. Unfortunately, few of these variables have been widely researched. In addition, no research exists in which these identified variables have been examined in an integrated manner.

The following chapter provides a review of the homework literature. This review will focus on the areas in which homework research has been conducted. The literature review will culminate in a model which will form the basis of the proposed research effort.

CHAPTER II

Review of the Literature

In the present review major issues related to homework and academic achievement will be described. Research related to these issues will be discussed. A theoretical model summarizing and integrating these issues will be presented. Finally, further research will be proposed.

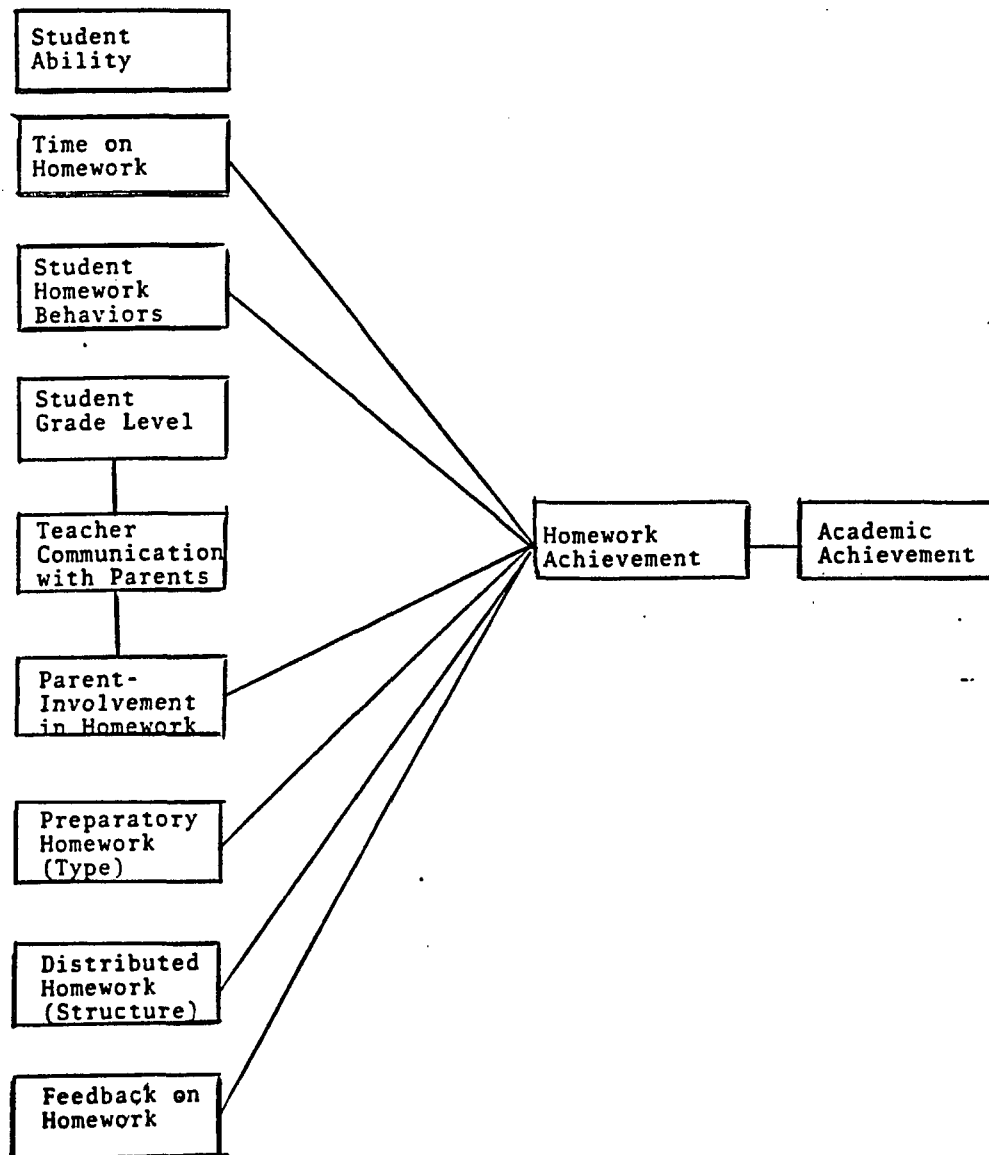
Major Issues Raised Within the Literature

A number of issues were identified as needing exploration regarding the relationship between homework and academic achievement. These issues can be classified in terms of ten major areas: (1) homework achievement, (2) amount of time on homework, (3) student homework behavior (4) the structure of homework, (5) student ability, (6) amount of feedback on homework, (7) type of homework, (8) amount of parent-involvement in student homework, (9) amount of teacher communication with parents and (10) student grade level. These ten variables and their relationship to academic achievement are presented in Figure 1.

Homework Achievement

To date, no research exists which has examined the direct relationship between homework achievement and

Figure 1

A Model for Homework Research.

academic achievement. The study of homework has generally involved an examination of a particular homework variable and its relation to academic rather than homework achievement. Although an increase in academic achievement is the ultimate goal when assigning homework, a more direct effect can be found in the relationship between homework and homework achievement. Coulter (1979) stressed the need to consider homework achievement as a variable of importance in its own right. The homework variable is of particular concern when the focus of the research is an examination of the factors which influence homework achievement. Coulter suggested that researchers devote more effort to formative evaluation, i.e., homework achievement, when the specific focus of the research is an examination of the variables which predict homework performance. Subsequent summative evaluation will reveal the effect of homework on the broader concern of academic achievement. The relationship between homework achievement and academic achievement is depicted in the homework research model.

Time on Homework

The homework literature suggests a positive relationship between the amount of time students spend on homework and student academic achievement. As previously noted, Stevenson (1983) found that American students spend much less time on homework than do Japanese children and

both groups spend significantly less time on homework than do Chinese students. On weekdays an American fifth grader spends an average of 46 minutes a day on homework while the corresponding averages for Japanese and Chinese students are 57 and 114 minutes respectively. The effect of this national difference in time spent on homework is evidenced in the findings of recent international studies of school achievement. In these studies few American students have scored on a par with their Chinese and Japanese counterparts (Stevenson, 1983).

A large-scale study of the effect of time on homework and high school grades was conducted by Keith (1982). Using the data from High School and Beyond, a 1980 study commissioned by the National Center for Education Statistics, Keith conducted a path analysis to determine the causal relationship between time spent on homework and student achievement. After controlling for race, family background, ability and program of study, Keith found that the moderate zero-order correlation ($r = .32$ $p < .05$) between time spent studying and student grades reduced to a smaller but still highly significant coefficient ($r = .19$ $p < .05$). The direct effect of homework on student grades was second only to that of intellectual ability for this sample of 20,364 high school seniors.

The N.C.E.S. data were also analyzed by Page and Keith (1981) using achievement test scores rather than grades as the criterion. As expected, ability had the

largest impact on achievement. Homework's effect, however, was larger than that of race and approached that of family background ($\underline{r} = .10$, $\underline{r} = .03$ and $\underline{r} = .12$, respectively). All correlations were significant beyond the .05 level. Time spent doing homework is, indeed, an important determiner of student achievement.

Etzioni (1983), in his examination of the data of the Coleman Study, focused attention on the relationship between the amount of time students spend on homework and subsequent achievement. Etzioni's analysis indicated that students in high performance schools did considerably more homework than students in average schools. He reported that 5.4 percent of the public high schools require students to do more than 10 hours of homework a week while 12.7 percent of high performing public schools require that amount. Within the private sector the number requiring 10 hours of homework ranges from 13.3 percent in Roman Catholic schools to 19.8 percent in others. Among the high performing private schools 47.9 percent require 10 hours of homework a week. Clearly, such evidence is indicative of a relationship between the amount of time students devote to homework and subsequent achievement. The variable is appropriately included in the proposed research model.

Student Homework Behavior

The student plays an important role in the homework process. Surprisingly few studies exist, however, concerning the impact of the student in homework research. One study has been identified in which student choice of study conditions has been examined. Patton, Stinard and Routh (1983) surveyed the home study environments of 387 students in Grades 5-9. They found that most students, regardless of reading level, chose quiet settings to complete reading assignments but did mathematics and written work while listening to a radio, stereo or television. The researchers reported that with increasing age students were more likely to select quiet settings for reading and to prefer radio or stereo to television while doing mathematics. Students' ratings regarding the effects of different settings on their studying indicated that, overall, television was considered a moderate distractor, while radio and stereo were generally considered beneficial.

Etzioni (1983) focused further attention on the importance of the student variable in homework research. In his examination of the Coleman Study data, Etzioni isolated two factors that relate to student willingness to engage in homework: (a) student belief that the homework is fair and purposeful and (b) student perception that their teachers are interested in them.

The recent research of Zimmerman and Martinez Pons (1986) has provided further support for the need to consider student variables in homework research. Zimmerman et al. (1986) examined student use of self-regulated learning strategies during class, homework and study. Forty high and low achieving high school students were interviewed regarding their use of self-regulated learning strategies. Of the 14 categories of self-regulated learning that were studied, the high achievement group reported significantly greater use than the low achievement group of 13 of the categories.

Zimmerman et al. (1986) found that 4 of the 14 categories of self-regulated learning were most highly correlated with academic achievement. These categories included: processing information, seeking social assistance from peers, parents and teachers, administering self-consequences and reviewing tests, notes and text. Other significant predictors included: consistency in goal-setting, seeking information, keeping records, environmental structuring and rehearsing and memorizing.

Student use of the self-regulation strategies enumerated above enabled prediction of student achievement group with 93 percent accuracy. Such predictive accuracy lends support to the hypothesized relationship between student use of self-regulated strategies and academic achievement. While Zimmerman et al. (1986) explored the issue of self-regulated learning

relative to high school students, it is clear that self-regulated behavior is also an issue of concern with regard to elementary school students.

In summary, little research exists which has examined the role of the student in the completion of homework assignments. Patton et al. (1983) examined differences in student choice of home study conditions and found that reading and math assignments were completed by students under differing conditions. Students selected more distracting conditions for the completion of math homework than for the completion of reading homework. This finding may have some bearing upon the lower mathematics performance of American students found in recent cross-cultural studies.

Etzioni (1983) found that willingness to engage in homework is based, in part, on student perception of the usefulness and fairness of homework. Finally, it has been shown that certain self-regulated learning strategies are correlated with academic achievement (Zimmerman et al., 1986). Among those strategies which impact positively on academic achievement, a number appear highly relevant to a study of homework achievement on the elementary school level. These include seeking social-assistance from parents, teachers and friends, administering self-consequences and environmental structuring.

The student, with his/her various behaviors and perceptions, requires consideration in homework research.

Based on the foregoing discussion student behavior is included in the homework research model.

The Structuring of Homework

The classroom teacher plays a vital, yet somewhat poorly explored, role in the area of homework. Coulter (1979) raised the need to explore teacher behavior as it relates to the structuring of student homework. He noted that in order to adequately assess the nature of the relationship between homework and school achievement some account must be taken of the manner in which homework assignments are structured.

Several studies have examined the manner in which homework is best organized or structured. The majority of these studies have been short-term experimental treatments in which different sequencing patterns in the assignment of mathematics homework have been examined. These studies have generally compared two patterns of homework organization. In one pattern, variously termed traditional, massed, or spiraled, homework related to a particular topic is concentrated in one or more assignments. Upon completion of one topic, a new topic is introduced. Homework assignments then relate to the new topic and the original topic is no longer the subject of homework assignments. In the other pattern, termed distributed or spaced, homework problems are distributed over a number of assignments and interspersed with

previously learned material according to a predetermined schedule.

Four studies have been identified in which homework sequencing patterns have been examined. In two of these studies significant differences were found favoring the use of spaced over massed homework. In the remaining two studies, while significant results were not obtained, all treatment effects favored the spaced homework group.

Butcher (1975) examined the comparative effects of assigning mathematics homework according to a massed and distributed practice schedule with students in 13 ninth-grade algebra classes. In this experiment two textbooks of dissimilar content and presentation were utilized resulting in two parallel studies evaluated by separate tests. Two achievement tests and one retention test were used to measure student achievement and retention for each of the two studies. Additionally, a student questionnaire was administered to assess preference for the two types of homework, massed and distributed.

Significant differences, ($p < .01$), in favor of distributed practice, were found in the achievement of students in the distributed homework group in one of the two studies. When results were analyzed according to intelligence, a significant difference ($p < .01$) was found in favor of distributed homework for students in the middle intelligence range. The F -statistic for the lowest intelligence group attained significance at the .06 level.

These findings are of note because they reveal an effect of student ability on structure of homework. In addition, in one study, a significantly greater number of students preferred the distributed homework assignment over the massed homework assignments. This preference for distributed homework, however, was not analyzed according to student ability.

In more recent research Hirsch, Kapoor and Laing (1983) examined the effectiveness of a distributive model and the traditional method for assigning homework in a first-semester course in calculus. On three of four unit tests a significant interaction ($p < .03$) was found between pre-calculus achievement and performance in calculus as measured by each of these tests. Students who scored above 27 on the pretest had better achievement if their homework assignments were structured in the conventional manner, whereas those pupils who scored 27 or below performed better under the distributive assignment model. In effect, students with a weaker pre-calculus background profitted more from the distributive assignment schedule, again, indicating an aptitude-treatment-interaction between the structuring of homework and student ability.

Urwiller (1971) investigated the effectiveness of spaced homework revision exercises over traditional exercises. This study involved 20 teachers and 732 students in junior high mathematics classes. With one-half of their classes, teachers followed a program in

which mathematics homework problems relating to the day's lesson were interspaced with previously learned material. With their other classes, teachers followed a traditional program in which they assigned problems related to the particular day's classwork. Although not significant, the students in the spaced homework group outperformed the traditional homework students on the Cooperative Mathematics Tests, Algebra II, test of achievement. Additionally, at the termination of the course, spaced students' attitudes toward mathematics were more favorable than the attitudes of traditional students' as measured by the Mathematics Inventory.

Laing (1970) also examined the comparative effects of assigning mathematics homework according to a massed and distributed practice schedule. Over a four month period, 526 middle-track eighth grade students in twenty math classes completed homework problems. Subjects in the experimental group received identical math problems dealing with number concepts over several assignments whereas control subjects solved math problems in one concentrated assignment. Class examinations provided two measures of initial learning of number concepts. A third instrument, administered after three weeks of interpolated activity, provided a measure of treatment effects on long-term retention. Differences between adjusted means consistently favored the distributed treatment group on each of the initial learning and retention measures with

values falling within a range of .08 to .16.

The available research concerning the structuring of homework shows a positive relationship between distributive homework and student achievement. Perhaps the most significant finding in this research is an interaction between the structure of homework and student ability level. Butcher (1975) found a significant effect ($p < .01$) of distributed homework for students of average intelligence. For students of lower intelligence, distributed homework produced nearly significantly (.06) more learning than massed homework. Likewise, Hirsch et al. (1983) found that weaker math students profitted more from homework of a distributed nature.

Further research into the effects on achievement of massed and distributed homework is needed. This research is needed to lend greater support to the present findings which indicate a positive effect for distributed homework. Continued research will serve to clarify the relationship between student ability level, structure of homework and academic achievement. Lastly, it is noted that research concerning structure of homework assignments has been confined to the area of mathematics. Further research is needed to examine the effect on achievement of the structure of homework assignments across a variety of subject areas. Such research will also provide needed information concerning the frequency with which homework of a massed and distributed nature is assigned within the

schools.

In sum, two patterns of homework organization, massed and distributed, are found within the schools. Research in this area has shown that the distribution of homework related to a particular topic over an extended period interspersed with previously learned material results in greater achievement compared to the massing of homework. Additionally, there exists evidence that distributed homework is especially beneficial for students of average and low ability. For the reasons outlined above, the structure of homework is considered a variable of importance to a study of the factors which contribute to achievement in homework. Therefore, it is included in the homework research model.

Student Ability

Extensive research concerning the relationship between student ability and academic achievement has been reported (Lavin, 1965; Tyler, 1965; Cattell and Butcher, 1968; Crano, Denny and Campbell, 1972 and Crano, 1974). The correlation of intelligence tests with educational achievement measures has typically been reported to be about .50. Higher correlations, .60 to .70, are usually found within the elementary schools. In high school and college, the typical median range is .50 to .60 and .40 to .50 respectively (Jensen, 1980). A high correlation might also be expected between intelligence and homework

achievement. Additionally, as previously indicated, an aptitude-treatment-interaction has been established between distributed homework, student ability, and academic achievement. The student ability variable is, therefore, included in the model.

Homework Feedback

In addition to structuring the homework, teachers also provide feedback on the accuracy of completed assignments. There exists evidence that homework that is graded or commented upon is more effective than homework that is merely assigned. Walberg (1984), in his meta-analysis of educational research, found that when homework is assigned without feedback from teachers, it seems to raise, on the average, the typical student at the 50th percentile to the 60th percentile on standardized tests of achievement. When homework is graded or commented upon, it appears to raise learning from the 50th to the 79th percentile. Walberg noted that this graded homework effect is among the largest ones discovered in educational research literature. He further noted that when graded or commented upon, homework has a three times greater effect on learning than SES. In contrast, homework that is merely assigned has an effect comparable to SES.

Walberg's findings are based on his meta-analysis of three thousand research studies which examine a multitude of factors influencing the productivity of America's

schools. The effect of grading on student performance is but one of many variables examined in this meta-analysis. Unfortunately, Walberg does not make explicit which studies yield the findings he proclaims. We can, however, examine the available research for evidence of the effect of feedback on student learning.

The available research on homework feedback strategies has examined the effect of corrections, comments or both corrections and comments on student achievement. Small, Holtan and Davies (1967) involved 36 tenth-grade geometry students in a year-long study on the effect of grading. Subjects in this study had either all homework assignments corrected or had the assignments spot-checked. During the experimental treatment, short daily tests were given. Although no significant differences between treatments were found, 10 of the 13 tests favored students with assignments corrected daily.

Austin and Austin (1974) reported different results using a similar strategy with 51 seventh and eighth-grade students over a seven-week period. Subjects within this study received correction on all math problems or on a random half of the problems. On subsequent class tests no differences were found between the two groups.

Research into the effects of teacher comments on homework has followed the model of Page (1958) in his test grading study. Using 2,139 students in grades seven through twelve across a variety of subject areas, Page

randomly assigned students to one of three groups in every class. Teachers wrote no comments on tests for students in one group. Teachers wrote standardized comments depending on the letter grade for students in another group. Teachers wrote free comments on tests in the other group. The free comment groups surpassed the fixed comment groups and the fixed comment groups surpassed the no comment groups. All effects were significant beyond the .01 level.

Austin (1976) adapted the Page model in studying the effect of comments on the mathematics performance of 222 students in nine 4th, 9th and 10th grade classes. Students were matched and randomly assigned to a comment or no comment group. Analysis of math achievement on a teacher-prepared test showed a significant difference favoring the comment group in two of the nine classes and when all students were pooled. No significant differences were evident for the group receiving no comments on mathematics homework.

Schoen and Kreye (1974) also adapted the Page model of test grading to homework grading. Comparisons were made of several different forms of written feedback on the homework assignments of 147 elementary education majors enrolled in a course on elementary mathematics concepts. This feedback ranged from a check mark to feedback containing the student's first name and an explanation specific to the error. After 10 weeks of the experimental

treatment no significant differences were found on an achievement test measuring course content. There was a significant difference in retention scores that favored feedback that was specific to the student's error.

Two factors become evident in an analysis of the literature on feedback on student homework. First, the majority of studies examining the relationship between feedback and achievement have been conducted in the area of mathematics (Small et al., 1967; Austin et al., 1974; Schoen et al., 1974; and Austin, 1976). Second, the relationship between feedback and achievement is more evident in studies which have examined the effect of feedback across a variety of subject areas (Page, 1958; and Walberg, 1984). Further research on the use feedback across a variety of subject areas may reveal the strong relationship between feedback and achievement that is masked by studies confined to the area of mathematics. Teacher homework feedback practices are included in the homework research model.

Type of Homework

The issue concerning the relationship between type of homework and academic achievement was raised by Lee and Pruitt (1979) and LaConte (1981). According to LaConte, three types of homework are common in U.S. schools: practice, preparation and extension. Each can be identified by its stated purpose. Practice assignments

provide students with an opportunity to reinforce newly acquired skills or apply recent learnings. Preparation assignments enable students to obtain sufficient background information to prepare for upcoming lessons or discussions. Extension assignments provide students with an opportunity to expand upon the learning begun in class. Extension homework encourages individualized and creative pursuit of knowledge through its focus on production rather than reproduction. Lee et al. (1979) and LaConte (1981) have suggested that certain types of homework may be more or less effective depending upon the ability of the student, implying an aptitude-treatment-interaction between homework and student ability. They have suggested that further research is needed to determine which types of homework are most beneficial for which types of student.

While LaConte has presented guidelines to insure the effectiveness of practice, preparation, and extension type assignments, surprisingly little research on the comparative merits of practice, preparation, or extension assignments exists. Two studies examining the effects of exploratory (preparatory) homework have been identified.

Friesen (1975) reported algebra achievement differences that favored students who had exploratory home exercises for two days prior to the class teaching of the topic and review homework for two days following the topic. The control group in this sample of 143 junior

high school students followed a traditional program of homework problems relating to the particular day's work. The experimental group outperformed the control group on text book chapter tests and on a retention test four weeks after completion of the unit.

Peterson (1971) investigated the effect of exploratory homework assignments on the achievement and retention of six eighth-grade mathematics classes that participated in a six-week long study. Each class was randomly assigned to one of three groups: (1) the experimental group which received exploratory homework exercises for three days prior to the teaching of the topic, (2) the placebo group which solved mathematical puzzles unrelated to the subject matter taught during the study and (3) a control group assigned no supplementary homework prior to the teaching of a topic. Peterson found a difference ($p < .05$) for exploratory assignments. It is curious, however, that students solving mathematical puzzles unrelated to the teaching content showed significantly higher achievement and retention than students in the control group.

The research of Peterson (1971) and Friesen (1975) indicates a positive effect of exploratory or preparatory type homework assignment on student achievement. Though yielding positive results, these two studies are confined to the area of mathematics. Further research is needed to examine the effect of exploratory homework across a

variety of subject areas. Such research will also provide needed information concerning the frequency with which preparatory homework is assigned within the schools.

With the variable, type of homework, added to the homework research model, six factors are shown to influence student achievement. These factors include: (1) homework achievement, (2) amount of time on homework, (3) student homework behavior, (4) the structure of homework, (5) student ability (6) amount of feedback on homework and (7) type of homework.

Parent-Involvement

Research on parent-involvement has been concerned with parents acting in three separate capacities (Weibly, 1979). These capacities include: (1) parents serving as tutors of their own children, (2) parents working as paid employees within the school system and (3) parents acting in the capacity of advisors or decision-makers within the school system.

Of relevance to the present research effort are those studies concerned with the effect on student achievement of parents serving as tutors of their own children. Although research in this area has shown a positive effect of parental-involvement on student achievement (O'Neil, 1975; McKinney, 1975 and Rodick and Henggeler, 1980) two additional points need to be emphasized: (1) within the parent-as-tutor research there exist studies which

indicate a positive effect of parental-involvement in student homework on student achievement and (2) the available research on parent-involvement in student homework does little to specify which parental behaviors bear a relationship to student achievement.

Bronfenbrenner (1974) has been an ardent proponent of parental-involvement in the education of the child. His examination of the effects on intelligence of early educational interventions in the home and the pre-school setting exposed the crucial role played by the parent in the development of the young child. His investigation of school-based and home-based interventions, led Bronfenbrenner to conclude that parental intervention at home fosters greater cognitive development than parental-involvement within the classroom setting. Bronfenbrenner urges parental support and direct involvement in the child's educational activities in the home and emphasizes the need for continued home-involvement during the elementary school years. Parental-involvement in homework falls naturally within this domain.

The relationship between parental-involvement and student achievement is clearly evident in the correlational research of McDill and Rigsby (1973). These researchers developed a three-item scale based on teachers' observations of the degree of parental-involvement and interest in their children's high school (PIHS). These three items measured: (1) parental interest

in school policies, (2) parental interest in the child's academic progress and (3) the frequency with which parents seek appointments with teachers to discuss their children's schoolwork. Although limited in number of items, the scale possessed a significant degree of reliability. McDill et al. (1973) found a high correlation between PIHS and scores in math, .82, and percentage of students with college plans, .80. All scores were significant at the .05 level.

In addition to correlational data there exists experimental evidence (O'Neil, 1975; McKinney, 1975; Rodick et al., 1980) that when parents act as teachers of their own children their childrens' academic achievement improves. O'Neil, (1975) studied the effect of parental tutoring on the reading performance of 159 first, second and third-grade students who were at least one year below grade level in reading comprehension or vocabulary. The children of parents who volunteered to participate in the study were randomly assigned to one of three groups: (1) students whose parents received little or no supervision in instruction, (2) students whose parents received ongoing close supervision by a reading specialist and (3) students who received no parental tutoring. Parents in the tutoring groups used the instructional guide, Helping a Child to Learn, for a ten-week period during the summer months. Participants in the supervised instruction group attended weekly meetings to hear formal

presentations regarding the program. At the conclusion of the intervention period students were posttested using the Gates-MacGinitie Reading Test. After ten weeks children who received supervised tutoring performed better in reading consonant sounds and in oral reading rate than the students who received unsupervised tutoring although no significant differences in decoding skills were noted between the two groups. Both the supervised and unsupervised groups performed better on various subtests of two posttests than did the untutored group. This study indicates that, with little or no training, parents can produce substantial improvement in the reading performance of their children.

McKinney, (1975) studied the effect of parental tutoring on the reading and math achievement of elementary school children. One hundred parents were randomly selected from a group of six hundred parents who had volunteered to participate in a program to help raise the math and reading achievement of their children. Fifty parents were trained to tutor their children at home in reading and math for two hours a day for 15 weeks. Fifty pupils, whose parents did not receive the training, served as the control group. Telephone conferences and home visitations for the purpose of observing parents working with their children were an integral part of the program. Experimental and control group students were pretested in the two subject areas involved, and parents were pretested

using an attitude questionnaire. During posttesting, program students scored higher than non-program students in both reading and math, and program parents developed more positive attitudes toward the school than nonparticipating parents. All differences were significant at the .001 level.

Strong evidence for the effect of parent-involvement on student learning has been found in a study by Rodick and Henggeler (1980). Fifty-six low-achieving seventh graders with a history of poor achievement and low motivation were divided into four groups. One group participated in a program called SMART (Staats Motivation Activity Reading Technique), which involved subjects working with trained graduate students for one hour per day in activities designed to increase motivation and raise reading achievement. A second group participated in the "PUSH" for Excellence program, wherein parents received training from the program supervisor, and then worked with their children for one hour each evening in such activities as reading and discussing novels or working on school assignments. In reading, parents emphasized pronunciation, vocabulary development and comprehension. A standard reading group participated in the regular school reading program and a control-group received no special reading instruction. A battery of reading and attitudinal tests was administered to students: (1) before assignment to groups, (2) immediately

after the 10-week intervention period and (3) after a six-month period.

Both the SMART and PUSH groups showed significant achievement and motivational improvements from pretest to posttest. Standard reading group changes were not significant. The control group declined in reading achievement. Both SMART and PUSH groups showed significant increases in achievement (vocabulary, reading recognition and comprehension) and achievement motivation from pretest to follow-up test. However, only the PUSH group showed significant gains from posttest to follow-up. These results are significant for parent-involvement since they reveal a positive correlation between student achievement and the duration of parental-involvement. Although students working with either trained graduate students or parental tutors made significant achievement gains during the brief experimental period, only the parent-tutored group continued to achieve significantly during the longer six-month follow-up period.

In some research on parents serving as tutors of their own children, there exists limited evidence on a positive effect of parental-involvement in student homework. Stevenson (1983) underscored the effect of parental-involvement in homework in a cross-cultural study of parental-attitude and practice relative to student achievement. The parents of American, Japanese and Chinese students were asked to consider the best ways of

promoting student achievement. Parental responses fell into the categories of helping, encouraging, involvement and acceptance. Parental behaviors of assisting the child with homework, supervising homework and reading to the child fell within the category of helping. Stressing the importance of education, encouraging a good attitude and expressing positive feelings about the child constituted the category of encouragement. Involvement included interacting and communicating with the child, expressing an interest in the child's school experiences and being informed of school events. Finally, the category of acceptance consisted of accepting the child as he or she is.

Stevenson found vast differences cross-culturally in parental responses in each of these categories, in the amount of time students spent on homework, and in subsequent achievement. Of particular concern to the present research effort are the cultural differences in the category of helping. Stevenson found that more than 50% of Japanese parents favored helping the student while fewer than 10% of American respondents indicated that direct assistance was a viable means of promoting achievement. The majority of responses of Chinese parents fell within the categories of providing direct assistance and offering encouragement.

Stevenson provided data on the frequency of high and low performance in reading and math achievement for the

American students. He noted that, if students in the three cultural groups selected for study performed comparably, approximately 33 children from each country would be among those receiving the top 100 scores and the same number would be found among those students achieving the lowest scores. American students tended to be overrepresented among the best and worst readers. In reading vocabulary, 47 American students were among those receiving the top 100 scores at first grade. In reading comprehension, 32 American first graders were among the top 100 scorers. The corresponding numbers for fifth graders were 40 and 56. In math achievement, American students were overrepresented among the poorest scorers. Among the 100 students from the three groups who received the lowest scores, there were 58 American students at the first-grade level and 67 at the fifth grade level. Among the top 100 first-graders in mathematics, were only 15 American children. Finally, only one American child appeared among the top fifth-graders.

Stevenson found a relationship between the attitudes of American, Japanese and Chinese parents and the amount of time their children devoted to homework. Mothers in each of the three cultural groups were asked to rank order four factors posited as contributing to academic success: effort, ability, task difficulty and luck. In all three countries, effort was given the greatest number of points, ability was second, task difficulty was third and luck was

fourth. Points were divided primarily between effort and ability. The average difference between these two ratings by American mothers was small, .53, larger for the Chinese mothers, 1.76, and largest for the Japanese mothers, 2.71.

Stevenson speculated that differences in attributions of success to ability and effort may account for the wide discrepancy in the amount of time American, Chinese and Japanese students spend on homework. Within the same study parents reported the amount of time their children spend on homework in a typical week. On weekdays, American first-graders were estimated to spend an average of 14 minutes a day on homework and in fifth grade, 46 minutes a day. In Japan, corresponding averages were 37 and 57 minutes. In China, first-graders were estimated to spend an average of 77 minutes a day on homework and fifth-graders 114 minutes. On weekends American students worked 18 minutes, Japanese students 66 minutes and Chinese students 156 minutes.

In addition to international studies that examine the effect of parental-involvement in homework on student achievement, two further studies dealing with parental-involvement in homework have been identified. Maertens and Johnson (1972) sampled 400 fourth, fifth and sixth-grade pupils to determine the effect of training parents to provide feedback on arithmetic assignments over a six-week period. Children were randomly assigned to a no homework or a homework with feedback condition. The two

homework groups received feedback from their parents either at the completion of each problem or at the completion of the entire assignment. No differences were reported between the per problem and the end of assignment feedback groups; significant differences were found between the homework and no homework groups. Since this investigation did not include a homework without parental feedback group it is not possible to determine if differences were attributable to homework or parental feedback. This investigation is noteworthy, nonetheless, for its consideration of the need to involve parents in the homework of elementary school children.

Baenniger and Ulmer (1976) reported on a program that involved training the parents of children who had serious behavioral and study habit problems to supervise their children's home study habits. Thirty-six children aged 5-12 (27 boys and 9 girls) and their parents were referred to this program at the Baton Rouge Mental Health Center. The program children's problems included short attention span, disruptive classroom behavior, failure to complete assignments and lack of self-confidence. Parents and children participated in training sessions five days a week for seven weeks, during which time parents received instruction in behavior modification techniques and practiced using these with their children. At home, parents applied these techniques providing reinforcement of desirable study behaviors in prescribed ways. Of the

36 families, 31 were able to achieve a situation in which the child had an average of 90% intervals of steady and correct working habits on the last four sessions. While no control group was available for comparison, follow-up interviews and behavior rated sessions of 16 of the parents and children who had been out of the program for at least six months revealed that 12 of the families were able to produce a 90% steady and correct session with their child on current homework.

In addition to research, a number of articles have been identified which offer suggestions for parental-involvement in homework. Duckett (1983) stressed the need for parental-involvement in the development of good study habits. He provided suggestions on a number of ways in which parents can foster effective study practices in the home. Among his suggestions were the importance of establishing a set time, the proper place and the materials needed for homework completion. He encouraged parental participation in the development of student organizational skills and provided guidance to parents in dealing with the frustration students encounter in the completion of homework assignments.

More recently, Rubin (1986) offered a segment on homework. The opinions of prominent educators, psychologists and psychiatrists were culled to address the role of the parent in student homework. While stressing the fact that no single formula will work with every

child, guidelines were presented for successful parent-involvement in student homework. These guidelines included: (1) discussion with the child on a daily basis of the day's school activities, (2) provision of an appropriate environment for the completion of assignments, (3) assistance in the establishment of a study routine, (4) an effort to develop the child's organizational skills and (5) an ultimate goal of establishing the child's independence in and responsibility for homework by the junior high school years.

England and Flatley (1985) explored attitudes toward homework through a series of interviews conducted with parents, students, teachers and principals regarding the pros and cons of homework. His interviews revealed a number of the problems facing parents and students regarding the assignment and completion of homework. Chief among these concerns was the tension caused by issues of autonomy and control in student homework. Lack of clarity on the issue of when to supervise and when to let students struggle on their own toward independence in completing homework assignments was cited as a major parental concern regarding student homework.

Although there remain unresolved concerns regarding the involvement of parents in student homework (Duckett, 1983, England et al., 1985 and Rubin, 1986), there exists evidence that parents can, through their involvement, exert a positive effect on student achievement. As the

research of O'Neil (1975), McKinney (1975) and Rodick et al. (1980) has indicated, parents, when serving as tutors of their own children, can affect positive changes in their children's academic achievement. The research of McDill et al. (1973) revealed a positive correlation between two parental-involvement factors, i.e., interest and frequency of parent-teacher conferences, and subsequent achievement. Likewise, Stevenson (1983) found a relationship between parental willingness to provide help in the completion of homework and student achievement.

Based on the foregoing research, the variable of parent-involvement in homework has been included in the model. Eight factors are shown to influence student achievement. These factors include: (1) homework achievement, (2) time on homework, (3) student homework behavior, (4) the structure of homework, (5) student ability, (6) amount of feedback, (7) type of homework and (8) amount of parent-involvement.

Teacher Communication

Although parent-involvement in student homework has been shown to affect student achievement, not all families become involved in the school-related learning of their children. Epstein and Becker (1982) speculated that parental-involvement in home learning activities with children is a function of teachers' organization of their

teaching practices to include parents in their children's learning. In an attempt to examine this question a study of parent-involvement in student learning was conducted at the Johns Hopkins University Center for Social Organization of Schools (Epstein et al., 1982). This research will be considered in some detail.

A statewide survey of 3,700 teachers addressed two questions: (1) How much do elementary school teachers organize their teaching practices to facilitate parent-involvement in homework? and (2) How do teacher practices of parent-involvement affect student achievement?

Teachers were asked about the frequency with which they employed 14 different teaching techniques that involve parents in learning activities at home with their children. Factor analyses of the 14 indices of parent-involvement showed a clustering of responses around five different approaches to parent-involvement at home: (1) an emphasis on involving parents in the child's reading instruction, (2) an emphasis on encouraging or structuring oral discussion between parent and child, (3) a focus on informal instructional activities for parents to conduct, (4) the use of formal contracts between parent and teacher that specify particular roles or responsibilities for parents and (5) an emphasis on developing parent tutorial, observational or evaluational skills.

Among the five parent-involvement approaches, the most popular approach involved parents in reading related

instruction. Two-thirds of the teachers surveyed reported that they frequently asked parents to read to or listen to their children read. Subsequent parental data (Epstein, 1983) confirmed the frequency of parental-involvement in reading related instruction. Parent-involvement in reading activities was a more prevalent teaching practice among teachers of younger children. Only one-third of the fifth grade teachers surveyed reported active use of this parent-involvement strategy, whereas seven out of eight first grade teachers reported employing this method of involving parents in student learning.

The effects of teacher use of parent-involvement in student learning are presented in Epstein (1985). This report contains the math and reading scores of 293 third and fifth grade students in Baltimore City who took the California Achievement Test (CAT) in the fall and spring of the 1980-81 school year. The effects are presented against a background of teacher use of parent-involvement. The fourteen teachers of these 293 students had been identified by their building principals for their use of parent-involvement in home learning activities. The teachers ranged from confirmed leaders to infrequent users to non-users of home learning activities. Results of the CAT indicated that from fall to spring, students whose teachers were leaders in the use of parent-involvement made significantly greater gains in reading achievement than did students whose teachers were not recognized for

their parent-involvement practices. There were no effects on change in math achievement for teacher practices of parent-involvement.

Epstein's (1985) longitudinal research used multiple regression analysis to identify the independent effects on change in student achievement. Teacher leadership in parent-involvement provided a significant influence on change in reading achievement even after other variables, i.e., parent education, parental response to involvement and quality of student homework completion, were added to the model. Teacher leadership in parent-involvement added 4% to the explained variance in change in reading scores. Epstein (1985) speculated that the lack of change in math scores may be attributed, in part, to the fact that parents reported more frequent involvement in their children's reading activities than in their children's math activities.

In sum, Epstein's (1985) longitudinal research indicates that teacher use of parent-involvement in student home-learning plays a crucial role in the reading achievement of students at the elementary level. This research (Epstein et al., 1982, Epstein, 1983 and Epstein, 1985), is particularly noteworthy since it is the only research to date that allows the direct linking of teacher practices of parent involvement to the families and students in the teachers' classrooms.

With the inclusion of the teacher-communication

variable, nine factors are shown to influence student achievement. These factors include: (1) homework achievement, (2) time on homework, (3) student homework behavior (4) the structure of homework, (5) student ability, (6) amount feedback on homework, (7) type of homework, (8) amount of parent-involvement and (9) amount of teacher communication with parents.

Grade Level

In their survey of the parent-involvement practices of 3,698 Maryland school teachers, Epstein et al. (1982) found that teacher use of parent-involvement is, in part, a function of grade level. She noted that the only parent-involvement techniques frequently used by a majority of teachers center around activities related to reading. Epstein found that nearly 90 percent of first grade teachers requested parents to read aloud or listen to their children read. By fifth grade fewer than 40 percent of parents were asked to engage in reading activities with their children. Epstein also noted that grade level is a significant determinant of teachers' attitudes about parent-involvement, but has a smaller effect on attitudes than on teachers' reported behavior. She speculated that teachers of older students may want to practice parent-involvement strategies as much as teachers of younger students. She suggested that teachers in the intermediate grades may perceive a conflict between

requests for parent-involvement and their concern for the development of independence and responsibility in their students.

In sum, the relationship between student grade level, teacher behavior, and parent-involvement is based on the findings of Epstein (1983) regarding the effect of grade level on teacher use of parent-involvement. As discussed, parental-involvement was found to decrease with increasing grade level. As the homework research model indicates, ten factors are shown to influence student achievement. These factors include: (1) homework achievement, (2) time on homework, (3) student homework behavior, (4) the structure of homework, (5) student ability, (6) amount of feedback, (7) type of homework, (8) amount of parent-involvement, (9) amount of teacher communication with parents and (10) student grade level. With the inclusion of the student grade level variable the homework research model has been discussed in its entirety.

Theoretical Model for the Present Study

The theoretical model as presented in Figure 1 has been discussed in its entirety. The model involves a number of relationships between key variables. In this model, academic achievement is hypothesized to be a function of homework achievement. This hypothesis was suggested by Coulter (1979) who urged consideration of homework achievement as a variable of importance in homework research.

Homework achievement is hypothesized to be a function of nine separate variables. These variables include: (1) student ability, (2) amount of time on homework, (3) student homework behavior, (4) student grade level, (5) teacher communication with parents, (6) parent-involvement in student homework, (7) type of homework, (8) structure of homework and (9) amount of feedback on homework.

The hypothesized relationship between student ability and achievement was established by the findings of Lavin, 1965; Tyler, 1965; Cattell et al., 1968 and Jensen, 1980, who reported a correlation of .50 between measures of student intelligence and school achievement. The relationship between time on homework and homework achievement was suggested by the findings of Page et al. (1981), Keith (1982) and Stevenson (1983) who found that students who spent more time on homework assignments scored higher on tests of achievement compared to students

who completed less homework.

The hypothesized relationship between student homework behavior and homework achievement was suggested by the findings of Etzioni (1983), Patton et al. (1983) and Zimmerman et al. (1986). This body of research has focused attention on the often neglected need to consider student homework behavior as important determiners of homework achievement.

Within the homework research model student grade level and teacher communication with parents is shown to affect the degree to which parents become involved in the homework of their children. This hypothesis was suggested by the findings of Epstein et al. (1982). Additionally, as suggested by the findings of Epstein (1985) teacher communication with parents is hypothesized to affect homework achievement.

The relationship between parent-involvement in student homework and homework achievement has been established by the findings of McDill et al. (1973), O'Neil (1975), Rodick et al. (1980), McKinney (1975) and Epstein (1985). This research on parent-involvement has revealed a strong positive relationship between parental interest and assistance with the student in home learning and student achievement.

The impact of the classroom teacher on homework achievement is found in research related to the type and structure of homework. The hypothesized relationship

between type of homework and student achievement is based on the findings of Peterson (1971) and Friesen (1975) who found higher achievement in students receiving preparatory homework. The hypothesized relationship between the structure of homework, student ability and homework achievement was suggested by the findings of Butcher (1975) and Hirsch et al. (1983) who found greater achievement in students of average and low ability who received distributed homework. Finally, the impact of the classroom teacher is found in research related to feedback on homework. The findings of Page (1958), Austin (1976) and Walberg (1984) revealed a positive effect of feedback on achievement.

Proposed Research and Hypotheses

In summary, researchers have identified ten variables important to a study of homework. To date, these ten variables have been studied in isolation from one another. A need therefore exists to examine these issues in an integrated manner.

On the basis of the proposed model, the following hypotheses will be tested by means of a series of multiple regressions and correlation.

- H1: A significant multiple correlation exists between the following variables and academic achievement as measured by reading and math scores on the California Achievement Test: homework achievement, student ability, time on homework, student homework behavior, parent-involvement in student homework, preparatory homework, distributed homework and amount of feedback on homework.
- H2: A significant correlation exists between student homework achievement and academic achievement. Students who achieve higher ratings in homework achievement will achieve higher scores in reading and math on the California Achievement Test.
- H3: Significant beta weights will be obtained for time on homework, student homework behavior and parent-involvement in student homework with student homework achievement. Students who spend more time doing homework, exhibit more positive homework behavior and experience more parent-involvement in their homework will achieve higher ratings on homework achievement.
- H4: For students of average and low ability, a significant positive correlation exists between the degree to which the structure of homework is distributed and student homework achievement. Students who do more distributed homework will achieve higher ratings on homework achievement.

- H5: A significant positive correlation exists between the degree of preparatory homework and homework achievement. Students who do more preparatory homework will achieve higher ratings on homework achievement.
- H6: A significant positive correlation exists between the amount of feedback students receive on homework and homework achievement. Students who receive more feedback on homework will achieve higher ratings on homework achievement.
- H7: A significant negative correlation exists between student grade level and parent-involvement in student homework. With increasing grade level there is a decrease in parent-involvement in student homework by virtue of a decrease in teacher communication with parents.

Chapter III

Methodology

Sample

The present study was conducted in a suburban, public school district with a white, middle-class, ethnically mixed population. Three distinct groups, i.e., parents, students and teachers comprised the study sample. Permission was received from the Assistant Superintendent of Schools to conduct the study within the district. A copy of the letter requesting permission to carry out the study can be found in Appendix A.

Parents. The parents participated in the initial phase of data collection. They consisted of the parents of the 236 third through sixth grade students in one of the district's elementary schools. A Parent Homework Questionnaire was distributed to this group. Among those receiving questionnaires were the parents of 52 third, 51 fourth, 65 fifth and 68 sixth grade students.

Students. The students participated in the second phase of data collection. The inclusion of students in the study was contingent on parent participation. The student population included youngsters who returned parent homework questionnaires. Among those students returning completed parent questionnaires were 44 third, 41 fourth, 47 fifth and 59 sixth grade students. These students, 191 in all, received and completed the Student Homework

Questionnaire. Also included in the sample were 112 students from a second elementary school in the district. These students were included to provide additional data for the examination of two variables of interest. The additional data on these students was collected through school records and the teacher homework questionnaire. This group of students did not complete the student homework questionnaire.

Teachers. Teachers participated in the third phase of data collection. Sixteen classroom teachers in grades three through six completed the Teacher Homework Questionnaire. This group included 5 third, 3 fourth, 5 fifth and 3 sixth grade teachers. The sample consisted of 11 teachers from the first school in which both parents and students participated and 5 teachers from the second school in which additional data was collected.

To summarize, the study sample consisted of 191 parents, 16 teachers and 191 students in the third through sixth grades. In addition, data was collected on 112 students in a second elementary school. These students did not participate directly in the study.

Instrumentation

To obtain descriptions of student, parent and teacher behavior relative to homework, three separate questionnaires were developed. A pilot study was conducted to insure that the homework questionnaires

tapped the variables of theoretical relevance to the present investigation. The pilot study was conducted in the Spring of 1986 at the school from which the sample for study was drawn. The pilot sample consisted of the three graduating sixth grade classes, their parents, and their teachers. A Parent Homework Questionnaire was distributed to the parents of the 75 graduating sixth-graders. A total of 51 questionnaires were returned. A student questionnaire was completed by each of the 51 students returning a completed parent questionnaire. Finally, the three sixth grade teachers completed the teacher questionnaire. A total of 51 students, 51 parents and three teachers responded to the student, parent and teacher questionnaires respectively. The development and testing of each questionnaire will be discussed.

A total of 51 valid homework questionnaires were obtained from the student population. The student questionnaire consisted of 25 items. Twenty-one questions were Likert scale items anchored by a "Never-Always" format. The remaining four questions were yes/no and fill-in-the blank items. Response means on the five-point Likert items ranged from a low of 1.73 to a high of 4.37. A principal components analysis was conducted. The first two components of the analysis accounted for 25% of the variance. Forty-nine percent of the variance was explained by the first five principal components.

The principal components analysis yielded a number of

variables that mapped onto the components of interest in the present investigation. These components included student behavior of administering self-consequences for homework performance, seeking social assistance when completing homework and structuring the homework environment. The principal components analysis also revealed a clustering of questions on two additional components, i.e., time spent on homework and difficulty encountered in the completion of homework assignments.

The Student Homework Questionnaire was modified based on the results of the principal components analysis. Fifteen of the 25 questions were maintained from the original questionnaire, 4 questions were modified, 9 questions were added and 6 questions were dropped. The decision to maintain or drop questions was based on the following criteria: (1) Does the item reveal a loading of .30 or higher on the principal components analysis?, (2) Does the item have a primary loading on one component? and (3) Does the item fit with the other items which load on the same component, i.e., does it make sense? Items were added as needed to gain further information on variables of theoretical relevance.

A total of 51 valid questionnaires were obtained from the parent population. The Parent Homework Questionnaire consisted of 26 items. The parent questionnaire contained 11 Likert items anchored by "Never-Always", 5 yes/no items, 4 multiple-choice and 6 fill-in-the-blank items.

Response means ranged from a low of 1.98 to a high of 4.10 on the five-point Likert scale items. A principal components analysis was conducted for the parent questionnaire. The first three components accounted for 29% of the variance. The principal components analysis yielded a number of variables that mapped onto the components of interest in the present investigation. These components included parent interest in and assistance with homework and parent-teacher communication relative to homework. A number of questions were included on the parent homework questionnaire as a manipulation check on student responses to the student questionnaire. These questions loaded on components concerned with student behavior of administering self-consequences for homework performance, seeking social assistance when completing homework, structuring the homework environment and meeting with difficulty or frustration in the completion of homework assignments.

The Parent Homework Questionnaire was modified based on the results of the principal components analysis. Twelve of the 26 questions were maintained from the original questionnaire, 3 questions were modified, 3 questions were added and 9 questions were dropped. The decision to maintain or drop questions followed the guidelines presented in the development of the student questionnaire: (1) Does the item reveal a loading of .30 or higher on the principal components analysis?, (2) Does

the item have a primary loading on one component? and (3) Does the item fit with the other items which load on the same component, i.e., does it make sense? Items were added as needed to gain further information on variables of theoretical interest.

A 16-item teacher homework questionnaire was developed and administered to the three sixth-grade teachers involved in the pilot study. The items on the teacher questionnaire were designed to gather information on three variables of theoretical interest. These variables included teacher behavior of involving parents in student homework, teacher behavior of providing feedback to students on homework accuracy, and teacher behavior of assigning homework of a drill or preparatory nature. The teacher questionnaire included a rating scale for student homework achievement. This rating form, a five-point Likert scale, provided teacher measures of the quality of homework completion for each student.

The small sample size of the teacher population as well as the high inter-item correlation on the teacher questionnaire precluded the calculation of a principal components analysis. The modification of this questionnaire followed different guidelines than employed in the revision of the student and parent questionnaires. Two guidelines were employed in the revision of the teacher questionnaire. First, items were added to or deleted from the questionnaire in an effort to align the

instrument more closely to the variables of theoretical interest. This task was accomplished through the addition to the questionnaire of 4 items. Two of these items concerned the structuring of homework assignments. Two additional questions were added to the domain of homework achievement to enable separate reporting of homework achievement in reading and math. Items deemed unrelated to the variables of interest were dropped. A 12-item teacher questionnaire resulted from these modifications.

The final student, parent and teacher questionnaires along with the cover letter for the parent questionnaire are presented in Appendix B. The student questionnaire consisted of 28 items. Items 1-17 were concerned with the topic of student behavior in the completion of homework. Within this domain, questions were included on student behavior of administering self-consequences (items 1-3) seeking social assistance (items 4-6), structuring the homework environment (items 7-14) and dealing with difficulties in the completion of homework assignments (items 15-17). The remaining items of the student instrument addressed the topics of parental-involvement (items 18-21), amount of feedback on homework (items 22-26) and amount of time spent doing homework (items 27-28).

A final modification of the student questionnaire was carried out to insure that future data would provide the most precise information possible. Toward this end the Never/Always format of the original five-point Likert

scale was changed to yield the following frequencies: 0-20%, 21-40%, 41-60%, 61-80% and 81-100%. A coefficient alpha was calculated to determine the reliability of the 28-item Student Homework Questionnaire. The calculation yielded a reliability of .71. A reliability of .66 was obtained for the 17-item student homework behavior subscale of the student questionnaire.

The final parent questionnaire consisted of 17 items. The questions in this instrument addressed the following variables of theoretical interest: frequency and quality of parent-teacher communication (items 1-3), amount of student homework time (item 4), student environmental structuring (items 5-10), student homework difficulties (items 11-13) and parent-involvement in student homework (items 14-17). Items 4-13 provided a manipulation check on student responses. A coefficient alpha was calculated to determine the reliability of the Parent Homework Questionnaire. This calculation yielded a reliability of .62. One subscale of the parent questionnaire addressed parental evaluation of student homework behavior. The reliability of this nine-item subscale was .77.

The final teacher questionnaire consisted of 12 items. These items addressed concerns related to homework feedback (items 1-3), the structuring of homework (items 4-5), type of homework (items 6-7), amount of homework assigned (item 8) and student achievement in reading and

math homework (items 9-12). A coefficient alpha was calculated to determine the reliability of the Teacher Homework Questionnaire. It yielded a reliability of .27 on this 12-item questionnaire. This low correlation was not of particular concern to the study results. The questionnaire was designed to provide data on a number of diverse variables and, therefore, it was not expected that the items would fit together well. A higher reliability could be obtained, however, by increasing the number of items in the questionnaire.

Procedure

The present study was conducted in the Spring of the 1986-87 academic year and involved three separate phases of data collection. Each phase of data collection will be described below.

Parent Data Collection. Data was collected from the parents of the third, fourth, fifth and sixth grade students by means of the Parent Homework Questionnaire. The questionnaires were distributed to the third through sixth grade students at individual meetings with each of the 11 classes involved in the study. The students received a brief description of the study. They were encouraged to deliver the questionnaires to their parents and return the completed forms to their classroom teachers. Students were informed that those who returned the completed parent questionnaires would receive a

Student Homework Questionnaire to complete in class.

A total of 235 parent questionnaires were distributed. The completed and returned questionnaires numbered 197, yielding a response rate of 84%. Six inaccurately completed questionnaires were eliminated from the study. A total of 191 Parent Homework Questionnaires were available for data analysis.

Student Data Collection. The returned parent questionnaires provided the consent needed for students to complete the Student Homework Questionnaire. The student questionnaires were completed on a class by class basis under the supervision of the present investigator. Approximately 75 minutes were required for data collection in each of the 11 third through sixth grade classes involved in the study.

Student data collection consisted of practice on the use of the Likert Rating Scale and completion of the Student Homework Questionnaire. All materials, i.e., the Likert Practice Sheet, the student homework questionnaire, the student answer sheet and pencils were distributed at the beginning of the session. Materials remained face down on desktops while the chalkboard was used to introduce students to the following percentage intervals of the Likert rating scale: 1 = 0-20%, 2 = 21-40%, 3 = 41-60%, 4 = 61-80% and 5 = 81-100%.

Practice in the use of the rating scale was provided. The Likert Practice Sheet, found in Appendix C,

contained 7 sample items pertinent to the experiences of students in grades three through six. Each sample was read aloud and the students were asked to circle the choice corresponding to their experience. After each item was completed, the class was asked to respond by a show of hands, "How many chose 1 ?, How many chose 2 ?, etc. Then the examiner requested individual students to explain their reasoning for selecting a 1,2,3,4 or 5. Other students were asked to indicate whether they agreed or disagreed with the reasoning behind the response. This procedure was followed with each of the seven practice items until the investigator was satisfied that students were clearly able to distinguish between the 1,2,3,4 and 5 of the Likert rating scale.

Completion of the Student Homework Questionnaire followed the practice on the use of the Likert scale. Items 27 and 28, the only questions not using a Likert format, were completed first. These two items asked students to consider the amount of time spent in math and non-math homework in an average week. The examiner demonstrated the calculation of these two sums on the chalkboard and circulated around the room to provide assistance as needed.

The remainder of the Student Homework Questionnaire was completed as the examiner read each item aloud. Each item was read twice and time was allotted for the recording of responses on the student answer sheet.

Teacher Data Collection. Data was collected from teachers on an individual basis. The examiner met with each of the 11 classroom teachers to discuss the completion of the Teacher Homework Questionnaire. The teachers were asked to read through the 12-item questionnaire and any questions which arose were addressed at that time. The teachers were requested to complete the questionnaire which included an individual rating of each student on the quality of homework completion. The eleven classroom teachers returned the completed questionnaires within a two week period.

The examiner met with with five additional teachers in a second elementary school within the district. Teachers at this school had been informed by the building principal of the nature of the study and were requested to attend a brief before school meeting. From a total of 12 third through sixth grade teachers, five teachers attended the meeting. This group consisted of two third grade teachers and one each from fourth, fifth and sixth grade.

Method of Data Analysis

Data relative to the ten variables of interest in the present investigation were obtained from the following six sources: The Test of Cognitive Skills, The California Achievement Test, school records, the Student Homework Questionnaire, the Parent Homework Questionnaire and the

Teacher Homework Questionnaire. Below are listed the ten variables of interest accompanied by the sources from which the data was obtained.

Student Ability. The Test of Cognitive Skills is an ability test designed to assess student's academic aptitude. TCS focuses on those cognitive abilities that are important in an educational program. TCS is divided into five levels. For purposes of the present study two levels were administered: Level 2 for grades 3, 4 and 5 and Level 3 for grade 6. Each level of TCS included four subtests: Sequences, Analogies, Memory and Verbal Reasoning. The test contained 160 items and required approximately 106 minutes to administer. It was administered during the week of May 4-8, 1987.

Student Grade Level. Data on student grade level was obtained from school records.

Teacher Communication. Data relative to amount of teacher communication with parents regarding student homework was obtained from the parent questionnaire (items 1-3). This information was gathered from the parent questionnaire rather than the teacher questionnaire in order that individual rather than group data could be obtained. The responses to these three Likert items on parent-teacher communication provided a measure of teacher communication (parent response to item 3 was converted to a five-point scale).

Structure of Homework. Data relative to the structure

of student homework assignments was obtained from the teacher questionnaire (items 4-5). Each question, for math and non-math respectively, required the teacher to calculate the percentage of assigned homework that followed a massed or distributed schedule. Homework was considered massed when the assignment related solely to the topic under study in class. Homework was considered distributed when material previously taught was interspersed with the day's assignment. Relative to the present study interest lay in the percentage of distributed homework assigned in math and non-math.

Feedback on Homework. Data relative to feedback on homework was obtained from the student questionnaire (items 22-26). Student responses to these five Likert items were summed to provide a measure of feedback on homework. Students were asked about the frequency with which their teachers find out if the homework is completed, check the homework and provide praise for homework done well. Students were also asked how often they find out how well they have done on math and non-math homework. Items 1-3 of the teacher questionnaire served as a manipulation check on this data.

Type of Homework. Data relative to type of homework was obtained from the teacher questionnaire (items 6-7). Teacher responses to items 6 and 7 provided a measure of the frequency with which three types of homework, practice, preparation and extension were assigned in both

math and non-math respectively. Each type of homework was defined by its stated purpose: 1) practice homework gave students an opportunity to reinforce newly acquired skills or apply recent learnings, 2) preparation assignments enabled students to obtain sufficient background to prepare for upcoming lessons or discussions and 3) extension assignments provided students with an opportunity to expand upon the learning begun in class. Relative to the present study interest lay in the percentage of preparatory homework assigned.

Parent-Involvement. Data relative to parent-involvement in student homework was obtained from the parent questionnaire (items 14-17). Responses to these four items were summed to provide a measure of parent-involvement in student homework (responses to item 17 were converted to a five-point scale to facilitate calculation of the total response). Parents were asked the frequency with which they asked if their child had homework, checked homework for completion and checked homework for accuracy. They also indicated the amount of time they assisted their child in math and non-math homework in an average week. Items 18-21 of the student questionnaire served as a manipulation check on this data.

Student Behavior. Data relative to student homework behavior was obtained from the student questionnaire (items 1-17). These items represented the following categories of student behavior: administration of self-

consequences for homework completion (items 1-3), social-assistance seeking in the completion of homework (items 4-6), structuring the homework environment (items 7-14) and dealing with trouble/frustration in the completion of homework (items 15-17). Items 14, 15, and 17 were reverse scored and responses to these 17 Likert items were then summed to provide a measure of student homework behavior. Data relative to the four subscales of the student questionnaire, i.e., administration of self-consequences, social-assistance seeking, environmental structuring and dealing with trouble/frustration were examined in post-hoc analysis. Data from the parent questionnaire (items 5-13) served as a manipulation check on student responses.

Time on Homework. Data relative to amount of time spent doing homework was obtained from the student questionnaire (items 27-28). Item 27 provided a measure of the average amount of weekly math homework and item 28 provided a measure of the average amount of weekly reading homework. Data from the parent questionnaire (item 4) served as a manipulation check on the student response.

Homework Achievement. Information relative to student achievement in homework was obtained from the teacher questionnaire (items 9-12). Items 9 and 11 provided individual measures of the frequency of student homework completion in math and reading respectively. This data was collected according to the following time frequencies: 1 = 0-20%, 2 = 21-40%, 3 = 41-60%, 4 = 61-80% and 5 = 81-

100% of the time. Items 10 and 12 provided a measure of the quality of completed homework in math and reading, respectively, according to the following scale: 1 = F, 2 = D, 3 = C, 4 = B and 5 = A. Responses to items 9 and 11 were summed to provide a total rating for student math homework and similarly responses to items 10 and 12 were summed to provide a total rating for student non-math homework.

Academic Achievement. The reading and math scale scores of the California Achievement Test provided a measure of student academic achievement in math and reading. This test was administered during the week of May 4-9, 1987, and thus provided a measure of academic growth for the entire school year.

Data collected from the six sources outlined above, i.e., the Test of Cognitive Skills, the California Achievement Test, school records, the Parent Homework Questionnaire, the Teacher Homework Questionnaire and the Student Homework Questionnaire were analyzed in the following manner. Descriptive statistics (means, modes, standard deviations and frequency distributions) were obtained. A multiple regression was calculated to test the relationship of all the variables of theoretical interest and academic achievement. Simple correlations among all the predictor variables and academic achievement were obtained. The seven hypotheses of the study were tested as follows. For Hypothesis 1, a multiple

regression was calculated. Simple correlations were calculated to test the remaining six hypotheses of the present investigation.¹

¹ Data processing was provided by Dr. Richard Evangelista

CHAPTER IV

RESULTS

Hypothesis Testing

This chapter presents the findings related to the testing of seven hypotheses. Multiple regression analysis was the statistical procedure used in the first analysis of the study. Simple correlation was the procedure used in the testing of the remaining six hypotheses. All analyses, t-tests and correlations used two-tailed tests. Each hypothesis was tested twice, first for achievement in math and second for achievement in reading. In effect, the results of 14 analyses will be discussed.

Table 1 presents the means, standard deviations and ranges of the predictor variables for CAT math and CAT reading respectively. There were eight independent variables: homework achievement, time on homework, student homework behavior, parent-involvement in homework, type of homework (preparatory), structure of homework (distributed), feedback on homework and student ability.

Hypothesis 1: Math. In the testing of Hypothesis 1, math scores of the California Achievement Test were regressed on the independent variables. A multiple regression was calculated twice. The first calculation included all of the predictor variables involved in the regression equation. The second calculation included only

Table 1

Means, Standard Deviations and Ranges for Predictor Variables of California Achievement Test Math and Reading.

Variable	Math			Reading		
	Mean	Standard Deviation	Range	Mean	Standard Deviation	Range
Homework Achievement	3.65	1.07	1-5	3.66	1.09	1-5
Time on Homework	47.41	48.56	0-340	134.29	149.39	0-900
Student Behavior	50.86	8.31	31-75	50.86	8.31	31-75
Parent-Involvement	14.23	3.92	4-20	14.48	3.90	4-20
% Preparatory Homework	6.05	12.69	0-40	29.27	14.02	0-50
% Distributed Homework	50.45	15.77	30-80	23.74	16.43	0-60
Feedback on Homework	14.37	2.86	6-20	14.18	2.89	6-20
Student Ability	110.49	14.38	60-141	110.49	14.38	60-141

variables that attained a statistically significant explained variance.

In the testing of Hypothesis 1 a significant multiple correlation was found ($R = .62$, $F(8, 182) = 14.18$, $p < .001$). Four variables were found to be significant predictors of CAT math: rating on homework, student ability, parent-involvement in homework and amount of preparatory homework. They accounted for 38% of the explained variance. Table 2 presents the findings of the multiple regression analysis.

Of the four significant predictor variables cited above, rating on homework was most predictive of CAT math. A significant relationship ($F(8, 182) = 22.03$, $p < .001$) was uncovered between rating on homework with CAT math.

Student ability was the second largest predictor of CAT math. A significant relationship ($F(8, 182) = 20.99$, $p < .001$) was discovered between ability and CAT math.

The third largest predictor of CAT math was parent-involvement in homework. A significant negative relationship ($F(8, 182) = 8.10$, $p < .01$) was uncovered between parent-involvement and CAT math.

The fourth largest predictor of CAT math was amount of preparatory homework. A significant relationship ($F(8, 182) = 4.42$, $p < .05$) was uncovered between amount of preparatory homework and CAT math.

Table 3 summarizes the results of multiple regression analysis for CAT math using variable entry dictated by the

Table 2

Significant Predictors of CAT Math Using Multiple Regression Analysis.

Variable	r	B	Beta	F
Homework Achievement	.49	12.11	.31	22.03***
Time on Homework	.11	.09	.10	2.71
Student Homework Behavior	-.08	-.28	-.06	.82
Parent-Involvement	-.27	-1.83	-.17	8.10**
% Preparatory Homework	.05	.50	.15	4.42*
% Distributed Homework	-.14	-.16	-.06	.98
Homework Feedback	.01	.31	.02	.10
Student Ability	.46	.96	.33	20.99***
Constant = 634.6414				

*** $p < .001$

** $p < .01$

* $p < .05$

Table 3

Significant Predictors of CAT Math Using Stepwise Multiple Regression Analysis.

Variable	¹ r	² R	B	Beta	F
Homework Achievement	.49	.24	12.25	.32	22.54***
Student Ability	.46	.31	.99	.34	23.04***
Parent-Involvement	-.27	.35	-1.80	-.12	7.83**
% Preparatory Homework	.05	.37	.49	.15	5.33*

Constant = 616.0656

*** $p < .001$

** $p < .01$

* $p < .05$

¹ Variables entered in the following order

explained variance. Again, a significant multiple correlation was found ($\underline{R} = .60$, $\underline{F}(4, 186) = 26.82$, $\underline{p} < .001$). This method of data entry revealed the same four variables to be predictive of CAT math. These four variables, i.e., rating on homework, student ability, parent-involvement in homework and amount of preparatory homework, accounted for 37% of the variance.

Of the four significant predictor variables cited above, rating on homework and student ability were most predictive of CAT math. A significant relationship ($\underline{F}(4, 186) = 22.54$, $\underline{p} < .001$) was uncovered between rating on homework with CAT math. Rating on homework contributed the largest amount of explained variance ($\underline{R}^2 = .24$) in CAT math.

Student ability was the second largest predictor of CAT math. A significant relationship ($\underline{F}(4, 186) = 23.04$, $\underline{p} < .001$) was discovered between student ability and CAT math. Student ability accounted for a .06 increase in \underline{R}^2 over rating on homework.

The third largest predictor of CAT math was parent-involvement in homework. A significant negative relationship ($\underline{F}(4, 186) = 7.83$, $\underline{p} < .01$) was uncovered between parent-involvement in homework and CAT math. Parent-involvement in homework accounted for a .04 increase in \underline{R}^2 over rating on homework and student ability.

The fourth largest predictor of CAT math was amount of preparatory homework. A significant relationship ($\underline{F}(4, 186) = 5.33$, $\underline{p} < .05$) was uncovered between amount of

preparatory homework and CAT math. Amount of preparatory homework accounted for a .02 increase in \underline{R}^2 over rating on homework, student ability and parent-involvement in homework.

Hypothesis 1: Reading. The testing of Hypothesis 1 also involved the regression of CAT reading on a number of predictor variables. A multiple regression was calculated twice. The first calculation included all of the predictor variables involved in the regression equation. The second calculation included only variables that attained a statistically significant explained variance.

Results of the first analysis are presented in Table 4. A significant multiple correlation was found ($\underline{R} = .62$, $F(8,182) = 14.54$, $p < .001$). Three variables were found to be predictive of CAT reading. They were student ability ($F(8, 182) = 30.76$, $p < .001$), rating on homework ($F(8, 182) = 14.68$, $p < .001$) and parent-involvement in homework ($F(8, 182) = 5.25$, $p < .05$). These three variables accounted for 39% of the explained variance.

Hypothesis 1 was again tested with variable entry dictated by the explained variance. Results of this analysis are presented in Table 5. A significant multiple correlation was found ($\underline{R} = .61$, $F(4, 186) = 26.97$, $p < .001$). Four variables were found to be significant predictors of CAT reading. These variables, student ability, rating on homework, amount of preparatory homework and parent-involvement in homework

Table 4

Significant Predictors of CAT Reading Using Multiple Regression Analysis.

Variable	r	B	Beta	F
Homework Achievement	.45	8.53	.25	14.68***
Time on Homework	.10	.03	.11	3.07
Student Homework Behavior	-.10	-.38	-.08	1.93
Parent-Involvement	-.25	-1.29	-.14	5.25*
% Preparatory Homework	.15	.35	.14	2.80
% Distributed Homework	-.18	-.24	-.11	1.72
Homework Feedback	.02	.95	.07	1.12
Student Ability	.48	.97	.38	30.76***
Constant = 606.7301				

*** $p < .001$

* $p < .05$

Table 5

Significant Predictors of CAT Reading Using Stepwise Multiple Regression Analysis.

Variable	1 r	2 R	B	Beta	F
Student Ability	.48	.23	.99	.39	33.07***
Homework achievement	.45	.30	8.55	.25	14.67***
% Preparatory Homework	.15	.35	.53	.20	11.45**
Parent-Involvement	-.25	.37	-1.40	-.15	6.23*

Constant = 593.2548

*** $p < .001$

** $p < .01$

* $p < .05$

1

Variables entered in the following order

accounted for 37% of the explained variance.

Of the four predictor variables cited above, student ability was most predictive of CAT reading. A significant relationship ($F(4, 186) = 33.07, p < .001$) was uncovered between student ability and CAT reading. Student ability contributed the largest amount of explained variance ($R^2 = .23$) in CAT reading.

Rating on homework was the second largest predictor of CAT reading. A significant relationship ($F(4, 186) = 14.67, p < .001$) was discovered between rating on homework and CAT reading. Rating on homework accounted for a .07 increase in R^2 over student ability.

The third largest predictor of CAT reading was amount of preparatory homework. A significant relationship ($F(4, 186) = 11.45, p < .01$) was uncovered between amount of preparatory homework and CAT reading. Amount of preparatory homework accounted for a .05 increase in R^2 over student ability and rating on homework.

The fourth largest predictor of CAT reading was parent-involvement in homework. A significant negative relationship ($F(4, 186) = 6.23, p < .05$) was uncovered between parent-involvement and CAT reading. Parent-involvement in homework accounted for a .02 increase in R^2 over student ability, rating on homework and amount of preparatory homework.

In summary, 4 variables were significant predictors of CAT reading. They were student ability, homework achievement, percent preparatory homework and parent-

involvement. These same four variables were also predictive of CAT math.

Hypothesis 2: Math. Hypothesis 2 predicted the existence of a significant correlation between student homework achievement and academic achievement. The results indicate that for the 191 subjects sampled, a significant correlation was uncovered ($r = .49$) between rating on math homework and CAT math. The correlation is significant at the .001 level ($t = 7.78$). Student ratings on math homework ranged from a low of 1.0 (F) to a high of 5.0 (A) while scores on CAT math ranged from a low of 585 to a high of 863 with a mean of 747.75 (standard deviation = 41.45). An analysis of variance determined that a statistically significant difference on CAT math scores was obtained for students at different homework ratings ($F(4, 186) = 17.49, p < .001$). A follow-up t-test was conducted using a Bonferroni correction to control for Type I errors caused by 10 pairwise comparisons. Values of t greater than 2.85 were considered to be significant at the .05 level. It was determined that students rated a 5(A) in math homework achieved significantly higher CAT math scores than students rated 4(B) ($t = 4.8, p < .001$), or students rated 3(C) ($t = 5.1, p < .001$), or 2(D) ($t = 7.6, p < .001$) or 1(F) ($t = 4.7, p < .001$). Students achieving a homework rating of 2(D) scored significantly lower in CAT math scores than students rated 3(C) and 4(B) ($t = 3.5, p < .001$ and $t = 4.3, p < .001$, respectively) in

math homework.

Hypothesis 2: Reading. Data for Hypothesis 2 were analyzed for reading. For the same subject sample, a significant correlation was uncovered ($r = .45$) between rating on reading homework and CAT reading. The correlation was significant at the .001 level ($t = 7.02$). Student ratings on reading homework ranged from a low of 1(F) to a high of 5(A) while scores on CAT reading ranged from a low of 565 to a high of 810 with a mean of 729.48 (standard deviation = 36.83). An analysis of variance determined that a statistically significant difference on CAT reading scores was obtained for students at different homework ratings ($F(4, 186) = 12.32, p < .001$). It was determined that students rated 5(A) in reading homework achieved significantly higher CAT reading scores than students rated 4(B) ($t = 2.9, p < .01$), or students rated 3(C) ($t = 4.9, p < .001$) or 2(D) ($t = 4.7, p < .001$) or 1(F) ($t = 5.4, p = .001$). Students achieving a homework rating of 4(B) scored significantly higher in CAT reading than students rated 2 (D) ($t = 2.8, p < .01$) and students rated 1(F) ($t = 4.0, p < .001$) in reading homework.

In summary, a significant positive correlation was uncovered between homework rating in reading and scores in CAT reading. This relationship was also found between homework rating in math and CAT math.

Hypothesis 3: Math. Hypothesis 3 predicted that students who spend more time doing homework, exhibit more positive homework behavior and experience more parent-

involvement in their homework will achieve higher ratings on homework.

For the 191 subjects sampled, no significant correlation was uncovered between time spent doing homework ($\underline{r} = .03$, $\underline{t} = .44$), positive homework behavior ($\underline{r} = -.02$, $\underline{t} = .31$) or parent-involvement in homework ($\underline{r} = -.12$, $\underline{t} = 1.69$) with rating on math homework.

The data indicate that while there was a distribution on math homework from 1(F) to 5(A) and students reported spending between 0 and 340 minutes on math homework weekly, most students devoted less than 100 minutes to weekly math homework assignments (mean = 47.41, standard deviation = 48.56). An analysis of variance revealed no significant difference in time spent on weekly math assignments for varying levels of homework achievement ($F(4, 186) = 0.12$, $p > .05$). Data relative to time spent on weekly math homework was obtained from item 27 of the Student Homework Questionnaire.

Although student reports of time spent on homework did not yield a significant correlation with homework achievement in math, an analysis of teacher report of amount of assigned math homework was undertaken. The analysis of this data, obtained from item 8 of the teacher questionnaire, revealed a significant positive effect ($\underline{r} = .14$, $p < .05$) of amount of assigned homework on rating in math.

No significant trend was evident in the relationship

between student reports of positive homework behavior and achievement in math homework. Students reported positive homework behavior ranging from a low of 31 to a high of 75 (potential low = 17, potential high = 85) with a mean of 50.86 and a standard deviation of 8.31. An analysis of variance revealed no significant difference in positive homework behavior for differing levels of homework rating ($F(4, 186) = 0.66, p >.05$).

Four subscales comprised the category of positive student homework behavior. These subscales were (1) administering self-consequences, (2) seeking social assistance, (3) environmental structuring and (4) dealing with trouble/ frustration in the completion of homework. The average correlation of each subscale with math homework achievement was computed. No significant correlations were obtained.

Further analysis was conducted in which individual items of the student homework behavior scale were correlated with achievement. Within the 17-item student behavior scale, five items were significant predictors of math homework rating. They were item 5 ($r = -.14, p <.05$), a seeking social assistance question, items 11 ($r = -.20, p <.01$) and 14 ($r = .30, p <.001$), environmental structuring questions, and items 15 ($r = .31, p <.001$) and 17 ($r = .14, p <.05$), trouble/frustration questions. While item 11 did not correlate with the other items, the remaining four items were generally well intercorrelated. In addition, item 14, an environmental structuring item

was more correlated with the trouble/frustration items than with the remaining environmental structuring items indicating that, perhaps, it too was measuring trouble/frustration. Table 6 presents the correlations of the 17 student homework behavior items with homework rating in math, reading, CAT math and CAT reading.

Although student reports of positive homework behavior did not reveal a significant effect on achievement, analysis of parent responses to this variable proved more predictive of student homework rating. Items 5-13 of the parent questionnaire provided a measure of positive student homework behaviors. The average correlation of these items with student rating in math was $.20$, $p < .01$). Item 5 provided a measure of student social assistance seeking and was predictive of math homework rating ($r = .19$, $p < .01$). Items 6-10 provided a measure of environmental structuring and were predictive of math homework rating ($r = .16$, $p < .05$) and items 11-13 provided a measure of trouble/frustration and correlated with math rating ($r = .27$, $p < .001$). As Table 7 indicates these items, especially those of trouble/frustration, were particularly predictive of student achievement.

Lastly, as indicated, Hypothesis 3 revealed no significant relationship between parent-involvement and homework rating in math as determined by items 14-17 of the parent questionnaire. Parent reports of help with math homework ranged from a low of 4 to a high of 20 (potential

Table 6

Intercorrelations of Student Homework Behavior With Major Dependent Variables.

	Item #	Math Rating	Reading Rating	CAT Math	CAT Reading
Self- Consequences	1	-.03	-.05	-.18*	-.28***
	2	-.03	-.12	-.21**	-.25***
	3	.02	-.04	-.12	-.23**
Social Assistance	4	-.01	.02	-.02	-.04
	5	-.14*	-.11	-.07	-.03
	6	-.01	-.02	.11	.05
Environmental Structuring	7	-.13	-.13	-.10	-.08
	8	.04	.09	.05	.06
	9	-.11	-.10	-.02	-.02
	10	-.09	-.04	-.03	.05
	11	-.20**	-.19**	-.13	-.09
	12	-.06	-.06	-.27***	-.24***
	13	.03	.07	.11	.10
	14	.30***	.27***	.14*	.23**
Trouble/ Frustration	15	.31***	.32***	.26***	.26***
	16	-.09	-.07	-.18*	-.24**
	17	.14*	.21**	.14*	.10

*** $p < .001$

** $p < .01$

* $p < .05$

Table 7

Correlations of Parent Report of Student Homework Behavior
With Major Dependent Variables.

	Item #	Math Rating	Reading Rating	CAT Math	CAT Reading
Social Assistance	5	.19**	.23**	.13	.11
	6	.10	.13	-.00	.03
	7	.10	.12	-.04	-.00
Environmental Structuring	8	.18*	.14*	.14*	.13
	9	.21**	.25***	.20**	.19**
	10	.20**	.27***	.23**	.22**
	11	.22**	.30***	.35***	.25***
Trouble/ Frustration	12	.38***	.46***	.28***	.21**
	13	.22**	.26***	.20**	.23**

*** $p < .001$

** $p < .01$

* $p < .05$

low = 4, potential high = 20) with a mean of 14.23 and a standard deviation of 3.92. An analysis of variance indicated no significant difference in amount of parent-involvement for varying levels of math achievement ($F(4, 186) = 1.21, p > .05$). The direct measure of time spent in helping with weekly math assignments (item 17) revealed a significant negative correlation with math homework rating ($r = -.18, p < .05$)

Student reports of amount of parent-involvement in math homework served as a manipulation check on parent responses to this variable. Items 18-21 of the student questionnaire provided a measure of parent-involvement. The average correlation of these four items with math homework rating was computed and a significant negative relationship was uncovered ($r = -.14, p < .05$). Three of these four items were predictive of homework rating in math. They were items 19 ($r = -.17, p < .05$), 20 ($r = -.25, p < .001$) and item 21 ($r = -.16, p < .05$). Table 8 presents data relative to this analysis.

Hypothesis 3: Reading. For the third analysis data were also analyzed to determine the relationship between the same three variables, i.e., homework time, positive homework behavior and parent-involvement, with student homework rating in reading. Relative to rating of students on reading homework, no significant relationship between time spent doing homework ($r = .01, t = .12$) or positive student homework behavior ($r = -.01, t = .08$) was revealed. However, a significant negative relationship

Table 8

Correlations of Student Report of Parent-Involvement With Major Dependent Variables.

Item #	Math Rating	Reading Rating	CAT Math	CAT Reading
18	.01	.05	-.00	-.05
19	-.17*	-.13	-.19**	-.18*
20	-.25***	-.23**	-.26***	-.22***
21	-.16*	-.17*	-.34***	-.23***

*** $p < .001$

** $p < .01$

* $p < .05$

was uncovered between parent-involvement in homework and homework achievement in reading ($r = -.15$, $t = 2.05$). These results were significant beyond the .05 level.

Relative to time spent doing homework, derived from item 28 of the student questionnaire, students reported spending between 0 and 900 minutes on reading homework each week with mean homework times averaging 134.29 minutes (standard deviation = 149.39). Student grades in reading homework ranged from a low of 1(F) to a high of 5(A). An analysis of variance indicated no significant difference in time spent in weekly homework for varying levels of homework achievement in reading ($F(4, 186) = 1.15$, $p > .05$).

Although student reports of amount of time devoted to weekly reading homework did not reveal a significant correlation with homework achievement in reading an analysis of teacher reports of amount of assigned reading homework approached significance with achievement in reading homework ($r = .14$, $p = .06$). This data was derived from item 8 of the Teacher Homework Questionnaire.

The relationship between student use of positive homework behavior and achievement in reading homework achievement was found to be nonsignificant. As previously reported in relation to math achievement, students displayed positive homework behavior ranging from a low of 31 to a high of 75 (potential low = 17, potential high = 85) with a mean of 50.86 and a standard deviation of

8.31. Again, students receiving a rating of 1(F) on reading homework reported no positive homework behavior below a rating of 40 while students receiving higher homework ratings did report scores lower than 40 in the category of positive homework behavior. An analysis of variance indicated no significant difference in positive homework behavior for differing levels of reading achievement ($F(4, 186) = 0.80, p > .05$).

As indicated in the analysis of math homework achievement, the average correlation of each subscale of student homework behavior (administering self-consequences, seeking social assistance, environmental structuring and dealing with trouble/frustration) with homework achievement in reading was calculated. For three of the four subscales a nonsignificant relationship was found. A significant correlation, however, was found between dealing with trouble/frustration ($r = .15, p < .05$) and homework achievement in reading. Two of the three items in this subscale were significantly correlated with homework rating in reading. They were item 15 ($r = .32, p < .001$) and item 17 ($r = .21, p < .01$). In addition, items 11 and 14, both environmental structuring items, were significantly predictive of homework achievement in reading ($r = -.19, p < .01$ and $r = .27, p < .001$, respectively).

Although student reports of positive homework behavior did not reveal a significant effect on achievement, analysis of parent responses to this variable provided more

positive results. Items 5-13 of the parent questionnaire provided a measure of positive student behavior. These items yielded an average correlation of .24, $p < .001$) with homework achievement in reading. Item 5 provided a measure of student social assistance seeking and was predictive of reading homework rating ($r = .23$, $p < .01$). Items 6-10 provided a measure of environmental structuring and were predictive of reading homework ($r = .18$, $p < .05$) and items 11-13 provided a measure of trouble/frustration and correlated with reading rating ($r = .34$, $p < .001$). As previously indicated, these item correlations are presented in Table 7.

A significant negative relationship was uncovered between parent-involvement in homework and student homework achievement in reading ($r = -.15$, $p < .05$) as measured by items 14-17 of the parent questionnaire. Parent-involvement ranged from a low of 4 to a high of 20 (potential low = 4, potential high = 20) with a mean of 14.48 and a standard deviation of 3.90. Student homework ratings ranged between 1(F) and 5(A). An analysis of variance revealed no significant difference in amount of parent-involvement for varying levels of homework rating ($F(4, 186) = 1.38$, $p > .05$). The direct measure of amount of parent time spent helping with weekly reading assignments (item 17) revealed a significant negative correlation with reading homework rating ($r = -.23$, $p < .01$).

Student reports of amount of parent-involvement served as a manipulation check on parent responses to this variable. Again, items 18-21 of the student questionnaire provided a measure of parent-involvement. The average correlation of these four items with reading homework rating was computed yielding nonsignificant findings. Two questions, items 20 and 21, were predictive of homework rating in reading ($r = -.23$, $p < .001$ and $r = -.17$, $p < .05$), respectively. As indicated, Table 8 presents the correlations of student reports of amount of parent-involvement with the major dependent variables of the study.

In summary, no significant relationship between time on homework or student homework behavior with homework achievement in reading was found. However, teacher report of the amount of assigned homework approached significance with reading achievement, and parent report of positive student behavior correlated with reading achievement. A significant negative relationship was uncovered between parent-involvement and homework achievement in reading.

These findings were similar to those uncovered in relation to homework achievement in math. No significant correlation between time on homework and student homework behavior was found. Teacher report of amount of assigned homework correlated significantly with math achievement and parent report of positive student homework behavior correlated with math achievement. The relationship between parent-involvement and homework

achievement was negative but not significant.

Hypothesis 4: Math. Hypothesis 4 predicted that, for students of average and low ability, a significant correlation exists between the degree to which the structure of homework is distributed and student homework achievement.

The results of the study indicate that, for the 16 classes sampled ($N = 189$, I.Q. < 115) no significant relationship was uncovered for the students between percent of distributed math homework and math homework achievement ($r = -.09$, $t = 1.17$). The 16 teacher respondents reported giving math homework that ranged from totally non-distributed (massed) to 80% distributed. The mean reported distribution was 35.81% with a standard deviation of 24.08.

Hypothesis 4: Reading. The results of the study also indicate that, for the same 16 classes sampled ($N = 189$, I.Q. < 115) no significant relationship was uncovered between percent distributed reading homework and reading homework achievement ($r = .12$, $t = 1.70$). The 16 teacher respondents reported giving reading homework that ranged from totally non-distributed (massed) to 60% distributed. The mean reported distribution was 22.32% with a standard deviation of 18.59.

In summary, the findings for structure of homework with achievement in reading were similar to those for structure of homework with achievement in math. In

neither case was a significant relationship uncovered between the structure of homework and the homework achievement of students of average and low ability.

Hypothesis 5: Math. Hypothesis 5 predicted that students who do more preparatory homework will achieve a higher rating on homework achievement. The results of the study indicate that for the 16 classes sampled ($N = 309$), no significant correlation was found between percentage of preparatory homework and student achievement in math homework ($r = .01$, $t = 0.11$). Teachers reported that math homework ranged between totally non-preparatory to 40% preparatory with a mean preparatory rate of 6.31% and a standard deviation of 12.46. The relatively modest amount of preparatory homework assigned in math may have accounted for the lack of a trend in the data.

Hypothesis 5: Reading. For the fifth analysis data were also analyzed in relationship to reading homework achievement. The results of the study indicate that for the 16 classes sampled ($N = 309$) no significant relationship was uncovered between amount of preparatory reading homework and student homework achievement ($r = .03$, $t = .45$). Teachers reported assigning a mean of 22.84% preparatory homework in reading (standard deviation = 15.98). This mean percentage ranged from a low of zero for classes in which no preparatory homework was assigned to those in which a maximum of half the assigned homework was preparatory in nature.

In summary, no significant relationship was uncovered

between percent of preparatory homework and homework achievement in reading. Similar findings were reported relative to homework achievement in math.

Hypothesis 6: Math. Hypothesis 6 predicted that students who receive more feedback on homework will achieve higher ratings on homework. No significant relationship was found between amount of feedback and homework achievement in math ($\underline{r} = .17$, $\underline{t} = 0.23$). Student report of feedback ranged from a low of 6 to a high of 20 (potential low = 4, potential high = 20) with a mean of 14.37 and a standard deviation of 2.86. Student homework grades ranged between 1(F) and 5(A). An analysis of variance revealed no significant difference in frequency of feedback for differing levels of homework achievement ($\underline{F}(4, 186) = 1.49$, $\underline{p} > .05$).

Four items on the Student Homework Questionnaire addressed the topic of homework feedback in math (items 22-25). None was predictive of math homework rating. Two items (23 and 25) dealing with having the homework checked and finding out homework results were positively correlated with performance in CAT math ($\underline{r} = .15$, $\underline{p} < .05$ and $\underline{r} = .30$, $\underline{p} < .001$, respectively) and item 24 was negatively associated with CAT math achievement ($\underline{r} = -.41$, $\underline{p} < .001$).

Teacher reports of the amount of feedback provided students served as a manipulation check on student response to this variable. Items 1-3 of the teacher

questionnaire provided a measure of teacher feedback. The average correlation of these three items with math homework rating was computed and yielded nonsignificant findings.

Hypothesis 6: Reading. For the sixth analysis, data examined for reading achievement yielded similar results. No significant relationship was found between amount of feedback and homework achievement in reading. Students reported a feedback frequency ranging between 6 and 20 with a mean of 14.18 and a standard deviation of 2.89. Although results of hypothesis testing were not significant, an analysis of variance determined that a statistically significant difference in amount of feedback was obtained for differing levels of homework achievement ($F(4, 186) = 3.17, p < .05$). A follow-up t-test was conducted. It was determined that students receiving homework grades of 1(F) reported significantly more feedback than students achieving homework ratings of 3(C) ($t = 3.02, p < .01$) and students achieving homework ratings of 4(B) ($t = 2.90, p < .01$).

Four items on the Student Homework Questionnaire addressed the topic of homework feedback in reading (items 22-24 and 26). None was positively correlated with homework achievement. Item 24 was negatively correlated with homework achievement. Two items (23 and 26) dealing with having the homework checked and finding out the results of homework were positively correlated with performance in CAT reading ($r = .16, p < .05$ and $r = .17, p$

<.05, respectively) and item 24 was negatively associated with achievement in CAT reading ($\underline{r} = -.32$, $\underline{p} < .001$).

Items 1-3 of the Teacher Homework Questionnaire also served as a check on student responses to the amount of feedback received on reading homework. While the average correlation of these three items with rating in reading homework was not significant these three items were highly intercorrelated, and item 1 was significantly positively correlated with homework achievement ($\underline{r} = .14$, $\underline{p} < .05$)

In summary, the hypothesis that students who receive more feedback on homework will achieve higher ratings on reading homework was not supported. These findings parallel those uncovered between feedback and rating on math homework.

Hypothesis 7. Hypothesis 7 predicted that with increasing grade level there is a decrease in parent-involvement in student homework. The results of the study indicated that for the 191 students sampled, a significant negative relationship was found between parent-involvement in math homework and student grade level ($\underline{r} = -.33$, $\underline{t} = 4.80$, standard deviation = 3.91) and parent-involvement in reading homework and student grade level ($\underline{r} = -.33$, $\underline{t} = 4.72$, standard deviation = 3.89). Each of these findings was significant beyond the .001 level.

No significant relationship was found between the number of parent-teacher communications and student grade level ($\underline{r} = -.13$, $\underline{t} = 1.74$). The study results indicate

that the 172 parent respondents experienced a mean of 2.92 communications during the school year relative to their children's academic progress (standard deviation = 3.46). The actual number of communications ranged from a low of 0 to a high of 40.

Analysis was conducted of the relationship between the number of parent-teacher communications initiated by the teacher and student grade level. Results of this analysis yielded nonsignificant findings ($r = -.11$, $t = 1.50$). The 179 parent respondents indicated that a mean of 1.51 communications were initiated by the classroom teacher with a standard deviation of 1.88. This average ranged from a low of 0 to a high of 20.

Finally, analysis was conducted of the relationship between the number of homework suggestions offered by the teacher in the course of the school year and student grade level. As predicted, a significant negative correlation was uncovered between number of teacher suggestions and grade level ($r = -.19$, $t = 2.55$). This finding was significant beyond the .05 level. The 179 parental respondents reported that teachers offered an average of 1.24 suggestions (standard deviation = 1.61) on ways to help with homework. This average ranged from a low of 0 to a high of 10 suggestions.

In summary, student grade level was significantly negatively correlated with parent-involvement in student homework, i.e., with increasing grade level parents reported less involvement in their children's homework.

This increase in grade level was not accompanied by a decrease in the number of teacher-parent communications but by a decrease in the number of suggestions given to parents on ways to help with homework.

Post Hoc Analyses

Analysis by Grade Level. Table 9 presents the intercorrelations of the major variables of the study for math and reading respectively. As is evident, student grade level is significantly positively correlated with a number of the major variables of the study. Of particular interest for the present investigation are the correlations of grade level with CAT math ($r = .54$, $p < .001$), CAT reading ($r = .49$, $p < .001$), and student ability ($r = -.16$, $p < .05$). Further analysis was undertaken to determine the effect of grade level on each of these variables.

An analysis of variance was conducted using each of these variables as the dependent measure. The analysis of variance determined that a statistically significant difference on CAT math scores was obtained for students at differing grade levels ($F(3, 187) = 26.01$, $p < .001$). A follow-up t-test using a Bonferroni correction for 6 pairwise comparisons (2.67) determined that students in grade 3 scored significantly lower on CAT math than did students in grade 4 ($t = 3.1$, $p < .01$), grade 5 ($t = 5.9$, $p < .001$) and grade 6 ($t = 8.4$, $p < .001$) and students in

Table 9

Intercorrelations of Homework Variables: Mathematics and Reading.N = 191

	CAT	Rating	Abil	Time	SHB	Grade	TCP	P-I	Prep	Dist
Homework Rating	.49*	.45*								
Student Ability	.47*	.47*								
	.48*	.46*								
Time on Homework	.11	.03	.10							
	.10	.01	-.10							
Student Homework Behavior	-.08	-.02	.02	.10						
	-.10	-.01	.02	.06						
Student Grade Level	.54*	.15*	-.16*	-.10	-.25*					
	.49*	.20*	-.16*	.18*	-.25*					
Teacher-Parent Communication	-.15*	-.20*	-.14	-.01	.00	-.13				
	.14	-.20*	-.14	-.01	.00	-.13				
Parent-Involve-ment	-.27*	-.12	-.08	.02	.05	-.33*	.18*			
	-.25*	-.15*	-.11	-.06	.08	-.32*	.20*			
Percent Preparatory Homework	.05	-.06	-.35*	-.23*	-.19*	-.48*	-.06	-.20*		
	.15*	.02	-.19*	.13	-.15*	.58*	-.07	-.09		
Percent Distributed Homework	-.14	-.07	-.02	-.15*	.06	.03	-.19*	-.01	-.22*	
	-.18*	-.05	.07	.00	.17*	-.48*	.00	.12	-.66*	
Feedback	.01	.02	.23*	.16*	.32*	-.27*	.12	.12	-.43*	.08
	.02	.00	.20*	.10	.30*	-.30*	.10	.11	-.40*	.46*

* $p < .05$

grade 6 scored significantly higher on CAT math than did students in grade 4 ($\underline{t} = 4.9, p < .001$).

An analysis of variance also revealed a statistically significant difference on CAT reading scores for students at differing grade levels ($\underline{F}(3, 187) = 21.4, p < .001$). A follow-up t-test determined that students in grade 6 scored significantly higher on CAT reading than did students in grade 3 ($\underline{t} = 7.2, p < .001$) grade 4 ($\underline{t} = 6.3, p < .001$) and grade 5 ($\underline{t} = 4.1, p < .001$). Students in grade 3 scored significantly lower on CAT reading than did students in grade 5 ($\underline{t} = 3.0, p < .01$).

As indicated, a scanning of the intercorrelation matrix revealed an unexpected and significant negative correlation of student grade level with student ability ($\underline{r} = -.16, p < .05$). To determine whether this finding might explain the lack of support for a number of hypothesized relationships, an analysis of variance was conducted of the effect of student ability at differing grade levels. No significant effect was obtained ($\underline{F}(3, 185) = .13, p > .05$)

In summary, achievement in CAT math and CAT reading appears to be an increasing function of grade level. Differences in student ability do not appear to be a function of grade level.

Analysis by Class. To further understand the source of the correlation of student grade level with CAT math an analysis of variance was conducted to determine whether

scores on CAT math differed among classes. The analysis of variance revealed that a statistically significant difference in CAT math was obtained between classes ($F(10, 180) = 14.75, p < .001$). A follow-up t-test was conducted using a Bonferroni correction to control for Type I errors wherein t-values greater than 3.38 were considered significant for the .05 level. These values were compared for classes in those grades in which a significant effect of grade on CAT math had been found. As noted above, students in grade 3 scored significantly lower on CAT math than did students in each of the other grades and students in grade 6 scored significantly higher on CAT math than did students in grade 4. An analysis of t-test results revealed no significant difference in CAT math scores for grade 3 classes. Similarly, no significant difference was uncovered in t-test scores for grade 4 classes.

To further determine the source of the correlation of student grade level with CAT reading an analysis of variance was conducted. The analysis revealed a statistically significant difference in CAT reading between classes ($F(10, 180) = 10.28, p < .001$). A follow-up t-test using the Bonferroni correction was conducted. Values were compared for those grades in which a significant effect of CAT reading had been found. As noted above, students in grade 6 scored significantly higher on CAT reading than did students in each of the other grades and students in grade 3 scored significantly lower in CAT reading than did students in grade 5. An

analysis of t-test results revealed no significant difference in CAT reading scores for grade 6 classes. Similarly, no significant difference was uncovered in t-test scores for grade 3 classes.

In summary, achievement in CAT math and CAT reading appears to be a function of differences in grade level, not differences between classes.

Analysis by Student Ability. Due to the substantial correlation of student ability with the major variables of the study, data were again analyzed according to student ability as measured by the Test of Cognitive Skills. This analysis was conducted with two goals in mind: (1) to determine the extent to which supported hypotheses held across ability groups and (2) to determine whether hypotheses unsupported for the entire 191 sample might obtain for different ability groups.

Data were analyzed by examining the responses of the entire sample (ability range 60-141), presented in Table 9, the average sample (ability range 85-114) presented in Table 10 and the above average sample (ability range 115-141) presented in Table 11. Data were not analyzed separately for the below average sample which contained only 8 subjects. However, by comparing data of the average and above average sample, the effect of the below average sample on the results could be obtained. The entire sample on which this post hoc analysis was conducted consisted of 191 students in the entire sample,

Table 10

Intercorrelations of Homework Variables for Average Ability
Students: Mathematics and Reading.

N = 112

	Ach	Rating	Abil	Time	SHB	Grade	TCP	P-I	Prep	Dist
Homework Rating	.42*	.38*								
Student Ability	.19	.25*	.24*							
Time on Homework	.09	-.02	.02							
Student Homework Behavior	.17	.00	-.12							
Student Grade Level	-.16	-.02	-.06	.10						
	-.07	.06	-.06	.05						
Teacher-Parent Communication	.69*	.27*	-.15	-.14	-.19					
	.61*	.27*	-.15	.20*	-.19					
Parent-Involve-ment	-.08	-.22*	-.02	.00	.03	.14				
	-.08	-.19	-.02	.01	.03	-.14				
Percent Preparatory Homework	-.29*	-.13	.00	.09	.08	-.44*	.19			
	-.24*	-.14	-.02	-.19	.11	-.41*	.20*			
Percent Distributed Homework	.27*	.16	-.09	-.28*	-.22*	.58*	-.15	-.36*		
	.20*	.07	-.28*	.18	-.22*	.68*	-.06	-.25*		
Feedback	-.20*	.03	-.07	-.05	.11	-.06	-.23*	.05	-.26*	
	-.26*	-.07	.08	.01	.24*	-.59*	-.03	.24*	-.69*	
	-.23*	-.20*	-.02	.12	.34*	-.32*	.19	.16	-.47*	.18
	-.13	-.15	-.04	.08	.33*	-.35*	.16	.17	-.41*	.55*

* p < .05

Table 11

Intercorrelations of Homework Variables for Above-Average Ability Students: Mathematics and Reading.

N = 71

	Ach	Rating	Abil	Time	SHB	Grade	TCP	P-I	Prep	Dist
Homework Rating	.45*	.37*								
Student Ability	.21	.40*								
	.30*	.39*								
Time on Homework	.06	.03	.04							
	.14	.07	-.04							
Student Homework Behavior	.02	-.07	.13	.12						
	-.16	-.13	.13	.02						
Student Grade Level	.68*	.19	-.02	.01	-.34*					
	.57*	.29*	-.02	.17	-.34*					
Teacher-Parent Communication	-.25*	-.01	.10	-.01	-.18	-.25*				
	-.04	-.08	.10	-.08	-.18	-.25*				
Parent-Involve-ment	-.33*	-.14	-.20	.06	.00	-.19	.17			
	-.20	-.15	-.20	.10	.03	-.23	.23			
Percent Preparatory Homework	.05	-.04	-.07	-.07	-.15	.23	-.11	.00		
	.23	.06	-.08	.06	-.05	.38*	-.17	.14		
Percent Distributed Homework	-.09	-.26*	-.13	-.30*	-.03	.17	-.12	-.06	.00	
	-.15	-.17	.10	-.11	.00	-.29*	.27*	-.05	-.66*	
Feedback	.11	.11	.13	.19	-.10	-.09	.03	.05	.01	-.10
	.11	.01	.12	.14	.29*	-.11	.04	.08	-.34*	.22

* $p < .05$

112 students in the average range and 71 students in the above average range.

1) Supported Hypotheses and Student Ability.

Due to the substantial correlation of student ability with the major variables of the investigation, a reanalysis of the data was undertaken to determine the extent to which support for the original hypotheses would be maintained at each level of student ability.

Analysis of the data of Hypothesis 2 had revealed that students who receive higher ratings on homework achievement will achieve higher scores on the math and reading subtests of the CAT. This hypothesis was reanalyzed for math according to student ability. In this follow-up analysis, the relationship held for the entire sample, the average group and the above average group ($\underline{r} = .49, \underline{p} < .001, \underline{r} = .45, \underline{p} < .001$ and $\underline{r} = .42, \underline{p} < .001$, respectively). Reanalysis of this hypothesis for reading revealed a significant finding for the entire sample ($\underline{r} = .45, \underline{p} < .001$) the above average group ($\underline{r} = .37, \underline{p} < .01$) and the average group ($\underline{r} = .38, \underline{p} < .01$).

Analysis of the data of Hypothesis 7 revealed a significant negative correlation between student grade level and parent-involvement in math and reading. This data was reanalyzed for math according to student ability. In this follow-up analysis, the relationship held for the entire sample and the average group ($\underline{r} = -.33, \underline{p} < .001$ and $\underline{r} = -.44, \underline{p} < .001$), respectively, but not for the above ($\underline{r} = -.19, \underline{p} > .05$). Reanalysis of this data for reading

revealed a significant negative relationship for the entire sample and the average group ($\underline{r} = -.32$, $\underline{p} < .001$ and $\underline{r} = -.41$, $\underline{p} < .01$ respectively) but not for the above ($\underline{r} = -.23$, $\underline{p} > .05$).

2) Unsupported Hypotheses and Student Ability.

Reanalysis of the data of the unsupported hypotheses of the study revealed a difference in two hypothesized relations, one for the average group and one for the above average group. For the average group a significant negative correlation ($\underline{r} = -.20$, $\underline{p} < .05$) was found between amount of feedback received on math homework and homework achievement in math. For the above average group a significant negative correlation was found between percentage of distributed math homework and homework achievement in math ($\underline{r} = -.26$, $\underline{p} < .05$).

Due to the high correlation of homework achievement with academic achievement, the data were also examined using CAT reading and math scores rather than homework achievement ratings as the dependent measure. This method of analysis revealed one significant relationship for math and three significant relationships for reading that were not found when homework achievement in math and reading were the dependent variables of the analysis. A significant negative relationship was found between parent involvement in math and CAT math for the entire sample of 191 students ($\underline{r} = -.27$, $\underline{p} < .01$), the average group ($\underline{r} = -.29$, $\underline{p} < .01$) and the above average group ($\underline{r} = -.33$,

$p < .01$). A significant negative relationship was found between parent involvement in reading and CAT reading for the entire sample ($r = -.25, p < .01$) and the average sample ($r = -.24, p < .01$) but not for the above average sample ($r = -0.19, p > .05$).

A significant positive relationship was found between amount of preparatory reading homework and CAT reading for the entire sample ($r = .15, p < .05$). When analyzed for ability level, a significant correlation ($r = .20, p < .05$) was found for the average group but not for the above.

Lastly, a significant negative relationship was uncovered between amount of distributed reading homework and CAT reading for the entire sample ($r = -.18, p < .05$) and the average group ($r = -.26, p < .01$) but not the above average sample ($r = -0.20, p > .05$).

Analysis of Achievement by Grade Level

As previously indicated, an analysis of variance revealed a significant difference in CAT math by grade level. Students in grade 3 scored significantly lower on CAT math than students in grade 4 ($t = 3.1, p < .01$), and students in grade 5 ($t = 5.9, p < .001$) and grade 6 ($t = 8.4, p < .01$). Students in grade 6 scored significantly higher in CAT math ($t = 4.9, p < .001$) than students in grade 4.

Achievement in CAT math was analyzed by grade level. At the third grade level CAT scores ranged from a low of 618 to a high of 781 with a mean of 713.71 and a standard

deviation of 34.94. Scores were relatively normally distributed (skewness = $-.45$, kurtosis = 3.16).

At the fourth grade level CAT math scores ranged from a low of 585 to a high of 800 with a mean of 737.56 and a standard deviation of 38.35. Scores were moderately negatively skewed (skewness = -1.98 , kurtosis = 8.24) with a pile-up of scores at the higher end.

At the fifth grade level CAT math scores ranged from a low of 683 to a high of 821 with a mean of 757.23 and a standard deviation of 30.0. Scores were relatively normally distributed (skewness = $.04$, kurtosis = 2.90).

At the sixth grade level CAT math scores ranged from a low of 604 to a high of 863 with a mean of 772.66 and a standard deviation of 35.43. Scores were moderately negatively skewed (skewness = -1.43 , kurtosis = 10.07) with a pile-up of scores at the higher end.

Achievement in CAT reading was analyzed by grade level. AT the third grade level, CAT scores ranged from a low of 637 to a high of 785 with a mean of 709.30 and a standard deviation of 32.31. Scores were relatively normally distributed (skewness = 0.21 , kurtosis = 2.48).

AT the fourth grade level CAT scores ranged from a low of 565 to a high of 775 with a mean of 714.32 and a standard deviation of 41.40. Scores were moderately skewed (skewness = -1.66 , kurtosis = 6.38).

At the fifth grade level CAT scores ranged from a low of 664 to a high of 790 with a mean of 729.51 and a

standard deviation of 27.87. Scores were relatively normally distributed (skewness = .02, kurtosis = 3.01).

At the sixth grade level CAT scores ranged from a low of 689 to a high of 810 with a mean of 755.03 and a standard deviation of 25.78. Scores were relatively normally distributed (skewness = -.15, kurtosis = 2.46).

Summary Statement

The proposed homework research model, as presented in Figure 1, contained student, parent and teacher variables hypothesized to affect homework and academic achievement. Among the student variables were student ability, time on homework, student homework behavior and grade level. The parent variable was involvement in homework. The teacher variables included teacher communication with parents, type of homework (preparatory), structure of homework (distributed) and feedback on homework.

Relative to the model, the present investigation has shown that academic achievement is a function of homework achievement. Academic achievement and homework achievement are also a function of student ability. The direct linking of student ability with these two variables would strengthen the model. The present study did not support the hypothesized relationship between student ability and distributed homework.

Achievement was hypothesized to be a function of student homework behavior. This relationship was generally supported by an examination of parent responses

to this variable. Time on homework was shown to affect achievement in the analysis of teacher data on this variable.

Achievement was hypothesized to be a function of parent-involvement. The data of the present study revealed a negative relationship between these two variables. Parent-involvement and teacher communication with parents were hypothesized to be a function of student grade level. These relationships were generally supported. Parent involvement was shown to decline with increasing grade level and the number of homework suggestions offered to parents was shown to decline with increasing grade level.

Achievement was hypothesized to be a function of type of homework, structure of homework and feedback. The hypothesized relationships between these teacher variables and achievement were not generally supported in the present research effort. Type of homework (preparatory), however, was predictive of academic but not homework achievement.

Chapter V

Discussion

The present study was conducted to examine a number of variables important to understanding the relationship between homework and academic achievement. As noted, few of these variables had been widely researched. In addition, no previous study had examined these variables in an integrated manner.

The following variables were identified in the literature as important to a study of homework and academic achievement: (1) homework achievement, (2) amount of time on homework, (3) student homework behavior, (4) the structure of homework, (5) student ability, (6) amount of feedback on homework, (7) type of homework, (8) amount of parent-involvement in student homework, (9) amount of teacher communication with parents and (10) student grade level. The findings related to the relationship between each of these variables and student achievement will be discussed below.

The discussion will begin with a consideration of the findings of Hypothesis 2 and will continue through Hypothesis 7. During the discussion of each hypothesis, findings related to homework achievement in math and reading will be considered. In addition, findings related to CAT math and CAT reading, the dependent measures of Hypothesis 1 will also be discussed. Since Hypothesis 1

provides a synthesis of the relationships posited in the remaining hypotheses, CAT math and CAT reading can be considered as each of these relationships is discussed relative to Hypotheses 2 through 7.

Hypothesis 2 predicted the existence of a significant positive correlation between student achievement in homework and academic achievement. This hypothesis was supported for both math and reading. Students who achieved higher ratings in math and reading homework scored significantly higher in CAT math and reading than did students with lower homework ratings. In both math and reading students who achieved an A in homework scored significantly better on the CAT than did students who achieved any other homework rating. In math, homework ratings above an F were consistently correlated with increases in CAT math achievement. In reading, increases in homework rating at each level were consistently correlated with increases in CAT reading achievement.

The above findings are of major significance. They establish the direct link between achievement in homework and academic success. No prior research has yet shown a direct relationship between homework achievement and academic achievement. Rather, prior homework research has focused on the study of isolated variables and their impact on academic achievement. Although an increase in academic achievement is the ultimate goal in the assignment of homework, it is necessary to establish the

direct relationship between these two variables. The findings of this study make it clear that increases in achievement in homework are correlated with improved academic functioning.

The uncovering of a strong correlation between homework achievement and academic achievement also bodes well for teachers who are the determiners of homework grades. Such a strong relationship between these two variables suggests that teachers are accurate assessors of student achievement.

It is important to note that teacher ratings on homework reflect more than student ability. Although student ability was correlated with homework achievement, homework did contribute significantly to the explained variance of CAT reading over and above student ability. As Table 5 indicates, the unique contribution of homework achievement to CAT reading was .07.

The contribution of homework achievement to CAT math, over and above student ability, is not as readily apparent. As presented in the analysis in Table 3, homework achievement entered the regression equation before student ability and as a result the reported variance of .24 is variance shared with student ability. The unique contribution of homework achievement can be obtained, however, by reversing the order of variable entry. When student ability is entered first into the regression equation, homework achievement contributes .09

to the explained variance of CAT math.

Hypothesis 3 predicted that students who spend more time on homework, exhibit more positive homework behavior and experience more parent-involvement in their homework will achieve higher ratings on math and reading homework. This hypothesis was not supported when analyzed from student data.

In regard to time on homework and contrary to expectation, a significant positive relationship between time and homework achievement in math and reading was not established. In seeking an explanation for this lack of findings, the distributions of data for time on math and time on reading were examined. In math, students reported spending between 0-340 minutes a week on homework. However, the mean was only 47 minutes and more than half of the students reported spending 40 minutes or less on math homework. In reading, homework times ranged from 0-900 minutes. The mean, however, was only 134 minutes and almost half of the students reported spending an hour or less on homework. Each of these distributions was positively skewed and revealed a restriction of range. This restriction in range would serve to lower the correlation. An analysis of variance indicated that the amount of time spent on homework did not vary significantly for different homework ratings.

What is interesting about student reports of time spent on homework is that they appear to be in keeping with the results of recent international studies.

Stevenson (1983), in comparing the achievement of American, Japanese and Chinese students, reported that an American fifth grader spends an average of 46 minutes a day on homework. In this study comprised of third, fourth, fifth and sixth grade students the weekly homework average was 45 minutes per day.

It had been anticipated that students would need instruction and assistance in determining the amount of time spent on homework assignments weekly. For this reason the time on homework item, although appearing last in the student questionnaire, was the first addressed. An average of twenty minutes was devoted to instructing students in methods to calculate a response to the item. It remains a possibility that students may have had difficulty in calculating an accurate response.

It is also possible that an element of social desirability may have been operating as students responded to this question. This item was discussed with a view toward assuring accuracy of calculation. This discussion may have increased the probability of a socially desirable response. All self-report data is subject to bias and the extent to which the responses of students as well as parents and teachers were biased, remains unknown.

The hypothesized relationship between time spent on homework and subsequent achievement was unsupported when the analysis was based on student reports of time spent on homework. Although teacher reports of amount of assigned

homework were correlated with CAT math and reading and homework achievement in reading, these results must be viewed with caution. Amount of assigned homework as reported by the teachers was a class variable; it was correlated with student report of time spent on homework, an individual variable. Perhaps more meaningful results might have been obtained had teachers been asked to report amount of assigned homework for individual students. This individual data could also have revealed any potential discrepancies between the amount of homework teachers assign and the amount of time needed for student completion of assignments.

The relationship between amount of teacher assigned homework and student achievement can be viewed as an interesting one. It suggests the possibility that teachers are more accurate than students in assessing the amount of time spent on homework. If such is the case, then the relationship between time on homework and student achievement may be more optimistic than indicated by the primary analysis.

Hypothesis 3 also predicted that students who exhibit more positive homework behavior will achieve higher ratings on math and reading homework. Student positive homework behavior consisted of four categories: (1) administering self-consequences, (2) seeking social assistance, (3) structuring the homework environment, and (4) dealing with trouble and frustration in the completion of homework.

Since an overall significant relationship between positive student homework behavior and homework achievement had not been found the average correlation of each subscale with homework achievement was calculated. Dealing with trouble/frustration in the completion of homework was found to be predictive of homework reading achievement. This finding is of interest particularly in light of the fact that parental reports of student homework behavior also isolated the trouble/frustration variable as predictive of achievement, not only in reading homework but in math as well.

Parents were asked three questions concerned with student experience of difficulty in working on homework (items 11-13). Each of these items was predictive ($p < .01$) of all four dependent measures: CAT math, CAT reading, homework math and homework reading. Parents reported that student tension, difficulty starting on assignments and becoming frustrated with the homework assignment were all highly predictive of achievement difficulties.

Student report of homework difficulties concurred with parent evaluation. Students who reported having difficulty getting started on homework assignments and experienced frustration in the completion of assignments showed significant decrements in achievement on all four dependent measures. Within the trouble/frustration subscale, one question addressed student lack of enjoyment

of homework. Although this item was not positively predictive of achievement, in retrospect, this outcome seems highly reasonable. A question assessing the lack of enjoyment in doing homework (item 16) may not tap into the same construct as questions dealing with difficulties encountered in getting started on homework (item 15) and persevering in the face of frustration (item 17).

In addition to detecting their children's difficulties in doing homework, parents also noted student homework behavior which correlated positively with achievement. Parental responses to the subscales of seeking social assistance (item 5) and structuring the environment (items 6-10) were predictive of homework achievement. Parents indicated in item 5 that students who sought assistance in getting needed homework materials had higher homework achievement than students who did not seek such assistance. Items 6-10 of the parent questionnaire addressed student behavior of structuring the homework environment and were predictive of homework achievement in math and reading. Parents reported that children who isolate themselves from distraction, remember to take completed assignments and books back to school and remember to bring home from school needed homework supplies performed significantly better in homework and on tests of achievement. Parental responses did not indicate that students who adhere to a particular schedule or complete homework in a set place attain greater levels of achievement than those who do not engage in this

behavior.

Although student reports of homework difficulties concurred with parent reports, parent responses to the other subscales were more predictive of achievement than were student responses. Perhaps students on the elementary level do not yet possess the necessary skills to accurately evaluate their own behavior. The above findings when evaluated from a parental perspective seem to lend support to those of Zimmerman et al. (1987). These researchers found that the self-report of high school students on the use of self-regulated learning strategies were highly predictive of achievement. It seems that the parents of elementary school children like the high school students in the above-mentioned research are accurate assessors of behavior which affect school achievement.

Finally hypothesis 3 predicted that students who experience more parent-involvement in their homework will achieve higher ratings in math and reading homework. This portion of the hypothesis was unsupported for math and a significant negative relationship was found between parent-involvement and reading. In addition, parent-involvement was significantly negatively correlated with CAT math and CAT reading.

A determination of the degree of parent-involvement in student homework was made by an analysis of parent responses to 4 questionnaire items. Parents were asked how often they ask if their child has homework (item 14),

check the homework for completion (item 15), and check the homework for accuracy (item 16). In addition, parents noted the amount of time they helped with math and reading homework in an average week (item 17). Parent-involvement was negatively correlated with homework achievement in math; this negative relationship attained significance for homework achievement in reading. In addition, analysis of just the amount of time parents helped with homework (item 17) was significantly negatively correlated with math and reading homework,

At first glance this negative relationship between parent-involvement and achievement appears distressing, and one may begin to wonder if parents actually have such a deleterious effect. We know, of course, that a correlation does not imply causation and so can begin to search for a more optimistic alternative explanation.

It is interesting to speculate about the nature of the negative relationship between parent-involvement and homework achievement. This relationship is contrary to evidence within the literature which indicates that parent-involvement is positively associated with student achievement. Although it might be suggested that this negative relationship is a reflection of greater parent-involvement in the homework of students who are doing poorly in school, an analysis of variance did not indicate that parental-involvement differed for level of homework rating. This analysis, however, does not resolve the issue.

It seems plausible that not all students receiving the lowest homework ratings are the poorest students. On the contrary, bright students may be among those receiving the lowest homework grades. It is conceivable that bright students who fail to do homework or do it poorly are graded more harshly than lower ability students who are completing assignments but meeting with minimal success. Indeed, data analysis suggests support for the speculation that brighter students are among those receiving the lowest homework grades. An analysis of variance indicated that students rated D in homework did more poorly on the CAT than students achieving homework ratings of B and C. However, students rated F in homework did not do more poorly on the CAT than D, C and B rated students. If brighter students are found in this F-rated group, they would suppress the effect of parent-involvement at different homework ratings.

In a final attempt to explain the negative relationship between parent-involvement and student achievement, the correlation of student ability with parent-involvement was examined. No significant relationship was uncovered. This finding negates the speculation that the negative relationship between these two variables is an indication that parents become more involved with students of lower ability. Within the present sample, there exists little relationship between parent-involvement and student ability. Rather, each of

these variables is independently correlated with CAT achievement. This independence is evidenced in the negative sign and small size of the Beta weight for parent-involvement. Parent-involvement is not an intervening variable between student ability and achievement.

Hypothesis 4 predicted that students of average and low ability who do more distributed homework will achieve higher ratings on homework achievement. This hypothesis was not supported.

This study revealed that teachers assign more massed than distributed homework and more distributed homework in math than in reading. Teachers reported that 36% of all math homework is distributed (64% massed) while 22% of all reading homework follows a distributive format (78% massed). These findings are in keeping with evidence from the literature in which four studies on the distributive nature of homework were found. Each study involved the effect of distributed homework on achievement in mathematics. No research had been identified in which the effect of distributed homework on reading achievement had been examined.

Although the research of Butcher (1975) and Hirsch (1983) has shown that student ability mediates the relationship between distributed homework and student achievement the present study did not indicate support for these findings. Differences in the design of the present and prior studies may account for differences in results.

In the Butcher (1975) and Hirsch (1983) studies, cooperating teachers were assigned particular homework schedules so that differences in massed and distributed homework could be ascertained. In the present investigation in which the structure of homework was one of many variables investigated, teacher reported behavior of assigning massed and distributed homework were based on teacher's natural practices and their recollections of these practices. Perhaps future research in this area would be better served by assigning schedules to be followed or by requiring teachers to keep ongoing records of their structural practices.

The present study did provide information concerning the frequency with which homework of a massed and distributive nature is assigned within the schools. In addition, this investigation also extended the study of distributive homework beyond the confines of mathematics. Further research is needed to assess the relationship between distributed homework, student ability and academic achievement.

Hypothesis 5 predicted that students who do more preparatory homework will achieve higher ratings on homework achievement. This hypothesis was not supported when the homework achievement of 16 classes was examined. However, preparatory homework was predictive of homework achievement in CAT math and CAT reading. Preparatory homework has been defined as those homework assignments

which provide students with an opportunity to gain sufficient background information to prepare for upcoming lessons or discussions. It is one of three types of homework commonly assigned in the schools and had been shown, through limited prior research (Peterson, 1971 and Friesen, 1975), to affect student achievement.

The present study revealed that teachers assign a mean of 6% preparatory math homework. This limited amount of preparatory homework can be attributed to the fact that 11 of the 16 teachers sampled did not assign preparatory math homework. The preparatory math homework required by the remaining 5 teachers accounted for only 18% of their total math assignments.

This study also indicated that teachers assigned somewhat more preparatory homework in reading than in math. Teachers indicated that 23% of all reading homework was preparatory in nature. Although fewer teachers refrained from assigning preparatory homework in reading than in math, this relatively modest amount of preparatory reading homework may have accounted for the lack of a relationship in the data.

It is interesting to note that the limited amount of preparatory homework assigned was, nonetheless, modestly predictive of CAT reading and CAT math achievement. Future research on this variable may reveal a stronger relationship between preparatory homework and student achievement masked by the limited amount of preparatory homework assigned in the present study.

The present study provided information on the frequency with which preparatory homework in math and reading is assigned. It also extended the investigation of preparatory homework to the area of reading. As noted, only two studies, both in the area of mathematics, had assessed the relationship between preparatory homework and achievement prior to the present investigation.

Hypothesis 6 predicted that students who receive more feedback will achieve higher ratings on homework. Questions on the frequency with which students received feedback on homework were concerned with the extent to which the classroom teacher checked the homework, found out if it had been completed, informed students of the quality of completed assignments and offered praise for homework done well.

Although this hypothesis was not generally supported, an examination of responses to selected questionnaire items revealed several interesting relationships. In the present investigation teacher efforts to find out if the homework had been completed did not impact on student achievement but checking of the homework correlated with an increase in CAT scores. This outcome lends support to the findings of Schoen and Kreye (1974) who found that feedback that was specific to the error resulted in greater retention of mathematical concepts compared to more general feedback. In the present investigation checking the homework may be viewed as a more specific

form of feedback than merely finding out if the homework had been completed.

In response to the questions, "How often do you find out how well you have done on math homework?" and "How often do you find out how well you have done on reading homework?", the students who reported more frequent feedback performed better on the CAT. These results are in line with the findings of Walberg (1984) who noted that homework that is graded or commented upon raises achievement to higher levels than homework that is merely assigned. In the present study a relationship was noted between appraising students of their achievement and performance on a standardized test.

It was also noted that while the subscale of student positive homework behaviors was correlated with very little in the present investigation, it was correlated significantly with feedback on math and reading. Perhaps students who find out how well they have done on homework apply themselves more assiduously to future assignments.

Hypothesis 7 predicted that with increasing grade level there is a decrease in parent involvement by virtue of a decrease in teacher communication with parents. The study revealed that parents became significantly less involved in both math and reading homework as grade level increased. These results are supportive of the findings of Epstein (1982) who reported that with increasing grade level there is a decrease in parent-involvement.

In the present investigation this decrease in parent-

involvement was reflected, not in a decrease in the number of parent-teacher communications, but, in a decrease in the number of suggestions made by teachers on ways to help with homework. These findings parallel those of Epstein. She noted that nearly 90 percent of first grade teachers requested parents to read aloud or listen to their children read. By fifth grade fewer than 40 percent of parents were asked to engage in reading activities with their children.

The results of the present study along with the findings of Epstein reveal a decline in parent-involvement with increasing grade level. As the research of Epstein indicates this decline in parent-involvement is related to a decrease in teacher practices of involving parents in student learning. In the present investigation this decline in parent-involvement is correlated with a decrease in teacher practices of offering suggestions on ways to help with homework. In each of these studies, the quality of teacher-parent communications seems crucial to parent-involvement. Future research in teacher-parent communication would be well served by focusing on the kinds of interactions that might enable parents to maintain academic involvement with children as students progress through the grades.

A final note relative to the results of the present study. An unexpected and significant positive correlation between student grade level and a number of variables of

the investigation was uncovered. The correlation of grade level with the dependent variables of the study, CAT math, CAT reading, homework math and homework reading were of particular interest. A correlation between student ability and grade level might have explained this unexpected finding. However, student ability was not positively correlated with grade. It was, in fact, negatively correlated.

It is possible that teachers of students in the higher elementary grades place greater emphasis, whether consciously or not, on the scores and grades that may be used to determine the placement of students in junior high school. In the present study students in grade 6 scored significantly better in CAT math than students in grades 3 and 4. Grade 6 students also scored significantly better in CAT reading than students in grades 3,4 and 5. Students and teachers in the higher elementary grades may be influenced by additional concerns which do not impact on the achievement of students in the lower elementary grades.

Educational Implications

Educators have become increasingly concerned with declines in levels of student achievement and view homework as a means of reversing this trend. Educators have suggested a number of ways in which homework can affect achievement. They look to homework to extend the amount of time students are involved in

learning. The relationship between time on homework and student achievement had been established in previous research (Keith, 1982 and Stevenson, 1983). Within the present study, homework grades and academic achievement were a function of the amount of assigned homework. Teachers seem to understand how much homework is needed to insure the academic success of their pupils. In suggesting that homework can foster student initiative, independence and responsibility educators have focused on the student as the recipient of homework benefits. In more recent research (Patton et al, 1983 and Zimmerman et al, 1987) the focus has shifted to the student as an active and vital participant in the homework process. The present study identified particular student behavior that interferes with achievement. For example, it was shown that failure to bring home the materials needed for the completion of homework and forgetting to take completed assignments back to school were associated with decrements in achievement. These findings are an indication that academic difficulties are related to poor organizational skills. They can be remediated through the efforts of parents and teachers working together to isolate the causes of such difficulty. Within the classroom setting teachers can check that assignments are copied completely and accurately. Student buddies can be assigned to check that classmates are taking home the needed homework materials.

Since direct assistance provided by parents in the completion of homework did not correlate with achievement, there may exist a need to reconsider the role of parents in the homework process. In the present study parents provided responses predictive of the academic functioning of their children. They noted student difficulties in starting on homework and dealing with frustration in the completion of assignments. Rather than providing direct assistance in the completion of homework, parents may more positively affect achievement by helping reluctant students get started on assignments and by providing a word of encouragement when frustration begins to mount.

In struggling with homework, a student is sending the message that academic functioning is suffering. Parents can to be made aware of the relationship between trouble/frustration and academic performance, and encouraged to bring homework difficulties to the attention of the classroom teacher. Although the student's difficulties will eventually be realized in low homework grades and poor test performance, parents can inform teachers of student homework struggles and assistance can be provided before serious difficulties ensue.

The contributions and responsibilities of student, teacher and parent merit serious consideration in discussions of homework. The present study represents the first effort to examine the roles of each of the participants in an integrated manner.

Appendix A

April 22, 1987

Dear Mr. Mann:

As you are aware, I have been involved in research concerning the relationship between homework and academic achievement and with your permission piloted my dissertation at Central Boulevard School last Spring. I am now further along in my research and am preparing to collect my dissertation data. Again, I am gathering information on homework through parent, student and teacher responses to three questionnaires I have developed.

I request your permission to collect my data at Central Boulevard School. My sample will consist of the students in the third through sixth grades, their parents and teachers. As with my pilot study, I will send home parent questionnaires with the students. Only students returning completed parent questionnaires will receive the student questionnaire to complete in class. My plans have met with Mr. Blau's approval.

I have enclosed a copy of my parent, student and teacher questionnaires for your review. They are basically the questionnaires I used in my piloting with some additions, deletions and modifications. The sixth

grade parents, students and teachers were most cooperative in responding to my piloting last June.

I will call to speak with you in a day or two, and I thank you for your time and consideration.

Sincerely,

Maura Olson

Appendix B

Student Homework Questionnaire

You are going to answer some questions on homework. Please listen to each statement as it is read aloud to you. Then, in the time provided, mark the number of your response on the answer sheet.

1. How often do you reward yourself for doing well on your homework by watching television, reading a book, playing a game or doing something else you enjoy?

0-20%	21-40%	41-60%	61-80%	81-100%
1	2	3	4	5

2. If you do well on a test how often do you reward yourself in some way?

0-20%	21-40%	41-60%	61-80%	81-100%
1	2	3	4	5

3. If you do poorly on a test how often do you punish yourself in some way?

0-20%	21-40%	41-60%	61-80%	81-100%
1	2	3	4	5

4. If you are having difficulty with a homework assignment how often do you ask someone like a parent, a brother, a sister or a friend for help?

0-20%	21-40%	41-60%	61-80%	81-100%
1	2	3	4	5

5. When your teacher gives you a homework assignment that you don't understand how often do you ask your teacher to explain it?

0-20%	21-40%	41-60%	61-80%	81-100%
1	2	3	4	5

6. If you don't have the books or papers you need for your homework how often do you try to get them from a friend?

0-20%	21-40%	41-60%	61-80%	81-100%
1	2	3	4	5

7. How often do you write down the homework assignment before leaving school?

0-20%	21-40%	41-60%	61-80%	81-100%
1	2	3	4	5

8. Before leaving school how often do you make sure that you are taking home the books and papers you will need for your homework?

0-20%	21-40%	41-60%	61-80%	81-100%
1	2	3	4	5

9. How often do you do your homework at the same time each day?

0-20%	21-40%	41-60%	61-80%	81-100%
1	2	3	4	5

10. How often do you do your homework in the same place each day?

0-20%	21-40%	41-60%	61-80%	81-100%
1	2	3	4	5

11. When you are doing your homework how often do you keep yourself away from things that distract you?

0-20%	21-40%	41-60%	61-80%	81-100%
1	2	3	4	5

12. If you have a test or assignment due in a few days how often do you start working or studying right away?

0-20%	21-40%	41-60%	61-80%	81-100%
1	2	3	4	5

13. When you have finished your homework how often do you check to see if you have completed everything assigned?

0-20%	21-40%	41-60%	61-80%	81-100%
1	2	3	4	5

14. How often do you forget to bring your homework back to school?

0-20%	21-40%	41-60%	61-80%	81-100%
1	2	3	4	5

15. How often do you have a hard time getting started on your homework?

0-20%	21-40%	41-60%	61-80%	81-100%
1	2	3	4	5

16. How often do you enjoy doing homework?

0-20%	21-40%	41-60%	61-80%	81-100%
1	2	3	4	5

17. How often do you become frustrated when you do homework?

0-20%	21-40%	41-60%	61-80%	81-100%
1	2	3	4	5

18. How often do your parents ask if you have homework?

0-20%	21-40%	41-60%	61-80%	81-100%
1	2	3	4	5

19. How often do your parents help you with homework?

0-20%	21-40%	41-60%	61-80%	81-100%
1	2	3	4	5

20. How often do your parents help you get organized in doing your homework?

0-20%	21-40%	41-60%	61-80%	81-100%
1	2	3	4	5

21. How often do your parents check your homework?

0-20%	21-40%	41-60%	61-80%	81-100%
1	2	3	4	5

22. How often does your teacher find out if you have done your homework?

0-20%	21-40%	41-60%	61-80%	81-100%
1	2	3	4	5

23. How often does your homework get checked when you bring it back to school?

0-20%	21-40%	41-60%	61-80%	81-100%
1	2	3	4	5

24. How often does your teacher praise you for doing well on your homework?

0-20%	21-40%	41-60%	61-80%	81-100%
1	2	3	4	5

25. How often do you find out how you have done on MATH HOMEWORK?

0-20%	21-40%	41-60%	61-80%	81-100%
1	2	3	4	5

26. How often do you find out how you have done on all the OTHER HOMEWORK (not counting math)?

0-20%	21-40%	41-60%	61-80%	81-100%
1	2	3	4	5

27. How much time do you spend doing math homework in an average week?

A) _____

28. How much time do you spend doing other homework in an average week?

B) _____

STUDENT HOMEWORK ANSWER SHEET

- | | | | | | |
|-----|-------|-----|-------|-------|-----------|
| 1. | _____ | 11. | _____ | 21. | _____ |
| 2. | _____ | 12. | _____ | 22. | _____ |
| 3. | _____ | 13. | _____ | 23. | _____ |
| 4. | _____ | 14. | _____ | 24. | _____ |
| 5. | _____ | 15. | _____ | 25. | _____ |
| 6. | _____ | 16. | _____ | 26. | _____ |
| 7. | _____ | 17. | _____ | 27. | _____ (A) |
| 8. | _____ | 18. | _____ | 28. | _____ (B) |
| 9. | _____ | 19. | _____ | _____ | (A+B) |
| 10. | _____ | 20. | _____ | | |

April 29, 1987

Dear Parents:

As some of you may remember, I have been involved in research concerning the relationship between homework and academic achievement. I am continuing my research to gain a better understanding of the factors which contribute to homework achievement.

I am presently working on my doctoral dissertation in this area. As part of my research I have developed three separate questionnaires, one each for parents, teachers and students. The responses to these questionnaires will provide information on a number of homework related questions.

I am, once again, asking your cooperation in helping me with my research. The form you have received has been distributed to the parents of the third through sixth grade students in Central Blvd. School. Each student returning a Parent Homework Questionnaire will be given the Student Homework Questionnaire to complete in class. The third through sixth grade teachers will also be responding to the Teacher Homework Questionnaire. It is my hope that the combined responses of parents, teachers and students will provide answers to a number of research

questions.

Many of you responded to my last research effort and I was most appreciative of your assistance. I thank you, once again, for your cooperation.

Sincerely,

Maura O'Leary

Central Blvd. School

Parent Homework Questionnaire

Below appear a number of questions related to student homework. Kindly respond to each statement or question as it pertains to your child. Consider all aspects of homework, both written and study.

Please enter the NUMBER of your response on the answer sheet. PLEASE REMEMBER THERE ARE NO RIGHT OR WRONG ANSWERS. DO NOT IDENTIFY YOUR CHILD BY NAME.

1. How often have you communicated with your child's teacher regarding your child's academic or social progress so far this year?(Examples: letter, phone, conferences, etc.)
2. Parent-teacher communication can be initiated by the parent or the teacher. How often was this year's communication initiated by the teacher?
3. During your communication with your child's teacher this year, how many times have you received suggestions on ways to help your child with schoolwork.
4. How much time does your child spend on homework in an average week? (If needed, please discuss this question with your child).

A) Math Homework: _____

B) Non-Math Homework: _____
(all other homework)

Total Average Weekly Homework: _____ (A+B)

5. If your child does not have the needed homework materials how often does he/she attempt to get the materials from a friend or by going back to school.

0-20%	21-40%	41-60%	61-80%	81-100%
1	2	3	4	5

6. My child adheres to a particular schedule for doing homework?

0-20%	21-40%	41-60%	61-80%	81-100%
1	2	3	4	5

7. My child completes homework in a set place.
- | 0-20% | 21-40% | 41-60% | 61-80% | 81-100% |
|-------|--------|--------|--------|---------|
| 1 | 2 | 3 | 4 | 5 |
8. When doing homework my child isolates himself/herself from distraction.
- | 0-20% | 21-40% | 41-60% | 61-80% | 81-100% |
|-------|--------|--------|--------|---------|
| 1 | 2 | 3 | 4 | 5 |
9. How often does your child go to school in the morning and neglect to take books or assignments with him/her?
- | 0-20% | 21-40% | 41-60% | 61-80% | 81-100% |
|-------|--------|--------|--------|---------|
| 1 | 2 | 3 | 4 | 5 |
10. How often does your child neglect to bring home from school the books or materials needed for homework completion?
- | 0-20% | 21-40% | 41-60% | 61-80% | 81-100% |
|-------|--------|--------|--------|---------|
| 1 | 2 | 3 | 4 | 5 |
11. If you are working with your child on homework how often does he/she become tense?
- | 0-20% | 21-40% | 41-60% | 61-80% | 81-100% |
|-------|--------|--------|--------|---------|
| 1 | 2 | 3 | 4 | 5 |
12. How often does your child have difficulty getting started on homework assignments?
- | 0-20% | 21-40% | 41-60% | 61-80% | 81-100% |
|-------|--------|--------|--------|---------|
| 1 | 2 | 3 | 4 | 5 |
13. How often does your child become frustrated with the homework assignment?
- | 0-20% | 21-40% | 41-60% | 61-80% | 81-100% |
|-------|--------|--------|--------|---------|
| 1 | 2 | 3 | 4 | 5 |

14. I ask if my child has homework.

0-20%	21-40%	41-60%	61-80%	81-100%
1	2	3	4	5

15. I check my child's homework for completion.

0-20%	21-40%	41-60%	61-80%	81-100%
1	2	3	4	5

16. I check my child's homework for accuracy.

0-20%	21-40%	41-60%	61-80%	81-100%
1	2	3	4	5

17. How much time do you spend helping your child with homework in an average week?

A) Math Homework: _____

B) Non-Math Homework: _____
(all other homework)

Total Average Weekly Help: _____ (A+B)

Answer Sheet: Parent Homework Questionnaire

Student Grade: _____ Student Gender: _____

Please enter the NUMBER of your response.

- | | | |
|--------------|-----------|---------------|
| 1. _____ | 6. _____ | 13. _____ |
| 2. _____ | 7. _____ | 14. _____ |
| 3. _____ | 8. _____ | 15. _____ |
| 4. _____ (A) | 9. _____ | 16. _____ |
| _____ (B) | 10. _____ | 17. _____ (A) |
| _____ (A+B) | 11. _____ | _____ (B) |
| 5. _____ | 12. _____ | _____ (A+B) |

Questionnaire was completed by: (please check one)

- _____ Mother
- _____ Father
- _____ Sibling
- _____ Other (please specify relationship) _____

Comments: (Optional)

Teacher Homework Questionnaire

Below appear a number of questions related to homework assignments. In answering these questions kindly consider all aspects of homework, both written and study. Please enter the NUMBER of your response on the enclosed answer sheet.

1. How often do you go over the homework with your students after it has been completed?

0-20%	21-40%	41-60%	61-80%	81-100%
1	2	3	4	5

2. How often are your students made aware of how well they have done on homework assignments?

0-20%	21-40%	41-60%	61-80%	81-100%
1	2	3	4	5

3. How often are your students made aware of the mark when homework is graded?

0-20%	21-40%	41-60%	61-80%	81-100%
1	2	3	4	5

Please consider the STRUCTURAL pattern of the homework you assign by examining the following descriptions of massed and distributed homework.

Massed homework: follows an organizational format in which homework related to a particular topic is concentrated in one or more assignments. Upon completion of this topic a new topic is introduced. Subsequent assignments relate to the new topic and the original topic is no longer the subject of homework assignments. As noted below under the heading, MASSED HOMEWORK, topic A is no longer assigned for homework once topic B is introduced on Day 3.

Distributed homework: follows an organizational format in which homework related to a particular topic is distributed over a number of assignments and interspersed with previously learned material. As noted below under the heading, DISTRIBUTED HOMEWORK, topic A is assigned again on Day 4, even after new topics B and C have been introduced.

<u>MASSED HOMEWORK</u>	<u>DISTRIBUTED HOMEWORK</u>
Day 1- Topic A exercises	Day 1- Topic A exercises
Day 2- Topic A exercises	Day 2- Topic A, B exercises
Day 3- Topic B exercises	Day 3- Topic B, C exercises
Day 4- Topic B exercises	Day 4- Topic A, C, D exercises

4. What percentage of the MATH homework you assign is?:

Massed: _____ %
 Distributed: _____ %
 Total Math Homework: 100 %

5. What percentage of the NON-MATH homework you assign is ?:

Massed: _____ %
 Distributed: _____ %
 Total Non-Math Homework: 100 %

Please consider the TYPE of homework you assign by examining the following descriptions of three types of homework commonly assigned in the schools.

PRACTICE: homework assignments which provide students with an opportunity to reinforce newly acquired skills or apply recent learnings. For example: 1) answer questions 1-5 on page 107 of your social studies text concerning today's lesson on "The Causes of the Civil War" and 2) practice reducing fractions to lowest terms as a follow-up to the day's lesson.

PREPARATION: homework assignments which enable students to obtain sufficient background information to prepare for upcoming lessons or discussions. For example: 1) read pages 83-87 in your social studies book in preparation for tomorrow's discussion on "The Causes of the Civil War" and 2) examine pages 103-114 in your math book to become familiar with the new unit on fractions.

EXTENSION: homework assignments which provide students with an opportunity to expand upon the learning begun in class. Extension homework encourages individualized and creative pursuit of knowledge through its focus on production rather than reproduction. For example: 1) prepare to debate the pros and cons of slavery from the point of view of an abolitionist or advocate of slavery and 2) design a game to teach the concept of equivalent fractions.

6. What percentage of the MATH homework you assign is?:

Practice:	_____	%
Preparation:	_____	%
Extension:	_____	%
Total Math Homework:	100	%

7. What percentage of the NON-MATH homework you assign is?:

Practice:	_____	%
Preparation:	_____	%
Extension:	_____	%
Total Non-Math Homework:	100	%

8. In an average week how much homework do you assign?

Math Homework: _____ (a)

Non-Math Homework: _____ (b)

Total Average Weekly Homework: _____ (a+b)

Please rate each student on homework achievement by placing a NUMBER in the appropriate column.

9. QUALITY of homework completion in MATH:

1 = F

2 = D

3 = C

4 = B

5 = A

Student #	Quality	Student #	Quality
1	_____	16	_____
2	_____	17	_____
3	_____	18	_____
4	_____	19	_____
5	_____	20	_____
6	_____	21	_____
7	_____	22	_____
8	_____	23	_____
9	_____	24	_____
10	_____	25	_____
11	_____	26	_____
12	_____	27	_____
13	_____	28	_____
14	_____	29	_____
15	_____	30	_____

Please rate each student on homework achievement by placing a NUMBER in the appropriate column.

10. QUALITY of homework completion in NON-MATH homework (all other homework):

1 = F 2 = D 3 = C 4 = B 5 = A

Student #	Quality	Student #	Quality
1	_____	16	_____
2	_____	17	_____
3	_____	18	_____
4	_____	19	_____
5	_____	20	_____
6	_____	21	_____
7	_____	22	_____
8	_____	23	_____
9	_____	24	_____
10	_____	25	_____
11	_____	26	_____
12	_____	27	_____
13	_____	28	_____
14	_____	29	_____
15	_____	30	_____

Appendix C

Likert Scale Practice Items

- | | | | | | |
|----|---|--------|--------|--------|---------|
| 1. | How often do you eat breakfast before coming to school? | | | | |
| | 0-20% | 21-40% | 41-60% | 61-80% | 81-100% |
| | 1 | 2 | 3 | 4 | 5 |
| 2. | How often do you watch Alf on television on Monday night? | | | | |
| | 0-20% | 21-40% | 41-60% | 61-80% | 81-100% |
| | 1 | 2 | 3 | 4 | 5 |
| 3. | How often do you watch Kate & Allie on television on Monday night? | | | | |
| | 0-20% | 21-40% | 41-60% | 61-80% | 81-100% |
| | 1 | 2 | 3 | 4 | 5 |
| 4. | Some children buy lunch in the school cafeteria and other children bring lunch from home. How often do you buy lunch in the school cafeteria? | | | | |
| | 0-20% | 21-40% | 41-60% | 61-80% | 81-100% |
| | 1 | 2 | 3 | 4 | 5 |
| 5. | How often do you bring lunch from home? | | | | |
| | 0-20% | 21-40% | 41-60% | 61-80% | 81-100% |
| | 1 | 2 | 3 | 4 | 5 |
| 6. | How often do you read the newspaper? | | | | |
| | 0-20% | 21-40% | 41-60% | 61-80% | 81-100% |
| | 1 | 2 | 3 | 4 | 5 |
| 7. | During the whole school year how often do you have indoor recess? | | | | |
| | 0-20% | 21-40% | 41-60% | 61-80% | 81-100% |
| | 1 | 2 | 3 | 4 | 5 |

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