

Student Motivation for Completion of
Mathematics Homework

Introduction:

Looking back at my last five years of teaching I have noticed a discrepancy between student homework averages and test scores. Those students who do not complete homework assignments on a regular basis have lower course grades and usually lower test scores. Not only are their grades lower, their mathematical knowledge is not well represented. I believe these students will have better mathematical understanding if they had the motivation to complete their homework assignments. When looking into this discrepancy I looked at grades from my eighth grade math classes last year (2010 – 2011). For each individual nine week quarter I pulled up students that received a D or F as their final grade. Then I proceeded to look at the number of incomplete homework assignments. These students did not complete four or more homework assignments throughout the quarter. I had three students fail the course last year and each one failed to complete ten or more homework assignments during at least one of the nine week quarters. I realized that something needs to be done to help motivate middle school students to complete their math homework. This not only needs to be completed to help improve their grades, but also to improve their mathematical understanding. How can negative views of homework be adjusted or changed to help students feel motivated to complete their assignments? Will this improved homework motivation and completion also improve mathematical understanding and success?

Literature Review:

Student motivation to complete homework assignments becomes a constant struggle within the classroom. It is important to realize that homework can be assigned for a variety of purposes: “practice, participation, preparation, personal development, parent-child relations,

parent-teacher communications, peer interactions, policy, public relations, and punishment” (Epstein & VanVoorhis, 2001, p. 181). These different purposes allow students to develop certain emotions that go along with the thought of homework and requirement for its completion. Studies have found “that students’ who complete their homework have better report card grades and higher achievement-test scores than do students who do not complete their work” (Epstein & VanVoorhis, 2001, p. 183). This shows the importance of homework completion for success in the classroom and why more and more research is being done to determine how to improve student motivation in the area of homework completion.

Many different factors can go into the influences students have on homework. One factor influencing student motivation is the type of homework assignments given, which have been discussed in a number of studies. Epstein and VanVoorhis (2001) looked at ideas such as interactive homework where students are required to conduct conversations and interactions with family partners. This was shown to help develop math skills and peak student interest with the information drawn from the community. Olympia, Sheridan, Jenson, and Andrews (1994) used cooperative learning to help students rework homework assignments and make corrections while allowing them the opportunity to complete extra practice problems. The teacher used the information on how many students completed extra practice problems to determine their level of motivation for math understanding. Cooperative learning required the students to work in small groups with a specific task assigned to each member. All members had a necessary part in the problem solving tasks and these tasks were rotated as new assignments were given. These groups consisted of mixed ability students allowing for a great resource to build community in the classroom.

Another factor that influences student motivation on homework is their emotion towards the work. “There is some indication that many students engage in homework assignments not because of interest or excitement about the task but rather because of a sense of duty, desire to please, and avoidance of punishment” (Katz et al. 2009, p. 246). However, this is not true of all students, especially since homework is a unique academic task which is in conflict with other activities. (Katz et al. 2009). The name homework explains what type of work it is. It is academic work that is to be completed at home outside of the normal school day. The motivation students have to complete homework decreases as it takes away from the activities they are involved in after school or would prefer to be doing after school. Teachers really need to take into account what homework is up against even though traditionally it is a required part of academic culture. This means teachers have a great impact on student homework completion.

Not only do teachers have the ability to adapt homework assignments for the benefit of the students, but they also have the ability to support students in a way that homework completion seems like an easy task. The findings of Katz et al. (2009) state “that the role of teacher’s support of psychological needs in students’ autonomous motivation for homework was moderated by students’ level of expressed needs” (p. 266). Students believe that they are not given as much help in the upper level grades and support necessary for successfully completing homework assignments. If students believe that the teacher has not prepared them with the appropriate information to successfully complete the homework assignment frustration may set in. The emotions the student relates to that assignment can in turn cause them to dismiss it or not work diligently on it.

One article “Students’ emotions during homework in mathematics: Testing a theoretical model of antecedents and achievement outcomes” investigates both homework research and

research relating to emotions and achievements (Dettmers et al, 2011). In this investigation both homework selection and homework challenge were looked at. It is important to note that both of these parts can foster emotions that students have on homework. “Homework tasks that are overly challenging, or that do not present enough challenge at all, may evoke unpleasant emotions such as anger, anxiety, or boredom” (Dettmers et al, 2011, p. 27). Teachers have the ability to organize homework tasks that are at the correct level for all students so that they can have successful completion of assignments. These research ideas also caused me to think about reevaluating some of my normal homework assignments for challenge level of the material covered. Not all assignments are at an appropriately challenging level that the students are able to reach. Creating real life problem solving activities should help to reach students at a variety of levels and stretch those who are able to work with more complex mathematics. The researchers came to this conclusion: “in order to trigger pleasant rather than unpleasant homework-related emotions in mathematics – teachers need to set interesting homework assignments that are well integrated into lessons, that reinforce classroom learning, and that are not too challenging” (Dettmers et al, 2011, p. 34).

There are many important factors that play into the study of homework and student motivation causing results to relate to a variety of different factors. Student motivation on homework is a prevalent problem within the American school system today. In order to look into a more specific factor of homework motivation I am choosing to work with the type of homework assignments that are required of students. Technology is becoming such an important aspect of society; education needs to start following these ideas. Students are fluent in working with technology and are interested in things that involve technology; this can be carried over into the classroom with homework assignments. I am choosing to look at creating interactive

homework assignments involving a wiki requiring students to work together on mathematical problem solving tasks. Most of the research was focusing on students emotions towards homework, following these thoughts I wanted to see how more technologically based math assignments may change students' emotions towards homework, leading them to show more motivation in completing assignments and therefore improving mathematical understanding.

Description of Research Context:

I will be using my middle school classroom as the primary resource of data. The research will take place at Westminster Christian School in Miami, Florida. The school is located in an affluent area of South Florida. It is a pre-k – 12th grade school on the same campus. The school has a very strong community feeling with full campus events and the middle school and high school share many facilities such as; the media center/library, gymnasium, auditorium, and athletic fields. The middle school consists of about 350 students in sixth through eighth grade. I am focusing my research in three class periods of eighth grade Pre-Algebra. These three classes are made up students who are taking the 8th grade required math course, but are not considered to be advanced math students. In each class period the number of students can range from fifteen to twenty two students. Class periods last for 45 minutes. The classroom consist of individual students desks and a LCD projector is used frequently in class for note taking purposes and online whole class activities. Computers are not available in the classroom, but students have access to the media center in the afternoon for computer use. Also being in an affluent city the majority of the students have great resources for an internet source: laptops, phones, ipads, itouch etc.

The data collection will take place over the course of the 2011 – 2012 academic year. The academic year consists of four quarters made up of about nine weeks each. The full academic year is being used as the timeline to look at the turn in rate of homework and how it impacts their course grade. The course grade is figured based on the average of all four quarters. This also allows for multiple interactive homework assignments to be required of the students giving more accurate data for finding an average turn in rate.

Methods/treatment:

The goal of this research is to use adapted homework assignments to create a motivational environment for students. . I will be changing problem solving tasks to a more interactive homework approach. In order to determine if students are more motivated to complete their homework assignments it is necessary to get a baseline view of their normal homework practices. This baseline data will be collected from a student survey (see appendix A) given at the beginning of the year as well as the tendency of these students to turn in math homework during the first month of the school year. The homework assigned the first month of school will only be in the form of a textbook assignment or a worksheet. Homework is assigned daily based on the lesson taught in class that day. Most days five to ten minutes at the end of the class period are allotted for students to begin working on the homework assignment allowing me time to answer individual questions. Homework is required to be turned in at the beginning of the class period the next day and is usually reviewed together allowing more time for questions and review of the math topics.

The survey will give me an idea about students' feelings toward math homework, tendencies for completing math homework, and understanding of their previous math homework

habits. My grade book will be used to total the number of homework assignments completed each day with the total students that are in the class. I am required by my math department to grade all math homework, so in my grade book a zero represents homework that was not turned in. For this study homework that is not turned in will be viewed as not completed. At the end of each week I will find the percentage of homework assignments that were turned in. These percentages will be compared weekly and averaged to find the homework turn in rate for the class (see appendix B). This will be looked at heavily in the beginning of the year, but since my grade book is a great tool, textbook assignments and worksheets can still be looked at over the course of the year to see how many students are completing the assignments.

Once the baseline data is collected I will introduce problem solving tasks that require a more interactive approach for homework assignment. The problem solving task will not only involve the use of technology, but also require the students to work more in depth with mathematical ideas. Students will be placed in a group of three and required to complete these problem solving tasks on a wiki. The task will be posted to each groups' wiki site in the middle of our chapter of study. The students will be given a period of time to discuss ideas and formulate a working solution to the problem. The homework requirement will involve a minimum number of discussion responses on the wiki before the due date. The number of responses required may be changed based on the depth of the problem. The goal of using wiki assignments are to change students' feelings towards homework by using interesting technology. I also hope to build a strong sense of community between classmates, allowing for students to rely on each other for some of their learning and not always the teacher.

Only one assignment through the course of the chapter will require students to work in this interactive environment while the other assignments will remain textbook assignments. I

have decided to only go with one wiki assignment per chapter so that students are given more time to work with the in depth problems that they are assigned. This gives students time to post multiple responses to the discussion board and put together a solution. With more time allotted for the assignment I am looking for fewer excuses as to why it wasn't completed and less competition with after school activities. Multiple days give the students time to plan and complete the work that is required. Requirements will be specifically laid out for students in the initial assignment so that confusion can be limited. It may be necessary to work through how a group would interact with these problem solving activities as a whole class activity since this is a new way to look at solving math problems. Similarly to using my grade book of finding the percentage turn in rate of textbook assignments, I will use a table to record and determine the percentage turn in rate of these discussion responses (see appendix C).

The comparison will be made between the average turn in rate of textbook assignments with the average turn in rate of wiki assignments. Both types of assignments will still have specific due dates and requirements for the students. This allows for a fair comparison to determine if motivation is improving based on the type of homework task assigned.

Another student survey will be given at the end of the first semester when students have completed about six wiki assignments (see appendix D). This second survey will focus on students' emotions towards the wiki assignments; are these assignments more enjoyable than textbook assignments. I will be journaling in my lesson plan book about student responses in class in relation to these wiki assignments. This journaling may be sporadic based on students' informal discussion with each other. I overhear a lot of discussions in between class periods about homework assignments and work that the students are doing. If information is discussed in relation to wiki assignments I will record those in my lesson plan book next to that wiki

assignment. I am hoping to just get some more ideas of students' feelings towards the wiki assignments as opposed to textbook and worksheet assignments.

Lastly, test grades will be looked at to determine if the adapted homework assignments are improving mathematical understanding and success. Test grades for each chapter will be compared with quiz grades from the first half of the chapter. Since the wiki problem for the chapter will not be assigned until after the quiz I will be able to see how the understanding is impacted based on the different types of homework assignments. Quarter grades will also be looked at for each student. I will compare how many zeros the students have to their quarter grade to see if improved motivation in homework completion is increasing students' quarter grades and eventually course grades.

Analysis:

After collecting all the data I will use the tables found in appendix B and C to compare homework turn in rates. I will be looking at the differences between textbook or worksheet assignments with wiki assignments. The number of homework assignments turned in will be divided by the number of students in the class to determine the homework turn in percentage. These percentages can then be compared with one another to determine which type of homework assignment had a higher turn in rate. The survey at the beginning of the year and then the survey at the end of the first semester will be compared with one another. Both surveys ask students to write down what comes to their mind first when they work on their math homework. I can then compare student feelings about textbook homework assignments with student feelings about wiki assignments to determine if there was more positive view on homework after the interactive

assignments. A change in emotion will hopefully be correlated to increased motivations for students to complete math homework.

To analyze improved mathematical understanding and success, quiz grades, test grades, and quarter grades will be looked at. Quiz grades will show student proficiency in mathematical concepts using only textbook or worksheet homework while test grades will show student proficiency in mathematical concepts using both textbook or worksheet homework and wiki homework. It may be difficult to just compare quiz and test grades with one another because the students have also had time to work with these math concepts more in class when test time arrives than they did for the quiz. In addition to this, both types of homework assignments are used throughout the chapter. However, it will be beneficial to compare number of missing homework assignments throughout the chapter with the students score on the chapter test. This can then be looked at to see if there is a correlation between how many incomplete homework assignments a student has within the chapter and the chapter test score. Incomplete textbook assignments can be compared with chapter tests and then incomplete wiki assignments can be compared with chapter tests to see if student understanding has become more proficient.

At the end of the year it will be necessary to look at my grade book for all three class periods and count how many missing assignments each student had in the category of textbook/worksheet assignments and in the category of wiki assignments. Once these numbers are recorded they can be compared with the course grade for each student. My baseline data from last year will be the standard to look at how the number of not completed homework assignments may or may not have changed. I will look at students that have a D or F as a final quarter grade and also course grade and determine how their number of missing homework assignments

compares with the previous years' students with the same grades and number of missing homework assignments.

References:

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Appendix B: Example of Table for Recording Textbook Homework Turn in Percentages

Day				
# of students turn in hw				
# of students total				
Turn in %				

Appendix C: Example of Table for Recording Wiki Homework Turn in Percentages

Day				
# of students turn in hw				
# of students total				
Turn in %				

Appendix E: Notification to Conduct Research at my School**Sent to Principal of Westminster Christian Middle School**

August 4, 2011

John Manoogian,

During the 2011-2012 school year, I will be conducting an action research project to determine how the use of interactive homework assignments improved student motivation for completing homework and mathematical understanding. I am instituting this project in response to the grading discrepancy I have seen between homework scores and test scores. All students will be given the same treatment throughout the program and parents will be informed of the plan as a part of the syllabus they sign at the beginning of the school year. I just wanted to inform you that this is occurring. I have attached my research proposal. If you have any questions please notify me and I would enjoy discussing it with you.

Thank you,

Lisa Nanninga

Math Teacher

Westminster Christian School