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**Oral Presentation: Exploring Oral Presentations of Homework Problems as a  
Means of Assessing Homework**

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Action Research Project Report

In partial fulfillment of the MAT Degree  
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## **Oral Presentation: Exploring Oral Presentations of Homework Problems as a Means of Assessing Homework**

### **ABSTRACT**

In this action research study of my freshmen Algebra I class, I investigated a method of assessing homework based on completion and presentations. When I changed the method of grading from checking answers to looking for completion and presentation of selected problems, I found that the majority of the students enjoyed the method because it allowed them to explore other methods of solving and helped them gain an understanding of the problems. This resulted in less stress on obtaining “the” answer. I also realized that I viewed homework differently and had a better understanding of the students’ thought processes, which caused me to check tests differently. These results led to a better relationship between the students and myself. As a result of this research, I plan to change my methods of assessing homework from the traditional right or wrong to a rubric assessment based on presentations and completion of the assignment.

## **INTRODUCTION**

As I began my fourteenth year of teaching secondary mathematics in our district, I have found myself getting set into certain routines. One of these routines has dealt with homework. When I first began teaching, I would assign 30 problems a night, collect all the papers the next day, and check each problem on the assignments. I wanted the students to fully benefit from the assignments and thought this was the best method.

My goal was to find another means of assessing students' understanding of the material that would be more time manageable for myself. In addition to time management outside of the classroom, I wanted to develop the National Council of Teacher of Mathematics (NCTM) communication standard (NCTM, 2000) in my students. I wanted to find a new instructional technique that would increase my students' understanding. The technique needed to be one that would not be too time consuming.

I found that after starting a family of my own, the time I had in the evenings to check homework decreased tremendously. I have been Involved with the Math in the Middle (MIM) program at the University of Nebraska at Lincoln. MIM is a masters program for teachers that focus on improving mathematical knowledge and teaching techniques. The program has taught me that I do not need to assign all of the problems in a particular textbook lesson every night. In addition to learning new ways of thinking about the amount of homework I assign, I have also realized that the purpose of homework does not need to be solely based on the correct answer but could also focus on the process involved in getting the solution(s).

## **PROBLEM STATEMENT**

Homework has always been an area of interest to me. How do I provide a student with the correct amount of homework and yet stay on task with assessing the homework? Which assignments do I check? Do I check all of them? Each year I have to turn in goals for our principal. Every year I turn in a goal about changing methods in which I check homework so I do not get burned out. However, the goal is never met. Each year my goal involved a method of assigning homework that still involved requiring the same amount of homework but being selective on the assignments I checked. This project has given me ample opportunity to explore these concerns and try something new.

The first question seemed to be “What can I try?” My recent involvement in the Math in the Middle (MIM) program has led me in a direction to explore. The program has made me aware of the process standards set forth by the National Council of Teachers of Mathematics (NCTM). I came to realize that along with being overwhelmed with homework papers, I was also lacking in an NCTM (2000) communication standard in my classroom. The need to incorporate an NCTM communication standard link in my classroom inspired me to study the effects of assessing homework by means of homework presentations. In visiting with other teachers, I know that I am not alone with the feeling of being overwhelmed with checking assignments or in the need to increase communication in our students. I think that others are also seeking ways to check for understanding in an efficient way.

I am excited about studying this approach to homework yet apprehensive about failure. I feel that communication is an important tool for our students to possess. I have seen that an increase in my communication skills since MIM has led to an increase in my students’ communication skills during class discussion. However, I have not attempted the presentation of homework problems with the students myself. I hope that this technique will have positive

effects on homework in general, improve communication skills, provide the students with even more techniques to solve problems, and decrease my workload outside of school.

## **LITERATURE REVIEW**

As I read research dealing with my problem of practice, three main themes stood out: Oral Communication, Assessment, and Views of Homework. In my research, I discuss my findings on the importance of oral communication. I also provide information on different methods of assessing oral presentations. Finally, I conclude with a viewpoint on what homework is and the misconceptions and realities of homework. In doing this I discuss my research findings along with changes I made to my teaching regarding homework based on the research literature for my own action research project.

### **Oral Communication**

By becoming familiar with the NCTM standards and principles (NCTM, 2000), I have come to the realization that communication is important for students. The National Council of Teachers of Mathematics states, “Communication is an essential part of mathematics and mathematics education” (NCTM, 2000, p. 60). This is something that I was not comfortable with prior to my involvement in MIM. However, now I see the importance in communicating mathematics and want to increase the level of communication in my classroom. Another NCTM process standard focuses on representations. My students needed to be able to communicate mathematical approaches, arguments and understandings to themselves and others. They needed to find the connections between related topics and apply them to realistic problems. The desire to implement these process standards into my classroom aided me in the development of studying homework presentations with my students.

Kotsopoulos (2007) studied a ninth-grade mathematics classroom to find the gaps in

students' oral communication. The study showed that students experienced interferences with the language and everyday vocabulary along with interferences within mathematics itself. For example: Canceling could result in one or it could result in zero. Therefore, when one says that the values cancel, some students may think that the result is one and others may think the result is zero if they are uncertain of the context that it is used in. I believe that it is important for me to be aware of these interferences in the oral presentations of my students.

Kotsopoulos (2007) was not the only researcher who presented interesting information about communication. Butler and Stevens (1997) stated:

Children listen and speak before they read and write. Their ability to communicate orally in effective and appropriate ways with family members, peers, and teachers often impacts their self-image. For this reason, the development of children's oral language skills is critical to both their social and academic success (p. 214).

Butler and Stevens also pointed out the importance of developing an open classroom environment where the students feel comfortable using verbal expression. The students should feel free to react orally to what they hear or read. When this environment was created, Butler and Stevens believed that students were more apt to take risks and become confident in their own ability to use language.

Butler and Stevens (1997) also pointed out that being able to adjust one's language to specific situations or to a specific audience is important. They mentioned that students should be exposed to a wide range of communication opportunities and become flexible in their own language skills. Research conducted by Berry and Houston (1995) had similar findings. Independently the authors introduced student generated posters into their undergraduate

mathematical modeling courses during the 1992/1993 sessions and continued to use them. The research concluded with students possessing a very positive attitude and an increase in understanding about their peer's work due to the implementation of posters. Berry and Houston also reported, "students have particularly enhanced understanding and greater retention of the subject matter of their own poster" (p. 22). They concluded that the usual methods of presentation and assessment of mathematics are still needed but posters seemed to be enjoyable and add versatility in thinking and communication. Berry and Houston mentioned that teachers of mathematics who require their students to talk and write about their own work encourage conceptual development and understanding. They cited an old proverb "The one who teaches learns twice" (p. 23).

All of the authors performed qualitative studies on oral communication. They agree that the communication needs to be audience appropriate. When one has to orally communicate one's thoughts, one better understands a topic. This leads into the next section, assessment.

### **Assessment**

Time is precious and there are not enough hours in the day for one teacher to correct 30 problems each on 110 homework papers. What do I do? How else can teachers assess students besides paper and pencil homework and tests? These are questions that I have had for several years now. With oral communication as a focus, I started to look into oral presentations and the use of them as an assessment tool. NCTM (2000) states:

To maximize the instructional value of assessment, teachers need to move beyond a superficial "right or wrong" analysis of tasks to a focus on how students are thinking about the tasks. Efforts should be made to identify valuable student insights on which further progress can be based rather than to concentrate solely

on errors or misconceptions (p. 24).

My next concern was if I was going to implement oral presentations as an assessment tool in my classroom, how do I assess such presentations? I found three sub-themes occurring in the assessment research literature: descriptors, non-verbal effects, and peer assessment.

Borko (1997), a professor of education at the University of Colorado- Boulder, has worked with teachers in the CU territory on incorporating classroom-based performance assessments into their reading and mathematics instructional programs. The CU Assessment Project was a multi-year staff development and research project. The goal was to help teachers develop or select performance standards to implement in their own goals. Borko found that most teachers were using activities closely aligned with the NCTM standards to supplement and replace more traditional text-based assignments. Borko mentions that the teachers that were the most successful were the ones that were open to change.

A study performed by Haines and Izard (1994) provided a set of descriptors that were used to make independent assessments of students giving oral presentations on their projects at Brighton University. Students were assessed on both group involvement and individual skills. In this article, Haines and Izard provide a copy of the descriptors and commentary for those descriptors. I found four of the eight descriptors to be helpful because I felt they were items I wanted to focus on in my classroom.

1. Rapport with the audience (engaging and keeping the interest of the audience; eye contact; enthusiasm, personal qualities etc.)
2. Effective delivery (speed, pace, tone, pauses, intonation, well rehearsed, spoken not read, rhythm.)
3. Command of spoken English (Sentence structure, vocabulary, grammar, appropriate use of appropriate language).
4. Appropriate use of visual and other aids (choice of right medium for communication and good use of it. Aids present when necessary. Explanation.)(p. 384)

I have also seen these descriptors focused in other articles. For example, the appropriate use of

visual aids was also a focus in the article by Berry and Houston (1995). Students aware of the components of an effective delivery and use them. The presenter's rapport with the audience is important in the effectiveness of a presentation. In doing this, a student needs to focus on delivery skills that include the speed of their presentation and a comfort zone with a problem that allows them to discuss it and not read the material. Using appropriate visual aids can complement their oral presentation.

Haines and Izard (1994) have one descriptor that coincides with the focus of a study performed by Seddon and Pedrosa (1990). The study performed by Seddon and Pedrosa involved oral questioning of students who were 14-15 years of age. There were two conditions for the oral questioning. The two conditions stated that two judges would listen to the student face-to-face and see any non-verbal communication and two examiners would listen to the answers via microphone/speaker system set up in another room. The result of the study points to an increase in the mean scores of two points when the examiners had face-to-face assessment of the students. The authors have concluded that additional studies need to be conducted on the types of non-verbal communication techniques used. For example, did gestures replace words or did the student just have a nice smile? Did the student provide hand gestures that aided in the effectiveness of the delivery of the problem or did the student dress nicely, which influenced a high score for the assessors who observed the non-verbal gestures? Seddon and Pedrosa believe that more studies need to be done on the types of non-verbal gestures that lead to higher marks.

Non-verbal communication and eye contact are once again included in the study by Butler and Stevens (1997). They provide 4 ratings to assessing the oral presentations:

S—secure behavior

D-developing behavior

B-beginning behavior

N-no behavior (p. 216)

In addition to this assessment, Butler and Stevens focus on delivery assessment points based on:

- Maintains eye contact with audience
- Demonstrates good posture
- Uses appropriate language for a formal presentation
- Uses appropriate voice level (p. 216)

This is similar to the previous article in which the person critiquing the oral presentation takes into consideration non-verbal gestures such as eye-contact and posture.

The last sub-theme covered in the assessment articles that I read dealt with peer assessment. Berry and Houston (1995) mentioned the use of peer assessment but did not go into great detail. I did find research on peer assessment of oral presentations in a study that took place by Langan and his colleagues (Langan, et al., 2005). The study took place at the University level with students ranging from 19 to 27 years of age. The focus of the study was to compare students' peer assessment of the presenters to the tutor's assessment of the presenters. The results showed that the peer assessments were on average higher but the tutor assessments paralleled the peer assessments for presentation, content, and structure. The only assessment area where there was a discrepancy was 'accuracy' marks. On the other hand, the correlation of the mean marks from students and tutors indicated a high level of 'precision' in the students' marks (about 5% higher). The student responses to the peer assessment indicated that the students benefited from the more 'active learning' aspect and that assessing peers increased the audience attentiveness. Peer assessment also allowed the students to learn how to deal with constructive criticism.

The articles that focused on homework seem to agree that one needs to have an effective delivery of one's oral presentations. Things such as eye contact and other non-verbal gestures seem to enhance the presentations and lead to better scores. However, presenters must also

remember to use appropriate vocabulary and visuals to help increase their scores.

### **Homework**

A focus on oral presentation of homework problems needs to include research about homework in general. As I began my search of the literature, one author appeared numerous times. Corno (1996, 2000) is a professor at Columbia University. Corno's specialties are classroom learning and motivation. Corno points out that to arrive at understanding in homework, a student needs to make meaning out of material, to explain why, to build a persuasive case, to find and solve problems, to transfer thoughts and ideas in new contexts and to personalize.

Corno (1996) points out the misconceptions and realities of homework. Corno listed the five misconceptions about homework. Corno cites this list of five misconceptions but elaborates on what really happens. Regular homework assignments are a misconception because the best teachers vary their homework based on students' interests and capabilities. Homework should be flexible and be used for furthering collectively defined curricular goals. Corno states that more homework is better than less is a misconception because there are too many differences between home environments. Knowing that time spent actively engaged in work is beneficial, one cannot judge the amount of engaged time students spend. Therefore, one cannot say more homework is better. Parents want their children to do well and if homework is one way of accomplishing this then they support it. However, when the homework is lengthy or difficult, parents tend to get upset. Corno (1996) states the *New York Times* as noting that this is when angry phone calls come into the schools' homework hotlines. Corno (1996) states that the misconception that homework will automatically support school learning is a misconception because teachers do not always assign homework for its purpose (support school learning). Also, students respond

differently or have different interests, study habits, and home environments.

I found several comments that homework aids in the development of personal responsibility. Corno (1996) states that personal responsibility is like school learning and evidence suggests that this occurs only under certain conditions. As much as teachers would like learning environments to exist in their students' lives, it is beyond their control.

In addition to Corno's (1996) list of misconceptions in homework, she has also developed a list on the realities about homework. Corno believes that one-way teachers misuse homework is by using it as a discipline tool. She points out that homework can also be misused when a school policy states the type and frequency of recommended homework. Corno says that this final misuse of homework can result in teacher burnout.

Reality hits my school setting as Corno (1996) points out that homework can be the bane of parents' existence. As students become more active in extra-curricular activities, "homework nights" become a survival mode and not the learning experience teacher's hope for. This is one aspect of students' lives that leads to Corno's third reality in which students avoid rather than enjoy homework. Teachers, need to inspire their students. To do this they need to focus on as many interests and motivations or connections to real life as possible.

Corno (1996) says "the best homework may be done at home and brought to school" (p. 29). She states that if students can bring things from home that they can connect to, it makes the learning more meaningful and successful. For example: bring samples of leaves from your tree at home or write about a weekend trip with family or friends.

Finally, Corno (1996) states the last reality. Everyone can benefit from knowing the results of research on homework. Well-informed policy makers can offer suggestions to teachers who may reevaluate their homework beliefs. This in turn can benefit parents and their view of

“homework” when it is given.

Corno (1996) based her research on several studies conducted by other researchers. There are several misconceptions about homework that several teachers live by. Teachers and parents need to be informed of these misconceptions and work together to find the appropriate homework assignments for students. Finding the appropriate meaning of homework can help lighten stress on the students, parents and teachers.

I believe that the topic of homework involves so many people, (teachers, students, parents). Certain aspects can be controlled by teachers while others cannot. Corno’s (1996) research concluded that misconceptions and realities exist with homework. The amount of homework given does not lead to the success but instead the time spent engaged in the work does.

### **Conclusion of Literature Review**

Communication is a process standard receiving attention at the national level with the help of NCTM (2000). NCTM is also pushing for multiple assessment methods to take place in the school settings. In my action research, I increased the amount of communication that took place in my classroom by incorporating homework presentations. I used this as a method of assessing my students’ mathematical understanding. I was hoping that my students would explore numerous ways of presentations that might even model the poster presentations of Berry and Houston (1995). I assessed my students using rubrics. In my rubric, I took into consideration descriptors provided by Seddon and Pedrosa (1990) and by Haines and Izard (1994) to include non-verbal effects. Finally, I wanted to see if peer assessment would also help increase the mathematical understanding in my students. This would follow ideas by Berry and Houston (1995) and Langan et al (2005). However, the peer assessment was difficult to do in the allotted

time of the study. Through my action research, I hoped to increase the mathematical understanding of my students by increasing their communication skills, which will open numerous doors in their future.

The study by Kotsopoulos (2007) made me realize that even if the students and myself have increased our vocabulary over the past two years, there may still exist some interference. Presently, I am not aware of this and I wanted to look for this during the students' presentations. Oral presentations could help me determine interference that I might be missing with my present method of assessment.

Berry and Houston (1995) used posters as a focus of their study. To do posters, the authors point out the importance of selecting the correct topic for poster presentations. I was able to take one topic during the course of the study and use it in-group poster presentations. Berry and Houston also cite the proverb "The one who teaches learns twice." I know that this is a true proverb for me. I have had a student tutoring a classmate of hers for the last three years in numerous subject areas including math. She informed me that she likes this because she feels like she understands the material better when she has to explain it to someone. I hoped that my research would help increase the students understanding of problems by having to present a problem to their classmates.

The study conducted by Butler and Stevens (1997) was based on an English classroom setting. They mention their use of "book talk" which is an oral book report and they used these presentations to measure growth of formal presentations. I did not do this in my study. My study focused on the presentation of mathematical problems that were assigned as homework. Finding an article that incorporated the presentations of mathematical problems was difficult for me to locate. Therefore, I hope I can develop research to help others with implementing presentations

of homework into a communication standard. In addition to this, I scored the presentations instead of checking all of the homework papers. I was unable to find a study that directly focused on doing presentations and using them as an assessment tool for homework problems.

Corno's articles (1996, 2000) made me analyze my personal view on homework. I needed to determine my purpose in assigning homework and the direction I was pushing my students towards. Was this the direction I wanted homework to go? I wanted the homework presentations to increase the student's mathematical understanding. This followed Corno's methods of achieving this.

Corno (1996, 2000) says that a misuse of homework can result in teacher burnout. This is where I believe I am heading if I do not change something in regards to homework. I also feel that my students can get burnout. Corno points out as students become more active in extra-curricular activities; "homework nights" become a survival mode and not the learning experience teachers' hope for. I know that this is a reality in our district where approximately 90% of the high school student body is involved in some type of extra-curricular activity at school. This occupies time before and after school along with evenings and weekends.

I planned to use presentations of homework problems to help engage the students in mathematical work. The result I hoped to see was an increase in students' understanding and possibly a snowball effect with students' enthusiasm for the material. I wanted the presentations to also lighten my workload but yet provide me with a deeper understanding of each students thought process and knowledge of the material.

## **PURPOSE STATEMENT**

Communication is an important quality to possess in today's society. I have thought that showing work on homework assignments was an effective way of seeing students' thought

processes. However, I would sit at home some nights checking papers and think to myself, “What were they thinking?” I wanted to explore homework presentations as a method of assessing students understanding of the problems instead of checking for right/wrong answers. I believed that I could learn more about a student’s thought process by listening to them explain the problem, as well as seeing other methods to solving a problem from the students. I hoped to gain a sense of their interest so I could make a better connection to their life to help inspire the learning process. By exploring communication, I hoped the students would develop an appreciation for the subject matter, increase their own knowledge of the subject matter by listening to peers, and enjoy discussing the topic with other people. Even if they did not specifically discuss mathematics, maybe they would become better communicators of any situation they may encounter.

The purpose of my action research project was to incorporate presentations of homework problems into my classroom. I wanted to know if doing presentations would be an effective and efficient means of assessing homework. I also wanted to know if students would increase the value they placed on homework as an important tool to understanding mathematics by incorporating the presentations. I was seeking to answer the following research questions:

- What will happen to the level of students’ mathematical knowledge after implementing homework presentations?
- What will happen to students’ views on the role of homework after the implementation of homework presentations?
- What happens to my teaching when I institute student homework presentations?

## **METHOD**

I began my action research project on January 28, 2008 and concluded on April 11, 2008

using my Algebra I class. The first week of research was off to a rough start due to weather, an observation by a MIM professor, and preparations necessary to inform the students of the presentation expectations. I provided a copy of the rubric that I would be using to grade presentations (Appendix A). This is the first time that I had used a rubric for assessment and the first time the students had been assessed in math class by use of a rubric.

I was able to have a few students give presentations at the end of the first week of data collection. However, several changes had taken place in my room since first semester. One of those changes was the addition of the first SmartBoard into our district. I was selected to be the recipient and the students and I were getting familiar with the new piece of technology. In addition to the SmartBoard, in early January, I was able to visit with the administration, school board, and technology coordinator about the purchase of a document camera, ELMO, for my room. Due to all of the changes in technology in my room, I informed the students that the first presentations would not be graded. I explained that I wanted to give them ideas of what I would be expecting and the opportunity to become familiar with the technology. The technology was an added pressure to the presentations and I did not want to cause additional stress and possible errors in explanations.

I tried multiple methods of selecting the problems to be presented and even asked the students for their advice on problems they wanted to see presented. The process began by selecting the presented problems that I saw as the most frequently missed problems on the last test and the new material presented in the last few lessons. During the middle of the research project, I had the students ask the questions and then asked for volunteers or selected the students to present. During a group interview on March 28<sup>th</sup>, Troy informed me that he had heard outside of class that some of the students were expressing a concern that certain students did not want to

verbalize their questions and maybe a box in which suggested problems could be placed when problems were encountered would help eliminate the fear of asking about a problem with the assignment. Therefore, the end of my research involved presentations over problems from the assignment selected by the students via problem numbers placed in a box. Due to time constraints, the first problems to be presented were the problem numbers that had been submitted most frequently by students.

Determining who would present problems introduced a conflict I had considered. I thought that I would allow the students to sign up for the problems they wanted to present. The method worked for a short time period but turned into chaos as students would rush to the board and argue over who selected which problem. I then decided to approach this concern with the students during the group interview and then with the class in general. I explained my reasoning in the sign-up method due to the fact that I wanted them to present a problem about which they felt confident. However, the problem selection method that the majority of the students wanted involved me as the selector. They felt that if they were selected to present a problem they did not know, they could get help during the presentation and therefore, would understand the problem better after the presentation was over. The students also felt that they had to be responsible for knowing how to explain the method and solution for all problems by using this type of selection. Due to this advice, popsicle sticks were used as the selection method for students' presentations. However, each student had to present once prior to a student repeating a presentation. In addition to this, I would allow them to skip the selected problem if they did not feel comfortable or had reservations about the problem selected. Some students would continue to present a problem even if they did not know how to finish it. During their presentation they would go as far as they could and would then ask the class for assistance. Others would opt to skip the problem if they

did not have it complete. The last week of data collection I did ask for volunteers to present.

I had planned on performing three group interviews of the students. Due to scheduling conflicts, I was only able to perform one group interview (see Appendix B for group interview questions). The one interview took place during a track meet day in which the majority of the students were gone. I asked all of the students present that day to participate in the interview. In addition to this group interview, I conducted six individual interviews (see Appendix C for individual interview questions). The students selected for the individual interviews involved students in the top, middle, and lower portion of the class based on grades. I asked prior to selection who did not want to interview and only one student wanted to decline the interview. However, when asked, she easily conceded to be interviewed.

I kept a personal, teacher journal on the computer during the research period. I included daily entries, the obstacles I encountered, the observations I had made, and a weekly entry that involved a summary of the week's events. In addition to this, I had given the students five journal prompts during the course of my research, which resulted in brief journal entries (see Appendix D for student journal prompts).

In addition to journal prompts, I asked the students to complete a survey during the beginning of my research, February 1<sup>st</sup>, and at the end of my research, April 10<sup>th</sup> (see Appendix E for survey). This survey allowed me to see the change in the students' viewpoints due to the implementation of presentations as a means of assessing homework. I tallied the results on another spreadsheet so I could evaluate any changes the students had.

A final piece of data collection involved gathering tests and entering grades for the entire year. I organized the grades into a spreadsheet so I could evaluate the homework averages, test averages, and overall averages before and after my research project. I could also examine the

tests of a particular individual to determine the types of errors made pre- and post-presentation assessment implementation.

## FINDINGS

### **Research Question #1: What will happen to the level of students' mathematical knowledge after implementing homework presentations?**

The students have increased their understanding of methods to solve problems and have improved on their verbal and written communication skills on explaining these methods. With the exception of three students out of the 19 in class, the homework averages increased. I would have expected this due to the fact that completion was a key factor. The three exceptions had a decrease in two, four, and 14 points. These students failed to complete or even attempt to do the assignments early in the project and this led to the decrease. The average change in homework scores was an increase of 5.3 percentage points.

I examined the students' test averages before and after the implementation of presentations in the same manner. Upon analysis of the data, seven of the students maintained the same test average after the implementation of presentations compared to before the presentations. The majority of the students, 10 out of 19, had a decrease in their test averages after the implementation of presentations. The decreases of test averages ranged from one to six percentage points, with an average decrease of 0.77 percentage points. One student had a decrease in test average of 23 percentage points (student 17), but this student received a zero on one exam due to an out of school suspension. When calculating student 17 into the average, I saw a decrease of 1.95 percentage points.

Although the majority of the students showed a decrease in test averages, I believe other factors besides homework presentations played a role. My research study took place during the spring semester of the school year. At this time of the school year the material is becoming more

advanced and the students are frequently absent in smaller school districts like ours. The numerous activities that encompass the majority of the student body tend to take them away from class in the spring.

I also wanted to examine the overall change in each student's average before and after the implementation of homework presentations. Approximately half of the students showed no change in their overall averages. The number of students showing an increase in their overall average was very close to the number of students who dropped their average. The data showed that five students increased their overall average from 1 to 8 points and six students had a decrease in 1 to 4 points in their overall average with the exception of the student with out of school suspension who dropped his average 15 points. As a teacher of 14 years, I feel that the fluctuation of grades is normal.

Even though the scores did not show an across-the-board improvement, I did see an improvement in the mathematical knowledge of the students. They were improving their terminology, explanations, and desire to explore mathematics. I had several journal entries highlighting that homework presentations were increasing the students' knowledge and helping students catch their mistakes and consequently learn from those mistakes. A few of the journal entries are:

The class has deduced, on their own, the fact that parallel lines have the same slope. They are graphing without creating a table and Monte<sup>1</sup> continues to go to the board and present information during lecture. He is really doing better and staying focused in class. We took class, today, to a higher exploratory level with graphing inequalities. They had great thought processes. Monte first thought that greater than meant the larger shaded region but then realized the graphs extend on. Monte also went as far as to try and find the equation of a vertical line. He thought it would just be  $y$ . After class I pointed out to him that it would be  $x = 3$  or something like that. (Personal Journal, February 28, 2008)

I have never graphed inequalities of lines with the Algebra I students before because it was not in

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<sup>1</sup> All names are pseudonyms.

the curriculum. Due to the presentations and a better understanding of their knowledge, I decided to see what they could do. The discussion that was held with graphing inequalities made me realize that they are becoming excellent communicators and mathematical thinkers.

I continue to be amazed with the understanding, deductive reasoning, expansion of topics, recognition of patterns, thought processes to approach an unfamiliar topic (right or wrong) and overall knowledge that the students are expressing in my classroom... We are branching in so many directions and going to different levels ... I have let them explore and enjoy watching them discover future material that will be presented. Some students really see the connection and others are struggling. However, I think that the ones that are struggling will understand the higher level material better when we do get to that lesson after having seen some connection to it already even if it wasn't to a complete comprehension level. (Personal Journal, week 5 summary entry)

Due to the Saxon curriculum and the format of the material, I was beginning to see the students making connections to future lessons. They were taking the lesson and making connections to what would be a chapter in another curriculum. This was a sign of growth in their mathematical understanding and exploration. I feel that this made the presentation of the future lessons easier and also took those lessons to a higher level of knowledge and understanding of the material.

Only 6 students out of 19 were in class today... The discussion from the students that are normally quiet was great. They had excellent exploration and insight into the problems. The small group discussion was an excellent opportunity for me to see some growth in Jeremy, a new student. He was able to provide correct input and was not his normal quiet individual. I am beginning to think that he may be struggling but is gaining knowledge... (Personal Journal, March 20, 2008)

I began to realize that even if certain students were withdrawing some from class discussion, they were still increasing their mathematical knowledge. This was evident in small group settings where I was able to focus on their verbal communication of their knowledge. I was impressed with their growth and in particular with one of the lower students' verbal expression of his knowledge.

I was also able to do a student journal entry on April 9, 2008. I asked the students to write

a paragraph or two reflecting on their retention of mathematical concepts since presentations have been implemented. Following are a few responses.

Kacy: My retention of mathematical concepts since presentations have been implemented has increased. Being able to see how work on problems I don't understand is done helps me to understand an easy way to perform the mathematical work. Also, being able to show the problem but being unsure helps because we can see our mistakes and others can see where mistakes could be made.

Jill: I feel I understand and can work out the mathematical concepts more efficiently than, ... just talking about them. When I see the concepts visually my mind can grasp them better. I think presentations are a positive influence in math.

Emy: My feelings reflecting on presentations are that I really like doing it to help me when I don't get how to get at the problem. It helps me when I present too because I get better at speaking in front of the class and also it helps me better understand my knowledge on mathematical concepts. Also, when you keep presenting problems you learn how to do it and it sticks with you for a long time when you have a whole bunch of problems like them. I think it is really helping me when it comes time for test time and I finally get how to do the problem. It helps when I am struggling with the problem and someone explains step-by-step how and why he or she got that answer. It is really helping my grade and me overall.

From the student journal entries, I realized that the students enjoyed the presentations and felt that they understood the material better. They felt increased their mathematical knowledge by seeing, hearing, and/or presenting multiple methods of solving the problem. The students also felt that the step-by-step explanations helped them realize where mistakes could be made in addition to finding their own mistakes by seeing correct methods presented.

A final piece of evidence to support the increase in mathematical knowledge of the students due to the implementation of homework presentations comes from the pre-and post student surveys. One of the survey statements was the following: I learn mathematics well from presentations. In the pre-research survey, 16 out of 19 students either strongly agreed or agreed

with the statement. In the post-research survey all of the students either agreed or strongly agreed with the statement. On the opposite end of the spectrum, I also provided the following statement: I learn mathematics well from lectures. There was a shift in the response. In pre-research survey results, 14 students agreed and four disagreed with the remaining students being undecided. In the post-research survey, 12 were in agreement, five disagreed and the remaining students were undecided. When asked to respond to the following statement, I think I learn math content better when I have to give a homework presentation about that content, pre-survey results had 12 students in agreement, four undecided and two students disagreed. The results of the post-research survey showed an increase in those that agreed with 14 agreeing, two undecided, and two disagreeing. Out of those in agreement, there was also a shift to more choosing a “strongly agree” response instead of just “in agreement”.

Please respond to the following items by circling the response that most closely represents you opinions right now:  
 Strongly Agree (SA), Agree (A), Undecided (U), Disagree (D), or Strongly Disagree (SD).

1. Math is enjoyable and stimulating to me.	SA	A	U	D	SD
pre-survey	1	10	6	1	
post-survey	3	8	4	3	
2. I am interested and willing to acquire further mathematical knowledge.	SA	A	U	D	SD
pre-survey	6	12	1		
post-survey	5	11	2		
3. I learn mathematics well from lectures.	SA	A	U	D	SD
pre-survey	1	13	2	3	1
post-survey	3	9	1	4	1
4. I learn mathematics well from presentations.	SA	A	U	D	SD
pre-survey	8	8	2		
post-survey	9	9			
5. I am sure I can learn mathematics.	SA	A	U	D	SD
pre-survey	7	8	3		
post-survey	8	9	1		
6. I learn mathematics from doing the problems/homework.	SA	A	U	D	SD
pre-survey	1	12	5		
post-survey	4	10	3	1	
7. I believe math homework is helpful.	SA	A	U	D	SD
pre-survey	1	11	4	2	
post-survey	5	7	6		

8. I believe that teachers assign math homework to help us learn better.	SA	A	U	D	SD
pre-survey	4	12	1	1	
post-survey	8	7	1	2	
9. I am good at completing my math assignments.	SA	A	U	D	SD
pre-survey	6	7	5		
post-survey	9	5	4		
10. I see the need for math homework.	SA	A	U	D	SD
pre-survey	1	8	7	1	1
post-survey	2	10	4	2	
11. I think I learn math content better when I have to give a homework presentation about that content.	SA	A	U	D	SD
pre-survey	6	6	4	2	
post-survey	9	5	2	2	
12. I hope my math class next year uses homework presentations.	SA	A	U	D	SD
pre-survey	3	12	3		
post-survey	8	8	1		1

The students' grades may not show a significant change due to the implementation of homework presentations. However, the evidence supports an increase in their ability to make connections and in their representations. I have also gained a sense that the students enjoy this type of learning. Since no significant decrease occurred and I had multiple sources to support an improvement in their understanding, I would like to continue with homework presentations next year with the same class and see if I can gather more supporting evidence over a long time period.

**Research Question #2: What will happen to students' views on the role of homework after the implementation of homework presentations?**

The student's view of homework after the implementation of presentations went from a role of getting an answer to understanding the process. The students felt less pressure to get the correct answer and more emphasis on how to solve the problem. A student interview with Monte also reinforced the idea that the students viewed homework differently than I did. In the interview on February 12, 2008, I asked Monte, "What do you think is the purpose of math homework?" Monte responded with, "To see if you know how to solve the problems." This was a

response that I expected. However, was I truly grading them based on their ability to solve or to get the correct solution? I really thought about my purpose of homework when I asked Monte the following question later in the interview session, “What are your feelings about the change in homework grades to reflect completion of the assignment and presentations? Is that fair? What would such grades reflect – understanding, completion, etc?” Monte responded by saying he liked it. He also said,

It is fair, if you at least try and do the assignment, you should get credit for that.

However, when you go over it in class you try to learn from your mistakes. If you do the problem wrong but tried, you shouldn't get penalized for that. Yes, I feel like the new method is doing that.

Had my students' view of homework really changed or did they open my eyes to my ideas about homework? Maybe Monte's did not change but I think that I was starting to change my ideas about completed homework assignments and how to grade them.

Cole was one student who did change his way of thinking about homework. In the interview session that took place with Cole on February 18, 2008, I asked Cole, “Think back to my old methods of homework. Do you think you understand homework or mathematics in general better then or now? Do you feel like you are getting more out of your homework problems then or now? Explain.” Cole provided an excellent response that made me realize that my method assessment was causing my students to focus differently on homework. Cole responded,

I think that before, I got to a little more detail to get the exact number. But now, because of presentations, I am not so worried about getting the exact number but how I get there. Now I don't have to worry about a calculation error but I can focus on the process so I

can apply it to other problems.

I also noticed in the pre- and post- research study that the students responded differently with the statement: “I see the need for math homework.” In the pre-research study, nine students either agreed or strongly agreed with this statement. The number of students either agreeing or strongly agreeing with the statement after the implementation of homework presentations was 12. With a change in the assessment method of homework, my students are beginning to see more of a need for math homework.

I have seen the students’ view of homework changing from a role of getting the correct answer to one where the students can focus on the process. From student journals, student Interviews, and student surveys, I feel that the students are beginning to feel less pressure about the homework assignments. By changing the method of assessment from a right or wrong answer to one focusing on process, the students have also changed their understanding of an assigned problem. They focus on the process now instead of the answer.

**Research Question #3: What happens to my teaching when I institute student homework presentations?**

The implementation of homework presentations has caused me to be more open to the students’ methods and more relaxed as a teacher. My role in the classroom has changed from a leader to a facilitator. I cannot express the personal changes that I have encountered due to this research. Looking at my journal entries, I can see how I have changed as a teacher. During the first week of research, I entered the following teacher journal entry: “I am still having a hard time not providing input for presentations. I need to work on questioning instead of re-explaining” (Personal Journal, January 31, 2008). However, by week 5 I had the following teacher journal entry for the week:

I felt that this week was better for me in terms of asking questions. I feel that the students' presentations are coming in the form of classroom discussion and presentation of new material instead of presentation of homework problems... I continue to be amazed with the understanding, deductive reasoning, expansion of topics, recognition of patterns, thought processes to approach an unfamiliar topic (right or wrong) and overall knowledge that the students are expressing in my classroom. This is exciting yet scary. I feel that we are tackling problems like the borders problem that we saw in MIM. We are branching in so many directions and going to different levels... So far, I have let them explore and enjoy watching them discover future material that will be presented... (Personal Journal, week 5)

Homework presentations have made a drastic change in me as a teacher. I went from being the teacher that modeled information to one that let the students explore and take the lesson in divergent directions. I realize that I can let the students explore and look at the concepts at a higher level. The following student journal entry by Troy also remarks about my findings.

In general, I believe that your teaching has not changed. Though you've changed the grading system, your teaching is just as good as it was before. You, on the other hand, are much more relaxed and possibly more freely go off on a future lesson. I think this is good because it can only allow you more teaching success. Keep up the great work.

I stated in my second memo writing that I was also aware of another change in my teaching that may not be fully described in my journal. I find that I am truly looking to understand "a" method and not "the" method involved in their answers. I have always given the students credit for their work but it is different now. I feel that I know each student's thought process and angle of approach in solving problems better. In the past, I felt that the only way I was able to understand students' thought process was by looking at their work or by working with them as individuals. In a teacher journal entry I wrote the following:

The test scores continue to be strong and I am still finding myself checking the test for understanding instead of checking them for answers. I am really focusing on trying to find their reasoning behind their solutions. This has occurred due to the presentations and hearing their approaches to solving the problems. It has been easier to figure out their mistakes since I have heard and seen their thought processes. (Personal Journal, March 10, 2008)

Due to the multiple problem solving methods my students modeled during presentations, I found it difficult to review tests so all methods could be touched upon. The students have also noticed this change. Two student journal entries that mention this change include the following:

Deb: Your teachings since the homework presentations, and you as a teacher have become more open to ideas and new ways to find the answer or answers. And most of the time, we get more than we bargain for- haha- when someone else is presenting. But that's a good thing because it's like a reminder that needs to "pop" into our heads when working on homework. So really you are helping us in the great long run coming for us. Thanks.

Emy: My feelings about your teaching is that I really like how you teach us different ways how to get at some problems not just the way the math book shows you how to do it. Also when you are struggling with some concepts you help us till we know how to do it. I really like when you give us the answer so we can see if we get that answer at the end by working through the problem and then see if you get they same answer when you are finished. I think I have gotten better with you as a teacher since you added homework presentations. I really like the way you are doing things like presentations and giving us the answers so we know in the end if we are right or if we are going to have to work through it again.

The biggest and most important transformation in me is my newfound joy in teaching. I have the following teacher journal entries:

I was so pleased with their displays and their thought processes that took place while I was on the phone (with the textbook representative). (Personal Journal, March 19, 2008)

Only six students out of 19 were in class today due to track meet. The remaining students could use additional material and help so we looked at a system of equations, graphed them, found their intersection point and then solved by substitution. The discussion from the students that are normally quiet was great. They had excellent exploration and insight into the problems. The small group discussion was an excellent opportunity for me to see some growth in Jeremy – a new student. He was able to provide correct input and was not quiet like normal. I am beginning to think that he may be struggling but is gaining knowledge. His lack of self-confidence may be holding him back in a large class discussion but when he is around a smaller group with more students at his level, he was a shining star in the discussions. This was exciting to see today. (Personal Journal, March 20, 2008)

I realized that I was enjoying teaching even more than before. The stress of not checking all of

the papers and yet seeing growth in the students made me view homework differently.

I enjoy the students and the subject I teach. I have found a new love in my profession and enjoy the students and their involvement. The presentations have allowed me to understand "each" student's thought process and gain a better understanding to each student's mathematical process of choice. I enjoyed this research and its changes. I even tried to expand it to the other classes that I teach. The students and I have reaped multiple benefits from this research.

## **CONCLUSIONS**

Through my research, I support the statements by Butler and Stevens (1997) that "the development of children's oral language skills is critical to both their social and academic success." By implementing presentations, I was able to hear my students explain their reasoning behind multiple steps in reaching solutions. I feel that this has improved my teaching and therefore, my students' academic success. If I, as a teacher, better understand my students, it stands that my students should perform better.

Research conducted by Berry and Houston (1995) report "students have particularly enhanced understanding and greater retention of the subject matter of their own poster" (p. 22). I would agree with this report but extend it to say it does not have to be a poster. The students that I worked with admit that they understood the problem better if they had to present it. If they did not know how to do it, the help they received would help them learn it better. Berry and Houston also mention that teachers of mathematics who require their students to talk and write about their own work encourage conceptual development and understanding. The results of my students' tests show that the students were missing fewer points due to conceptual errors. The points missed were now due to little calculation errors.

I noticed that my focus on my research has become a topic of conversation with

colleagues. I mentioned earlier about the study conducted by Borko (1997) and teachers in the University of Colorado territory incorporating classroom-based performance assessments into their reading and mathematics instructional programs. The goal was to help teachers develop or select performance standards to implement their own goals. I have noticed that my communication with teachers about my research has led to multiple questions and strategies tried by other teachers. Borko mentions that the most successful teachers were the ones who were open to change. I feel that I have been open to change and this has made the difference in my new love for teaching.

I would also have to support the findings of Haines and Izard (1994) that coincides with the study performed by Seddon and Pedrosa (1990). Both studies focused on the effects of scoring based on non-verbal communication. I felt that the scoring of my rubrics might have tended to be on the high side. I always like to look for non-verbal cues that may lead to a student's understanding of the problem. I wanted to improve oral communication and sometimes a gesture may lead to the verbal explanation you are looking for. Being able to point to information helps with the scoring on a rubric compared to standing with your hands in your pockets and saying a few words.

Finally, I support Corno's (1996, 2000) statements mentioned earlier. Corno points out that to get to understanding in homework, a student needs to make meaning out of material, to explain why, to build a persuasive case, to find and solve problems, to transfer thoughts and ideas in new contexts and to personalize. Prior to my research study, I was not looking at homework as a way of checking for understanding but as a test that counted for fewer points. I was checking for the solution. If they did not get it right, I was sure they must not know what they are doing. Now I view homework as a way for the students to assess their own progress.

What do you need to focus on and have explained? I want to know if they know how to get the answer and not what the answer is. In response, the students are focusing on the process and understanding the problem instead of getting an answer and moving on.

### **IMPLICATIONS**

The positive result that I have received from my students encourages me to continue with the implementation of homework presentations next year. The comfort zone issue that one student had in her journal entry made me realize that my students were doing something they were not familiar with. I know that the research took place over a short period of time and during a difficult time of the year – spring semester. I would like to see the results during first semester when the students are eager to learn and are not faced with multiple school outings due to sports and academic related events.

I would also like to continue with the presentations because they relieve my own personal stress of checking so many papers. Prior to my research, I felt checking their papers was the only way I could see if the students understood the material. Instead, I was seeing if they could obtain the right answer and blinding myself to the brilliant thought processes of the students in class. To see them enjoy and grow with knowledge and increase their communication skills in normal conversation and mathematical conversation has been inspiring. I enjoy the new relationship that has developed and the growth of mathematical knowledge that has taken place due to the implementation of homework presentations in my classroom.

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## APPENDIX A

### Homework Presentation Rubric

#### 4 3 2 1 Explanation

Concept is explained so that the process is clear; questions are answered thoroughly  
Concept is explained so that the process is clear; Most questions are answered thoroughly  
Concept is explained with a few errors; Some questions are answered thoroughly  
Concept explanation is not complete and questions are incomplete

#### Mathematics

Student uses correct mathematical language and symbols  
Student uses correct mathematical language and symbols with minor errors  
Student attempts, but does not use mathematical language and/or symbols correctly  
No use of mathematical language and/or symbols

#### Readiness

Student is ready to present  
Student is ready to present  
Student is not entirely ready to present  
Student is not ready to present

#### Effort

Student(s) made an excellent attempt to answer the problem and showed some excellent logic even though the answer may have been incorrect  
Student(s) made an attempt to answer the problem but gave up quickly  
Student(s) made little attempt to complete the problem correctly

Student did not seem to attempt the problem

#### Overall Score

Advanced (Superior)  
Proficient (Satisfactory, with Minor Flaws)  
Progressing (Nearly Satisfactory, with Serious Flaws)  
Beginning (Unsatisfactory)

## **APPENDIX B**

### **Group Interview Questions**

- 1. What do you feel has happened to your mathematical retention since homework presentations?**
- 2. How has my teaching changed?**
- 3. What can I change or do differently to improve?**

## APPENDIX C

### Student Interview Questions

1. How would you describe yourself as a mathematics student?
2. How would you describe yourself as a student in general?
3. How much time on average do you spend on math homework assignments?
4. What do you think is the purpose of math homework?
5. What is your overall opinion on homework presentations? Do you like doing homework presentations? Why or why not?
6. Think back to my old methods of homework. Do you think you understand homework or mathematics in general better then or now? Do you feel like you are getting more out of your homework problems then or now? Explain.
7. What are your feelings about changing homework grades to reflect completion of the assignment and presentations? Is that fair? What would such grades reflect – understanding, completion, etc.?
8. How would you rate your overall mathematical understanding after the implementation of homework presentations? Did it increase, decrease, no change? Please explain.
9. What do you like best about Math? What do you like least about Math?
10. What makes math easy or difficult for you?
11. As I think about how to do homework in my math classes next year, what advice would you give me? What advice would you give me about homework presentations?
12. Is there anything you want to know from me?
13. Is there anything else I should know about?

## **APPENDIX D**

### **STUDENT JOURNAL PROMPTS**

1. What is your definition of a completed homework assignment?
2. What do you think the role of homework is?
3. Is it harder to complete your homework when it is only graded on completion and presentations? Please explain why or why not.
4. Write a paragraph or two about your feelings reflecting your retention of mathematical concepts since presentations have been implemented.
5. Write a paragraph or two reflecting your feelings about my teaching or about me as a teacher since the implementation of homework presentations.

## APPENDIX E

### Student Survey To be used as pre- and post-research survey

Please respond to the following items by circling the response that most closely represents you opinions right now:

Stongly Agree (SA), Agree (A), Undecided (U), Disagree (D), or Strongly Disagree (SD).

1. Math is enjoyable and stimulating to me.	SA	A	U	D	SD
2. I am interested and willing to acquire further mathematical knowledge.	SA	A	U	D	SD
3. I learn mathematics well from lectures.	SA	A	U	D	SD
4. I learn mathematics well from presentations.	SA	A	U	D	SD
5. I am sure I can learn mathematics.	SA	A	U	D	SD
6. I learn mathematics from doing the problems/homework.	SA	A	U	D	SD
7. I believe math homework is helpful.	SA	A	U	D	SD
8. I believe that teachers assign math homework to help us learn better.	SA	A	U	D	SD
9. I am good at completing my math assignments.	SA	A	U	D	SD
10. I see the need for math homework.	SA	A	U	D	SD
11. I think I learn math content better when I have to give a homework presentation about that content.	SA	A	U	D	SD
12. I hope my math class next year uses homework presentations.	SA	A	U	D	SD