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**Using Relearning Groups to Help All Students Understand
Learning Objectives Before Tests**

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Math in the Middle Institute Partnership
Action Research Project Report

in partial fulfillment of the MAT Degree
Department of Mathematics
University of Nebraska-Lincoln
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Using Relearning Groups to Help All Students Understand Learning Objectives Before Tests

Abstract

In this action research study of my 8th grade algebra class, I investigated placing students in relearning groups based on learning objectives. A learning objective is what a learner should be able to do by the end of a learning experience. I was trying to see how this affected test scores, anxiety in the classroom and on tests, and how it affected my teaching. Overall, I discovered that the relearning groups were beneficial. Many students stated the extra practice helped them perform better and feel slightly less nervous than they originally had before a test. I did not discover the best way to group students or what the most effective script would be. However, as a result of the research, I still plan to continue relearning groups to help students fully understand objectives in the future. I also plan to implement some form of these groups in all of my classrooms and further investigate the grouping of students that is best for all students. I would also like to research how to use a script or help students communicate with one another more effectively in these groups.

I. Introduction

I studied how to use formative assessments in small groups to re-teach the concepts that students had not yet mastered. I had students re-teach each other to relearn the objectives before the chapter tests so they would understand all the concepts. My goal was to know exactly where each student was on their understanding of every objective.

In the past I have used formative assessments in terms of quizzes and homework assignments. The problem that was occurring was that I graded them, but did not document exactly the students' individual understanding of each concept. More importantly, I also did not have a plan for when I knew a student was lacking understanding. I would try to give them help during class or invite them in after school, but there was not a specific plan to re-teach every student who did not fully understand. Therefore, every year I had a few students who slipped through the cracks and my goal was for that to not happen again this year.

I put a plan in place so that I could easily analyze formative assessments and then group students by the objectives they did not understand. There were one, two, or three leaders in each group who understood the objectives the group was to re-learn. I was curious to see the effects of students helping others understand. One student from each group used a script to assist him or her with how to communicate within the groups.

It was crucial that while students were in their groups, they knew the expectations and had an idea of how to interact as a group. If students have never been taught how to talk in groups and share ideas in groups, working with other students will not be successful. There needs to be a plan in place to be certain that students who were not understanding a concept, understand once they have worked with their groups.

II. Problem Statement

The problem I addressed was how do I make certain that *all* students learn? This problem is very important for many reasons. It is extremely difficult for teachers to know where all their students are at with their level of understanding of individual learning objective, and to reach all of those students before they are given a summative assessment on each learning objective.

The No Child Left Behind legislation brought this problem to the forefront of issues in education. There are still so many students who are not understanding the concepts they need to understand, for whatever reason or excuse. It needs to become the teacher's problem to figure out a way to reach all students. Formative assessment is an important tool to use to help this problem. What to do with these formative assessments is one of the issues that still is largely unanswered.

Many students will have an opportunity to be more successful in math if they are able to effectively work in groups. After all two heads are better than one, right? There are many careers where people can not get the job done on their own so they must rely on others to accomplish their goal with a collaborative effort. Some students have a hard time working in groups because they have not been taught or are unsure of how to talk about mathematics. Students will not only be more successful in math but will probably be more successful in life if they are able to work collaboratively. There are many careers where adults will have to work productively with others. Students will need to use their communication skills they have been taught to do this. It is not just a matter of forcing them to be on task, but teaching students how to speak to one another, how to ask questions, and how to productively disagree. This creates the most ideal learning environment with some of the deepest understanding many of them have never experienced to learn a mathematical concept.

III. Literature Review

In the teaching of mathematics there are too many students slipping through the cracks. Students are failing to master key mathematical concepts that build to future learning. In order to be sure all students are learning these concepts, I have created formative assessments so that I know where my students are in their learning of these concepts. However, the problem lies in knowing what instructional strategies to implement next. When it is recognized that a student is not grasping a specific objective, the question is what I will do to make sure the student can learn it before they take a summative assessment? In my action research I hoped to identify those students who have not understood the specific math objectives and put a plan in place. Once a plan was in place the goal was to have my students work in groups to master the objective with the help of a peer leader.

The common themes I discovered while researching literature for my action research were formative assessment, motivating students to learn, communicating mathematical ideas, and homogeneous versus heterogeneous grouping. I chose not to include the theme of math anxiety in the review. Anxiety was discussed in a small way. Some of the focus was on math confidence rather than math anxiety, while other articles were based on a student's perception of mathematic level compared to a higher level student. Due to the lack of evidence, I chose to not review the literature on mathematical anxiety and instead focus on the four previously stated themes.

FORMATIVE ASSESSMENT

A major piece of formative assessment is not just knowing what a student knows and does not know, but acting on it. Formative assessment is defined by assessment that is used to improve students learning. There were three articles that touched on what it means to carry out

formative assessment and what actions should be taken if a student does not demonstrate mastery. Arter (2003) has written and co-written several books on assessment including the book *Evaluating Assessment Quality*, which she co-wrote with Rick Stiggins. She conducted a review of the research on assessment for learning. In that review she explained the many pieces to formative assessment. Arter explained that it is not only testing often, and having a plan for the next steps, but it is also having clear learning targets.

Gabrielle and Montecinos (2001) studied 35 pairs of fourth and fifth grade students using a skilled peer model. This research was done to see if motivational goals had an impact on low achieving students when collaborating with a high achieving partner. Like Arter (2003), Gabrielle and Montecinos found that clear learning targets were critical to mastering concepts. Gabrielle, a professor at the University of Northern Iowa in the department of educational psychology, and Montecinos also found that low-achieving students performed better on post-tests with clear learning targets. In other words low-achieving students performed better with learning goals rather than performance goals. Gabrielle and Montecinos actually conducted a study to reach their findings whereas Arter looked at many different studies on formative assessment to report her knowledge and perspective about the topic of formative assessment.

Another study on formative assessment was conducted by Kaftan, Buck, and Haack (2006). This was a team made up of a research assistant at the University of Nebraska at Lincoln, an associate professor of teaching at the University of Nebraska at Lincoln and a middle school teacher (Haack) in Lincoln, Nebraska. Buck, who took part in a larger study, realized that she needed to be better able to assess what students really know. She realized that her students were able to regurgitate information that was correct back to her on worksheets and quizzes. Yet through conversations with students, she realized that they were not actually understanding the

underlying concepts This ties very closely to what Arter (2003) said when suggesting that there be clear learning targets and that all students need to be able to express their understanding in many ways. Kaftan made many changes to her assessments. These changes included having students were able to write, draw, or create a chart to explain the objective or concept learned.

All three articles had findings that suggested the use of clear learning targets or goals in formative assessments as opposed to performance targets. The learning targets were shown in the studies by Arter (2003), Gabrielle and Montecinos (2001), and Kaftan, Buck, and Haack (2006) to lead to more conceptual understanding of concepts Students in these studies were more inclined to understand rather than simply memorize information. It could be inferred then that writing the assessments, learning targets in mind, is a crucial piece to students' mastery of a concept.

MOTIVATING STUDENTS TO LEARN

How do I get students to care? While motivating students is closely connected to formative assessment, students have a hard time being motivated to learn if they are not sure what they still do not know. The importance of motivating students is a hot discussion topic. The plan that will be put in place is based on assessment and students working together to reach clear learning targets. Arter (2003) believes that assessment is the key to motivating students about wanting to learn and how much they can learn. She says that everyone is born with intrinsic motivation but there are certain factors that can diminish motivation, including “coercion, intimidation, rewards and punishments, negative competitive relationships, infrequent or vague feedback, limits on personal control and responsibility without authority” (p. 480). This means that verbal aggression or intimidation, rewards and punishments, such as candy or no homework passes, and comments like “good job” or “keep trying” do not lend themselves to students being

responsible for their own learning. Techniques such as these simply put the responsibility on the teacher. Arter also said that the things that would increase intrinsic motivation would be “providing a sense of control and choice, increasing frequency and specificity of feedback, providing challenge without threat, and encouraging self-assessment” (p. 480). This is saying that if students have the power in their learning, in other words, they are learning with the responsibility on their own shoulders they are a lot more likely to self-assess because they are working towards learning the concept. It may be possible to stretch this further by collaborating with peers. The idea behind formative assessment is that students are working towards mastery goals instead of performance goals (Kaftan, Buck, & Haack, 2006). Both authors emphasized the importance of specific feedback. Arter (2003) said that something that helps to increase students’ intrinsic motivation is “increasing frequency and specificity of feedback” (p. 480). Kaftan, Buck, and Haack (2006) agreed, giving specific examples of what specific feedback and not specific feedback are and stating that this “helps focus the students’ efforts on understanding the content more deeply” (p. 45). This means that students know exactly what they understand and where they can concentrate on improving.

Corder (1999), who studied two sixth grade classrooms consisting of 43 students, looked to compare heterogeneously versus homogeneously grouped students. Corder seems to believe that cooperative learning groups are the key to motivating students. With evidence from his findings, Corder said that the students were more motivated and performed better academically no matter which way the students were grouped, homogeneously or heterogeneously.

Corder’s (1999) study relates to what Arter (2003) was saying because the things that Arter said increase intrinsic motivation are more apparent in cooperative groups than the things that eliminate intrinsic motivation. It seems in a cooperative learning group setting, students

would be getting much more feedback than if the teacher were the only one available to provide feedback. In cooperative learning groups, students would be held more accountable by each other to self-assess than if they individually had to remind themselves to self-assess.

COMMUNICATING MATHEMATICAL IDEAS

A key element in clear understanding of mathematics is communicating ideas. In order to fully understand a mathematical concept, there is a need for good written or verbal communication. Communication increases learning when it is conducted between the student and other students and between student and teacher.

When considering communications between students, the research indicates that it is important for students to ask detailed questions of a peer so that the peer leader knows where the student is missing complete understanding of the topic. McWhinnie and Peverly (2003) researched the effects of math knowledge and type of task given on peer-directed questions in cooperative groups in 54 fifth graders from two independent urban schools. They compared discrete tasks to continuous tasks and found that, “task structure and mathematics knowledge are directly related to the type and *quality* of student’s peer-directed questions” (p. 133). This would indicate that students need to know what questions to ask in order to improve task structure, or the way that a specific task is organized and implemented, and mathematics knowledge.

Communications was also found to be important in another study conducted by Veenman, Kerseboom, and Imthon (2000). They examined the thought processes of low and high test anxious students. One type of anxiety identified in this study was the feeling students had that they could not communicate their ideas on an assessment. This inability to communicate resulted from constant failure. Also found was that constant failure caused students to feel that they could not communicate what they knew to their teacher.

Webb and Mastergeorge (2003) took communication a step further in their research of peer-directed small groups, where they studied conversation and reactions of students in these groups. They looked at what help-seeking behaviors, both questions and responses, yielded the most successful posttest results. They discovered that students seeking explanations, admitting when they were confused, and being persistent in understanding a concept were the most successful on posttests.

The previously mentioned studies clearly demonstrate that communications is critical in both student to student communication and student to teacher communication. The student needs to be able to communicate their understanding or lack of understanding of mathematical tasks and concepts in order to demonstrate mastery of the material.

HETEROGENEOUS VERSUS HOMOGENEOUS GROUPING

Homogeneous grouping is the grouping of students by like ability, for example, low achieving students with low achieving students. Heterogeneous grouping is the grouping of students of all ability levels. Heterogeneous groups would consist of low achieving and high achieving in the same groups. There were two particular articles that had results that were somewhat contrasting in terms of the effects of grouping students. Leonard (2001) studied 177 sixth grade math students to decide what the impact heterogeneous and homogeneous groups have on math learning and achievement. Leonard's work was a quantitative study looking at two different groups of students over two years that were grouped differently. One was grouped heterogeneously and one homogeneously; Leonard looked at their performance on the Maryland Functional Mathematics Test. Leonard found that low achieving students in the homogeneous setting scored significantly lower than their counterparts in heterogeneous group setting. This could be attributed to the fact that Leonard found "the number interactions is greater, the quality

of discussions richer and more elaborate, and students work is more accurate in heterogeneous groups” (p. 194). This would seem to imply that students in heterogeneous groups are more likely to grasp concepts because they are having the rich discussions and working more accurately.

In Corder’s (1999) findings, however, it was discovered there were no differences in the motivational gains of heterogeneous groupings to homogeneous groupings. Although it would seem that Leonard and Corder had different findings it should be pointed out that Corder was studying motivational gains and Leonard was focusing on the overall effects of grouping students differently. Therefore their differences may not be the best comparison.

CONCLUSION

The literature that I reviewed made me extremely excited to further conduct the action research. There was a lot of research out there about aspects of my problem of practice, but there are still many gaps. Formative assessment is a hot topic in education. Yet I found it difficult to find much information on ways to reach students who do not understand the material on formative assessments and will not seek further assistance in a fast paced curriculum. For this reason the collaborative group plan was created. There is a multitude of information about cooperative learning groups but not much of it is on groups with learning targets rather than performance targets. There is even less research on the impact of cooperative groups on test anxiety. Finally, there is research on peer-directed heterogeneous groups but there is a lack of research on low performing homogenous groups led by a high achieving peer. I believe I have filled in some of the gaps with my research.

IV. Purpose Statement

This study was done for a few reasons. I first wanted to see how relearning groups would impact students' success on assessments. The study was done to see if relearning groups would help students who did not clearly understand a concept, to understand it better. I wanted to see if the relearning groups could catch the students that did not understand even after the teaching sessions and homework sessions.

This study was also conducted to look at the impact of relearning groups on student anxiety during tests. When I conducted a pre-survey (Appendix A,) I found the majority of students in all of my classes, including this particular Algebra class, feel nervous or anxious when they take a test. I wanted to find a way for students to be more comfortable with tests. In my mind was the thought that if students are aware that they understand concepts, they will be less likely to be nervous about showing what they know.

The third reason for this study was to find out what impact relearning groups had on the students who already understood concepts. There were students who were going to take on more of the teaching role than the learning because not all students needed to re-learn. I was curious to discover what impact, if any this study had on those students. This is different because it has always been my belief that students can always have an opportunity to improve their grade. If students' grades are reflective of what they know, then this should always be possible. In the district I work in it is policy to allow students to re-learn and retest on objectives that they do not meet the first time they test. So the students have the responsibility of practicing the work either alone, with a partner (which does not happen often), or talking it through with a teacher. Once they feel ready to retest they have to prove to the teacher they are ready by showing them their work or talking through the objective. Then the student is allowed to retest. The problem with

this is it after the fact. This is all done after the summative assessment has been taken and one or more objectives have not been passed. I want to be more preventative.

Finally, I wanted to discover the effects of relearning groups had on my own teaching in the classroom. How would I change my everyday planning, questioning, and assessment? All of these separate pieces were drawn out of the same problem of wanting all students to understand and be able to accurately show what they have learned on their assessments.

Therefore, to investigate the issues that have been mentioned I designed an action research project. This project was created to investigate the following action research questions hoping to get some solutions to my unanswered questions.

- 1) What will happen to students' anxiety about taking chapter tests (summative assessments) after having a plan for relearning material?
- 2) How will the re-teaching sessions influenced the students' ability to work in groups effectively?
- 3) What will happen to the rate of students meeting objectives on their tests after the re-learning process is in place?
- 4) How will the re-teaching process change my everyday planning, questioning, and assessment?

V. Method

To begin the study I created a survey asking students about their beliefs and feelings about assessment. I then split the chapters up into two pieces. I taught the first half of a chapter and then held a relearning session. I chose to relearn half a chapter at a time because it was easier to group students if I was just focused on three or four learning objectives rather than seven or eight.

Before the relearning session, I carefully created a multiple choice formative assessment. I discovered early on that creating these assessments carefully was crucial to the relearning groups being successful. I had to pick specific questions and answers so that I could see the errors that each student was making by the choices they made. I also needed to make sure that the assessments did not have correct answers that were easy to guess even if a student did not clearly understand the objective. I wanted the students to have to a complete understanding of the concept to get the answer correct. This assessment allowed me to see who understood which objective, who needed to relearn or learn in a different way, and who would be leaders of each group.

The other important piece of this assessment was creating an environment with my students to in which they understood it was important for them to be honest with their answers. I used technology for these assessments so the students could work out the assessment problem and then push a button A, B, C, or D based on their answer. It would be somewhat easy for students to look at what someone else chose and choose that so they are not in a minority. I believe in my classroom, students did not cheat because they understood that these formative assessments were not a part of their grade and that they were specifically used for me to know what the students understood and did not understand. I think that the students did a great job doing this. I know they did a good job of this because I had absolutely no students who sat next to each other with same incorrect answers. I also think students did a great job doing this because when I regrouped based on the formative assessment the students all seemed to be in the right place. They even asked me if they could have a plan for letting me know if they had no clue how to do a problem. We decided as a class that if they did not have a clue how to do the problem they should push the button for the letters E or F on the clickers. The questions I wrote were

always A, B, C, or D so this was a good indicator that students did not want to risk guessing correctly and me not knowing they did not understand something.

The day after the assessment I would group students based on the assessment. I would find the students who did not understand a particular objective and group them with two other students who clearly had a good understanding of the objective. This usually was not too difficult because often times the students who were able to be leaders were not lacking understanding in any area. The only problem I had with grouping students was where to put the students who did not understand *any* of the objectives.

I would have a script (Appendix B) typed up for the objectives and practice problems for the objectives. The students would also have a cooperative learning rubric that they were graded on during the re-learning session (Appendix C.) The day after the relearning groups I would have the students journal for 15 minutes about their thoughts on the relearning groups the day before. I would give them at least five prompts (Appendix D) in case they did not know where to start, but they were not limited to these prompts. Along with the beginning survey, I also surveyed the students during the middle of the study and at the end of the study (Appendix E). I conducted four relearning sessions during this study.

During this study I was also documenting the objectives and who passed what objective on their tests. I was looking to see if anyone was passing more objectives than before the relearning groups were put into place. Not only was I documenting objectives but I was also journaling myself once a week using prompts I had written (Appendix F.)

One data collection piece that I thought was very informative was the interviews. My original plan was to conduct a few different interviews throughout the session. This became difficult because I was having a hard time getting students to turn in their permission forms. I did

not just want to use the 6 first people who turned them in. I actually wanted to choose some students who were considered of each of the following achievement levels in this particular classroom; low, medium, and high. The interviews ended up happening at the end of the study in the middle of May. I conducted two interviews on the relearning groups and that process with three people in each of those groups (Appendix G.) I also conducted two interviews on tests and anxiety with tests with the same groups, two groups of three students each (Appendix H.) I chose these groups based on a list of students some of the students who returned their IRB forms. This list was not the complete list just a few of the students from each of the categories of low, medium, and high ability. I chose students to be in groups with others who I knew they would be comfortable talking in front of each other. My original plan was to conduct individual interview. Because of time I decided to do group interviews. I was pleased with my decision because the students could listen to each others' responses and either agree or disagree with their peers. Since they were in groups that they were comfortable with they could do this. They not only agreed or disagreed, they also sometime had things to add that they had not thought of until something their peer said sparked another thought.

I organized and analyzed my data by collecting everything in an accordion folder piece by piece. When I put the pieces in I would write a summary of what the data showed overall. Then I could get out the pieces, when I was writing my assertions, and find specific examples for them. Analyzing my data at the beginning was somewhat difficult because I was sometimes getting a fairly split decision on many things. This changed once the relearning groups continued.

VI. Findings

Before explaining what was discovered out of this research I want to explain what a day of a relearning sessions looked like. The night before the re-teaching sessions took place I would have to analyze their formative assessments and group them accordingly. I would find a groups of students who were not understanding a concept and group them together along with two people who understood that concept and did not need a great deal of re-learning in other areas. This was sometimes difficult for the simple fact that there would often be one or two out of the 28 that did not understand several objectives. I then had to make the decision on which concept would be most beneficial for them to be in the re-learning group of and make a plan to reach them at another time for the other objectives.

The day of the relearning session we would always start with accessing some prior knowledge about the concepts. Maybe a basic skill that many people needed to practice or a basic form of one of the concepts that I thought it would be beneficial to have a discussion about before they started in their re-learning groups. After that discussion I would hand everyone a rubric for working in groups, a script to follow, and a set of problems numbered and grouped by concept. I would remind them this session is to either help them understand concepts that were not clear or to help others who did not understand since our class is a unit working towards every member being successful. I never had any complaints from students who knew the concepts well who had to explain to others. They seem to like it when they are comfortable enough with something to explain it to a peer and I also think they like the idea of spending a whole period helping their group. Many stated in interviews that they even liked doing the problems that they already knew because it was a good refresher before the test. I also reminded them that they

would be grading themselves and their group using the rubric as would I be grading them. Lastly I reminded them of the purpose of the script. Then I told them the groups and let them get started.

While the re-learning sessions were going on I was walking around writing down conversations that I heard and assisting groups who needed it. My role on this type of day was more of an observer unless the groups were completely stuck. When students did not know how to solve the problem as a group I would ask them questions to lead members of the group in the direction to be able to solve it. Some of my questions included. "What does that mean we are trying to do? Or "Is there another way to write that expression that would make it easier to work with?" or sometimes it was a matter of just clarifying directions or emphasizing key terms.

It was so gratifying to hear the students talking to one another and not just telling each other how to do it but more importantly saying things like,

You have to add the exponents because x to the fourth means x times x times x times x and x to the third means x times x times x so that leaves you with seven x 's timesed by each other which gives you x to the sevenths.

With about 5 minutes left in the period I would have students grade themselves and their groups on their rubrics and hand those in. I would have them keep the problems they worked to use as a study guide for the test the next day. Before the test the next I would have them journal about their re-teaching session for 10 minutes. I liked to do this while it was fresh on their minds. The students seemed to be very honest. I believe we set a climate for that by really talking a lot about how this was all about helping them understand better. They would then take their test. These sessions were all very similar as to make my research as accurate as possible. So what did I learn from them?

One thing I was studying in my classroom was what will happen to students' anxiety about taking chapter tests (summative assessments) after having a plan for relearning material. At first I did not think that the relearning groups helped students feel more or less nervous on tests. Now that the study is over and the interviews have been done I believe there are many pieces of evidence collected that showed me that students feel slightly less nervous after the relearning groups have been put in place. On the post survey students responded in the following way:

The relearning process in groups makes me feel "better" because "I get to go over everything I don't understand."

The relearning process in groups makes me feel "good" because "then I'm getting more practice at the skill."

The relearning process in groups makes me feel "confident" because "I know what I'm struggling with."

The relearning process in groups make me feel "better" because "sometimes it just gives me more details and hints on how to do it."

As shown, many responses to this question showed that the relearning groups do help the students feel better, or not as nervous for various reasons. These reasons ranged from just getting more practice, to knowing what they needed to ask for help about, to learning one specific concept or method they were doing wrong.

One interview question was how do you feel about tests now compared to before relearning groups? One student responded by saying,

It's better for me because you are not off by yourself not knowing how to do it because you can maybe learn a better way and you can maybe get a better grade because of someone showing you how to do it a better way.

Another student answered the same question,

I think I perform better because when I would just do it myself I only knew one way whether it was easy or hard, but it's like when you work with a group you can look through someone else's eyes and see if that's easier or harder for you.

These examples are representative of the majority of the students' comments that being in groups helps them feel more prepared because they can learn new methods or ask small questions as they are practicing to make sure they are ready to show what they have learned.

On the post survey given at the conclusion of this study, 14 out of 20 students answered strongly agree or agree to the statement, my re-learning groups help me feel less nervous to take tests. This rose from the midpoint survey in which only half of the class (11 out of 22) said that they agreed or strongly agreed with that statement. As stated earlier, I believe the relearning groups have not made a major impact on students' anxiety about tests, but the data shows it has made them feel slightly more comfortable or better prepared for their tests.

I also wanted, within this research, to study how the re-teaching sessions influenced the students' ability to work in groups effectively. After the first re-teaching session I wrote, "It was somewhat frustrating when a particular group would ask for my help if the problem didn't seem easy to them at first. This particular group was students that do not usually associate with each other." I found the students at the beginning of this talk about wanting to work with their friends a lot. They brought it up in surveys, verbally, and in their journals. This told me that they needed support to become better at working in groups that are chosen by the teacher.

In some students' journals the following things were said about working in groups. One person stated, "We should do this again if we get stuck because sometimes learning from friends is easier if you don't understand it." Another student's comment was, "I think the groups went well for the most part. Although sometimes I'd rather be put with people I work well with or sometimes work as a class."

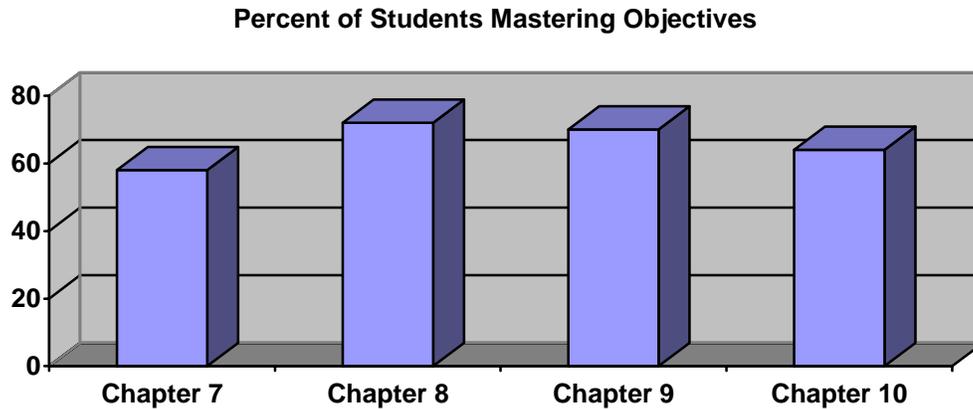
In the interview done at the end of the year one group really emphasized the fact that they thought the groups were most effective when they got to be with friends. The other interview groups said the exact opposite. The first group said the following when asked, what is your attitude about re-learning material in groups? "I like it a lot. It's easier with friends because sometimes people are not nice." These groups seemed to have an overall theme of feeling left out by people when I picked the groups. These students are the students who tend to be quieter and less outgoing. They did not feel comfortable speaking out in groups whether it was to ask a question or explain something to someone they did not know very well.

The other group that I interviewed spoke in response to the question, what did your teacher do, or could your teacher have done to make the re-learning process better? The student responded, "The teacher should always pick the groups based on that assessment because we were not focused (when we did get to pick our groups.)"

During the very last re-learning session that was held, I let the students choose their groups. This was based on the feedback they gave on their journals and for the fact that the formative assessment showed that they really understood these objectives fairly well. There was not a particular student who stood out as not understanding, so I made the decision to let them choose their groups so they could just get a little bit more practice in before their test.

On the post survey given to the students I asked if they trust their peers to explain things that are not clear for them yet. One student said, “yes because most of them I’m friends with.” Another student thought, “no, because they might have it wrong and explain it and make it confusing.” Another response was, “I only trust the people who are my friends because they know me better so they know how to explain in a way I will get it.” These comments alone really enforced the feeling I was having that students definitely need more support to become better at working in groups effectively. If they are only able to associate with people that they associate with outside of school are they really becoming better at working in groups effectively? In the real world it is not logical to assume that people are always going to be collaborating with their friends at work. There still needs to be more work done in this area.

The last focus was concentrating on the academic success of the students. I wanted to look at the rate of students meeting objectives on their tests after the re-learning process was in place. As a district, mastery is considered to be 80% or higher on the objective. On the chapter seven test, which was taken before the re-learning sessions were put in place, the class only mastered 58% of the objectives. The next test (Chapter 8) where the students participated in two relearning sessions, had 72% mastery of the objectives. On the Chapter 9 test, in which there was one relearning session, students mastered 70% of the objectives. On the third test, Chapter 10, where there was one relearning session, students passed 64% of the objectives. All three of these are higher than the Chapter 7 test which did not have any re-learning sessions in place before a test. These results are shown in the chart below.



Many students commented in their journals about how they feel that the re-learning sessions are helping them understand better. One student said, “The reteaching sessions were great cause I found out what a linear, quadratic and exponential lines look like on a graph.” Another said that, “The reteaching groups help me understand better from one of my classmates, and not just the teacher having to explain it everytime.” It was also stated that, “I like the regrouping because I am able to learning from other people. I think that every time we do the reteaching groups I do better on tests and I am not so nervous.” The students are passing more tests with this plan in place; they are also feeling like they are able to do better on tests.

In my journal I commented on the fact that students were not having as many questions that they wanted to ask as before. They were showing what they know the objectives and afterwards many of them said they thought they did very well. With that information, it is apparent that students are performing better on tests with the relearning process in place.

The last goal with this research project was to look at myself as a teacher to see how I have changed my planning lessons, questioning, and assessments. I believe I saw growth in all three areas but there were two things that stood out as major changes based on this research.

The first change that came out was in my assessments. I knew my formative assessments were going to be multiple choice because I had to analyze overnight this was the best solution.

At the beginning of this project I thought it would be simple to create multiple choice assessments. We have workbooks with them, and there are some multiple choice questions in our books so I thought for the most part that I would just be able to pull from those to create assessments that told me where the students were lacking understanding. I quickly found out that this was not the case. In a journal from Feb. 8 I spoke about this process.

I was a bit frustrated this week. We did our first quiz and relearning session and I found that students had a lot of questions that their groups could not answer. As I thought more deeply about the questions that were being asked and related them to the quiz I realized that they were not addressed by any of the answers in the quiz. In other words the quiz did not give me valid data on each certain type of mistake that the students were asking about. What made me most frustrated is that they were mistakes that I knew the students would probably be making and if I had thought the quiz out more thoroughly myself instead of trying to make it easy and rely on the texts questions I probably would have caught it before relearning time.

I decided after that incident that it would be beneficial in the long run to write each question and set of answers myself so that I could address the mistakes that I knew my students would be making. In my Feb. 22 journal I wrote about the second relearning session.

The groups went much more smoothly this time. They were asking fewer questions to me and because they were answering more amongst themselves. It really pays off to take the time to write all of the problems and answers myself for their formative assessments so that I am able to analyze and group the students more accurately.

Another piece about my teaching that really stands out is the questioning aspect. I believe that being in Math in the Middle has changed my questioning greatly but I think that these

relearning sessions pushed me even harder to be a better questioner. Throughout the relearning sessions I would have students as a group ask me specific questions about problems. I would have to think out my questioning very carefully and sort of target one or two people in the group that I knew could figure it out on their own if I just push them. My questioning became key to pushing students to work together and learn from each other rather than relying on the teacher to teach each student individually. In my Feb. 22 journal I discussed this.

I am really struggling between the role of the researcher and the teacher. When students ask questions about problems while they are in their groups I have to think long and hard about who in their group could help them and what I need to say to that group to help them get passed that question together. I believe it is harder for me to know that it is okay to see a student struggling than for a student to think it's okay to struggle. I can tell that questioning is a major piece of this research for me that I didn't even think about when starting it all.

VII. Conclusions

All of the information above supports that the relearning plan that I put in place this last year with my 8th grade algebra students did have an impact on the students in various ways. Arter (2003) stated several times that it is crucial that students have clear learning targets and not performance goals. During this research the class did not talk about letter grades at all; it was all about understanding each concept. I believe that this action research took clear learning targets a step further to specifically address one or two targets that the students did not understand. With this research the students new specifically what they did not understand and had a plan in place to help them get to the spot where they did understand.

This research took some of the suggestions of Webb and Mastergeorge (2003) in the aspect that the class built a climate of feeling it was okay to admit confusion. Right away on the first formative assessment students wanted a way to express to me that they did not understand a problem and wanted more help with it in their re-learning groups. I believe this did lead to catching more students who would have otherwise fallen through the crack on certain objectives. It seems students do need a very specific plan in place to help them better understand objectives and show their understanding on summative assessments. When there were relearning groups helping one another, the students felt like they were slightly less anxious on tests because they were more aware of what they understood. The plan could be improved if students were more able to work effectively in small groups. Students are still not comfortable working with people outside of their social circle. Some come to realize that it is more important for them to associate with others because they will be able to work more effectively if they are placed a certain way. Once again we want to support our students to be successful adults. At most jobs or careers these students have when they are adults they are not going to get to choose who they collaborate with. It is important that we somehow start to teach that skill now.

VIII. Implications

So if the relearning groups do help students understand objectives and do better on tests, what can be done to help them be more effective? First of all, students need to be able to communicate with one another in groups. My goal for next year is to help students be more comfortable working with anyone. One way I plan to do this next year is to start the regrouping sessions at the beginning of the year. The more they work together, then the more comfortable they will become communicating with one another. I also hope to do more class builder activities so the students become more comfortable with one another on a social basis. I also plan on, as a

class, coming up with questions and comments to use during instruction so that in groups students do not feel like they are having difficulty communicating.

This year I also emphasized math vocabulary somewhat but next year I would like to even more. When students know the correct terminology they are more able to speak to each other. I would also like to further investigate why students get so anxious about tests and how to help students get over their bad feelings about tests. I do plan on continuing the relearning groups and making them even more effective and beneficial for students than this year.

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Appendix A

Student Survey Test Anxiety

4- Strongly Agree

3- Agree

2- Disagree

1- Strongly Disagree

1.) I think tests are important in math class.	4	3	2	1
2.) I feel nervous before I take a math test.	4	3	2	1
3.) I feel nervous while I am taking a math test.	4	3	2	1
4.) Being nervous about a test affects how well I do on the test.	4	3	2	1
3.) I take tests to prove what I know.	4	3	2	1
4.) Working in groups helps me better prepare for tests than working individually.	4	3	2	1
5.) It is easy to learn from a classmate who has mastered an objective.	4	3	2	1

Please complete the following statements.

6.) When I am taking a test I feel _____ because

7.)The hardest thing about taking tests is

8.) When preparing for a test I

9.) Do you ever feel like being nervous on a test makes you forget things? If so explain.

Appendix B

Regroup sessions:

- Power to a Power
- Product of a Power
- Quotient of a Power
- Negative exponents
- Using all properties and Simplifying

Script: *(Don't read anything in italics out loud.)*

We are going to be working on mastering _____ today. This is so that when it is time to take a test you can be sure that you understand.

The way this is going to work is we are going to work out a problem together on the markerboards, then you will work out a problem on your own to check your understanding.

***Write the first problem on your markerboard. *(Problem #1A)*

Please do not move ahead of the group until it is time to work on your own.

What is the first step?

Why can we do this?

What is the next step?

Why can we do this?

What is the next step?

Why can we do this?

(Continue this until the problem is on the last step.)

.
.

.

What is the answer?

Is this in simplest form possible?

(Pass out problem #1B)

Now try this problem on your own. Flip your papers over when you are done. Do not discuss with anyone until everyone has tried the problem.

On the back of your paper rate your confidence with this problem. On a scale from 1-10 where 10 is the highest.

Now let's compare answers. Don't change anything on your paper but think to yourself,

“ If this problems was on my next test would I get it correct now that we have discussed it.”

*(At this time pick up the problems and go back to the place in the script marked with ***. Repeat this for problems #2A&B and #3A&B. When you are done raise your hands to signal that you have finished.)*

All “A” problems should be worked together. All “B” problems should first be worked individually.

Solve a quadratic equation

#1A) $y^2 - 9 = 72$

#1B) $n^2 + 15 = 79$

#2A) $4p^2 + 27 = 3$

#2B) $-3m^2 - 30 = -57$

#3A) $q^2 + 1 = 21$

#3B) $6x^2 = 30$

Identify a, b, and c in a quadratic

#1A) $6x^2 - 4 = 13x$

#1B) $-3x + 6 = -x^2$

#2A) $2x^2 - 7 = 0$

#2B) $-9x^2 + 5x = 0$

Simplify expressions with square roots

#1A) $\sqrt{54}$

#1B) $3\sqrt{20}$

#2A) $4\sqrt{\frac{6}{3}}$

#2B) $\frac{\sqrt{20}}{\sqrt{8}}$

#3A) $\sqrt{3} \cdot \sqrt{56}$

#3B) $4\sqrt{3} \cdot 5\sqrt{18}$

Find the vertex of a quadratic

#1A) $2x^2 - 8x + 3 = y$

#1B) $-x^2 + 2x - 10 = y$

#2A) $3x^2 - 2x + 9 = y$

#2B) $-x^2 + 5x - 2 = y$

Graphing a Quadratic

#1A) $3x^2 - 2 = y$

#1B) $x^2 - 4x + 6 = y$

#2A) $x^2 + x + 7 = y$

#2B) $-2x^2 - x + 1 = y$

Appendix C

Collaborative Work Skills : Re-learning Objectives

Teacher Name: **Ms. Pease**

Student Name: _____

CATEGORY	4	3	2	1
Working with Others	Almost always listens to, shares with, and supports the efforts of others. Tries to keep people working well together.	Usually listens to, shares, with, and supports the efforts of others. Does not cause "waves" in the group.	Often listens to, shares with, and supports the efforts of others, but sometimes is not a good team member.	Rarely listens to, shares with, and supports the efforts of others. Often is not a good team player.
Quality of Work	Provides work of the highest quality.	Provides high quality work.	Provides work that occasionally needs to be checked/redone by other group members to ensure quality.	Provides work that usually needs to be checked/redone by others to ensure quality.
Time-management	Routinely uses time well throughout the project to ensure things get done on time. Group does not have to adjust deadlines or work responsibilities because of this person's procrastination.	Usually uses time well throughout the project, but may have procrastinated on one thing. Group does not have to adjust deadlines or work responsibilities because of this person's procrastination.	Tends to procrastinate, but always gets things done by the deadlines. Group does not have to adjust deadlines or work responsibilities because of this person's procrastination.	Rarely gets things done by the deadlines AND group has to adjust deadlines or work responsibilities because of this person's inadequate time management.
Monitors Group Effectiveness	Routinely monitors the effectiveness of the group, and	Routinely monitors the effectiveness of the group and	Occasionally monitors the effectiveness of the group and	Rarely monitors the effectiveness of the group and

	makes suggestions to make it more effective.	works to make the group more effective.	works to make the group more effective.	does not work to make it more effective.
Leadership Script	Script was followed completely and effectively	Script was followed for the most part.	Script was somewhat followed.	Script was followed a little or not at all.

Date Created: **Nov 06, 2007 08:14 am (CST)**

Appendix D

Student Prompts

- 1.) What went well in re-learning groups this week? Explain.
- 2.) What could have made re-teaching groups better this week?
- 3.) How do I feel re-learning groups effected my understanding of the math this week?
- 4.) How did the math script effect my learning this week?
- 5.) How did the teacher leader effect my learning this week?
Or (if teacher leader)
- 5.) How did I feel about my explanation after the group session was over?

Appendix E

Student Survey on Taking Tests

4- Strongly Agree

3- Agree

2- Disagree

1- Strongly Disagree

1.) I think tests are important in math class.	4	3	2	1
2.) I feel nervous before I take a math test.	4	3	2	1
3.) I feel nervous while I am taking a math test.	4	3	2	1
4.) Being nervous about a test affects how well I do on the test.	4	3	2	1
3.) I take tests to prove what I know.	4	3	2	1
4.) Working in groups helps me better prepare for tests than working individually.	4	3	2	1
5.) It is easy to learn from a classmate who has mastered an objective.	4	3	2	1
6.) My re-learning groups help me feel less nervous to take tests.	4	3	2	1
7.) I feel nervous working in groups to re-learn a concept.	4	3	2	1
8.) I feel nervous having another student explain a concept that I don't understand.	4	3	2	1

Please complete the following statements.

9.) When I am taking a test I feel _____ because

10.)The hardest thing about taking tests is

11.) When preparing for a test I

12.) Do you ever feel like being nervous on a test makes you forget things? If so explain.

13.) The relearning process in groups makes me feel _____ because

14.) Does the relearning process make taking tests better, worse, or the same? Explain.

15.) Do you trust your peers to explain things that aren't clear for you yet? Why or Why not?

16.) Do you think it is possible for you to learn from one of your peers? Why or Why not?

Appendix F

Date: _____ Time: _____

Teacher Journal

Research Question #1 – What will happen to the rate of students meeting objectives on chapter tests after having a plan for relearning material not understood before a test (summative assessment)?

Before test

- 1.) What are that students understood about the objective today?

- 2.) Where did the students struggle with today's objective?

- 3.) Were there things that I said or a peer said that made today's objective obviously more clear for someone?

Day of regrouping

- 4.) What are some struggles that students had today in specific groups?

- 5.) What are some things the peer leaders said or did that made the table groups understand more or become more confused?

- 6.) What is something that I could have done to make today more productive for students?

- 7.) Talk about a specific event that happened today in regards to students meeting objectives after re-teaching.

- 8.) Talk about one prediction I have for the next reteaching session.

Research Question #2 – What will happen to students' anxiety about taking chapter tests after having a plan for relearning material not understood before a chapter test?

- 1.) What are some things I heard students say in regards to learning math or testing about math concepts?
- 2.) What concepts today were students more comfortable with less comfortable with?
- 3.) What did I learn this week about students anxiety about math in particular math tests?
- 4.) Talk about one event that occurred that I believe has something to do with math anxiety or test anxiety.
- 5.) What is one thing that I would have done differently to either prevent the event or encourage it?

Appendix G
Student Interview Questions about the Re-learning Process

- 1.) What is your attitude about re-learning material in groups?
- 2.) What effect do you think the re-learning groups have had on your learning?
- 3.) What could your teacher have done during this re-learning process to make it better?
- 4.) How did being in cooperative teams help you learn more math?
- 5.) How did being in cooperative teams hinder your understanding of math?
- 6.) How much has your student leader helped you understand math? Please explain.
- 7.) How much has your ability to talk about math changed in the past 6 weeks? Please explain.
- 8.) How much do you think having a script helped your groups communicate? Please explain.
- 9.) How much do you think having a script helped your groups be productive? Please explain.
- 10.) Overall how would you rate your involvement in the cooperative groups (0-5 where 0 was “not involved” and 5 “very involved”) and why?
- 11.) Is something that could have been done differently in the cooperative teams so that you were more able to pass each objective on the tests?
- 12.) What advice can you give me about using re-learning groups next year?
- 13.) Why do you think we have begun having re-teaching groups?
- 14.) Why do you think we have students be the leaders of the groups?
- 15.) Is there anything else you would like to tell me about the re-learning process?

Appendix H

Student Interview Anxiety in Math

- 1.) What is your favorite thing about math? Least favorite?
- 2.) What is one thing that makes math hard?
- 3.) Do you feel like you perform better, worse, or the same in testing situations as non-testing situations? Why?
- 4.) What is one thing that could be done to make tests more comfortable?
- 5.) Why are tests given in math class?
- 6.) What is something that we do in math class that make tests easier?
- 7.) Have you ever had a bad experience in any math class? If so explain. Please tell me about it in general without using any specific names of students or teachers.
- 8.) What do you wish teachers would do to help you feel less anxious in class?
- 9.) Is there anything else you want me to know about your feelings about math in general?