

7-2009

Using Cooperative Learning In A Sixth Grade Math Classroom

Teena Andersen
Pilger, Nebraska

Follow this and additional works at: <http://digitalcommons.unl.edu/mathmidactionresearch>



Part of the [Science and Mathematics Education Commons](#)

Andersen, Teena, "Using Cooperative Learning In A Sixth Grade Math Classroom" (2009). *Action Research Projects*. 12.
<http://digitalcommons.unl.edu/mathmidactionresearch/12>

This Article is brought to you for free and open access by the Math in the Middle Institute Partnership at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Action Research Projects by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

USING COOPERATIVE LEARNING IN A SIXTH GRADE MATH CLASSROOM

Teena Andersen
Pilger, Nebraska

Math in the Middle Institute Partnership
Action Research Project Report

In partial fulfillment of the MAT Degree
Department of Mathematics
University of Nebraska-Lincoln
July 2009

Using Cooperative Learning in a Sixth Grade Math Classroom

Abstract

In this action research study of my classroom of sixth grade mathematics, I investigated the impact of cooperative learning on the engagement, participation, and attitudes of my students. I also investigated the impact of cooperative learning upon my own teaching. I discovered that my students not only preferred to learn in cooperative groups, but that their levels of engagement and participation, their attitudes toward math, and their quality of work all improved greatly. My teaching also changed, and I found that I began to enjoy teaching more. As a result of this research, I plan to continue and expand the amount of cooperative group work that happens in my classroom.

The sixth grade class that I had this year was one of the most challenging classes that I had ever had. My students had home issues. They had behavior issues. They had learning difficulties. They lacked self-control and social skills. Yet, as I got to know them and began to see them as individuals, I kept noticing not only how much I LIKED all of them but also how much potential they had. Unfortunately, their issues made it extremely difficult to keep the classroom a place where learning was more important than behavior control.

When this school year started I had a recurring fantasy. I would sprinkle a magic powder into the school lunches of my students, and they would suddenly start to exercise self-control and begin thinking about the choices they made, even the little choices like blurting out every comment that came into their heads. They would become interested in their own learning and start paying attention in class and doing their homework. The constant tattling would stop—not only because the tattlers would start minding their own business, but also because the guilty ones would be keeping their hands to themselves, not kicking in the halls, not stealing pencils... They would be respectful to adults, other students, and themselves. I would not have to say everything 19 times. I wanted to have a classroom where my students were engaged and could participate in more open-ended problem-solving activities. I wanted them to be able to learn in cooperative groups, find answers, understand where those answers came from, and be able to communicate that information to me and to each other. Most importantly, they would start learning as deeply as I thought they were capable of learning, and I could really see them begin to reach their potential. For that to happen, I needed them to be able to control their behavior, be interested and willing to work, and able and willing to communicate with each other.

Unfortunately, at the beginning of this year, I was dealing constantly with the negative behaviors that I described in the paragraph above. When I taught math, about half of the students would listen, usually a different half every time. I was wondering if the problem with communication was coming from my not communicating effectively. When I did pull in a problem-solving activity, it seemed like my low-ability students became really engaged, but my higher-level students wanted to write down an answer and

then tune out. Even with my lower-ability students engaged, they still struggled with the mechanics of communicating with me about the assignment. These lower students either could not write, did not know math facts, or lost the paper before they could hand it in. I also had a couple of students with math phobias who panicked and shut down at the first sign of anything new. It seemed like the more capable students had quit because they could not get the attention that they needed, and others had learned that being quiet and not causing trouble would be rewarded. The students who struggled dealt with so many other issues that I wondered if they just did not want to bother anymore. I was sure these students had heard that they had a bad reputation, and I wondered if there was a bit of a “Well, everyone thinks we’re bad anyway” mentality.

Since my district has switched to a new reading program requiring extensive training and planning time, my time for math preparation was ridiculously short this year. Due to these circumstances, I was not planning effectively for my math period at the beginning of the year. On top of that, my school was preparing for a December move to a new school building, so most of my furniture and supplies were already packed and in storage before the school year began. I was also dealing with my students’ issues almost daily—social services, absenteeism, parent issues, behavior problems, and special education issues, to name a few. While I was dealing with these issues, I felt myself wearing out, and I was wondering if teaching really was meant as my life-long profession. I did not feel like I was being effective or doing my best teaching, and the pressures of a stressful school year were making me wonder if any of this was worth it at all. I was hoping that this research would help me become more effective and remind me of why I chose this profession in the first place. I was hoping to find positive results with this project for both my students and myself.

Talking with other Math in the Middle teachers during the past two years, listening to teachers in my building discuss their work, and interacting with other educators at workshops had convinced me that I was not alone in my frustrations. I was not the only teacher seeing students coming to school with more and more baggage, but more importantly, I was questioning my expectations. I heard so many times from veteran teachers that “students used to be so much better/different/more responsible/more self-

controlled/more respectful....” In reflecting on those conversations, I could not help but think that somehow I was communicating my frustration to students without realizing it. Maybe the way I used to teach was not the best way to teach these “new types” of students. Maybe if I could change what I did in my classroom just a little, I could make a dent in the problem—even when I could not improve a student’s crummy home life or their poverty or their having to spend weeks or months in Mexico during the school year...

My problem—with this year’s class especially—was really strongly related to the issue of equity in the National Council of Teachers of Math (NCTM) standards. These students deserved to be held to the same high expectations as the students I had taught in the past. They deserved my and their future teachers’ best teaching—even if that teaching had to look different from here on out. Communication was another standard that needed to be addressed in my math classroom because the group I had this year did not seem to understand really basic rules about respect, self-control, or communicating with both adults and peers. This affected my teaching, which affected their learning, which affected their assessment...and the ball kept rolling down the hill. In mathematics specifically, my students struggled to work together, to communicate what they knew, and to demonstrate any behavior that would aid their learning. This affected their ability to make connections, problem solve, and perform well at any of the NCTM content standards. These basic problems caused my students to struggle with every single standard in the NCTM document, and they would continue to struggle unless I could find a way to intervene.

LITERATURE REVIEW

At the beginning of this study, cooperative learning brought to my mind pictures of students working in groups with cute little titles—reporter, noise monitor, writer, checker, etc. Upon further research, however, I found cooperative learning to be much broader. Several themes emerged during my study of cooperative learning literature: a more clear and detailed definition of cooperative learning, the rationale behind the development of cooperative learning, benefits of cooperative learning, considerations for lower-achievers, and cautions and concerns for teachers implementing cooperative learning.

Definition of cooperative learning

Cooperative learning is described by Slavin (1984), one of the leading developers of cooperative learning, as

a set of instructional methods in which students are encouraged and required to work together on academic tasks. Cooperative learning methods may be as simple as having students sit together to discuss or help one another with classroom tasks, or they may be quite complex. They may use group rewards, as in group contingencies, or may not do so. (p. 31)

Students might be assigned a specific role and be responsible for a specific part of a project, or they might just work together without having separate tasks. Kagan, perhaps one of the most well-known cooperative learning researchers, said in an interview with Brandt (1989) that cooperative learning is “curriculum free. The choice of a structure does not involve choice of any particular curriculum or curriculum materials, in fact, the structures can be used from kindergarten through university across the curriculum” (p. 10). In other words, cooperative learning can be used with any class, and just about any objective can be taught through a cooperative group activity. In cooperative learning, while the group may be working together, each individual within the group is still accountable for learning the material. Heterogeneous teams almost always characterize cooperative learning organization, and the groups are usually very carefully planned to include all levels of learners. Interestingly, Good, Reys, Grouws, and Mirvan (1989) researched effective implementations of cooperative learning, and their findings led them to recommend that teachers NOT assign students roles in their groups. They found in their research that the roles were frustrating for students and teachers, so my conception of cooperative learning was not even a recommended model.

The development of cooperative learning

Kagan told Brandt (1989) during an interview that he became interested in cooperative learning as an undergraduate at the University of California at Los Angeles in the 1960's. One of his professors

had been researching competitiveness and cooperation between Mexican children. The professor found through his research that competitiveness increased with urbanization, leading Kagan to realize that “if you couple that finding with the fact that the whole world is rapidly becoming more urban, you can see what our future social character will be unless we somehow intervene” (Brandt, 1989, p. 9). Cooperative learning strategies started to appear in classrooms as teachers and administrators realized how competitive most classroom structures are. Grades are based on class competition. My high school teachers who graded on the curve were encouraging classmates to compete against each other. Even today’s grades can be seen as competitive because teachers structure their classes and grading systems fully expecting that not everyone will receive an A. If all students received a 100% on an exam, for example, teachers would probably conclude that the class was too easy and raise the difficulty level of either the material or the assessment.

Another concern that led to cooperative learning being used in classrooms was the strength of peer pressure upon a student’s achievement. Both Kagan (1994) and Slavin (1987), in illustrating what competitiveness looks like in the classroom, used the all too common illustration of the child who raises his/her hand and gives the wrong answer in class as an obvious proof of the phenomenon of competition in the classroom. As soon as the class realizes a wrong answer has been given, the rest of the students practically fall out of their chairs trying to correct the error and win the attention of the class (Brandt, 1989; Slavin, 1987).

Quinn (2002) studied the effects of cooperative learning on the behavior of 375 first grade boys who had been identified by their teachers as showing characteristics of antisocial behaviors. Her research found that after just six weeks of their teachers implementing cooperative learning strategies, the boys’ behavior improved. In the explanation of the purpose for her study, she stated, “Left unchecked, antisocial behavior patterns also put children at great risk of becoming ‘career antisocial adults.’ The absence of the social skills necessary to move beyond a marginal existence substantially diminishes any hope for a quality life” (p. 80). Slavin (1987) also cautioned that “after awhile many students come to understand that school success is not a route open to them and begin to seek other routes to a positive self-image,

such as delinquent or antisocial behavior” (p. 30). It is exactly for these reasons that I have chosen to research cooperative learning and its benefits.

Benefits of Cooperative Learning

Research into cooperative learning has shown that it can have several benefits. Slavin (1987) reviewed 50 different studies that compared the achievement of students taught in cooperative learning classrooms to the achievement of students taught in traditionally organized classrooms. He reported that 89% of the students in 50 different studies earned higher scores on achievement tests when they had participated in cooperative learning. Nattiv (1994) found in her own study that students who learn in a cooperative learning format learn significantly more than those in traditional formats, especially when they are taught “helping behaviors” such as how to give explanations and ask for help. However, both Slavin and Nattiv said that there are conditions. Nattiv found much greater achievement results when students were trained and expected to explain their solutions rather than just share answers. Students also needed to have explanations given to them as well. Slavin cautioned that his results about the increase in student achievement occurred in rooms where not only cooperative learning took place but also where students worked to earn group rewards as well.

There are other rewards and benefits to cooperative learning. Several researchers reported an increase in student involvement during class. Peterson and Miller’s (2004) research dealt with 113 college students and asked those students to compare their own perceptions of their involvement during cooperative learning and whole-class instruction. The college students overwhelmingly reported that they were more engaged and paid better attention during cooperative learning activities. Gillies’ (2003) interviews of 223 junior high students also found that those students felt like they were more on-task and involved during cooperative learning. Mulryan (1995) observed 48 fifth and sixth graders during cooperative learning activities and whole class instruction. The students in her study were shown to spend more time on-task and were more engaged during cooperative learning activities. Quinn (2002) found that the first grade boys in her study, who had been reported as having behavior problems, also spent more

time on-task. No matter what the age level, it seems clear that cooperative learning results in students spending more time engaged in learning.

Of particular interest to me was the finding that in almost all of the studies, students started to communicate and get along better as a result of their experiences using cooperative learning (Brandt, 1989; Gillies, 2003; Good, 1989; King, 1993; Nattiv, 1994). Children in cooperative groups showed “a reluctance to interrupt or disrupt each other as they worked together” (Gillies, 2003, p. 206). The improvement in student relationships was reported by researchers’ observations, by teachers, and by the students. Students themselves reported enjoying math more in cooperative learning settings, and they also reported a higher confidence in their abilities as math students (Good, 1989; King, 1993; Peterson & Miller, 2004; Slavin & Cooper, 1999). In fact, the study by Quinn (2002) went as far as to report that cooperative learning helped boys who were labeled “antisocial” to a point where they could function normally in the classroom.

Another significant finding was that students and teachers alike enjoyed the benefit of more students exchanging help and ideas in the cooperative learning classroom. Good et al. (1989) surveyed more than 1,500 teachers and observed more than 60 cooperative learning lessons and found that students spent more time talking about math in cooperative learning settings. They also were more likely to use manipulatives to look for patterns and make predictions than students in regularly taught lessons. Nattiv (1994) provided training in “helping behaviors” to three teachers who already used cooperative learning. As a result, the third through fifth grade students of these teachers were observed to ask and answer more questions than they did before the training began. When Gillies (2003) interviewed the junior high students in her study, she found that the students’ perception was that they gave and received better quality help while participating in cooperative learning. They were more willing to help each other and gave more elaborate explanations.

Another benefit that was interesting to see was that racial relations improve in schools where cooperative learning is used. When comparing the students from traditionally taught classrooms to those in cooperative learning classrooms, Slavin and Cooper (1999) reviewed the research regarding the eight

most popular forms of cooperative learning and found that all eight types promoted positive race relations in classrooms. They found that students in traditional classrooms usually made friends of the same race. Students in cooperative learning classrooms, however, had friends of all races, and their friends were usually the students from their cooperative learning groups. Kagan also found in a 1980 study of more than 1,500 students that self-segregation among students disappeared in schools that used cooperative learning techniques (Brandt, 1989). Gillies (2003) also found that students “were more willing to help and promote each other’s learning” (p. 209).

A consideration of low-achievers and cooperative learning

Since my classroom has so many students who are labeled low-achievers, I wanted to look especially at the effects of cooperative learning on this group of students. I found mixed results as I researched this area. While lower-achieving students enjoy cooperative learning and report that they feel like they learn more, they also report a lot of uncertainty (King, 1993). King interviewed eight high- and low-achieving third graders extensively in order to find out their perceptions of cooperative learning. He found several characteristics of low-achievers. These students tend to either remain passive in their groups or become dependent on higher achievers. He also found that low-achieving students are often ignored in their groups, and they express frustration and insecurity about their ability to contribute anything of value to the group. This tendency was also found in Mulryan’s (1995) study of 48 fifth and sixth graders. In her observations and interviews, she also found that teachers can contribute to the problem by communicating lower expectations for these students. If low-achieving students do not feel like they can contribute to the group, they will often withdraw from the group. In contrast, however, King’s study found that low-achievers do ask good questions and do not seem to have trouble asking for help in their groups (1993). Unfortunately, King’s study also found that in spite of enjoying being a part of a cooperative learning group, low-achievers “were not learning to any significant degree” (King, 1993, p.413). This is in direct contrast to Slavin’s (1987) assertion that lower achievers do learn more in cooperative groups. King only looked at eight students, and he cautioned against making broad

conclusions about his results with such a small group of students. He wondered if factors such as teacher expectations and training of the students were factors in his findings.

Another facet of lower achievers' learning during cooperative learning that must be considered is the influence of the high-achiever. Low- and high-achievers are both aware of their "status" in the classroom, according to King (1993). King also found that it was common for lower achievers to not be allowed to contribute to the group's discussion. If roles were assigned, the low-achiever was easily talked out of his or her role, usually without conflict. During discussions, low-achievers were also manipulated into following the group's ideas, even if the low-achiever knew that his/her own idea was correct. Some students, particularly higher achievers, were impatient with low-achievers when they tried to ask questions, and King found that as a result, low-achievers were not as active in their groups as the rest of the members. Mulryan (1995), reported that low-achievers tend to view themselves as dispensable, and they assume that they do not need to participate because they have nothing to offer. She cautioned against allowing a "caste system" of "helper" versus "helpee" to develop and block the very nature of discussion that makes cooperative learning so worthwhile. Slavin and Cooper (1999) also pointed out that "children often re-create the status differences of the larger society in their groups" (p. 652). Peterson and Miller (2004) reported that the college students they interviewed in cooperative learning situations felt self-conscious and worried about how they were being perceived by their group's members. They cautioned that teachers should carefully monitor lower students to make sure that they are in fact feeling like a part of their group.

Cautions/concerns when implementing cooperative learning

Because I am so new at using cooperative learning strategies, I also investigated some of the limitations or cautions about using cooperative learning, and I found several. The first dealt with the importance of preparing my students to work together in their cooperative groups. Good (1989) said that intermediate students should begin working with as little help from the teacher as possible as soon as it is feasible, but Mulryan (1995) and King (1993) both cautioned that teachers should not assume that

students know how to work cooperatively and that time should be given to ease the students into the process by giving them progressively more complicated tasks that will develop their skills.

Passivity is another concern that teachers will need to consider while using cooperative learning. High-achievers in particular may want to work alone or control the groups they are placed in (Good, 1989; King, 1993; Quinn, 2002). Teachers need to watch for lower achievers who want to withdraw or let the group work around them in order to cover their insecurity or lack of abilities. King's study found that these problems tended to stick throughout the duration of his study, and he found that students' perceptions of each other were very slow to change. Teachers need to be very aware of these concerns, and they need to be particularly vigilant in making sure that students do not end up repeating old cycles in their new cooperative processes. Slavin and Cooper (1999) suggested publicly and positively commenting about lower students' skills in order to raise the perception of their worth in the classroom.

Another concern is the worry about how girls do in the math classroom compared to boys. Mulryan (1995) was concerned to find that girls asked many more questions than boys in their cooperative groups, and that they gave less information than boys did. The girls' questions dealt more with procedures and directions, and she wondered if the questions came more from insecurities than inability to carry out the tasks. However, Nattiv (1994) found no such differences in her study, and she hypothesized that the teachers had done such a great job of training both groups of students that gender ceased to be a variable. Mueller and Fleming (2001) studied six groups of students working cooperatively. The groups were not assigned a leader, and they were interested to find that in all six groups, the leader who emerged was a girl. They wondered if this was due to girls having more developed language skills. Either way, teachers need to be alert and make sure that boys and girls are prepared to use the skills required to complete a cooperative learning activity.

One last concern that surfaced in the literature was that of materials. Good et al. (1989) found several obstacles to the successful implementation of cooperative learning in the mathematics classroom. One was the lack of classroom materials suitable for cooperative learning activities. They were concerned about teachers developing activities that may or may not be suitable for the grade level where they were

used and may or may not connect to the curriculum satisfactorily. Another related concern was that of activities that were deep enough to be successful as a cooperative learning activity. They pointed out that computational activities and worksheets should, in general, be used for individuals rather than groups. They went on to suggest that teachers choose problem-solving activities where the solution was not obvious to anyone at first so that everyone in the group had a chance to grapple with the material. Teachers sometimes err when assigning cooperative learning activities by either allowing too much or too little time for students to work, and they also err when they do not plan enough time for the groups to come together as a class to summarize and discuss findings. Making sure that teachers receive enough training to become efficient in using cooperative learning strategies and making sure that they receive support along the way are two other concerns cited by Slavin and Cooper (1999), Mueller and Fleming (2001), and Peterson and Miller (2004).

Conclusion

Implementing cooperative learning in the classroom would be a challenge, but the benefits would definitely outweigh the challenges. The class I had this year came with many, many challenges, and I felt myself burning out from carrying the weight of trying to meet my students' needs while trying to do things the way I always had. After reading the research about cooperative learning, I felt like I might have been thrown a lifeline. The only article I found that dealt with students who had behavior problems was the Quinn (2002) article, and I hoped that my project would show that cooperative learning could make a positive difference in the attitudes and behavior of my class of nineteen students—a class that is, unfortunately, known throughout our school as being an extremely difficult group of young people.

Although the research shows improvement in achievement through cooperative learning, I was not expecting to see significant results in the achievement of my students during the course of my study. My time period was too short, and what my students desperately needed was not an increase in their achievement scores, but a chance to learn positive and constructive behaviors. I really hoped for an increase in on-task behavior, engagement, and communication skills as my students did cooperative learning activities.

After reading about the perceptions of students who participated in the studies of others, I found myself especially interested in the perceptions of my own students as we implemented cooperative learning in our classroom. The interviews and journal responses were the pieces of this research that I looked forward to the most. I could not wait to get inside the heads of this group of students.

Another goal of my research was to see if using cooperative learning changed the way I perceived my teaching and the expectations I had for my students. There was little if any research about the cooperative learning teacher's feelings and perceptions. I was hoping that my journals would show improvement in my feelings about teaching. Through my journaling, I also hoped to find evidence that I was better understanding my students and how best to change my teaching in order to meet their needs.

PURPOSE STATEMENT

My plan was to incorporate cooperative learning into my math class. I was hoping that using cooperative learning would teach my students to become less focused on competing for attention and more interested in learning and communicating about mathematics. I was also hoping that using cooperative learning would help me remember and regain the energy and love for teaching that I once had. I wanted to know if my students' attitudes, levels of participation, and quality of work would change if I changed my teaching. I also wanted to know if and how my teaching would change.

My research questions were as follows:

- What happens to student attitudes toward math when I implement cooperative learning structures?
- What happens to the level of students' engagement and participation when using cooperative learning strategies in math class?
- What happens to the quality of student work when I implement cooperative learning structures in math class?
- What happens to my teaching and to my expectations of students when I implement cooperative learning structures in math class?

METHOD

I began using cooperative group work on February 16, 2009. I put my 19 students into three groups of four and one group of three, and I tried to plan the groups so that there was a high-ability student, a low-ability student, and one or two middle-ability students in each group. Happily, we began a

chapter on data at the same time that we began the study. This enabled me to teach the entire chapter using cooperative learning strategies.

I had originally planned to use specific cooperative learning structures from the book by Kagan (1994). This quickly proved to be too big a challenge for me. My lack of formal training on cooperative learning and trying to find structures to fit each specific lesson that I needed to teach while balancing all my other responsibilities was clearly not going to work. In the end, I did use some of the activities in his book, but I really focused on just designing lessons and activities that would allow my students to work together. I also took the advice of other teachers and used group activities that had worked for them in their classes.

During an average day in our class, I would teach for about 10 minutes so that the students would have the information that they would need to do the activity. The next 20 or so minutes were devoted to a group activity, and the last 10 minutes were supposed to be discussion time so that the groups could share their responses and results. One of my class's favorite activities was the "tour" during this time. Each group would take turns "hosting" the other groups and sharing what they had learned that day. When I noticed that the same students in each group were trying to share every day, I numbered each group's students with a 1, 2, 3, or 4. Then during "tour" time, the 1's started in one group's area, the 2's in another, and so on. When the person in the group got to his or her own area, that student was responsible for explaining his or her group's results to the rest of the group. This made each person in each group responsible for the information to be explained.

I quickly realized that planning a group project every single day of the week was going to be very difficult because several of the activities needed more than one day. My goal became to use some type of cooperative learning/group project at least three days a week. This turned out to be a very manageable goal.

To investigate my students' attitudes as we progressed through the project, I gave the students a survey on February 16 and followed up with the same survey at end of the study on April 28. The April survey included a couple of additional questions that dealt with how the students felt their answers

changed during these months (see Appendices A & B). I also conducted two interviews on March 21 and at the end of the study on April 29 (see Appendix C for sample questions).

Additionally, I kept a personal journal during this time to detail what was happening in my room. My goal was to journal once a week formally. A few weeks into the study, I realized I was collecting a lot of information from my point of view, but not enough information from my students' point of view. I started having the students rate each other's participation during our group activities on a scale of 1-3, and then they were asked to answer three questions: *What worked today?* *What didn't?* and *How can I help?* This daily student journaling also helped us address some behavior issues that continued to plague my classroom during the time of the study.

One dilemma I ran into was that my students started asking to change groups about halfway through the project. This was not something I had planned for, and I was stumped for a couple of days about how to handle it. I finally made the decision to keep the groups the same during the entire study, and I was glad that I did because the students reported later that their feelings toward their groups did improve as time went on. Another issue I faced was remembering to write down things that I heard during class time. I often became so excited about things that I was seeing or hearing from my students that I would get involved in the group and forget to write down what it was that excited me. I think I missed some important information because I forgot that I was both teacher and researcher and became caught up in the role of teacher.

I struggled a bit with which data to include. I originally wanted to compare test scores of my students before and during cooperative learning. When looking at the scores of the test we took before my research started and the test we took during the study, the vast majority of students' scores improved; in the most drastic case, one student's score improved by 47 points. Unfortunately, this improvement was not necessarily due to my students' participating in cooperative learning groups. The test my students took before the study began was over operations with decimals, and this is traditionally a very difficult test. The test we took during the research was over data collection, and it was not nearly as difficult as the

previous test. Because the difficulty level between the two tests was so completely different, I ended up excluding this data from my study.

I also chose not to use report card grades as data for this paper. One reason was the difference in difficulty level between the two units, but another reason was that I had not completely figured out how to handle the issues of group work and fair grading practices. I had not settled the matter of grading in my own mind yet, and I did not want that to factor into any of my assertions until I could justify my own philosophy. I also found that I did not take as many grades during my study, and that was another issue in my decision not to use report card grades as data for this paper.

By far my biggest frustration during these past few months was the issue of time. I would teach the students what they needed for the activity. The students would do the activity, and invariably I would find myself rushing them through their discoveries so that we would have enough time for discussion at the end of the period. I constantly struggled with my need to cover the curriculum and the students' need for time to process and discuss what they were learning. There were many days that I wished for longer than 40 minutes so that we could finish a lesson properly—with the students having the time needed to share their learning with each other.

FINDINGS

As my students participated in more cooperative learning projects and learned to work together, several findings emerged. Following are the results that I saw in my classroom. In almost all cases, the results of cooperative learning were positive for my students and for me.

Engagement and participation

Almost immediately, differences in my students' engagement and participation started to appear. Already on February 20, I wrote in my journal that "the noise level is down and more kids are on task." This was a huge surprise for me because I had expected that allowing my students to work in groups would result in a louder classroom. The noise level in my classroom became much more tolerable, and the students were much more focused. After some analyzing, I realized that my students were using their

energy to work on math rather than to disrupt the class. I still had noise, but it was the focused noise of groups that were actually discussing and working together on math tasks.

My students became much more engaged and excited, much less disruptive, and more willing to participate when we used cooperative learning groups in math class. From the very first attitude survey, the vast majority of my students said that they learned more when they worked in groups (see Table 1). During that first week, I also wrote that during an activity on range, mean, median, and mode, there were “absolutely ZERO disruptions and I did not need to redirect anyone to get back to work.” The students were immediately more receptive to my teaching as well. The second Monday of the study, I was greeted at the beginning of math class by a student asking me, “Are we going to do one of those group projects in math today, please?” When I reviewed the content from the week before in class that morning, almost every single student had his or her hand up. This was the first time the entire school year.

The engagement and participation of my lower kids even improved. The next week, I wrote, “My lower level kids seem to do better with the hands-on activities in the group, and they know it. This confidence allows them to contribute to the group—and that makes them really excited.” In March, I wrote that during a graphing activity connecting bar graphs to circle graphs, when I asked the students not to say anything but just to raise their hands when they realized what was happening, “Hands started shooting up—but they did not speak (a couple did start squirming and groaning).” This was the class that I described in my problem statement as blurting out every thought that came into their heads. One of my students wrote excitedly on his daily assignment, “I’m having a good time with my class—it’s fun!”

One of the groups I put together was a group of four students with rather abrasive personalities. They were all students with great potential, but two of them had a lot of problems finishing class work. The third was fiercely independent and determined that she would hate group work, and the fourth was very impulsive and emotional. This was a group that I believe had some of the greatest success. In March, as the groups were converting bar graphs to circle graphs, I happened to walk by and was amazed and delighted to hear that they were quite naturally assigning each other roles and were making decisions democratically. One of the group members said, “I’ll put my pencil in the middle of the circle. Raise your

hand everybody if you agree with me.” Another group member suggested, “I’ll color, but will you write your fancy title? It will look really good.”

Other people began to notice the success my students were having. On March 17, Arlene Mitchell, a researcher from an evaluator from RMC Research Corporation, Denver, CO., came to observe my class for Math in the Middle. After the class left the room that day, she said, “I was SO impressed with your groups. How did you get them to work that well together?” That night, in my journal, I wrote, “HALLELUJAH! IT’S WORKING!!!!” When I shared Ms. Mitchell’s comment with my students, one student said, “Someone who saw us at the beginning of the year would think that now we’re a totally different group of students.” Others in the group agreed. Another student said, “Now people on the outside would think that we’re good math students.” Still another student said, “Yeah, before we were just running around. Now we’re a lot quieter, and everyone knows how to do math.”

At the beginning of the study, I struggled with the fact that as I walked around the room, my students would abandon each other and want me to help answer their questions. Many comments in my journal centered on the frustration of needing to walk around to listen to the groups, but feeling like I stopped the groups’ progress because the students would try to ask me questions instead of each other. I tried really hard to re-direct individual questions back to the group, and I also made a rule that no one could ask a question unless the entire group raised its hands. By the end of the study—literally the last two weeks—I finally was able to write the following in my journal,

Oh my gosh! I was walking around today, and I kept thinking that something was different, but I couldn’t figure out what. It finally dawned on me—I’m not talking as much! The groups are asking EACH OTHER questions and explaining to EACH OTHER! Where it used to be that hands would fly up as soon as a group got stuck, now, the students are asking each other. I can walk up behind a group now, and the kids hardly even notice I’m there. I am not ‘nudging’ students along anymore—in fact, one group was even a little irritated when I stopped them to ask them to explain something they had written on their answer sheet.

My students may have been feeling this independence even before I saw it because during the first interview, one of my girls said, “We’re paying attention better, and you can tell because if you can’t understand or don’t catch on right away, your group will explain it to you.” During my final interview,

the students talked about how they did not need my help as much as they had before. “Yeah,” said another one of my girls, “that’s because now, we’re all, like, mini-teachers.”

Students’ attitudes toward math and math class

As my students’ engagement and participation in math class improved, their attitudes during math class also improved. At the beginning of March, one of my girls stopped me as I walked around during an activity on mean, median, mode, and range. “I’m feeling smart,” she said proudly. “I’ve never felt smart in math before.” About a month later, she came back to my desk with the paper from that day. “Mrs. Andersen, look,” she said. “I still have this math paper. I think it’s the first 100% I ever got. And I can still understand what I did!” (see Appendix D). On a different day, one of my boys wrote in his daily journal, “This (the tour) was fun because we got to see new things.” One of my girls said, “I liked explaining things to my classmates.” “I liked getting more points of view from different people,” said another student. During my first student interview in March, I asked, “If given the choice, would you choose math the way we are doing it now, or the way we did it before?” My interview group unanimously said they would choose group work over traditional class work.

Additional evidence of this change in my students’ attitudes toward math was seen when my students took a math test over the entire graphing unit. Before the study, test day was always stressful. Many students would raise their hands during the test, and several would stay in at recess to finish. One of my students has a pretty strong test anxiety, so I had to literally stand or sit with him during the entire test so that he would not just write down answers. On the test that we took during the study, however, none of these concerns were issues. As students were leaving the room after the tests, I overheard one student say, “I really get this.” To which her friend replied, “Yeah. This was easy!” My journal on test day stated, “Today it was all smiles. Two people did not finish the test (during math time), but they had it done during the restroom break time after specials with no trouble at all.”

On the pre and post surveys, the students were asked to rate the statements in Table 1 below on a scale from 1-4, with 1 being *strongly disagree*, 2 being *disagree*, 3 being *agree*, and 4 being *strongly agree*. Between the February and April surveys, the mean answers on every answer except “I understand

math better when I work in a group” rose, although not substantially in most cases. The largest difference was in the students’ answer to “I feel comfortable asking for help from other students when I work in a group,” and shortly behind that were the improvements in the students’ answers to the questions, “Working in groups in math class helps me do better work,” and “I like math.” What I found more informative than the numbers from these survey results were my students’ explanations about their answers.

On the February survey, one question asked the students to tell what they liked about working in groups. Twelve of my 19 students’ answers had something to do with being able to get help. “If you don’t understand something, you can ask for help from friends,” wrote one student. Other aspects of group work that students reported liking dealt with being able to check answers and being able to talk about the problems. On the April survey, twelve of the 19 students still reported that being able to get help was something that they liked. On this survey, one of my students also wrote, “I learn better.” Two other students similarly reported understanding math better as a result of working in groups.

When asked about what they did not like about group work, two students mentioned group members goofing off. Having a group member take over the group was mentioned by four students. Arguing and fighting in the group were other issues. Five students wrote down having issues with students not helping or not working. Four students said that there was nothing they did not like about working in groups.

On the April survey, I asked students to tell me which answers they thought had changed from the beginning of our study. Once again, the issues of getting more help and understanding the math better emerged as themes. “Math is easier in groups, and I understand it,” wrote one student. Another wrote, “Getting more help lets you give ideas and start to like math and get good at it.” “Working in groups helped me a lot to listen and pay attention,” was another comment. One girl said she changed her answers because, “I look forward to math” and “math is fun.” Another student said that her answer to being comfortable asking her group for help changed because, “I didn’t get along with my group that much (in February), but now I do and math is easier.”

In spite of finding that engagement and participation were increasing in math class, I still struggled with students either arguing or not working. On March 26, I wrote, “I had a really tough day with my students today. Everyone was really bouncy, off-task. One kid completely refused to work at all. I had a terrible time getting students to follow directions.” Another entry a couple of weeks later stated, “My highs still try to take over, and my lows still tend to be passive...this is still a challenge.” During both of my interviews, my students reported not liking the fighting that went on in their groups. “They don’t pay attention and when you call them up they’re like, ‘How do you do this problem?’” During the final interview, one of the students said, “My group did get better, but we argued and sometimes someone wouldn’t work.” Several times during the study, a student would report in his or her daily assignment that someone in their group was not working.

Table 1: Survey Question Means

	February	April	Difference
I feel comfortable asking for help from other students when I work in a group	3	3.39	.39
Working in groups in math class helps me do better work	3.41	3.76	.35
I like math	2.29	2.64	.35
I think I pay attention better when I work in a group	3.18	3.47	.29
People think I have important things to say in math class	2.64	2.76	.12
I like to work with other students	3.59	3.7	.11
Working in groups in math class is helping me get along better with my classmates	3.35	3.41	.06
I’m good at math	2.59	2.65	.06
I understand math better when I work with a group	3.47	3.41	-.06

Quality of Student Work

One of my research questions dealt with whether the quality of students' work would change. While I did not notice much of a change in the quality of their written work, I did notice that my students felt like their ability to do math had increased. "Before we started in groups, I just bombed assignments," one of my students told me during the final interview. "Yeah," said another, "Before this there were times I just put something down on the paper, and then when you would give back the papers, I would think I should have done it differently. Now I have ways and I have better ways." Other comments representative of students' views of their increased understanding from my April interviews include:

- I think we look smarter.
- We really, really understand it more because our group understands it more.
- At the beginning it was really hard not to give the answers, and one person always got the answer first. Now we get the answers together as a group and go around and talk about what we got.
- Now we can tell someone what they did wrong, then they can figure out how to get the right answer. They need to learn how to get the answer.
- We went to the book sometimes to help us re-explain it.

My students also seemed to become more willing to think about math and share that thinking with me. One day, as we talked about and built equivalent ratios, we looked at two pizzas that one group had drawn. "Why does $\frac{1}{4}=2/8$? What does 'equals' really mean," I asked. Several of the students said that they were the same, but a couple of students said that one piece of pizza was not the same as two pieces of pizza. After some discussion, one group said, "It's the SIZE that's the same-not the numbers. It's the amount that has to be the same even if it looks different because of a different number of pieces." In my journal later, I wrote, "That felt good." The same day, my students designed equivalent ratios in their groups, and we all rotated around the room to hear each group explain. One group had drawn $9/10=18/20$ and had illustrated our classroom ratio of 9 boys to 10 girls. "But," the group quickly explained, "This isn't a real life ratio." "Why not," I asked, thinking that they were confused. "Because if we happened to get nine more boys, we wouldn't automatically get ten more girls—that just wouldn't happen," said one

of the group members. My students were starting to look at the numbers from a place that they had not been before; this was the first time all year I had heard them discuss math like this.

Changes in my teaching

My students were not the only ones unchanged by my study. My attitude toward teaching improved as well. Already at the end of February, I wrote in my journal, “I’m not constantly dealing with behavior, so I have time to engage more with the students.” A month later, I said, “I feel like I’m getting to know them better and that they are treating me as more of an ‘equal’ rather than just the disciplinarian that needs to be taken down. We are joking more, discussing more, and enjoying school more than we were before.” My students also noticed this difference. One of my girls wrote a P.S. on one of her assignments. “P.S. Your teaching has gotten better since we’ve been in groups!!” During the final group interview, a boy said, “You were more relaxed and calm.” I wrote in my journal, “I’m finding that there are students in my room who knew more than I gave them credit for before—I am butting in less often for these students and trusting them to explain to me before I do their talking for them.”

As my attitude changed, the activities that I used in math class changed too. Before my study, math class usually consisted of my explaining the lesson, the students doing some practice problems, and the individual students having work time while I circulated around the room and tried to deal with math questions and behavior problems. During the study, without my even planning it, I started adding more open-ended problems and more manipulatives. When we started talking about graphing, I found myself dropping the assignment in the book and instead sent my groups around the building on “spy missions.” Each group was to think of a secret survey question, and then they were to secretly travel around the building collecting the information for their question. Previously, I would never have trusted this group of students to leave my classroom without strict reasons for being gone. During this activity they amazed me by not only being really excited about the idea, but also by conducting themselves perfectly in the hallways. I had previously e-mailed the teachers in my building, warning them about what we were doing, and a couple of teachers even sent replies detailing how well-behaved and excited the students were as they worked on this project. “We’re out of our seats, and we’re still learning,” remarked one of my

students on a daily journal entry. As a result of their success with this project, I began incorporating more activities into math class, and as I loosened control, my students responded by working harder.

On another day, we were working on mean, median, and mode. One of the students asked why not handing in a paper could make such a difference in someone's grade. That day, instead of doing the book assignment in our groups that I had originally planned, I gave the students a list of grade book entries. The students found the current average and then averaged the same list of grades with the addition of a 0%. The job of the groups that day was to figure out how many 100%'s the student with this list of grades would have to earn in order to raise that grade back to what it was before the 0%. Other activities that we did included the human circle graphs that I described earlier. We also polled the other two sixth grade homerooms and tallied the types of fingerprints they had. After graphing the information, we researched fingerprints on the internet to see if the most popular type of fingerprint in the sixth grade matched that of the general population. As negative behaviors decreased, my trust in my students increased, and I was willing to do more and more activities that took us out of the book.

Giving and receiving help

As I went through my data, there was one other significant finding that I had not been looking for, but it emerged so often in my students' responses that I had to include it. The ability to receive and give help consistently showed up in my students' journals, comments, and interviews. In one of his earliest journal entries, a student wrote, "I am getting more help and don't have to struggle to find the answer." "I'm getting more help," wrote one of the girls in hers. "I like working in groups so I get it," wrote a special education student. Another student said, "I like working in groups because if you don't know something they can help you." "I like working in groups because people help me," said an ELL student. My students consistently commented about getting and receiving help throughout my study. Even my stronger students talked about the help they received in their groups. "If I needed help with something and I didn't understand, I asked my whole group, and my whole group would help me understand," said one of my top students. Another of my higher level students wrote the following comment about one of the students who struggled with behavior: "When he gets it, he really helps us all." During our final

interview, the student she was talking about said, “She and I know different things, so when we work together, sometimes she can do it, and sometimes I can do it. We can work together, so we both try harder.” Another student who struggles mightily with behavior said, “Before you were just stressed out because you didn’t get it. Now you can calm down because your group gets it, and they will help you.”

The issue of giving help was another frequent theme with my students. At study time one day, I was excited to see one of my students start to ask me a question about the math assignment, and then change his mind. “Never mind,” he said. Then he turned to ask one of the students from his group—she is a student with an IEP who is often described by teachers as “passive.” This same student said on her journal entry on the last day of the project, “My group listened to me. I could help them too and that feels good to me.”

CONCLUSIONS

During my research, I did learn that “cooperative learning” could mean many things. Several of the activities that we did were highly structured, and then we also did activities that were more loosely constructed. Both types of activities served the purpose of having my students work together and learn to communicate with each other. The findings of Kagan (1994), Brandt (1989), and Slavin (1987) all discussed cooperative learning’s influence on reducing the amount of competition between students, and in my classroom, I did find that my students began to work together in ways that I had previously not thought possible. While I had not considered that my students’ behavior was a result of competitiveness, my students’ behavior, participation, and engagement all improved greatly. They started to get along better with each other and with me, and they demonstrated a strong preference for working in groups rather than working alone.

My research and the research of Peterson and Miller (2004), Gillies (2003), and Mulryan (1995) found definite increases in the amount of students’ participation and communication during math class. My students also began to work more as a team of learners. Communication between my students and me improved immensely as well. Before my study began, my response to the behavior challenges presented by my students was to become stern, more controlling, and more in charge. I believe now that this was the

wrong response. Through cooperative learning, my students and I were provided a way to stop battling over who would be in charge, and we all relaxed and started focusing on math.

Another issue that I dealt with that was supported by the research of Good, et al. (1989) was that of time. While I do not think that I struggled to find activities or materials for my students—probably because this was an easy unit to find group activities for, I did struggle with the issue of finding enough discussion time at the end of each activity. I believe that if my groups could have spent more time communicating about what they had learned during the activity, they would have learned more. I mentioned earlier that I had not had any formal training in cooperative learning before the study began, and I strongly believe that this would have helped me be a more effective teacher during these past few months.

Although I did not list it as a research question, my students repeatedly mentioned that their ability to give and receive help increased as well, and this was supported by the research of Nattiv (1994) and Gillies (2003). I was so focused on finding a way to help my students behave, that I had not considered the importance of students giving and receiving help. I wonder now if this may have been an even more important idea than I had originally thought, especially since it was emphasized by both high and low-ability students.

The research of Quinn (2002), Good (1989), and King (1993) suggested that there would still be problems with lower-ability students wanting to withdraw and higher-ability students wanting to take over. While that was not a problem in every case in my classroom, it was still an issue I needed to address with some of my students. Perhaps the short time of my study was not enough to break some of the patterns or give students the support they needed to change those behaviors.

I found no evidence in my study to support cautions by Mulryan (1995) that girls would struggle more in their cooperative groups than boys. I think that I have a group of girls with pretty strong personalities and a healthy amount of self-confidence. We did not have any problems that were clearly girl-related.

IMPLICATIONS

I have been amazed and excited by the effects of cooperative learning in my math class this semester, and I believe that my teaching is changed forever. Using cooperative learning has definitely been a positive move, and next year's class will begin doing group work immediately. Next year I would like to add more team-building and social skills training to my classes. Those were pieces that I did not have time to implement during this study, and I believe those additions would have increased the positive results I found even more, especially because behavior issues continued to come up during the study. There definitely were a couple of students who could have used additional help learning to work with other students, and I learned that cooperative learning would not make every student behave perfectly. I do need more training in cooperative learning techniques, and I will definitely be spending my summer looking for more hands-on activities and open-ended projects that fit my curriculum goals for next year.

In the midst of struggling with wondering whether teaching is worth it anymore and considering burn-out as a real possibility, I feel a bit refreshed at the end of this study. There are still the challenges of being required to implement a direct instruction program, which I have found is definitely not my favorite teaching strategy. However, math class has really become the high point of my day, and the group projects that we did helped me feel more energized and willing to do the other things I have been asked to do.

Along with my excitement about the changes in my students as a result of cooperative learning comes some concern about how they will do with future teachers. I am worried that my students will encounter more traditionally-styled teachers who will not understand these students' need to communicate and be active, and my students will not be prepared to sit in their seats and follow rules. I wonder if they will be able to go back to a more traditional style of teaching, and I worry that this semester may have hurt them because they will now expect to learn this way. Do they depend on each other too much now? I need to do some further research to address these concerns. I will be following the progress of this class next year because I am interested to see if the changes I have seen will follow the students as they leave my room. I also have made sure to talk to the teachers who will have this group of students next year. I

have shared my findings and related the great success these students had when they were allowed to work in groups.

Another issue I need to further research is that of grading. During this semester, I found that I had fewer grades in the grade book, and I have not yet figured out how I feel about that. I also need to do some research into group grades or consider having a separate assignment that students do independently for their own grade. I wonder how to handle the student who does not do the same amount of work as his or her group members and how that should affect that student's grade.

Using cooperative learning groups in math class helped my students think more deeply in math class. Their attitudes toward math and their behavior improved. They liked math better, and they felt they were learning more. It seemed to me that through cooperative learning I began to work WITH my students' needs rather than against them. It appears that they NEEDED to be social, they NEEDED to be allowed to be creative, and they NEEDED to understand how a skill was relevant to them before they were willing to learn about it. Cooperative learning addressed these needs. Even though the amount of success that I saw for each student was not the same, I still saw success for each student, and that fact alone made this semester worth it.

REFERENCES

- Brandt, R. (1989). On cooperative learning: A conversation with Spencer Kagan. *Educational Leadership*, 47(4), 8-11.
- Gillies, R. M. (2003). The effects of cooperative learning on junior high school students during small group learning. *Learning and Instruction* 14(2), 197-213.
- Good, T. L., Reys, B. J., Grouws, D. A., & Mulryan, C. M. (1989). Using work-groups in mathematics instruction. *Educational Leadership*, 47(4), 56-62.
- Kagan, S. (1994). *Cooperative Learning*. San Clemente, CA: Kagan Cooperative Learning.
- King, L. H. (1993). High and low achievers' perceptions and cooperative learning in two small groups. *The Elementary School Journal*, 93(4), 399-416.
- Mueller, A. & Fleming, T. (2001). Cooperative learning: Listening to how children work at school. *The Journal of Educational Research*, 94(5), 259-265.
- Mulryan, C. M. (1995). Fifth and sixth graders' involvement and participation in cooperative small groups in mathematics. *The Elementary School Journal*, 95(4), 297-310.
- Nattiv, A. (1994). Helping behaviors and math achievement gain of students using cooperative learning. *The Elementary School Journal*, 94(3), 285-297.
- Peterson, S. E. & Miller, J. A. (2004). Comparing the quality of students' experiences during cooperative learning and large-group instruction. *Journal of Educational Research* 97(3), 123-133.
- Quinn, M. M. (2002). Changing antisocial behavior patterns in young boys: A structured cooperative learning approach. *Education and Treatment of Children*, 25(4), 380-395.
- Slavin, R. E. (1984). Students motivating students to excel: Cooperative incentives, cooperative tasks, and student achievement. *The Elementary School Journal*, 85(1), 53-63.
- Slavin, R. E. (1987). Cooperative learning: where behavioral and humanistic approaches to classroom motivation meet. *The Elementary School Journal*, 88(1), 29-37.
- Slavin, R. E. & Cooper, R. (1999). Improving intergroup relations; Lessons learned from cooperative learning programs. *Journal of Social Issues* 55(4), 647-663.

Appendix A

Student Survey

Please answer the following questions as honestly as you possibly can.

	Strongly Disagree	Disagree	Agree	Strongly Agree
1. Working in groups in math class helps me do better work.	1	2	3	4
2. I feel comfortable asking for help from other students when I work in a group.	1	2	3	4
3. People think I have important things to say in math class.	1	2	3	4
4. I like math.	1	2	3	4
5. I'm good at math.	1	2	3	4
6. I like to work with other students when I do math.	1	2	3	4
7. I understand math better when I work with a group.	1	2	3	4
8. Working in groups in math class is helping me get along better with my classmates.	1	2	3	4
9. I think I pay attention better when I work in a group.	1	2	3	4

The things I like about working in groups in math are:

The things I don't like about working in groups in math are:

Appendix B

Student Survey

Please answer the following questions as honestly as you possibly can.

	Strongly Disagree	Disagree	Agree	Strongly Agree
1. Working in groups in math class helps me do better work.	1	2	3	4
2. I feel comfortable asking for help from other students when I work in a group.	1	2	3	4
3. People think I have important things to say in math class.	1	2	3	4
4. I like math.	1	2	3	4
5. I'm good at math.	1	2	3	4
6. I like to work with other students when I do math.	1	2	3	4
7. I understand math better when I work with a group.	1	2	3	4
8. Working in groups in math class is helping me get along better with my classmates.	1	2	3	4
9. I think I pay attention better when I work in a group.	1	2	3	4

The things I like about working in groups in math are:

The things I don't like about working in groups in math are:

Which of your answers to 1-9 have changed since we started doing more group work?

Why do you think so?

Appendix C

Interview Questions

1. What do you like so far about working in groups during math?
2. What don't you like so far about working in groups during math?
3. What changes do you see in yourself as a student since we've been working in groups?
4. What changes do you see in our class since we've been working in groups?
5. What changes do you see in me as a teacher since we've been working in groups?
6. If you had a choice today to keep working with your group or go back to the way we used to do math, which would you choose and why?
7. What else would you like to tell me about working in groups in math?

Appendix D—Student's Paper

100%! EXCELLENT MATH!

≈ Math ≈

2/25/69 p306-307
#1-8

1) 5 yrs ago: 220 It slowly increased
4 yrs ago: 235 and then decrease
3 yrs ago: 250 but it has risen
2 yrs ago: 242 again!
1 yr ago: 258

2. mean-5 3. mean-85 4. mean-12
median-5 median-85 median-12
mode-5 mode-none mode-12
range-4 range-14 range-5

5. mean-138 6. mean-29
median-135 median-30
mode-no mode mode-30
range-39 -

Number of Hilly peeps						
Jan	Feb	Mar	Apr	May	June	July
27	26	30	30	30	39	26

b. mean-30
median-30
mode-30

7. Without Alaska
mean-980
Median-840
mode-none

With Alaska
mean-2,395
Median-1,095
mode-none

8. mean-3.1
median-1 1/2
mode-0

The best way would be to go by the median of 1 1/2, because it is closer to all the amounts of snow.