DOCUMENT RESUME

ED 446 999 SE 064 304

AUTHOR Bernero, Jacqueline
TITLE Motivating Students in Math Using Cooperative Learning.
PUB DATE 2000-05-00
NOTE 27p.; Master of Arts Action Research Project, Saint Xavier University and Skylight Professional Development.
PUB TYPE Dissertations/Theses (040)
EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Cooperative Learning; Elementary Education; *Mathematics Anxiety; *Mathematics Instruction; Motivation Techniques; *Student Motivation; Teaching Methods

ABSTRACT

In many elementary classrooms, math tends to be individualized work with repetitive paper-and-pencil assignments. This research project attempted to generate more interest in math, reduce math anxiety, and make math more enjoyable for students. Through the use of cooperative learning, students practiced and developed social skills needed to successfully accomplish given tasks and projects. Cooperative learning encourages group interaction with assigned roles, with each member sharing responsibility for the group and the work produced. A second grade class of twenty-five Black and Hispanic students worked in a cooperative learning environment for math. Each group completed reflections on how they worked together as a team and what they could do to improve. Groups took part in evaluating their work both collectively and individually. Results indicated that the use of cooperative learning did generate more interest in math and made it more enjoyable for both students and teacher. Students improved academically, socially, and in self-esteem. Having assigned roles caused students to have a sense of responsibility toward the team and the completed work. Plus-Minus-Interesting (PMI) reflections proved to be very helpful and insightful for the teacher and brought ownership to the students. Noise level and monitoring conversation topics proved to be challenges when using cooperative learning. These improved when each team was assigned a "monitor" job to one of its members. This classroom will continue to make cooperative learning an important part of its teaching and learning. (Author)

MOTIVATING STUDENTS IN MATH USING COOPERATIVE LEARNING

Jacqueline Bernero

An action research project submitted to the graduate faculty
for the requirements for the degree of
Master of Arts in Teaching and Leadership

Saint Xavier University
I.R.I./Skylight
Field-Based Master's Program

Chicago, Illinois
May 2000

SIGNATURE PAGE

This project was approved by

Charles J. Nier
Advisor

Christina L. Dougherty
Advisor

Beverly Gulley
Dean, School of Education

ABSTRACT

In many elementary classrooms, math tends to be individualized work with repetitive paper-and-pencil assignments. This research project attempted to generate more interest in math, reduce math anxiety, and make math more enjoyable for students. Through the use of cooperative learning, students practiced and developed social skills needed to successfully accomplish given tasks and projects.

Cooperative learning encourages group interaction with assigned roles, with each member sharing responsibility for the group and the work produced. A second grade class of twenty-five Black and Hispanic students worked in a cooperative learning environment for math. Each group completed reflections on how they worked together as a team and what they could do to improve. Groups took part in evaluating their work both collectively and individually.

Results indicated that the use of cooperative learning did generate more interest in math and made it more enjoyable for both students and teacher. Students improved academically, socially, and in self-esteem. Having assigned roles caused students to have a sense of responsibility toward the team and the completed work. Plus-Minus-Interesting (PMI) reflections proved to be very helpful and insightful for the teacher and brought ownership to the students. Noise level and monitoring conversation topics proved to be challenges when using cooperative learning. These improved when each team was assigned a "monitor" job to one of its members. This classroom will continue to make cooperative learning an important part of its teaching and learning.

TABLE OF CONTENTS

CHAPTER ONE

PROBLEM STATEMENT AND CONTEXT

When people are asked to describe their feelings about their own mathematics ability, they often respond with such negative statements as, "I was never any good at math... I just couldn't get the hang of it... I was too dumb even to ask a question when the teacher explained something." These kinds of statements are typical of those made by people who dislike math and have a high level of mathematics anxiety. Mathematics anxiety is a fear of math or an intense, negative emotional reaction to the subject. Some researchers who have studied the problem contend that a majority of adults suffer from mathematics anxiety to some degree, and it frequently starts in the elementary years (Kennedy and Tipps, 1994). Many people have given up on math because they learned to fear it when they were young. This fear or loathing of math "seems to make people unempowered to make decisions themselves. Instead they'll defer to someone they think is smart," explains Marilyn Burns, founder of Math Solutions Inservice and Publications (as cited by Rasmussen, 1999, p. 2). Once adopted, these feelings of math anxiety are hard to lose, even in adulthood (Rasmussen, 1999).

At the second grade level this has been seen to be evident in many students. Students who have difficulty grasping an idea/concept soon become frustrated and want to give up because they "just don't get it." After a few experiences like this, students begin to assume they will never be able to do well in math because they are just not smart enough.

Problem Context

Besides students who may be feeling math anxiety, there are students that may find math to be just plain boring, given customary paper-and-pencil repetitive math problems. Adults who

had negative feelings regarding math report certain teacher practices and expectations that also contributed to their anxieties (Kennedy and Tipps, 1994). Among these are:

1. Lack of variety in teaching-learning processes
2. Emphasis on memorization
3. Emphasis on speed
4. Emphasis on doing one's own work
5. Authoritarian teaching

Kennedy and Tipps also describe some shortcomings/failures common to typical math instruction. Among other things, they maintain that in many elementary math classes more than 70% of time is spent in independent practice, mostly with workbook and paper-and-pencil tasks. This means that children often have had little instruction in the mathematical concepts and processes they practice. "Do your own work" has been a dictum in many elementary classrooms. They also maintain that children have usually been forbidden to help others or ask others for help. Many times, teachers will accept only "one right way" of working problems. Such practices can lead students to believe that mathematics is inflexible, lacking creativity and fun (1994).

Besides the emphasis of doing individual work and the students' home life, a third cause for math anxiety and low interest is the lack of variety in the teaching-learning process. In many classes, the majority of time is spent in independent practice. This means the children often have had little instruction in the mathematical concepts and processes they practice. Lorelei Brush reported that students in grades 6-12 disliked mathematics and were bored with "repetitive assignments which require them to solve a series of very similar problems" (Kennedy and Tipps, 1994, p.15). This problem is long-standing and persistent.

> Where active work is going on, all this is changed. Helping others, instead of being a form of charity, which impoverishes the recipient, is simply an aid in setting free the powers and furthering the impulse of the one helped. A spirit of free communication, of interchange of ideas, suggestions, results, both successes and failures of previous experiences, becomes the dominating note of the recitation .
>
> (John Dewey, as cited by Taylor, 1999, p.1).

Cooperative Approaches to Mathematics

The focus of this study is to see to what extent the use of cooperative learning will generate more subject interest, reduce math anxiety, and make math more enjoyable for students. "Teachers who encourage 'group work' know about the social and academic benefits for children who work together, share ideas, and explain concepts to help one another understand mathematics" (Kennedy and Tipps, 1994, p. 15). Cooperative–learning practice has produced positive benefits in many areas:

1. Academic achievement
2. Self-esteem and self-confidence as a learner
3. Intergroup relations, including cross-race and cross-culture friendships
4. Social acceptance of mainstreamed children
5. Ability to use social skills (when these are taught)

(Kennedy and Tipps, 1994).

In the earliest settlements, pioneer families knew the benefits of tutoring their children in groups. Very often, older students were paired with the younger "to cipher the slates," read stories and review their bible lessons. In pioneer schools, where several families bunched their children into one room, the teacher relied heavily upon children to help each other with lessons. Well into the twentieth century in rural America, the one room schoolhouse with cross-age tutoring, cooperative learning groups and group investigations were the norm. Not until the

urban school emerged and the modern factory arrived did schools adopt the "assembly line" model of teaching and learning (Bellanca and Fogarty, 1991).

Direct teaching is the mode of learning experienced by many people. Learning in this manner tends to be very passive and memory-based, making low cognitive demands on learners. Robert Gagne has challenged this type of direct instruction as ineffective. He believes the teacher needs to actively engage the students in learning (Kennedy and Tipps, 1994). Conclusions from research on effective learning and teaching are consistent with this thinking. Cooperative learning is one effective tool for instruction.

> "Cooperative learning defined is the instructional use of small groups so that students work together to maximize their own and each other's learning. Within cooperative learning groups or cohorts, students are given two responsibilities: to learn the assigned material and to make sure that all other members of the group do likewise. In cooperative learning situations, students perceive that they can reach their learning goals only if the other students in the learning group do so. Students discuss the material to be learned with each other, help and assist each other to understand it, and encourage each other to work hard."
>
> (Johnson and Johnson, 1992, p. 174 as cited by Taylor, 1999, p.3)

The National Council for Teachers of Mathematics (NCTM), as well as most other national organizations that contribute to the planning of school curriculum, has long recommended that instruction in math, as well as other subjects, rely less on the teacher and more on small group learning (Bell, 1978, p.353 as cited by Taylor, 1999, p. 5). It will be necessary to teach social skills prior to using cooperative learning in math to ensure that it will be used most effectively. Since it is likely that these students have not been exposed to cooperative learning in the first grade, this will be a new learning experience. The social skills that will need to be learned include what the role of each member should look/sound like, rules, and expectations.

Demographics

This school is located in the southeastern section of a large city. The student population consists of 94.8% low-income students. This could have a negative impact upon student achievement and motivation because home life necessarily emphasizes the basic needs of living and therefore, possibly, not on education. The average classroom teacher-pupil ratio is 1:29. This school is comprised of 4% White, 44% Black, and 52% Hispanic students with a 30% mobility rate. An average of 45-50 minutes is spent teaching Math at second grade. This site is a medium-sized elementary school (pre-kindergarten – 8th grade), with approximately 625 students. Sixty-four percent of students scored below national norms on the IOWA Math Tests. A greater number scored low on the Reading portion. These achievement levels have been of great concern to both administrators and teachers.

The community is a low-income area of primarily Black and Hispanic families. Gangs are quite active in this area, another probable contributing cause for the lack of motivation in school.

Summary

In the past, direct instruction has been used as the primary way of teaching mathematics at this school, which is quite consistent with the way the subject has been taught generally. Since an emphasis on individual work, the students' home life, and using direct instruction as the primary way of teaching mathematics have contributed to math anxiety and low interest, this study intended to ascertain whether adding cooperative learning to the math curriculum as an instructional strategy would alleviate these traditional student problems.

CHAPTER TWO

PROBLEM EVIDENCE

> "Almost the only measure for success (i.e. in schools) is a competitive one, in the bad sense of that term- a comparison of results in recitation or in the examination to see which child has succeeded in getting ahead of others in storing up, in accumulating, the maximum of information. So thoroughly is this the prevalent atmosphere that for one child to help another in his task has become a school crime. Where the school work consists in simply learning lessons, mutual assistance, instead of being the most natural form of cooperation and association, becomes a clandestine effort to relieve one's neighbor of his proper duties. "
>
> (John Dewey as cited by Taylor, 1999. p.1)

Too many students have gone through school learning this way, expected to listen and understand the content taught, on their own. Asking for help from a peer would be cheating! Student learning is to be done on an individual basis. This causes competitive feelings among students and an unwillingness to work with or help your neighbor. Working alone can be frustrating and boring after a while. This is a sure way to increase one's anxiety and/or lack of interest in any subject, and quite possibly contributes to why there are so many people "turned off" to math.

School Portrait

It has been noted that when students have been required to learn and master a math concept without help from fellow students, they become easily frustrated, sometimes bored, and definitely feel anxious the next time they hear "take out your math books." At the target school students come from a low-income home where the danger of gang activity and drugs is always nearby. The majority of students come from a one-parent home, which may provide even less attention and help for the child. It is no wonder the students have difficulty concentrating and enjoying school! Living in this kind of atmosphere easily develops a competitive, as opposed to

a cooperative, attitude. Once the child leaves school and is back home, priorities may very well shift from education to "survival of the fittest" and "get all you can." To assure that the student, or even the parent, makes homework a life priority in their life may be quite unrealistic. Consequently, it is common for teachers to see students get behind in their studies and eventually become frustrated.

Preliminary Data

Surveys were distributed to seventy second grade students to find out their like or dislike for both math in particular and school in general (See Appendix A). The purpose of this survey was to ascertain if:

1. the assumption that many students suffer from math anxiety and/or lack of interest is accurate; and,
2. using cooperative learning as a tool to teach math would increase math interest and enjoyment.

Sixteen surveys were distributed to math teachers at this school to find out how they perceive math anxiety or low math interest as a problem (See Appendix B). The teachers were to indicate the number of students taught and the teaching style most often used. They were to indicate how they felt their students perceived math throughout the year and school in general. From the 12 surveys returned, all teachers indicated they teach math using direct instruction as a main teaching method. About half of these teachers report their students have a strong dislike or understanding of the math concepts being taught as the year progresses and they are studying new concepts. Five teachers indicated they incorporate some type of cooperative learning style for teaching math along with direct instruction. Teachers reported the majority of their students showing great interest and enjoyment when it came time for math activities.

From the survey given to the entire second grade students, 20% showed a dislike/interest in school in general and 40% showed a lack of enjoyment specifically in math.

These surveys suggest that the school has shown itself to be continuing the direct method of teaching, at least in the area of math. As was noted, a great number of students learning math through this method of teaching are uncomfortable with math, resulting in low academic achievement. This supports Robert Gagne's theory that direct instruction is less effective, as noted in Chapter One. According to teachers who use cooperative learning in our school, all children showed positive interest towards math. This directly correlates to the comment made by Kennedy and Tipps, also noted in Chapter One, that cooperative learning benefits children socially and academically and increases their self-confidence. This evidence supports the reasoning for making cooperative learning an important part of teaching math to increase the students' enjoyment and understanding of math. It is expected that cooperative learning will improve social skills and social acceptance between races and mainstreamed children.

This study intends to systematically investigate and report the benefits and attitude changes resulting from cooperative learning being used as an important tool in learning, and to what extent cooperative learning apparently modifies existing student perceptions toward math and possibly school in general.

CHAPTER THREE

SOLUTION STRATEGY

Class Profile

The second grade class consisted of 25 students- 15 boys and 10 girls. The class is comprised of 25% Hispanic and 75% Black. From past observations, the entire Second Grade class was noted to be exceptionally active with many behavior problems. To prepare the students for cooperative learning, the teacher took time to discuss important social skills needed in order to ensure successful learning. A few general rules were established:

1. Each member has an assigned job and is an important part of the team
2. One person speaks at a time, everyone else listens
3. All members must agree on the finished assignment and sign off on the paper
4. If a member disagrees with something, he will politely wait his turn and then voice his viewpoint
5. The team will work together to come to an agreement on divisive issues

The teacher role-played with students modeling, positive and negative ways of working together and handling differences of opinion.

Action Plan

At the beginning of the year, cooperative learning was used about once or twice a week as a way of teaching math. At this point, students were put into pairs when working together. When working with place value, the pair needed to use manipulatives to show hundreds, tens, and ones. After agreeing, one was designated as the recorder to draw and write the agreed upon answer. When using various strategies for adding and subtracting, one partner needed to set up the manipulatives to start the problem. The second partner added to or subtracted from the original amount while modeling the strategy used to arrive at the answer. Partners also needed to

develop story problems using addition and subtraction, present these to the class, and model how they came to the correct answers. When working with fact families, partners worked together to arrive at the third number of a fact family and then wrote down the facts. After this, each partner had to illustrate two of the facts.

To demonstrate trading tens and ones for addition and subtraction problems, the students were put into groups of three. Each member had a job as follows: Tens, Ones, and a Banker. The math problem was to be set up using the tens and ones manipulatives. The banker held the extra tens and ones to give out for trading when needed. After the team agreed on the modeling and answer, the banker recorded their work. For the school store, each member was given a number of coins. Each member had to count his money in front of his teammates, then the group figured out the total amount they had. When they visited the store, each student figured out what he could buy, or the team could combine their money to purchase an item of greater value. After the visit, each member shared how much he spent and counted out the change he received , to check that it was right. After many of the group activities, each group filled out a Plus-Minus-Interesting (PMI) evaluation of their group's work and behavior. This form was used for group reflection on working together as a team, and then for each member to evaluate his individual work and contribution to the group. They were to reflect on their performance and think about how they could improve the next time.

Assessment

To assess the success of this project, the teacher took into account:

1. Observations of student interaction with team members and individual appearance of self-confidence.

2. Academic grades of group work and final tests.

3. Post-inventory survey of second grade students reactions toward math.

4. PMI evaluation forms

This project was carried out October, 1999 through March, 2000. Results appear below, Chapter 4.

CHAPTER FOUR

PROJECT RESULTS

Results

From the teacher's observation of student's team interactions, social acceptance and "working as a team" gradually improved. The teacher noticed improvement in the self-confidence of the slow-learners and a more positive attitude with fewer problems from the "discipline problem" students. Academically, students improved in class work and test scores. Figure 1 (p. 13), shows the dramatic increase in the number of students able to keep up their math grades throughout the second and third quarters from previous school years. It is not surprising that one's grades might falter after the first quarter, because they are learning and using new concepts that they have not been exposed to before. This class in general showed they understood and could apply the concepts learned to solve problems. In comparing student's individual work with group work, it was found that students who already did well in math continued to do so both individually and with a group. Those who struggled with math continued to struggle and became frustrated with individual work, but improved both academically and in self-confidence (thus leading to social improvement), when it came to group work. This resulted in 80% of their final test scores being average or above, as compared to 40% during the 1998-99 school year.

According to the post-inventory surveys, student reactions toward school from this particular classroom did not change from the first inventory. Twenty-five percent of this class still had neutral or negative feeling toward school. Their views toward math, however, did change. From the first survey, almost 45% of this class responded with a neutral to negative reaction toward math. After the post-inventory, over 90% of students had a positive response

toward math . Compare this to only 52% of 1998-99 students who responded favorably toward math (see Figure 1). Along with this, two-thirds of the class originally stated they preferred to work alone. By the end of this project, three-fourths of the students stated they would rather work cooperatively.

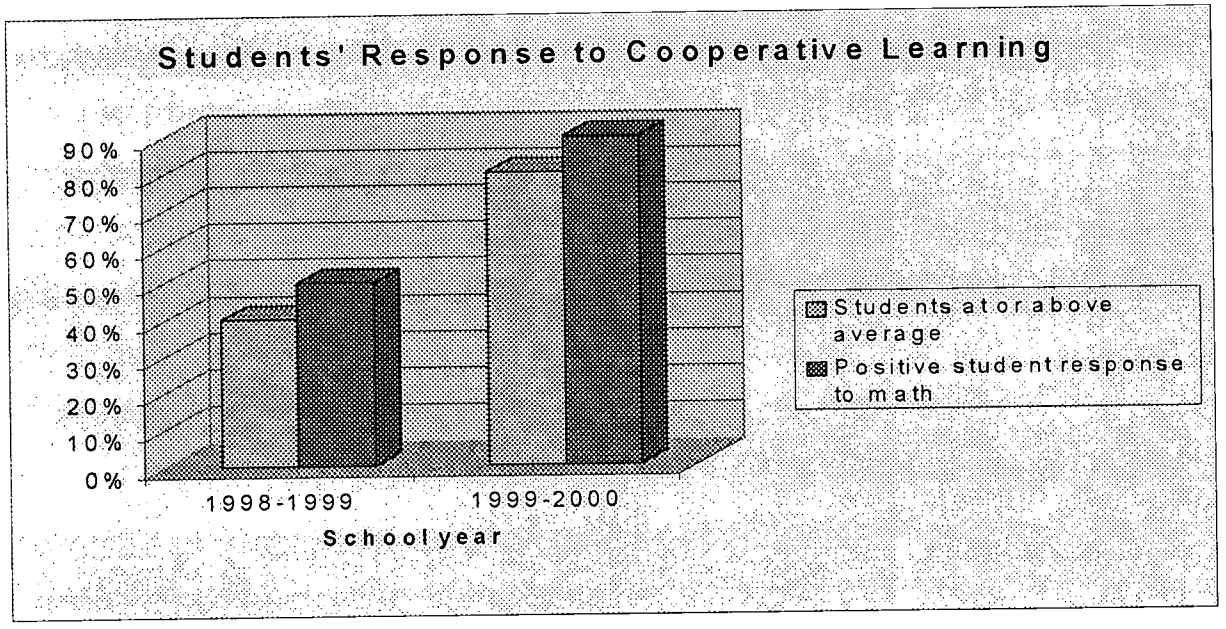

Figure 1: Comparison between 1998-1999 and 1999-2000 student results in math

The use of Plus Minus Interesting (PMI) forms the students filled out brought out much of what the teacher had observed along with other important, and sometimes humorous, thoughts and reactions from the students. Students seemed to like the PMI evaluations. It gave them room to express their thoughts and observations, as well as giving a sense of importance and ownership towards the group's activities. According to the PMI's, 80% of students expressed the importance and enjoyment of working together, helping one another, and sharing. Students also expressed a sense of relief that it was not all up to them to figure it out, there is a team to work through it together. At the beginning of this project, students actually found it to be interesting

(maybe surprising?) that the students were willing to share and work together! Again, these observations made by students helped them see some of their peers in a more positive light.

Discussion

With cooperative learning, it was observed that the social environment of the classroom became more positive. As the classroom engaged in more cooperative activities, a unity, or caring atmosphere seemed to emerge for the class that carried throughout the school day, not only during math. This in turn made the day much more enjoyable for the teacher and students! Discipline problems were fewer, and mainstreamed and slower learners were accepted and felt part of the group. Cooperative learning does much to foster a caring, team-like atmosphere. It definitely builds one's self-esteem and encourages even shy students to assert themselves.

The fact that 80% of students kept their grades at an average level or above can be attributed to students being able to share and hear each other's way of thinking through a problem and coming to a solution. When one is able to use what they are learning by listening, speaking, doing, and teaching (to their peers), the concept, or idea, becomes more thoroughly understood and engrained in one's mind, whether it is math or any other subject matter.

Cooperative learning activities enabled many of the "discipline problem" students to be actively involved in their learning, take responsibility for their job, in many cases use hands-on manipulatives, and allowed room for discussion. Results showed improved relations between the "discipline problem" students and other team members. For mainstreamed and slower students, cooperative learning seemed to help bring them up to speed, possibly because it allowed discussion among group members and a willingness on the team members' parts to help and explain the both concepts and processes. The teacher noticed a definite improvement in the self-confidence of these slow-learners and a more positive attitude with fewer problems from the

"discipline problem" students. Many times, if a student was unable to understand a concept or apply it in the way that was explained, his team members would explain or show it in a different way, and this many times was successful in helping that student back on track. In turn, it brought acceptance and positive feelings among the students, as well as an increase in self-confidence for both the student who was able to help, and the student who now understood. From observation, the class as a whole found enjoyment in cooperative learning activities in math.

While most of the results of using cooperative learning in math were positive, there were also some negative aspects. From the teacher's standpoint, a main problem was how to keep control over the noise level. The class was always reminded before the activities to keep 6" voices, with only one team member talking at a time. Some ways of handling this were to count to three, turn off lights, or do quiet "follow me" activity to get students' attention. As a last resort, it was "heads down!" As the year progressed, the class did improve slightly and the teacher found it possible to have one team member monitor the noise level and conversation topics.

A second challenging area (mentioned above), was the necessity to keep teams/pairs on task. This was not as great a problem as might be expected, but constant monitoring was needed by both teacher and students to make sure teams were on track.

Another challenge was how to deal with students who did not get along socially or disagreed about who was to do what job. When students called for the teacher to settle a dispute, she always encouraged students to work it out amongst themselves. Only as a last resort did she intervene, and even then responsibility was put back on the students, after they had expressed their viewpoints, to come to a decision.

Making sure everyone took responsibility for his or her job was constantly reinforced. This was somewhat of a problem at the beginning of the year. Those students who tended to be reserved and the slower learners were usually the ones who needed to be reminded that their job was an important part of completing the activity. As the year progressed, and everyone became more accustomed to cooperative learning, this did not prove to be a continuing, significant problem anymore.

Addressing the noise level and conversation topics, continues to be an area of concern. The teacher must take into consideration her own tolerance or comfort level of noise, and match that with reasonable expectations of the students. In talking with other teachers, she found this was a common concern (and ongoing struggle) with many. It seems to be important, especially with a group of talkative students, to have a student with the specific job of monitoring the team's noise level and conversation. When this was put into practice, there was some improvement. There were occasions when a student would complain there was too much talking in the room, and this student "couldn't think."

It was expected there would be disagreements at some points among team members, especially because rarely does a day go by when there hasn't been some type of disagreement during the day. The teacher was careful not to put these students together in the same group, so this alleviated much of that problem. Arguments usually occurred because one student was overstepping his boundary, wanting to take over more (or different) responsibilities than his job called for. What usually helped this was when the teacher allowed students to change roles within that day's activity, or for the next day, if time permitted. It is important for students to have a chance at taking responsibility for different roles and respecting other student's jobs without coming in and taking over.

Using the PMIs proved to be of great benefit to both the teacher and students. The teacher was able to get input and personal feelings from the students. This allowed the teacher to take into account how different students work together when forming teams and devising activities. The PMIs, as was mentioned above, seemed to give students a feeling of ownership and responsibility toward their team and the work produced. It also allowed an outlet for them to express their thoughts, concerns, and opinions. The PMI was an important positive part of the activities.

Recommendations

Cooperative learning has proven to be a successful tool to be used in achieving positive results academically in math, as well as socially. The following points are recommended for when cooperative learning strategies are implemented:

* Use PMI's to get input and personal feelings from students as well as an evaluation of student progress
* Take into consideration the teacher's tolerance of noise, combined with reasonable expectations of students
* Designate a student to monitor noise level and group conversation topics
* Take into consideration students who don't ordinarily get along when forming cooperative groups

Conclusion

It is important to have a balanced approach in presenting subject matter to students. There are many times when direct instruction is needed and is the best way to teach a concept or subject. It should be kept in mind that this project did not employ cooperative learning 100% of the time. It was infused gradually and became an often-used way of teaching, as situations

dictated. Given the results of this project, cooperative learning benefits far outweigh the negatives.

REFERENCES

Bell, F. (1978). Teaching and learning mathematics. Dubuque, IA: Wm. C. Brown.

Bellanca, J.& Fogarty R. (1991). Blueprints for thinking in the cooperative classroom. Arlington Heights, IL: IRI/Skylight.

Johnson, D. & Johnson, R. (1992). "Implementing cooperative learning." Contemporary Education, 63 (3) 173-180.

Kennedy , L. & Tipps S. (1994). Guiding children's learning of mathematics. California: Wadsworth.

Rasmussen, K. (Summer 1999). Break the chain. ASCD Curriculum Update, pp.2-3.

Taylor,S. Cooperative learning in a mathematics context. Internet www.indiana.edu/-1506/taylor.html

APPENDICES

APPENDIX A

Teacher Survey

1. Number of students I teach for Math _____

2. The teaching style I use most often when teaching Math

   Direct Instruction

   Cooperative groups

   Other_____

3. Most of my students seem to (enjoy, dislike) math.

4. The students find math to be (interesting, boring).

5. As we learn new math concepts throughout the year, the students become (interested, bored) with math.

6. My students seem to (like, dislike) school in general.

APPENDIX B

2nd Grade Student Survey

When I think of school, I think…

Interesting O O O Boring

Happy O O O Sad

Easy O O O Hard

Useless O O O Needed

Nervous O O O Happy

Good grades O O O Bad grades

_____ is my favorite subject.

I like to work (alone, with a group).

When I think of Math, I think…

Happy O O O Sad

Easy O O O Hard

Useless O O O Needed

Nervous O O O Happy

Good grades O O O Bad grades

In Math I like to work (alone, with a group).

SE0 4304

U.S. Department of Education
Office of Educational Research and Improvement (OERI)
National Library of Education (NLE)
Educational Resources Information Center (ERIC)

REPRODUCTION RELEASE

(Specific Document)

I. DOCUMENT IDENTIFICATION:

Title: Motivating Students in Math Through Cooperative Learning	
Author(s): Bernero Jacqueline M	
Corporate Source: Saint Xavier University	Publication Date: ASAP

II. REPRODUCTION RELEASE:

In order to disseminate as widely as possible timely and significant materials of interest to the educational community, documents announced in the monthly abstract journal of the ERIC system, *Resources in Education* (RIE), are usually made available to users in microfiche, reproduced paper copy, and electronic media, and sold through the ERIC Document Reproduction Service (EDRS). Credit is given to the source of each document, and, if reproduction release is granted, one of the following notices is affixed to the document.

If permission is granted to reproduce and disseminate the identified document, please CHECK ONE of the following three options and sign at the bottom of the page.

The sample sticker shown below will be affixed to all Level 1 documents

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL HAS BEEN GRANTED BY

Sample

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

1

Level 1

X

Check here for Level 1 release, permitting reproduction and dissemination in microfiche or other ERIC archival media (e.g., electronic) *and* paper copy.

The sample sticker shown below will be affixed to all Level 2A documents

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL IN MICROFICHE, AND IN ELECTRONIC MEDIA FOR ERIC COLLECTION SUBSCRIBERS ONLY, HAS BEEN GRANTED BY

Sample

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

2A

Level 2A

☐

Check here for Level 2A release, permitting reproduction and dissemination in microfiche and in electronic media for ERIC archival collection subscribers only

The sample sticker shown below will be affixed to all Level 2B documents

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL IN MICROFICHE ONLY HAS BEEN GRANTED BY

Sample

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

2B

Level 2B

☐

Check here for Level 2B release, permitting reproduction and dissemination in microfiche only

Documents will be processed as indicated provided reproduction quality permits.
If permission to reproduce is granted, but no box is checked, documents will be processed at Level 1.

I hereby grant to the Educational Resources Information Center (ERIC) nonexclusive permission to reproduce and disseminate this document as indicated above. Reproduction from the ERIC microfiche or electronic media by persons other than ERIC employees and its system contractors requires permission from the copyright holder. Exception is made for non-profit reproduction by libraries and other service agencies to satisfy information needs of educators in response to discrete inquiries.

Sign here, please

Signature: Jacqueline Bernero	Printed Name/Position/Title: Student/s FBMP	
Organization/Address: Saint Xavier University E. Mosak 3700 W. 103rd St. Chgo, IL 60655	Telephone: 708-802-6214	FAX: 708-802-6208
	E-Mail Address: mosak@sxu.edu	Date: 4-25-00

(over)

III. DOCUMENT AVAILABILITY INFORMATION (FROM NON-ERIC SOURCE):

If permission to reproduce is not granted to ERIC, *or*, if you wish ERIC to cite the availability of the document from another source, please provide the following information regarding the availability of the document. (ERIC will not announce a document unless it is publicly available, and a dependable source can be specified. Contributors should also be aware that ERIC selection criteria are significantly more stringent for documents that cannot be made available through EDRS.)

Publisher/Distributor:
Address:
Price:

IV. REFERRAL OF ERIC TO COPYRIGHT/REPRODUCTION RIGHTS HOLDER:

If the right to grant this reproduction release is held by someone other than the addressee, please provide the appropriate name and address:

Name:
Address:

V. WHERE TO SEND THIS FORM:

Send this form to the following ERIC Clearinghouse:

ERIC/REC
2805 E. Tenth Street
Smith Research Center, 150
Indiana University
Bloomington, IN 47408