THE IMPACT OF GROUPING IN MATHEMATICS
IN ELEMENTARY SCHOOL

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ABSTRACT

The topic the researcher chose is the impact of grouping in mathematics in elementary school. Points discussed regarding this topic were exploring the reasons behind teachers grouping of students in math. The participants were elementary teachers. In this report, questionnaires were distributed to elementary math teachers. The purpose of this study was to explore the concept of grouping and to understand the personal beliefs and opinions of teachers who group their students by ability in math.
DEDICATION

To my husband Doug and my son Derek
ACKNOWLEDGMENTS

I wish to thank my husband, Doug for all his love and support. Thank you for your understanding, your help and the sacrifices you made in order to make this thesis a reality.

I would like to thank my son Derek, for his patience when I made frantic phone calls needing help with technology problems.

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TABLE OF CONTENTS

Abstract .................................................................................................................. ii
Dedication ........................................................................................................ iv
Acknowledgements ............................................................................................ iv
Table of Content ................................................................................................ v

Chapters 1

Introduction ........................................................................................................... 2
Statement ............................................................................................................. 4
Purpose and Research Question ................................................................. 4
Central Phenomenon ......................................................................................... 5
Definition of Terms .......................................................................................... 6
Limitations of the Study ..................................................................................... 7

Chapters 2

Literature Review .............................................................................................. 8

Chapters 3

Methods ............................................................................................................. 16
Study Design ...................................................................................................... 16
Participants ........................................................................................................ 16
Procedure .......................................................................................................... 17
Chapter 4

Results ........................................................................................................ 18

Chapter 5

Discussion ................................................................................................. 22

References ................................................................................................. 25

Survey Questionnaire .................................................................................. 27
Children are placed in groups and taught together for social and practical reasons. However, the methods of organizing and creating their teaching groups have changed. Today, with greater emphasis placed on achieving standards, there has been a change in the way primary children are being grouped in math and other core subjects. A popular way for grouping students is by ability. This can be done within classes or across classes. Research shows that the reason given for grouping by ability is to assign differentiated work on the topic being taught to the whole class. But, is grouping students by ability versus mixed-ability the best way for all students to achieve? What is the reasoning behind grouping students in math? What are the reasons behind the decisions that have led to students being grouped?

Recent data shows that grouping students in math is on the rise at the primary school level. This means that for some children, by the time they enter secondary school have had up to seven years of being placed in lower-level math groups. Research also shows that grouping students by ability is setting, in a child’s mind, an image of high average or low ability. Are teachers placing a
limit on what students can achieve and will students lose confidence in their own

desire to improve further if a teacher’s view of their ability is fixed on what the
teacher feels is their potential? These types of labels placed on children become
extremely difficult for them to overcome. Since past learning is cumulative, will
there be long-term consequences for student development in math, and will that
student continue to underachieve and be stereotyped? Do teachers take these
questions into account when deciding whether to group students by mixed-ability
or to group students by same-ability?

This study looked at the views of teachers who group by ability in
mathematics and those who have a mixed-ability group for math. Their views
were examined via a questionnaire, which was completed by elementary teachers
at Marietta City Schools, and then evaluated and reported by the researcher who
seeked to show the ideas and views about why some teachers group by mixed-
ability and some group by same-ability, and why do they feel their grouping
procedure is beneficial to all students in achieving success in mathematics?
Statement of the Problem

According to this researcher not much has been done in determining why some teachers in the elementary school decide to group their students in math. Therefore, an attempt was made to determine as to why some teachers decide to have mixed-ability groups when teaching math and others decide to have same-ability groups.

Purpose and Research Questions

According to recent research, there are many reasons and purposes for children to be placed into groups and taught at the elementary school level. This method is now being carried over into the field of mathematics. There has been a major change in the educational and political climate due in part to the debate of educational standards. This has led many teachers to change the way they teach math. The purpose of this study was to discover the reasons behind the trend to group students by ability in elementary math.

This study uncovered the reasons why some teachers decide to group their math students by same-ability and some decide to group their students by mixed-ability. Data was collected through a survey distributed to teachers at Marietta City Elementary Schools. The teachers were asked to provide feedback on their personal views and knowledge of which grouping they believe is best for their students.
Central Phenomenon

What does it mean to be successful in mathematics by grouping students by ability?
Definitions of Terms

ABILITY GROUPING - The practice of placing students with others with comparable skills.

CLUSTER - placing several high achieving students in a regular classroom with other students.

COOPERATIVE LEARNING - instructional techniques that require learners to work together in order for learning to occur.

GROUPING ACROSS CLASS - grouping students from different classrooms by level of academic development for the purpose of teaching a core subject.

GROUPING WITHIN CLASS - a group of students within a classroom who are taught together because they have roughly the same level of academic development.

HETEROGENEOUS - grouping students of different abilities together.

HOMOGENEOUS - to group students together according to their ability.

TRACKING - the placing of students in any several courses of study according to ability, achievement, or needs.
Limitations of the Study

This study is a qualitative study. The researcher was more interested in “why” rather than statistical numbers. It was limited by the demographic region in which the sample was collected. The researcher sampled three elementary schools in the Marietta City School District. The researcher had some trouble getting responses to the questionnaire. According to this researcher, teachers are overloaded with paper work and additional duties. This study examined the views and opinions of the teachers and their beliefs as to why and how they group students for mathematics.
CHAPTER TWO

LITERATURE REVIEW

*Homogeneous Grouping*

One of the many ways to group students in mathematics, at the elementary level, is by ability. The belief is that grouping students by ability is one way to provide for student differences. In homogeneous grouping, students are measured against what other students do and teachers feel that students who are bright and ready to learn need to spend time with other students of the same ability because this is the only way for them to learn. Many studies show that special grouping arrangements can bring about increased student learning (Holloway, 2001). Research has also indicated that moderate gains have occurred in student’s academic achievement when grouped by ability (Becker, 2003). An additional reason for grouping by ability is to improve test scores. Elementary educators, who participated in surveys, stated that the reason they group students by ability is that they were able to provide differential work and to match the work to the individual so that the higher level students were challenged and lower level students were given supplementary work. They group students so they can better target small groups and be able to assign differentiated work. Teachers
stated that grouping by ability made teaching easier and their time was made more efficient. Disruptive students were kept together, able to teach capable children and not having to teach both extremes were also given as reasons why teachers chose to group students by ability. Standard focused motivations also contributed to their decision to group, stating the improvement of test scores, targeting a narrower ability range to better effect and to get better results. Teachers felt they needed to group students so that they could improve standard performance and by creating ability groups, the task was made more manageable.

In several studies, research showed that teachers who grouped homogeneously believed they were able to provide gifted students with an opportunity to be academically challenged. By grouping homogeneously across classes, it also gave teachers a chance to work with other students and it gave students a chance to socialize with different peers. A strong advantage for grouping students, as stated by teachers, was that each child was guaranteed to receive fifty minutes of math instruction (Van, 1999). These are some of the beliefs and ideas the teachers researched gave as to why their students are homogeneously grouped.

**Heterogeneous Grouping**

Mixed ability grouping is another way teachers group their students. Research states that students, when grouped by mixed-ability, learn better and see
more success when they are presented with a variety of teaching methods and are presented with different types of learning experiences that encourage them to take their strengths and challenge themselves to go further. Interaction between students and the teacher and students interaction with other students gives them all the opportunity to discuss and share ideas. Teachers also believe they are able to encourage mixed ability students to stretch their abilities and go beyond their comfort zone, but still keep them from becoming frustrated.

Gardner (2001) characterizes mixed-ability grouping as being the best for all students. He states that students bring experience and different abilities to class. Gardner also feels that all students can be involved in purposeful, valued learning activities and the learning process can be accomplished with a variety of materials. Teachers can also present a variety of ways to present information as well as the students sharing their own learning styles. Heterogeneous grouping will allow for flexibility and assessment can be represented with grades reflecting growth. Research showed that mixed-ability grouping allows students the opportunity to work with students who have the same ability as them and also the opportunity to work with students of different abilities.

*Positive Effects of Homogeneous Grouping*

In contradiction to the positive effect of mixed-ability grouping, research shows that moderate gains occur in student’s academic achievement when students are grouped by ability (Becker, 2003). In order for ability-grouping
practices to be successful, current research states that ability-grouping should be based on the philosophy behind the idea instead of on the fact of grouping itself. Ability grouping should provide differentiations in the content method, speed, and the technique of the teacher (Halloway, 2003). Grouping students with peers who can best support them can include sharing their understanding of a mathematical concept or the discovery of new ways of thinking. Allowing students the opportunity to work with peers who pursue mathematical content closer to their own level of understanding is another positive outcome for ability grouping. They can receive support and pursue mathematical thinking that becomes more complex (Freeman, 2000).

*Positive Effects of Heterogeneous Grouping*

There are many positive outcomes for having mixed-ability grouping according to the research. Students became good role models and the expectations for the students were increased because they had more drive to succeed due to the positive peer influence that was going on in the classroom. The students developed an understanding for there classmates and provided support to them. The differing needs in the class were met because of the influence of the higher achieving students. They took on leadership roles and were able to develop cooperation within the mixed-ability students in the class. (Drecktrah, 2002).

Also reviewed was discussion on which format would lead to a greater
student achievement on the part of the student and which system would benefit all
students, higher-level, lower-level, and on grade level students was researched.
When the groups were compared after a two-year period, the research revealed
that the high-level students in the same-ability classes were slightly higher than
those in the mixed-ability classes. The on-grade level students and the low-level
students, in the same ability groups, were significantly lower than those in the
mixed-ability groups (McSherry, 2002). The positive outcome showed that the
placement of students in mixed-ability math classes did not prevent them from
achieving when compared to those students who were grouped in same-ability
classes. The on-level students and the lower-level students in mixed-ability
classes showed significant improvement in their achievements. Therefore,
according to this research, grouping students heterogeneously will not keep high-
level students from achieving, but it will allow on-level and lower-level students
to be more academically successful in mathematics.

Effects of Grouping

Pros and cons can almost always be found when researching a topic where
there are two differing views. Controversy surrounding grouping includes the
claim that many students are misclassified or are placed in ability groups. The
placing of a student in a specific group can be long lasting, if not a permanent
Placement for that student. Grouping students sometimes is based on
socioeconomic, ethnic, and racial characteristics, as well as low income and being
Grouping in Mathematics

a minority student. These students will come away with a negative academic outcome (Simpson, 1999). Research showed that teachers noted other disadvantages of grouping students by ability. Higher-level ability students who were grouped together in homogeneous classes had lower self-esteem because they had to compete with students of equal or superior ability, while those students who were placed in heterogeneous classes often had better self-esteem (Holloway, 2003). Classroom teachers found that because their instructional day is already interrupted throughout the day, they are unable to extend their math lesson later in the day because they group their students across different classes. Therefore, the students in their homeroom class would be different from the students in their math class. Transition time was also noted by teachers as being a disadvantage. The canceling of math periods, due to grade level or school activities that cannot be scheduled at another time was also discussed by teachers as a negative outcome for grouping students by ability across different classes. Finding another time slot is difficult because of the many different schedules involved.

Ability grouping has come under attack because of concerns over issues of social and economic equity. Researchers expressed concern that the self-concept and self-efficacy of students who are placed in low-ability groups will suffer due to the stigma of such an assignment (Becker, 2003).
Grouping in Mathematics

Grouping Options

The data shows that grouping students in math is on the rise at the primary school level. This means that for some children, by the time they enter secondary school, have had up to seven years of being placed in lower-level math groups. Research is concerned that by grouping students by ability, that teachers are setting in the child’s mind an image of high, average, or low ability and therefore placing a limit on what they can achieve. The students will lose confidence in their own desire to improve further if a teacher’s view of their ability is fixed on what the teacher feels is their potential. If teachers place children in lower-level, undemanding work, are teachers depriving those students of opportunities to engage in more challenging parts of the math curriculum? This in turn can lead to boredom and a loss of interest in the field of mathematics. Also, when teachers place these types of labels on children; it becomes extremely difficult for them to break away from these labels (Van, 1999). Past learning is cumulative, therefore, long-term consequences for student development in math will continue and that student will underachieve and be stereotyped. One consequence students can develop is learned helplessness. The students will put forth little or no effort in their learning process. Their confidence has been diminished due to the labels placed on them over the past years.

Differentiated classrooms can meet the needs of all learners. Teachers can differentiate the instruction for advanced learners in many ways such as giving
them more advanced material calling on them to think at a deeper level of complexity, and asking them to use more advanced skills. Students are not simply gifted or non-gifted; rather there are various types of gifts and many ways to encourage those strengths and to accommodate the weaknesses of all students. Students who now perform only adequately could become expert learners. Teachers must also look past the students’ backgrounds (Holloway, 2003).

Ability grouping has been linked to tracking, an approach in which students have been assessed based on prior achievement or measured intelligence and placed in ability classes from which they can’t escape. Instead, ability grouping should be a flexible and temporary manner, with appropriate adjustments where significant achievement gains can be realized. Research has shown that moderate gains occur in students’ academic achievement when these practices are adopted and used when ability grouping students (Becker, 2003).

To group or not to group seems to be the question facing educators today. Teachers need to ask themselves what effect grouping will have on their students. Are they devaluing the student’s experience of math and will they leave school with an unconfident feeling toward math? Teachers need to make sure that they are basing their decision on whether to have homogeneous math groups or heterogeneous math groups, that they are making that decision based on what is best for all students and not what is easier for them.
CHAPTER THREE

METHOD

Grouping Students for Mathematics in the Marietta City School District

In the Marietta City Schools, there is not a consistent way of teaching math to elementary students. Teachers in some grade levels and buildings group their students by ability and others prefer to have a mixed-ability group. This being the case, the researcher needs to ask, “Why do some teachers choose homogeneous grouping and others choose heterogeneous grouping when teaching mathematics to their elementary age students?”

Study Design

This study of grouping in mathematics at the elementary level was done using the qualitative method. This was accomplished with open ended questionnaires. The results of the questionnaires were then coded and placed into themes for reporting. The researcher recorded why the participants chose to group their math students either homogeneously or heterogeneously.

Participants

The participants in this purposeful sampling were elementary teachers who teach mathematics. This was a purposeful sampling. The list of participants
were compiled by contacting the Marietta City School District’s elementary teachers at Phillips, Harmar, and Washington Elementary.

Procedure

First of all, the researcher developed a qualitative questionnaire with five open-ended questions. The principal of each school was then contacted to determine if they were willing to assist with the project. The teachers were also notified of the study. Next, the questionnaires were sent out with a cover letter explaining in more detail the purpose and the procedure of the study. All questionnaires were done anonymously. The researcher sent out twenty three questionnaires. They were to be returned to me through inner school mail. I received twelve questionnaires back. Finally, after the questionnaires were returned, the data was collected by and themes from the data were compiled based on the perspective of the participants in the groups.
CHAPTER FOUR

RESULTS

The results of the study indicate that teachers in this area group their students heterogeneously for mathematics. Across the board, teachers claimed that grouping their students this way is the best way because it allows the higher level students to serve as role models for the other students. The participants believed that the higher level students can also help instruct their peers. One teacher claimed, “We learn 95% of what we teach to others.”

Another positive result that came to light was mixed ability grouping made record keeping easier, shortened preparation time, and it allowed the teacher the ability to cover all the indicators on the report card. One teacher stated, “This helps me keep my sanity.” Dealing with their own class of students was easier as far as handling the paperwork required of them for reporting their students’ academic progress. Also lesson plans were less complicated to complete because they only had to write one set of plans for the math lesson being taught that day.

The time factor was another positive outcome of this study. The participants indicated that because they are required to cover so many subjects, they are under time restraints. Mixed ability grouping helps in this area because no time is wasted gathering
up materials and changing rooms. They are able to dedicate the entire uninterrupted time to the math lesson.

The last positive response of this study indicated that more of the teachers now have the assistance of a Title One math teacher in their classroom during the math lesson. This provides the classroom teacher a team teacher who is able to circulate around the class while the lesson is being presented. This also allows the teacher the option to group the students by ability within the classroom, making sure the higher level students are being challenged and the lower level students are getting the additional help they need. This division is only done when it becomes apparent some students need more time to learn an area of math or skill.

The negative results of this study indicate that the teachers feel that they could move quicker if they grouped their students by ability. Higher level students could be challenged and given the opportunity to soar while lower ability students would not be required to keep up. They stated that when students were ready to move on, they could and if the class needed more time on a specific skill, they could review the skill by spending more time on the skill.

Discipline was also stated as a negative result of mixed ability grouping. Higher level students who finish earlier become bored while lower ability students who are confused and still required to keep up can also cause discipline problems. The students become restless and talkative, therefore disrupt the class which takes away from the math lesson being taught.
Themes

Teachers felt that mixed ability grouping was the best because of the following qualitative statements:

Time factor:

“Less time is wasted switching classes.”

“Students don’t have to trade rooms.”

“Scheduling is the main issue.”

The teachers now have assistance:

“Title One really helps!”

“I work with another teacher (team teaching) in an inclusion class.”

“Extra assistance from Title One teachers.”

Teachers say that discipline is a problem:

“High become bored, talkative, restless, behavior issues.”

“Can open up discipline problems.”

“Kids that catch on quickly will sometimes misbehave due to boredom.”

Higher level students help:

“The students who are challenged can use more capable students as models, and sometime as peer tutors.”

“The students can learn from each other.”

“Higher level students can model what they know.”
Record keeping is easier:

“This helps me keep my sanity!”

“It helps with record keeping, preparation, and completion of indicators.”

“Relaying information to parents.”

Conclusion

In conclusion, the participants in this study have mixed ability grouping for math and would like to keep their class mixed, but would like to have the time to have math groups, much like the reading groups that have become the norm in their classrooms today. This way they would teach each child at their own ability, challenging those who need challenged and helping those with a skill they have not mastered or understood yet.
CHAPTER FIVE

DISCUSSION

Prior studies have been done comparing mixed-ability grouping and same-ability grouping for mathematics. The studies continue to weigh the pros and cons of which is the best way to teach math to elementary students, and there is still no hard evidence that concludes that one style is better than the other.

The purpose of this study was to discover which way, same-ability or mixed-ability, teachers in this area teach math and why they choose to teach it that way. The researcher sought responses to this question through surveys to obtain the responses of teachers who teach math to students in first, second, and/or third grade.

Just as some prior research has shown, this study supports the mixed ability grouping style believing that students provide good role models for their peers. The results stated that students can learn more from their classmates with different ability levels as opposed to being in a class where the students are all at the same or close to the same ability.
A majority of the teachers reported that it made their job easier because they kept their own students; therefore they kept one set of records. They could also teach/reinforce a math lesson at other times during the day if necessary; they weren’t locked into a specific time slot.

Also, with the direction inclusion is heading, many teachers stated that now they have the help of Title One teachers. The Title One teacher comes into the classroom and aides the teacher as opposed to pulling students out. This seems to eliminate some of the self-esteem issues, because students do not know who needs the extra help.

Although there was an overwhelming positive response, the teachers felt that students’ needs were not fully being met by having mixed-ability grouping. The lesson moved too fast for those having trouble with a skill and wasn’t challenging enough for those who grasped the concept easily and were ready to move on.

On the whole, like the research that has been done before, this study has shown that there are both pros and cons to both styles of teaching. It is this researcher’s opinion that teachers need to make sure that they are basing their decision on whether to have same-ability math groups or mixed-ability groups that they are making that decision based on what is best for all students.
Future Implications

In the future, I would expand my sample area in hopes of getting more diverse responses back that express teacher’s views on both subject areas. My current research responses did not express different views and therefore I was unable to provide any research on why same-ability grouping is the best way to teach mathematics.
REFERENCES


SURVEY QUESTIONS
(for teachers who teach first, second, or third grade)

1. What grade do you teach?

2. How is your math class grouped? Do you have a same ability group or do you have a mixed ability group?

3. Why do you feel this is the best way to teach math?

4. What do you feel are the positives for grouping this way?

5. What do you feel are the negatives for grouping this way?