The Impact of Math Talk and Flexible Grouping Strategies On Elementary Students' Mathematical Achievement

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Table of Contents

List of Tables

List of Figures

Abstract

The purpose of this study was to examine the impact of math talk and flexible grouping strategies on elementary students' mathematical achievement. The measurement tools used were Grade 5, Unit 4, Fraction Operations post-assessment in the Baltimore County Public Schools curriculum and the implementation of math talk supported by "Fluency Strategies Math Talk," by Common Core Math Hand2mind Kits. A one-group pre/post design was used to determine the impact of 4 weeks of daily math talk and flexible heterogenous grouping on students' math achievement. Pre-to-post gain was found in the areas of math talk and flexible grouping strategies students' mathematical achievement.

CHAPTER I

INTRODUCTION

Overview

It is evident that students often lack the necessary mathematical achievement to succeed in upper elementary classrooms. For instance, it is common for students to arrive from lower grade levels who are unable to perform basic multiplication and division skills. Additionally, students may end up with multiple deficit skills that get significantly worse as they graduate from grade level to grade level. In order to help improve these issues, students must learn different mathematical strategies. The implementation of math talks and flexible grouping are two critical strategies that can improve student mathematical achievement. It is important for educators and students to understand these highly effective strategies to be able problem solve independently.

As a fifth grade math teacher, the researcher often sees students struggle with basic operational skills that they should have mastered previously. Students also display low self-esteem and motivation to complete various mathematical tasks due to their lack of problem solving abilities. As a result, the researcher implemented both math talks and flexible grouping mathematical achievement strategies in her classroom. Bourassa (2016) states that math talks help to develop students' number sense, see patterns in different ways, and learn to reason numerically while building a classroom community. Additionally, flexible grouping can help students increase achievement and their mathematical self-concept (Castle, Deniz, & Tortora, 2005). It is critical that educators are knowledgeable about implementing mathematical strategies, organizing flexible grouping, and collecting and analyzing data needed for students to mathematical achieve in their elementary school years.

Statement of Problem

The purpose of this study was to examine the impact of math talks and flexible grouping on upper elementary student achievement.

Hypothesis

Math talk and flexible grouping will have no positive impact on student achievement.

Operational Definitions

The independent variables are daily math talks instruction and flexible grouping. This is operationally defined as explicit instruction using "Fluency Strategies Math Talks" by Common Core Math Hand2mind Kits. Math talks serve as a structured program, whereas flexible grouping may look different in each classroom. The dependent variables are the fifth grade, Unit Four, Fraction Operations (2020) preassessment and post assessment data points as measured by Baltimore County Public Schools (BCPS). This is operationally defined as assessments given pre- and post-instruction. Each student individually takes the pre-assessment and post-assessment. For this study, students were pre assessed at the start of Unit Four and post assessed after receiving explicit math talks instruction and participating in flexible group for four weeks.

CHAPTER II

REVIEW OF THE LITERATURE

Overview

This literature review explains the benefits math talks and flexible grouping strategies in upper elementary schools. The paper discusses both mathematical strategies and provides statistical evidence that these strategies can enhance student achievement. It then explains how to successfully implement these strategies with the key players involved, as well as identifying potential misconceptions. Lastly, it suggests ways to improve student achievement with professional development opportunities for educators.

Math Talks

The first type of mathematical strategy that can improve student achievement is math talks. This strategy can be implemented by the educator for the first ten minutes of every class. The purpose of this strategy is to help students practice independent reasoning skills, problem-solving skills, and basic operations to solve problems. Murphy (2015) states that math talks also help students verbalize their thinking while having mathematical conversations with peers. Murphy showcases the benefits of math talks with an elementary mathematics educator who implemented the strategy in their classroom. The educator said math talks helped improve independent communication among her students.

The evidence supports this educator's thinking about math talks, specifically with regards to improving number sense. Number sense is the ability to understand what numbers represent and their relationship to one another. A study was conducted to investigate the relationship between educators using math talks and the acquisition of number sense within elementary classrooms. Boonen, Kolkman, & Kroesbergen (2011) state that 76% of elementary school

students performed better on assessments once math talks were implemented into their classrooms.

Math talks improve achievement because they encourage students to develop better thinking skills and express problem-solving steps aloud to their classmates. According to Boonen et al. (2011), students need discursive tools to share ideas, interact positively with educators, and understand instructional goals. Math talks force students to practice thinking signals to communicate with educators. These signals include a fist on the chest, one finger up, and multiple fingers up. These signals mean using thinking skills, using a single strategy, and using multiple strategies to problem solve. John, an elementary mathematics educator, states that math talks transformed his teaching style. He explained that using math skills with open-ended tasks encouraged students to think more about each task. Students may communicate with peers about their analysis and explain why they agree or disagree based on the strategy they used to solve the problem. Math talks are a very helpful tool because educators can use it to reinforce skills that students are learning.

For this reason, both educators and students must be on board to successfully implement math talks in the classroom. According to Sun (2018), "The role of the educator is to welcome different answers and elicit students' strategies for solving the problem. The focus of math talks is primarily on supporting students as they explain their ideas and why their strategies make sense, rather than focusing only on the correct answer" (p. 49). Educators must implement math talks on a consistent basis and include engaging materials in order to effectively improve student achievement. According to Boaler (2014) educators should get students into a daily routine. Students should get accustomed to having their math block begin with math talks each day.

Students should also be provided with challenging problems or puzzles to complete. It is essential that students actively participate and respectfully listen to their classmates' reasoning.

While math talks can be a successful strategy, educators and students must overcome various misconceptions. According to Sun (2018), new perspectives about the role of language in mathematics education indicate that educators must help students verbalize their thinking process. One common mistake is for an educator to give students paper and pencil to show their work. Instead, educators should encourage students to use mental math to express their answer to the classroom. A major benefit of implementing math talks is to help students build their mathematical confidence. As a result, the strategy can create an important learning environment where all students feel safe sharing their mathematical ideas (Parker & Humphreys, 2018).

Flexible Grouping

The second mathematical strategy that can improve student achievement is flexible grouping. This strategy is implemented after the educator has briefly explained the math lesson to the whole class. At this point, educators then break up students into smaller groups based on their abilities. The flexible grouping strategy benefits students because they are placed with peers of similar learning and encourages the group to achieve together. Additionally, flexible grouping lets educators better tailor their instruction to meet the needs of each student. McKeen (2019) states that flexible grouping can help students who need additional support during the instructional process, as well as students who lack motivation or interest in learning.

McKeen's theory about flexible grouping is supported by a study that investigated the relationship of flexible grouping on student achievement in elementary school classrooms (Benders & Craft, 2016). According to the study, eleven students were able to increase their mathematical knowledge from below grade level to proficiency. This result was achieved after

educators implemented flexible grouping into their math block for one hour and fifteen minutes every day.

In order to best implement flexible grouping in the classroom, both educators and students should open-minded about the strategy. For instance, the educator will need to create skill-based student groups. Additionally, students should be open to working with different classmates based on abilities. If implemented correctly, according to Hoffman (2002), flexible grouping will help students showcase mixed cognitive abilities in the classroom. However, the process doesn't happen overnight and takes time and effort.

For this reason, it is important that educators implement flexible grouping on a consistent basis. Educators have greater accountability for a more heterogeneous population of students based on their abilities and must ensure the progress of every student (Doubet & Hockett, 2017). Therefore, in addition to mathematics, educators should use flexible grouping in all subjects. Educators should overcome potential misconceptions with students by switching their groups daily. This way students won't feel pigeonholed to a single group and instead will be able to allow for students to show improved understanding from skill to skill.

Professional Development Suggestions

After overviewing both mathematical strategies, math talk and flexible grouping, the final section of this literature review will offer additional suggestions for professional development to improve student mathematical achievement. One suggestion is for educators to participate in different professional developments and learning studies. According to Polly, Neale, & Pugalee (2014), "Data analyses indicated that the professional development had a statistically significant positive impact on participants' mathematical knowledge for educating, use of student-centered instructional practices, and beliefs towards mathematics as a subject area" (p. 1). A successful

educator is always trying to improve their practices and willing to learn new concepts. Another suggestion is for educators to identify their students' deficit skills before the end of the school year. This way educators can help students master skills that are lacking before they move grade levels. Finally, educators can use small group learning sessions to strengthen student understanding, build respect for all group members, and create a positive classroom environment (Box & Little, 2003). Pai, Sears, & Maeda (2015) state that small group learning can increase students' overall academic performance.

Conclusion

In conclusion, there is overwhelming evidence to support that mathematical strategies can improve student achievement. This is clear based on the proven benefits outlined above of implementing math talks and flexible grouping. Educators have a responsibility to put students in the best possible situations to help them succeed.

CHAPTER III

METHODS

The purpose of this research was to determine the impact of math talk and flexible grouping strategies on elementary students' mathematical achievement.

Design

A one-group pre-post design was used to determine the impact of math talk and flexible grouping strategies on students' mathematical achievement. The independent variables were the math talk and flexible grouping strategies. The dependent variable was the students' mathematical achievement. Pre-assessment data was collected in January 2020 and post-assessment data will be collected at the end of March. This data was collected using the Grade 5, Unit 4, Fraction Operations pre-assessment and post-assessment in the Baltimore County Public Schools curriculum. All students collaboratively participated in daily math talk. Additionally, they were placed in flexible grouping to receive explicit skill-based instruction with the teacher. The teacher utilized the resource, "Fluency Strategies Math Talks," by Common Core Math Hand2mind Kits, to provide a collaborative mathematical discussion that lasted for ten minutes.

Participants

This research was conducted in a fifth grade classroom at a Title I school in Baltimore County. The sample was convenience. There were 25 students who participated in the study: 15 males and 10 females. The class demographic was comprised of various races and ethnicities; 17 students identified as African American, six students identified as Caucasian, and two students identified as Hispanic. 16 students who took the January Grade 5, Unit 4, Fraction Operations pre-assessment scored 40% and below. Six students who took the pre-assessment scored 60%,

and two students scored 80%. One student had an IEP for speech services, and another student had an IEP for mathematical computation.

Instrument

Three instruments were used in this study. The first instrument was the Grade 5, Unit 4, Fraction Operations pre-assessment and post-assessment. The pre-assessment was used to assess students' prior knowledge of fractions. The purpose of the post-assessment was to determine whether math talk and flexible grouping increased student achievement. The second instrument was the implementation of math talk supported by "Fluency Strategies Math Talks," by Common Core Math Hand2mind Kits. This instrument was a four-week curriculum of daily math talk lesson plans. It was designed to increase students' mathematical vocabulary and problem-solving skills. Additionally, teachers observed students' mathematical comprehension to determine levels of understanding and make instructional decisions. The third and final instrument was the implementation of flexible grouping. Teachers implemented flexible grouping strategies to identify students' independent needs. The goal was to use differentiated instruction to allow each student to work at his or her own pace to master skills.

Procedure

For this study, pre-assessment data was collected in January 2020 and post-assessment data was collected at the end of March. This data was collected using the Grade 5, Unit 4, Fraction Operations pre-assessment and post-assessment in the Baltimore County Public Schools curriculum. Data was also collected through the implementation of math talk and flexible grouping. This data was collected to determine the success of mathematical strategies in order to increase student achievement.

CHAPTER IV

RESULTS

The purpose of this study was to determine the impact of math talk and flexible grouping strategies on elementary students' mathematical achievement. The Grade 5, Unit 4, Fraction Operations pre-assessment was used to measure students' prior knowledge of fractions and instructional mathematical levels. The Grade 5, Unit 4, Fraction Operations post-assessment was used to measure students' understanding of fractions and instructional mathematical levels after implementing four weeks of daily math talk and flexible grouping in the classroom. The study involved 25 fifth grade students at a Title I elementary school in Baltimore County Maryland. All data and results are displayed in the figures below. This data represents students' mathematical achievement reflected in both pre- and post- assessments.

Throughout the four-week implementation of math talk and flexible grouping, the teacher took anecdotal notes while observing students. During the Fraction Operations unit, the teacher identified students were struggling with visualizing fractional models. In order to help students better understand the material, the teacher used flexible grouping. This allowed students to collaborate with peers to practice drawing the models. Additionally, the teacher also observed students having difficulty using problem solving skills. In response, the teacher used math talks so students could to "turn and talk" and discuss essential vocabulary in the unit. The teacher also relied on flexible grouping to reteach the material in smaller groups.

It was clear both math talk and flexible grouping strategies increased students' confidence in their mathematical abilities and improved students' behavior during math time. However, due to unforeseen circumstances of the Coronavirus, the teacher was unable to give students the post-assessment in the classroom. The unprecedented nature of the virus

necessitated a six-week shutdown of Baltimore County Public Schools. As a result, the teacher emailed students the Grade 5, Unit 4, Fraction Operations post-assessment for completion at home. Unfortunately, only 1 of the 25 students completed the post-assessment. This student's score increased 40% between her/his pre- and post-assessment data. Therefore, the data did not support the hypothesis as math talk, and flexible grouping helped increase this student's score dramatically. As this is a very small sample size, the teacher also pulled in post-assessment data from two outside sources that studied the impact of math talk and flexible grouping on elementary school students.

Findings #1: Results from This Study

There were 25 students tested pre-treatment. The hypothesis was that math talk and flexible grouping would have no positive impact on student achievement. The average score for the Grade 5, Unit 4, Fraction Operations was 31%. Due to unforeseen consequences of the coronavirus, only 1 student was tested post-treatment. This student scored 80%. This student's post-assessment score increased 40% from her/his pre-assessment score.

Table 1

Grade 5, Unit 4, Fraction Operations Student Pre-Assessment Scores

Grade 5, Unit 4, Fraction Operations Student Pre-Assessment Scores
Scored 0%: 1 student **Scored 20%:** 7 students **Scored 40%:** 9 students* **Scored 60%:** 6 students **Scored 80%:** 2 students

**The 1 fifth grade student scored a 40% on the pre-assessment.*

Table 2

Grade 5, Unit 4, Fraction Operations Student Post-Assessment Scores

Grade 5, Unit 4, Fraction Operations Student Post-Assessment Scores
Scored 80%: 1 student*

**After implementing math talk and flexible grouping for a four-week period, 1 fifth grade student scored an 80% on the Grade 5, Unit 4, Fraction Operations post-assessment.*

Findings #2: Math Talks From Outside Study

Due to the unforeseen consequences of the Coronavirus, the following post-assessment data for math talks was taken from a similar study (Ruter, 2015), "Improving Number Sense Using Number Talks." This study examined the impact of number talks in two classrooms from two Denver suburban public elementary schools. The hypothesis of this study was that math talk would have a positive impact on student achievement. In this study, both classrooms at both schools were given a pre-assessment and post-assessment of rich math tasks. The study took place over four weeks. The study observed a total of 47 second grade students. One classroom was designated the control group and the other classroom was designated the experimental group. The teacher instructing the control group of students simply followed the regular math curriculum throughout the four-week study. The teacher instructing the experimental group of students implemented number talks during math lessons, in addition to their regular math curriculum instruction. At the end of the study, the data did not support the hypothesis. The results did not reveal a significant difference in student achievement between the two groups. There are many possible reasons why the data may not have supported the hypothesis. For instance, Ruter (2015) states that all 47 students did not complete the pre-assessment. Additionally, students' winter break fell between the four weeks that the study took place.

Lastly, the lessons in the Denver public elementary school curriculum during the study may not have benefited from using number talk with regular math instruction.

The study involved 47 students from two second grade classrooms in two Denver suburban elementary schools. The experimental group had 24 students, 14 females and 10 males. The control group had 23 students, 15 females and 8 males. The hypothesis was that math talk would have a positive impact on student achievement. The average score for the pre-assessment was 64%. The average score for the post-assessment was 70%. Half of the students who took the pre-assessment and post-assessment increased their scores by 6%.

Table 3

Growth/change mean scores, growth difference, and associated p-values

Test	Experiment Growth	Control Growth	Difference	P-value
P1LA	-1.2083	0.0870	-1.2953	0.0024
P1LB	1.333333	0.73913	-1.1522	0.000022
P2LA	0.5000	0.9565	-0.4565	0.1847
P2LB	0.7917	0.3478	.4438	0.2309

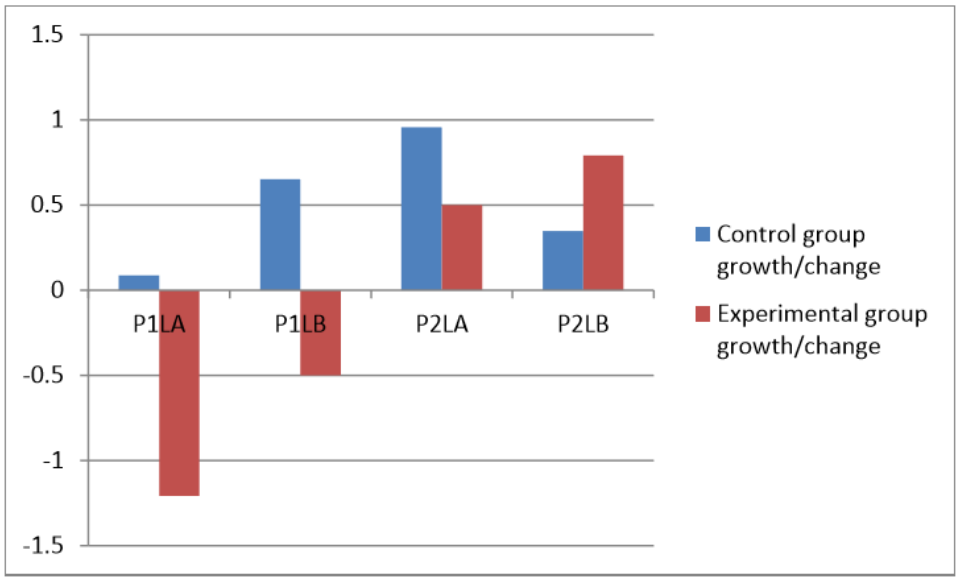

Figure 1. Bar graph shows a side by side comparison of the growth/change data for the control and experiment group

Findings #3: Flexible Grouping From Outside Study

Due to the unforeseen consequences of the Coronavirus, the following post-assessment data for flexible grouping was taken from a similar study, "The Impact of Grade Level Flexible Grouping on Math Achievement Scores" (McKeen, 2019). This study investigated the impact of flexible grouping on student achievement. The participants were elementary school students in grades one through four in a Georgia county school. The study did not reveal the number of students. The hypothesis was that flexible grouping would increase student achievement. In order to measure the data, all participants took the Criterion-Referenced Competency Test (CRCT) before and after the teacher implemented flexible grouping. The study said that the impact of flexible grouping varied among grades of students. While the charts are not clearly

labeled, students' CRCT scores generally show an increase after flexible grouping was implemented.

Participants included students from grades one through four in a Georgia elementary school. All students took the CRCT before and after flexible grouping. The hypothesis was that flexible grouping would have a positive impact on student achievement. Although the figures are not clearly labeled, students' CRCT scores generally show an increase after flexible grouping was implemented.

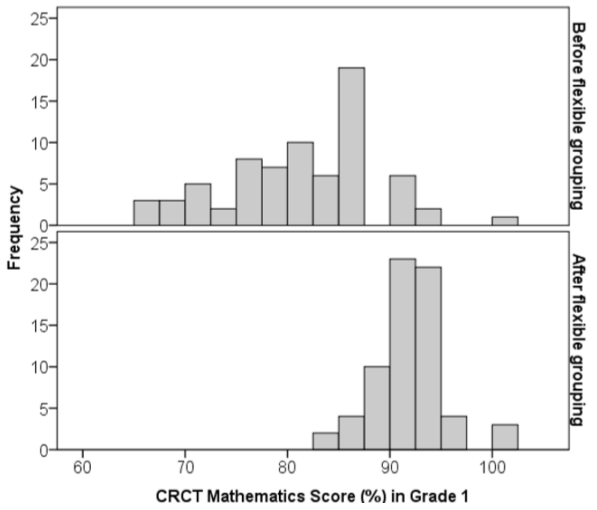

Figure 2. CRCT Mathematics Score in Grade 1.

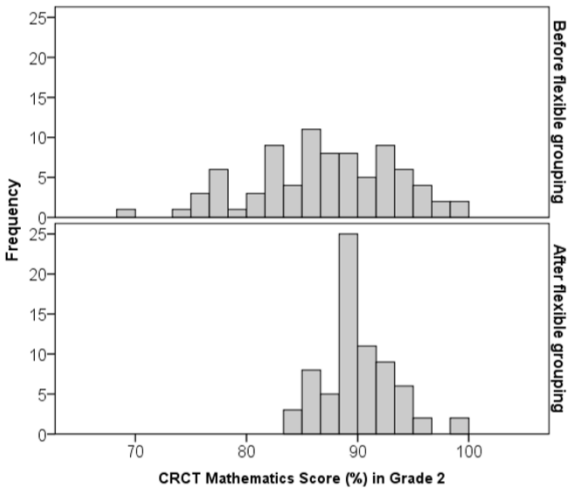

Figure 3. CRCT Mathematics Score in Grade 2.

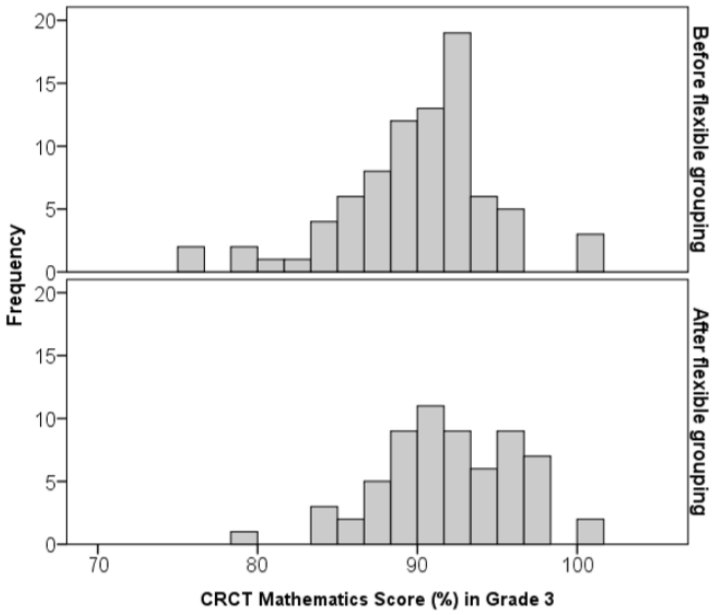

Figure 4. CRCT Mathematics Score in Grade 3.

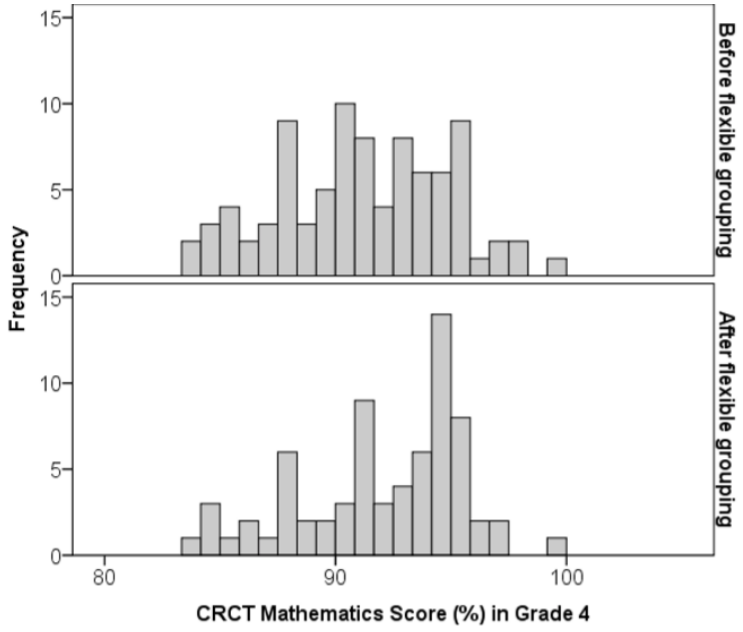

Figure 5. CRCT Mathematics Score in Grade 4

Summary

Unfortunately, only one of the 25 students completed the post-assessment. This student's score increased 40% between their pre- and post-assessment data. Therefore, the data did not support the hypothesis that math talk and flexible grouping would not impact student achievement. This student's score increased dramatically.

Due to the unforeseen consequences of the Coronavirus, the teacher relied on post-assessment data from two outside studies to get a larger sample size. The first study, "Improving Number Sense Using Number Talks," showed that math talks did not significantly improve student achievement (Ruter, 2015). The second study, "The Impact of Grade Level Flexible Grouping on Math Achievement Scores," generally showed that student achievement increased after flexible grouping was implemented (McKeen, 2019).

CHAPTER V

DISCUSSION

Study #1 examined the impact of math talk and flexible grouping strategies on elementary students' mathematical achievement. Results of the statistical analysis reported in Chapter IV indicated areas in which the hypothesis was rejected throughout various studies. In Study #1, Findings #1 indicates that the data did not support the hypothesis, as math talk and flexible grouping helped increase this student's score dramatically. Due to unforeseen circumstances of the Coronavirus, the teacher was unable to give students the post-assessment in the classroom. The unprecedented nature of the virus necessitated a six-week shutdown of Baltimore County Public Schools. Unfortunately, only one of the 25 students completed the post-assessment.

Study #2 examined the impact of number talks in two classrooms from two Denver suburban public elementary schools. In Findings #2, the data did not support the hypothesis as math talk would have a positive impact on student achievement. The results did not reveal a significant difference in student achievement between the control group and the experimental group.

Study #3 examined the impact of flexible grouping on student achievement. In Findings #3, the data supports the hypothesis as flexible grouping did increase student achievement. The study said that the impact of flexible grouping varied among students in grades 1 to 4.

Implications of the Results

The data implies that the implementation of math talk and flexible grouping had an impact on students' achievement. Treatment was provided by the implementation of math talk supported by "Fluency Strategies Math Talks," by Common Core Math Hand2mind Kits. This

instrument was a four-week curriculum of daily math talk lesson plans. It was designed to increase students' mathematical vocabulary and problem-solving skills. Additionally, teachers observed students' mathematical comprehension to determine levels of understanding and make instructional decisions. Teachers also implemented flexible grouping strategies to identify students' independent needs. The teachers used differentiated instruction to allow each student to work at his or her own pace to master skills.

In Study #1, one student scored 80% on the post-assessment. This student's score increased 40% between her/his pre- and post-assessment data. However, as this is a very small sample size, the teacher also examined post-assessment data from two outside sources that studied the impact of math talk and flexible grouping on elementary school students.

This outside data shows that the implementation of number talks did not impact students' achievement. In Study #2, the average score for the pre-assessment was 64%. The average score for the post-assessment was 70%. Half of the students who took the pre-assessment and post-assessment increased their scores by 6%. This is a very small increase. On the other hand, the outside data shows that flexible grouping has a positive impact on students' achievement. In Study #3, students' CRCT scores generally show an increase after flexible grouping was implemented.

Theoretical Consequences

Many factors are required to see a positive impact of math talk and flexible grouping strategies on student achievement. Teachers must utilize a balanced approach to ensure students are able to become independent problem solvers. They should encourage their students to participate in math talks during lessons. Teachers should also give students ample opportunities to be placed in flexible groups that meet their needs. If implemented correctly, collaborative

math talk and flexible grouping sessions should help improve students' mathematical comprehension, mathematical fluency, and independent problem solving skills. It is important to use these strategies because simply adding more direct math instruction alone will not drastically improve students' mathematical abilities.

Threats to Validity

Threats to internal validity include the quality of instruction and length of instructional time. The instruction was not observed or measured by the researchers. While the math talk and flexible grouping instruction was provided by the same three teachers within each study, the researchers did not observe the daily instruction that was provided by the classroom teachers. The participating teachers were instructed to conduct math talks for 15 to 20 minutes at the start of each math lesson. The participating teachers were also instructed to conduct flexible grouping during small group learning time. Additionally, the length of instructional time for flexible grouping was not measured by either researcher in Study #1 or Study #3. The participating teachers used their own judgement to determine the amount of instruction needed for each group of students. The length of explicit instruction ranged from 10 to 20 minutes in a small group setting.

Threats to external validity in Study #1 include the small sample size and the pre-post design. Study #1 involved 25 fifth grade students in one classroom. All 25 students received the same treatment. However, due to unforeseen circumstances of the Coronavirus, the teacher was unable to give students the post-assessment in the classroom. The unprecedented nature of the virus necessitated a six-week shutdown of Baltimore County Public Schools. As a result, only 1 of the 25 students completed the post-assessment. While the students showcased a wide range of

ability on the pre-assessment, results may be different for the post-assessment with a larger sample of students.

Threats to external validity in Study #2 include the pre-post design and two separate classrooms receiving different types of instruction. The first classroom only received direct math instruction. The second classroom received direct math instruction and participated in number talk. Half of the students from both classrooms who took the pre-assessment and post-assessment, increased their scores by 6%. While the students showcased a wide range of ability on the pre-assessment and post-assessment, results may be different with only sampling one classroom.

Threats to external validity include the large sample size and students' scores on the CRCT pre and post the implementation of flexible group in classrooms. Study #3 included various students from first grade to fourth grade. All students participated in flexible grouping within their class but did not take the CRCT. The students who took the CRCT generally show an increase in scores after flexible grouping was implemented. While the students showcased a wide range of ability on the CRCT pre and post the implementation of flexible grouping, results may be different if all students in first to fourth grade took the CRCT.

Connections to Previous Studies/Existing Literature

The study focused on the impact of math talk and flexible grouping strategies on elementary students' mathematical achievement. For decades, elementary research has identified mathematical computation as a critical skill needed to independently problem solve. Boaler (2014), well known mathematician and Professor of Mathematics Education at Stanford University, recently wrote an article on the importance of number sense. In that article she states:

> Number sense is the foundation for all higher-level mathematics. When students fail Algebra it is often because they don't have number sense. When students work on rich mathematics problems they develop number sense and they also learn and can remember math facts (p. 2).

Previous studies have found that the implementation of number sense did not have an impact on students' achievement. The "Improving Number Sense Using Number Talks" study examined the impact of number talks in two classrooms from two Denver suburban public elementary schools (Ruter, 2015). One classroom was designated the control group and the other classroom was designated the experimental group. At the end of study, the data did not support the hypothesis.

The study, "Improving Number Sense Using Number Talks," examined the impact of number talks in two classrooms from two Denver suburban public elementary schools. The hypothesis of this study was that math talk would have a positive impact on student achievement. In this study, both classrooms at both schools were given a pre-assessment and post-assessment of rich math tasks. The study took place over four weeks. The study observed a total of 47 second grade students. One classroom was designated the control group and the other classroom was designated the experimental group. The teacher instructing the control group of students simply followed the regular math curriculum throughout the four-week study. The teacher instructing the experimental group of students implemented number talks during math lessons, in addition to their regular math curriculum instruction. There was no evidence of a significant increase in students' pre- and post-assessment scores between the control and experimental group. Therefore, the data shows that the implementation of number talks did not have an impact on students' achievement and did not support the hypothesis.

The study, "The Impact of Grade Level Flexible Grouping on Math Achievement Scores," investigated the impact of flexible grouping on student achievement (McKeen, 2019). Various students in grades one through four in Georgia county school participated. In order to measure the data, all participants took the Criterion-Referenced Competency Test (CRCT) before and after the teacher implemented flexible grouping. The study said that the impact of flexible grouping varied among grades of students. While the charts are not clearly labeled, students' CRCT scores generally show an increase after flexible grouping was implemented. Therefore, the data implies that flexible grouping would increase student achievement.

Implications for Future Research

Future research should continue to investigate the impact of math talk and flexible grouping strategies on elementary students' mathematical achievement, especially in fourth and fifth grade classrooms. Based on the results of these studies, math talk and flexible grouping, among other best practices, provide elementary students with necessary mathematical computation skills to be independent problem solvers. Additionally, the use of flexible grouping and teacher to student feedback should be further studied.

Future studies on math talk should also consider a larger group of participants to gain additional information. The study was limited to two second grade classes, but a larger sample size using various grade levels should offer better insight about the benefits of explicit math instruction in small group. Additionally, future studies may want to manipulate the length of time to better determine if math talk and flexible grouping impact student achievement.

Conclusions and Summary

In conclusion, these studies emphasize the importance of math talk in elementary school classrooms. Math talk gives teachers the opportunity to provide immediate feedback to students

to clarify errors or misconceptions. The studies also emphasized the importance of giving elementary students opportunities to work in flexible groups. Flexible groups allow the teacher to customize their lessons beyond regular instruction. While increasing student mathematical achievement is a complex task, implementing math talk and flexible grouping in elementary schools is a necessary starting point.

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