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ABSTRACT

One of the most important concepts in the first grade math curriculum is learning addition facts. In schools today, teachers use many different methods to teach addition and subtraction concepts and the memorization of basic facts. A new movement in education advocates using movement to aid in rote memory of facts. In this project the researcher compared the traditional flash cards with a movement activity to discover if active learning had any impact on the memorization of addition facts. During a six-week period, the researcher worked with 16 students in one first grade class. Using a random table of numbers, the researcher placed the students in two groups. The researcher used a repeated measure study. For this reason, no pre-test was used. The controlled treatment consisted of the children sitting at their desk while the researcher showed flash cards of 30 addition facts. The students would repeat the math fact seen on the card. The experimental treatment consisted of the children standing in a specific area and bouncing a hand sized rubber ball while repeating the 30 facts. After each treatment, the researcher tested the students. The results of the controlled tests and experimental tests were compared. To test the student's recall of the addition facts, a Mad Minute test was used. This was a company-made test, designed to assess student's instant recall of addition facts. The 30 facts tested on Mad Minute Test A13 were the same facts used in both the control and experimental methods. After analyzing the test results, the researcher concluded that the active method of learning had no significant effect on the memorization of addition facts. Therefore, the researcher retained the null hypothesis that there is no significant difference between the use of the traditional method and the use of an active method on students' ability to memorize addition facts, as measured by the Mad Minute test at the .05 level of significance. However, the researcher noticed the enthusiasm of children when participating in the experimental method and the unenthusiastic responses to the controlled method. The researcher suggested that more research should be done in this area to obtain definitive results on the subject of active learning of math facts in the classroom. (Author)

ABSTRACT

A STUDY OF FIRST GRADE CHILDREN AND THEIR RECALL MEMORY WHEN USING ACTIVE LEARNING IN MATHEMATICS

An Action Research Project

Presented to the

Department of Teacher Education

Johnson Bible College

In Partial Fulfillment

Of the Requirement for the Degree

Master of Arts in

Holistic Education

by

Britiney Michelle Fife

July 2003

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After each treatment, the researcher tested the students. The results of the controlled tests and experimental tests were compared. To test the students' recall of the addition facts, a Mad Minute test was used. This was a company-made test, designed to assess students' instant recall of addition facts. The 30 facts tested on Mad Minute Test A13 were the same facts used in both the control and experimental methods.

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APPROVAL PAGE

This action research project by Britiney Michelle Fife is accepted in its present form by the Department of Teacher Education at Johnson Bible College as satisfying the action research project requirements for the degree Master of Arts in Holistic Education.

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Chapter 1

INTRODUCTION

Concern and Purpose of Study

Standard first grade curriculum currently has students memorizing addition facts to at least ten and sometimes up to twelve. Traditional methods of teaching addition facts use rote memory exercises to drill students until they commit the facts to memory. However, current trends in education suggest a more hands-on, active way to learn might aid in memory and retention.

The purpose of this study was to examine the effects of movement activity while memorizing math facts, as opposed to the rote memory methods traditionally used in classrooms.

Statement of Problem

The researcher will determine if there is any difference between the traditional method and an active method of teaching addition facts.

Definition of Terms

Traditional Method For the purpose of this study, traditional method refers to the use of flash cards with no movement from the students.

Addition Facts For the purpose of this study, addition facts are defined as a specifically chosen set of addition problems that are shown to each group and tested on the post-test at the end of the experiment.

The Mad Minute The Mad Minute is test produced by Pearson Learning Company used for drill and practice of addition, subtraction, multiplication, and division facts at the elementary and middle school level. For the purpose of this experiment, test A13 was used for both post-testing situations.

Movement Activity For the purpose of this study, a movement activity is defined as the bouncing of a ball while saying addition facts.

Active Method For the purpose of this study, the active method consists of the movement activity defined above, done during each treatment session.

Limitations of Study

This study did not accurately reflect all first grade students. This study is limited to one first grade classroom with sixteen subjects.

Assumptions

The groups were randomly assigned using a random table of numbers. Therefore, the researcher assumed that any degree of difference between the experimental group and the mean group was due to the type of method used, not to other factors.

Hypothesis

There is no difference between the use of the traditional method and the use of an active method on students' abilities to memorize addition facts as measured by The Mad Minute Test at the .05 significance level.

Chapter 2

REVIEW OF RELATED LITERATURE

For several decades, research has dealt with how children and adults learn and memorize certain skills. Many of these studies look at different aspects of mathematics curriculum in elementary, middle, and high school. There has been a push in educational research to find out how children are learning and what strategies help them to memorize, retain, and solve problems dealing with math facts (Urbanka, 1993; Hartnett & Gelman, 1998; Canobi, Reeve & Pattison, 1998; Heindel & Kose, 1990).

The topics of memory, mathematics and movement, and development of young children were specifically examined for this study. In the topic of memory, the researcher examined a range of articles that focused on memory in children, adolescents, and adults. Some of the research studied memory in general; other information was specifically directed to mathematics. The topic of math was the main topic of interest for this research. The researcher found articles that focused on different ways of teaching math, how children respond to certain techniques, and how numerical information was understood on different levels. In addition to child development and mathematics, movement was also examined. This topic ranged from how teachers use active learning in the classroom, to the studies of different types of physical education.

Types of Studies Reported

Mathematical Competency

Of first importance in this review is how six and seven year olds, typically first graders, develop their mathematical competency, and what they should already developmentally know by this age. One study by Hartnett & Gelman shows that what the children already know about math, also called their prior knowledge, bridges what they learn if it is consistent with what they have been taught in the past (Hartnett & Gelman,1998). For example, using concrete objects to form one-to-one correspondence can lead to writing numbers, an abstract task. This study used verbal feedback and a rating system as children helped puppets count by telling them the missing numbers.

Another study, conducted by Urbanska, states that all but one six year old in a group of 115 could count to at least ten. Many of the children counted, some reached one hundred or more. “All children affirmed their ability to count” (Urbanska, 1993). This experiment was done by having the children count individually and recording the results for each individual child. Children who learn counting, a typical kindergarten topic, should be able to use structural mapping as a bridge between counting and arithmetic. (Urbanska, 1993)

In addition to the topic of developmental readiness in counting, Urbanska also discusses the development of numerical competence in six year olds. His research states that children start to develop the vocabulary needed for numbers when they begin to speak. By ages six and seven, they begin to be able to apply this vocabulary to counting objects and numbers in the correct order. Most have one-to-one correspondence with numbers when they enter the first grade. To determine mastery of one-to-one correspondence, researchers had participants count objects in piles to determine the total number of objects before them (Urbanska, 1993).

The same sample population of 115 students surveyed above were assigned a task of problem solving that required counting; ninety-six of them used their one-to-one correspondence counting abilities to solve the task. Only seven who used their counting skills gave the wrong answers, and a few used other strategies besides counting. In general, they knew how to use the skills they had been taught about counting when confronted with a problem solving task (Urbanska, 1993).

In a simple division task, six years olds divided buttons by simultaneously making two separate groups, without counting the buttons first. They simply made two equal piles using both hands simultaneously or one hand then the other alternately (Urbanska, 1993). This shows that children are competent with this task even though they might not completely understand a concept, in this case division.

In addition, the same 115 children used concrete materials, such as buttons, to count, making a one-to-one correspondence between the buttons and the abstract numbers. All but twenty of the children made no mistake in counting the buttons. The mistakes of the twenty were mostly miscounting or double counting a button. By going back and counting out, students were able to correct most of the problems for themselves.

Many of the six-year-old children were excited about math. They were competent and confident about their counting skills and were able to use the knowledge to learn more complicated skills or to problem solve (Urbanska, 1993). The National Council of Teacher of Mathematics states that children should be "confident in their own abilities to do math, learn to solve mathematical problems, and learn to reason mathematically," among their goals for all students (Haury, 1998).

Canobi, Reeve & Pattison's study on problem solving using addition showed that "with experience, children become faster and more accurate at solving addition problems." The study tested the understanding of mathematical principles by measuring adding speed, accuracy and strategies used in solving problems. During an interview, the researcher showed the children a problem. The researcher then asked the children to solve the problem in the best way they knew how. The problems given to the children were addition problems. Furthermore, there were patterns and sequences that the children needed to follow in order to solve the problems proficiently. The researchers found that six-year-olds in this Australian school had a conceptual understanding of these problems, which led to the use of some identified strategies to solve the addition problems. The conclusion of this study was that children understand that parts can be combined in a different order (addition) before they understand that they can be decomposed (subtraction) and recombined. This understanding is the ceiling of most first grade students. The researchers used traditional addition problems. They also used arithmetic word problems and had the children explain if a puppet should use addition to solve the problem (Canobi, Reeve & Pattison, 1998).

According to a study by Hartnett & Gelman, first graders "had a considerable difficulty with 'Is there a biggest number of all the numbers?' and 'Is there a last number?'" (Hartnett & Gelman, 1998). These students did not have the conceptual knowledge to understand that numbers are infinite. Students in second grade and up had no problems understanding this concept and most always answered the question correctly. This is significant for addition because children used repeated counting in order to add. In first grade, children also learn about fractions as part of the number system. They use fractions to graph and have fraction illustrations in their books. Although most first graders do not completely understand the concepts behind fractions, they are beginning to grasp the basic principles. These students must use manipulatives to illustrate their limited understanding. However, many of them do not grasp how to compare fractions or add fractions until the upper grades of elementary and middle school (Hartnett & Gelman, 1998).

Memory

In addition to mathematical readiness and competence, the researcher looked at studies done on memory. A study by Heindel and Kose experimented with memory as it related to active learning. The study was designed so that half of the children looked at cards with shapes, and half actually drew the cards. Researchers examined the manner in which information was stored and organized in memory. The study developed from recent research that approaches memory as active learning. Many times, a mnemonic device or a routine is used to learn and remember information. This study found that strategies that used active learning actually helped improve memory and enhance learning. Specifically, this is related to motor activities during learning (Heindel & Kose, 1990).

During the experiment, reseacheres showed children colored shapes. The children had to remember which color went with which shape. The experimental group drew and colored shapes onto blank index cards. The control group was only shown the cards. Both sets of children matched the same shapes, without color, to the color that had been on the cards. The findings showed that in both cases the ability to remember the color of the shapes was poor, but the experimental group did perform better than the control group. There was a significant difference between the groups. The researchers stated that, "these findings clearly demonstrate the importance of action in processing organizational information in memory" (Heindel & Kose). The task of physically drawing the shapes had some effect on how the children remember the color and shape correspondence during the post test.

Another category of findings on memory dealt with the mental computation of math facts. These articles contain research about working memory as well as mental computation in both algorithms and word problem solving.

A study by Adams and Hitch on working memory suggests that mental addition is a natural task that is innate to humans and combines processing and storing different components. These abilities go across cultural lines to extend to all races. There is still much to learn about the subject of working memory as it relates to mental calculations. In order to be able to do multi digit mental addition, children must "acquire elementary arithmetical skills and concepts" (Adams & Hitch, 1997).

For this experiment, children were tested at eight different levels depending on their age. They were given easy, hard, and carry problems in each category. Level one started with (8+1), (3+5), and (5+9). Level eight included (4813 + 1152), (3623 + 5356), and (1512 + 5842). The researcher had the children solve the problems in a speed task and say the answers as fast as possible without mistakes. All the children started at level one and progressed until they no longer consistently answered questions correctly. This study showed that visual mental math is easier for children than oral mental math. In other words, students are more likely to be successful in solving a problem when they see it on paper as opposed to only hearing. Working memory is greater for visual tasks than for oral tasks. This study also showed that mental math is not limited by competence to complete the problem, but by working memory to store the problem until needed for further use (Lemaire, Barrett, Fayol, & Abdi, 1994).

In correlation with the above study (Lemaire, Barrett, Fayol, & Abdi), this study states that many children learn some type of mental math in first grade, although this task is thought to be difficult for children that age. "Accurate and effortless performance on simple mental addition problems is an important but difficult developmental task for children in the first grades of primary education" (Janssen, De Boeck, Viaene, and Vallaeys, 1999). Children go about learning these mental strategies in many different ways. For some children, counting involves using their finger and verbally counting. The counting strategies with addition include "counting on" or "counting all" strategies. The former consist of the numbers already present and just adding on to the number; the latter, puts two groups together and starts to count all the numbers from one. Both of these strategies lead young children to the acquisition of mental math competency. Sometime in first grade, children begin to show a shift from counting strategies to retrieval strategies. Retrieval strategies include internalizing and memorizing number combinations, or math facts, in order to retrieve them for use in more complicated or mental math problems. As children progress in first grade, they should go from using counting and other strategies to using retrieval strategies and should make fewer errors, according to Janssen. Children also use retrieval strategies to decompose numbers. This study showed that children from first to second grade start to show "an increased reliance on memory retrieval and a decrease in the use of counting strategies, as well as an increase in the speed of counting and of retrieving addition facts from long-term memory" (Janssen Et Al., 1999).

Math facts that are higher, such as 7+8, are slower to solve in mental math for both children and adults. Problems involving multiples, such as 4+4, seem to be the easiest to memorize. This may be due to how math facts are networked and stored in the memory. Math facts have been though of as a time-table, even in addition, where the problems are stored interconnected to each other. The activation rate of retrieving a problem depends upon how large the sum. Therefore, 2+3 is easier to get to than 7+8. This is true in both children and adults. When children first learn math facts, they typically count on their hands. As they become more familiar with the facts, they start using their retrieval system and memory to recall the facts instead of counting every time they encounter a familiar problem (Janssen ET Al., 1999).

Mental computation is important in math programs because it promotes number sense in young children (Heirdsfiled, 2000). In addition, mental math also helps children decide what answers are reasonable when using a calculator or computer to do more complicated problems (Haury, 1998). When students are encouraged to create their own strategies for mental computation, they internalize the number combinations. This study shows that mental computation has a connection among learning number facts, estimation, numeration, and properties of numbers (Heirdsfield, 2000). In a similar study, it was found that children who use counting and thinking strategies are better able to solve addition and subtraction problems than those students who were given the traditional curriculum of algorithms (Adetula, 1996).

Movement

Lastly, the researcher found articles related to movement and active learning in the classroom. In a study on dance and critical thinking, students were given a chance to solve critical thinking problems while interpreting and participating in a creative dance. These students were found to have a greater appreciation for dance, but more importantly, an appreciation for tackling and using correct strategies to solve problems in other settings besides the dance classroom (Chen, 2001).

In 1999, researchers Broderick & Newell designed an experiment to test the ability of people of all ages to bounce a ball. This article was not written for the classroom teacher, but for the physical education teacher. The researches designed this experiment to explain the physical skill and movement needed to bounce a ball. The main interest in this study, for the purpose of this review, is that the experiment showed bouncing a ball was a skill activity that required thinking and coordination. It can be done by child as young as four if the right size ball and instructions are provided (Broderick & Newell, 1999).

In a classroom, movement is the key concept for active learning. According to Bonwell, several studies have shown that students prefer active learning to traditional lecture style classrooms. Also, other cognitive research has shown that many individuals have learning styles suited to techniques other than lecture, namely active learning techniques (Bonwell, 1991).

In another study done by Shevtsoca and Reggia concluded that the left and right hemispheres of the human brain are specialized to process certain types of information. In their experiment, they sought to determine the hemisphere responsible for movement activities and for processing letter identification among kindergarten students. This study showed that student who crossed over an active movement, such as bouncing a ball, learned letter names more easily than those students who kept the ball on the right side of their bodies. This is significant to this review because it shows that active movement has a place in education (Shevtsoca & Reggia 1999).

Specific Case Studies

There are two notable case studies in the literature reviewed for this article. Urbanska reported a case study concerned with the numerical competence of kindergartners and first graders. The researchers asked a series of questions to five year olds and to seven year olds. The questions dealt with the concepts of finite numbers, or whether numbers go on forever. A seven-year-old also understands this concept as do some five-year-olds. However, other five-year-olds do not understand the concept at all. One child is asked why we would have to stop counting. He replies, "Cause you need to eat breakfast and dinner" (Urbanska, 1993). The research then asks if you can pick up where you left off, and the child replies that you would forget where you stopped. He did not directly answer the question of getting to the biggest number and adding one more, but instead said only that you would be very old and would know when you got to the end because you could stop any time (Urbanska, 1993).

In the second case study, researchers gave six-year-olds the task of counting buttons. Researchers asked the children to show them if they could count. They showed their ability to perform the task by using buttons and demonstrating a one-to-one correspondence. In performing this task, the children moved the buttons from one pile to the next as they counted. The researchers then asked the children to look at the pile of red buttons and take out the same number of green buttons from the box. Most counted the red buttons and then took out the same number of green buttons. A few tried to estimate how many were in the red pile and put that number in the green pile. The next task told the students to share their buttons with a specific number of friends. The students were able to do this by making piles of the buttons without counting. This case study showed that these students understood one-to-one correspondence, making equal piles, and counting one pile to make an equal pile (Bonwell, 1991).

Conclusion

The research reported in this review has focused on memory and how students memorize information, as well as what role active involvement plays in that memory and the development of a normal six year old.

In light of the review presented, further research seems to be necessary in how movement, which has had a positive effect on memory, effects the memorization of addition facts in the first grade.

Chapter 3

METHODS AND PROCEDURES

Subjects

This research project took place in an elementary school in East Tennessee. The students involved in this study were from one first grade class in this school. They ranged in age from six to seven years old.

Experimental Process

Students were assigned using a random table of numbers. Each child was given a number, and the researcher used a random table of numbers to select students for each of two groups, until all students were assigned. Both groups were given identical sets of thirty flash cards.

Control Method During the control method phase, students sat at their desks and looked at the front of the classroom. The researcher stood in the front of the classroom and held up one flash card at a time. Each card contained one addition equation from the post-test. The flash card showed the entire equation in vertical algorithm form. Students repeated the equation as soon as the card was shown. For instance, when the teacher held up a card reading 3+4=7, the students said, "Three plus four equals seven" in unison. The teacher then moved on to the next card, and students repeated the recitation. The group was shown fifteen flash cards in each of 24 sessions. This means that during the experiment, each child would have said each equation twelve times.

Experimental Method Students in the experimental group were taken to the school's cafeteria and asked to spread out within a given area approximately fifteen by fifteen feet. They were given rubber bouncing balls that were large enough to control, but fit in their hand. Students were instructed on the method desired to bounce the ball. They bounced the ball once on the floor, caught the ball in the same hand, held it, and repeated. They did this sequence three times. For each equation they bounced the ball, and said another number in the number sentence. They were then shown another flash card. For example, if this group was shown the flash card 3+4=7, they would have said, "three (bounce) plus four (bounce) equals seven (bounce)." If students lost their ball during the sequence, they continued to do the motion using an "imaginary ball" and retrieved the ball before the next flash card was shown. Students in the group were shown the same flash cards on the same days, the same number of times as in the traditional method group.

Timeline

The study was conducted for a six week period. These six weeks occurred after students had covered addition up to twelve in the math curriculum. During the six weeks, students were given the treatments two times a week, for twenty minutes each, during the regular afternoon math time. Each group received each treatment for three weeks at a time.

	Experimental	Control
First 3 weeks	A^1	B^2
Second 3 weeks	B^1	A^2

Figure 1
Design of Study

Tests

Post-Test #1 and #2 Both post-tests were "The Mad Minute" test A13 shown in Appendix C. It contained thirty addition facts with sums less than ten. All problems on this test were used in the sets of flash cards used by each method. The problems were written in vertical algorithm form as presented on the flash cards. There are three rows of problems, each row containing ten problems. The students were instructed to begin in the first row on the left hand side for each test. Students had one minute to complete as many problems as they could. No student was expected to be able to complete all problems correctly in one minute. Since the test contained the exact algorithms taught to the students, it has face validity.

Data Collection

Individual scores of how many problems each child answered correctly from the post-test were collected after week three and week six.

Variables

Independent variable The independent variable was the method of instruction used to reinforce memorization of thirty addition facts.

Dependent variables The dependent variables were post-tests one and two.

Statistical Analysis

A paired t-test was performed between the experimental factor group A^1 plus B^1 and the control factor group B^2 plus A^2.

Chapter 4

RESULTS

Analysis of Data

An independent t-test was used to compare memorization of math facts of the controlled and experimental groups. This test was the Mad Minute A13 test mentioned above. It contained the 30 math facts seen during the sessions. Since each group took the test twice, there were sixteen scores for the controlled group and sixteen scores for the experimental group. Groups A^1 and B^1's scores were compared to the scores from groups B^2 and A^2. After the experimental groups were exposed to the movement activity, no difference was found at the .05 significance level from the control groups as tested by the Mad Minute test (Table 1).

TABLE 1

COMPARISON OF MEANS OF EXPERIMENTAL AND CONTROLED SCORES

Groups	N	Means	Mean Difference	t Stat	T Critical two-tail
Experimental	16	5.375			
			-1.50	-1.69*	2.13
Control	16	6.875			

*Not Significant

Acceptance or rejection of the Hypothesis

The study data indicated there was not a significant increase in the memorization of addition facts for the controlled group compared to the experimental group, as reported in the above results. The researcher retains the null hypothesis.

Chapter 5

SUMMARY, CONCLUSIONS, RECOMMENDATIONS

Summary

This study examined two methods of teaching math addition facts to first graders. The first method was a traditional type of instruction where the subjects repeated facts while sitting at their desks. The second method used was an active type of instruction, where the subjects bounced balls while repeating the math facts. The study examined whether there was a significant difference in the memorization of math facts between the two groups.

Conclusion

The use of the active method of learning did not make a significant difference. This study was conduced over a six week period of time. The length of the study may have been a factor in concluding no statistical significance.

Students who were absent on days the treatments were given, made up the treatments at a later date, not more than two school days after they returned. This could have had an effect on the study since students were given the treatment individually or in a smaller group, as opposed to a large group. However, it should be noted that even with absences, all students in both groups were given the treatments exactly the same amount of times.

Because of a snow day, on one occasion during the study, subjects were given the treatment only one time during that week, and then three times the following week. This was true for both the control and the experimental group.

While the results were not significant at the .05 level, the mean results showed the traditional group average being 1.5 points higher than the active group. Due to the small group sample, it is possible that a larger sample would show results that were statistically significant. A greater number of students would be needed to draw a concrete conclusion.

Recommendations

Further study is recommended on the subject of active learning in the math classroom. It is recommended that the study be replicated in a difference setting using more than sixteen subjects. The results of the study may be due to the particular setting or to the age of the students.

Furthermore, the researcher also recommends research be done that varies the method and activities from this experiment. This project dealt with a movement that was unrelated to math; bouncing a ball the same number of times for every equation. A similar study might employ subjects to bounce a ball to show the equation. Also, another study might have students participate in an active method that requires them to cross hemispheres of the brain. In other words, they would be doing an activity that engages their right and left side of the brain at the same time.

During the study, the researcher noticed that the controlled or traditional group was bored with the activity quickly. They did not show enthusiasm when it was time to perform the treatment. In contrast, the experimental group was excited every time the researcher announced it was time for the treatment. Although there was no significant difference on test scores, any type of activity that excited students about learning is worthwhile.

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APPENDICIES

APPENDIX A

KNOX COUNTY SCHOOLS
ANDREW JOHNSON BUILDING

Dr. Charles Q. Lindsey, Superintendent

September 26, 2002

Britiney Michelle Fife
7906 Sunset Ct.
Knoxville, TN 37998

Dear Ms. Fife:

You are granted permission to contact appropriate building-level administrators concerning the conduct of your proposed research study entitled, "A study of first grade children and their recall memory when using active learning in mathematics." In the Knox County schools final approval of any research study is contingent upon acceptance by the principal(s) at the site(s) where the study will be conducted. Include a copy of this permission form when seeking approval from the principal(s).

In all research studies names of individuals, groups, or schools may not appear in the text of the study unless *specific* permission has been granted through this office. The principal researcher is required to furnish this office with one copy of the completed research document.

Good luck with your study. Do not hesitate to contact me if you need further assistance or clarification.

Yours truly,

Mike S. Winstead, Ph.D.
Coordinator of Research and Evaluation
Phone: (865) 594-1740
Fax: (865) 594-1709

Project No. 109

P.O. Box 2188 • 912 South Gay Street • Knoxville, Tennessee 37901-2188 • Telephone (865) 594-1800

APPENDIX B

10/17/02

Hello Parents!

It was great to see so many of you at the parent meeting and to get to know you a little better. For those of you who couldn't make it, my name is Britiney Fife, and I am the intern in your child's classroom this year. We have gotten off to a great start, and your children have been working very hard for quite a few weeks. As I mentioned in the parent meeting, I will be conducting research this year as part of my requirement for school. This letter is to let you know a little about my project, and to ask permission for your child to participate.

As you know, addition and subtraction is one of the biggest things we will teach in math this year. My study will be about how children best memorize their addition math facts. After we complete the chapters in math about addition and subtraction, I am planning to take two times a week and have the children work on their addition facts. In other words, I will be working on them memorizing 2+2=4, 5+3=8, and so on. The children will be in two groups for the experiment. One group will stay in the room and be shown flash cards. They will learn their facts by repeating the flash cards as Mrs. McLemore holds them up. The other group will be given balls the size of tennis balls and asked to bounce the balls as I hold the flash cards up. After three weeks the group will switch, so every child will get a chance to participate in both ways of learning.

This project will go on for six weeks, but we will only work on math facts two times a week in class. The other three days we will continue doing math instruction as we have been doing this year. If you have any questions or concerns, please contact me at the school, and I will be glad to speak with you on this matter. Thank you for you time and support on this matter.

Sincerely,

Britiney Fife

My child, ________________________, has permission to participate in this project as part of their math instruction for this year.

____

Signature of Parent

SE068300

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Signature: Britney M. Fife	Printed Name/Position/Title: Britney M. Fife
Organization/Address: Johnson Bible College 7900 Johnson Dr, Knoxville, TN 37998	Telephone: (770) 725-7811	Fax: N/A
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