"Mastering the Multiplication Facts"

Jenna D'Ettorre

5th grade teacher

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Abstract

The purpose of this paper is to share the results of a six-week research project (after baseline data was collected) that focused on three different strategies (flashcards, interactive games, and music) and their effectiveness in helping fifth grade students memorize the basic multiplication facts. Many teachers face a serious problem when their students lack basic mathematical knowledge. A firm foundation of basic skills is the first step towards success in mathematics. Each of the three strategies was implemented into a different class. Data was collected using three data collection instruments: timed multiplication tests, individual checklists regarding ongoing progress, level of mastery, and effort/participation, and finally a student survey/semantic differential. A literature review is provided for all relevant articles used to create and plan this project. Week-by-week data is analyzed to provide helpful final conclusions.

Introduction

I am a firm believer that every student is capable of learning or memorizing the basic multiplication math facts. If all of my students are able to memorize their phone numbers, their friends' numbers, birthday dates, and addresses, they are capable of memorizing their facts. I believe that children must know the math facts in order to accurately perform multiplication and long division; the children must then be able to transfer these skills to more involved problems. Even as a new teacher, I have quickly realized that you have to have a firm foundation (composed of fundamental basic skills such as math facts and knowing how to perform the four operations) in order to be successful in math. The purpose of my action research project is to determine the extent

of which three different strategies help increase students' memorization of the multiplication facts. Completing an Action Research project with this focus will help me "gain insight, develop reflective practice, effect positive changes in [the success of my students], and improve students outcomes" (Mills, 2007, p. 5). This research project will provide useful information, allow me to analyze the results, and then use the results to improve my classroom next year. All research will be completed in my fifth grade math classroom. Each strategy will be implemented into regular education classrooms.

I am a second year teacher at Tusky Valley Middle School (TVMS), part of the Tuscarawas Valley Local Schools. The school district is considered to be a rural district, and many of my students live on farms. The district is composed of one primary building (kindergarten and first grade), one intermediate building (grades two through four), one middle school (grades five through eight), and one high school. Each grade level averages approximately 130 students. The community includes residents of Bolivar, Mineral City, and the New Cumberland area. Many families in these areas are considered to be of low socioeconomic status. As has been the case for years, education is not a priority for many families.

As I began planning the details of my action research project, I realized that I may have my expectations set too high. I was always told that you should be able to recall one multiplication fact per second. However I think, realistically, one every three seconds will be considered having "mastered" the facts.

I am implementing three strategies: daily usage of student made flash cards, beginning class daily with a multiplication song, and playing interactive games. I am biased towards the use of flash cards, because I believe the best way of memorizing the

facts at this point is through drill and practice. I have a preconceived notion that the students that use the flash cards will show the greatest increase in memorization.

I believe that all students can memorize these facts, which would be another bias. For this reason, all of my research questions are based on the extent of which each strategy increases student memorization.

Despite my biases and assumptions, I will do my best to keep an open mind. As Dorothy Korzym states in her video, if I want my research to be valid, I must be careful that my "biases don't shine forth" (video, *How Can I Make Sure My Research is Valid?*).

Area of Focus Statement / Research Questions

I am concerned that my students' lack of memorization of the basic multiplication facts is causing struggles as we proceed further into the curriculum. Lack of this basic knowledge is causing unnecessary difficulties for my students. We lose valuable learning time because we have to spend so much time calculating the small things, such as multiplication facts. I teach fifth grade and assumed that my students should, and therefore would, have these facts memorized; however, I was wrong. The focus of my Action Research Plan is increasing students' memorization of the multiplication facts. My research will be focused on the following three questions:

1. To what extent do flashcards (used daily for five minutes) help students memorize the multiplication facts?
2. To what extent do interactive games help students memorize the multiplication facts?
3. To what extent do multiplication songs help students memorize the multiplication facts?

Defining the Variables

In my Action Research Plan, mastery of the multiplication facts will mean that a student can answer one multiplication question every three seconds. The students' scores on timed one-minute multiplication tests will measure their increase in memorization of the multiplication facts. These scores will be used to calculate by what percent they increased each week. Interactive games are defined as games that can be played in small groups or as a class. An important variable is the students' level of participation. Levels of students' understanding and interactions may also be variables.

Review of Literature

The sources below have provided insights and ideas during the planning of my action research project. These sources have also provided guidance as I create my data collection tools. Following each citation is a paragraph summary.

Zutaut, A.K. (2002). Using mnemonic strategies in fourth grade multiplication. Retrieved January 20, 2009 from, Education Resources Information Center (ERIC) Web site: http://www.eric.ed.gov

This thesis paper is centered on finding strategies that increase student recall of multiplication facts, and then seeing if students' accuracy when performing multiplication and long division improves. As I browsed through this reference, I felt as though this teacher experienced the same frustrations and challenges that I am currently facing. It is very parallel to my research focus. It presents new solutions other than the ones I had already brainstormed and provides insightful tips. The phrase that grasped my attention and made me choose this reference was, ". . . memorization of the one hundred

basic multiplication facts improves a child's ability to solve more involved problems." This is something that I believe whole-heartedly. Also, this resource includes an extensive list of additional references.

Brewer, R.A. (2004). Memory, multiplication, and mnemonics: A study into the recall of basic multiplication facts. Retrieved January 22, 2009 from, Education Resources Information Center (ERIC) Web site: http://www.eric.ed.gov

This resource is useful as it presents learning the multiplication facts in a unique way I had never heard of. The numbers are turned into words (for example: "four" is portrayed as "door"; sixteen is portrayed as "sick queen") so the students can memorize the facts as riddles. Since all students learn differently, this may be an alternative solution and very effective for some of my students. This research also discusses the retention rate after learning using this method. While I do not wish to test this specific strategy, I may use a similar idea as one of my interactive games.

Ortiz, E. (2003, February). Research findings from games involving basic fact operations and algebraic thinking at a PDS. Retrieved January 22, 2009 from, Education Resources Information Center (ERIC) Web site: http://www.eric.ed.gov

What makes this thesis paper beneficial is that it goes further than just learning how to memorize the basic math facts. It goes as far as discussing the relationship between knowing the multiplication facts and developing algebraic thinking. I can directly relate to several pieces in this document. While I am familiar with numerous games involving multiplication facts, this article helps me better organize my own research project.

Willis, J.K., & Johnson, A.N. (2001). Multiply with MI: Using multiple intelligences to master multiplication. Retrieved January 20, 2009 from Education Resources Information Center (ERIC) Web site: http://www.eric.ed.gov

This resource takes an entirely different approach to learning math facts! The article is based around Gardner's theory of Multiple Intelligences and takes into account students' individual needs and learning styles. It also discusses the relationship between basic facts and problem solving.

Vale, C. & Davies, A. (2007). Dean's great discovery: Multiplication, division, and fractions. Retrieved January 22, 2009 from, Education Resources Information Center (ERIC) Web site: http://www.eric.ed.gov

This article supports my initial thoughts: lack of basic skills that compose the foundation of math causes difficulty with higher-level math concepts. This reference helps me see this connection from other teachers' points of view. Something I had never thought of was the importance of the students being aware of the necessity of knowing the multiplication facts. Showing students and making them aware of the relationship between the facts, multiplication, division, and even fractions may increase motivation and answer the "why learn them?" question.

Ediger, Marlow (1998, September). Teaching suggestions in mathematics. Retrieved February 17, 2009 from, Web site: www.eric.ed.gov

This article supports my notion that flash cards are a promising and successful practice. In addition to discussing the success of flash cards, the journal presents other activities that I may be able to use with my "interactive game" group.

Dorwaldt, L.E. (1999). Understanding multiplication concepts. Retrieved February 17, 2009 from, Web site: www.eric.ed.gov

This article goes against my notion that flash cards will be the most successful strategy implanted. This article argues that repetitive exercises do not work well any longer; rather, multiplication concepts must be presented in fun and practical ways. This article gives me much to think about as I create interactive games for one of my classes.

Gopal, N. & Krupp, R. (2003). Tripleblaster. Retrieved February 19, 2009 from , Web site: www.eric.ed.gov

This is a very helpful article! It does, again, apply to my "interactive games" group of students. This article presents math games with die designed to help students learn addition, subtraction, multiplication, and division.

Haught, L., Kunce, C., Pratt, P., Werneske, R., & Zemel S. (2002, May). Improving mastery of basic multiplication facts in elementary school through various learning strategies. Retrieved February 24, 2009 from, Web site: www.eric.ed.gov

The reason I chose this source is because it includes a section on the importance of learning the basic math facts. Many teachers do not understand the importance. I also think this is information that needs to be shared with the students. Many of them don't understand why they need to memorize these things. Also, this resource discusses the use of music and game interventions.

(2008). Multiplication hip hop for kids. Retrieved February 24, 2009 from Web site: http://www.multiplicationhiphopforkids.com/home-nosound.html

This website contains hip hops songs for each set of multiplication facts. The songs are sung to current popular hip hops songs and the artists names are mimicked from real hip hop artists. These songs will really get my fifth graders enthused! I think these are the types of songs that they would be willing to sing along with.

Schoolhouse Rocks. Multiplication Rock. Retrieved February 24, 2009 from Kutztown University, R.S. Shaeffer Math Department Web site: http://faculty.kutztown.edu/schaeffe/Mnemonics/MultRock/multrock.html

These songs are from the "Schoolhouse Rocks" series that aired on ABC. There are songs for each set of multiplication facts. These songs are much more laid back than the songs sited in the previous source.

Proposed Intervention/Innovation

In order to increase my students' memorization of multiplication facts, I will implement three different strategies in three separate classes. In one class, I will implement the daily use of flashcards. In a second class, we will be playing interactive games once a week. In a third class, we will learn multiplication songs and chants and use these to begin class each day. These are based on strategies other professionals have used and have recommended. By comparing and analyzing my results, I hope to determine which strategy best increases the memorization of the multiplication facts so I can implement it into my curriculum next year.

Resources

- Access to copy supplies

- White index cards (for students to make flash cards)
- Several versions of teacher-made multiplication timed test
- Stop watch (for timed test)
- Funding to purchase or create interactive multiplication games
- CD of multiplication songs (must include lyrics)
- CD player
- Time set aside specifically for recording and analyzing results
- Data collection tools

Research Process - Data Collection Matrix

Research Questions	Source 1	Source 2	Source 3
1. To what extent do flashcards (used daily for five minutes) help students memorize the multiplication facts?	Multiplication timed test (100 questions, 2 minutes) – results will be kept on a spreadsheet	Checklist pertaining to each individual's ongoing progress, level of mastery, and effort/participation	Student survey/ Semantic Differential (regarding opinions about strategy implemented in his class, whether or not he feels it helped him memorize the multiplication facts, etc.)
2. To what extent do interactive games help students memorize the multiplication facts?	Multiplication timed test (100 questions, 2 minutes) – results will be kept on a spreadsheet	Checklist pertaining to each individual's ongoing progress, level of mastery, and effort/participation	Student survey/ Semantic Differential (regarding opinions about strategy implemented in his class, whether or not he feels it helped him memorize the multiplication facts, etc.)

3. To what extent do multiplication songs help students memorize the multiplication facts?	Multiplication timed test (100 questions, 2 minutes) – results will be kept on a spreadsheet	Checklist pertaining to each individual's ongoing progress, level of mastery, and effort/participation	Student survey/ Semantic Differential (regarding opinions about strategy implemented in his class, whether or not he feels it helped him memorize the multiplication facts, etc.)

I will be implementing three different strategies in three different classes and then measuring the extent to which each increased student memorization. Because I will be evaluating three different strategies that all have the same final goal (to increase student memorization of the multiplication facts), I believe that I need to collect data for each strategy using identical tools in order to make my research fair and valid. While only three different data collection tools are listed above, each one will need to be slightly altered to measure each strategy.

My primary source of data collection is a timed multiplication test (see appendix A). This first data collection instrument will be used to collect quantitative data. It will be an unbiased way for me to assess the rate and extent of my students' memorization of the multiplication facts. The timed multiplication test will be used weekly for six weeks to collect both baseline data and data after the implementation of each strategy. While the weekly multiplication timed tests will contain the same problems, the problems will be placed in a different order each week. Each of my research questions begins with "to what extent" and each measures the success of one of three different strategies used to teach the multiplication facts. The timed tests scores will be recorded and will enable me to determine by what percent each student improved.

The results of each student's timed test will be recorded on a spreadsheet. I will be able to determine by what percent each student is improving each week, as well as from the beginning of the research project to the end. At the bottom of the multiplication tests is a table to tally the facts that each student missed. This data will also be recorded on the spreadsheet (the individual's tallies will be combined and recorded as a class on the spreadsheet). This information will help me target my interventions and focus on specific facts using the three strategies. The spreadsheet will make it easy for me to organize, analyze and interpret the data and determine which strategy helped students memorize their math facts to the greatest extent.

My second data collection tool is a checklist pertaining to each individual student's ongoing progress, level of mastery, and effort/participation level (see appendix B). Below each student's name will be a box to check when the student has "mastered" the multiplication facts (one fact per three seconds). Even once students have mastered the facts, they will still participate in the research, as there is much room for improvement (goal: one fact per second). This column in the checklist will allow me to determine the percentage of each class that reaches the mastery level. This will help determine which strategy best increases students' memorization of the math facts.

Each checklist for all three strategies will have a column where I can mark whether each individual improved from week to week over the course of the six-week project. This will provide a visual of which strategy is working best. Each student's checklist will provide an area to make any important comments regarding effort and participation. While effort isn't directly related to my research questions, I need to make sure my students are trying and giving it their best. Lack of effort will prohibit

improvement despite the strategies. Students that are not participating will be required to have a conference with me during lunch.

My third data collection tool is part qualitative and part quantitative. The student survey (see appendix C) will ask students questions regarding their opinions about the strategy implemented in their class and to explain whether or not they think the flashcards (or multiplication songs, or weekly interactive games) helped them learn the multiplication facts. Dorothy Korzym emphasizes that you must collect both quantitative and qualitative data to have a good action research project (video, *What is Qualitative Data?*). I want to know my students' opinions about each strategy and whether or not they feel it helped them memorize the multiplication facts, and a survey will help me do this. Again, this will help me determine "to what extent" each strategy increased the memorization of math facts. To me, my students' opinions, thoughts, and feelings are just as important as the statistical numbers. In addition to the open- ended response questions, similar questions will be asked using a semantic differential to help confirm their responses. This data collection tool will be used during the final week of my research project.

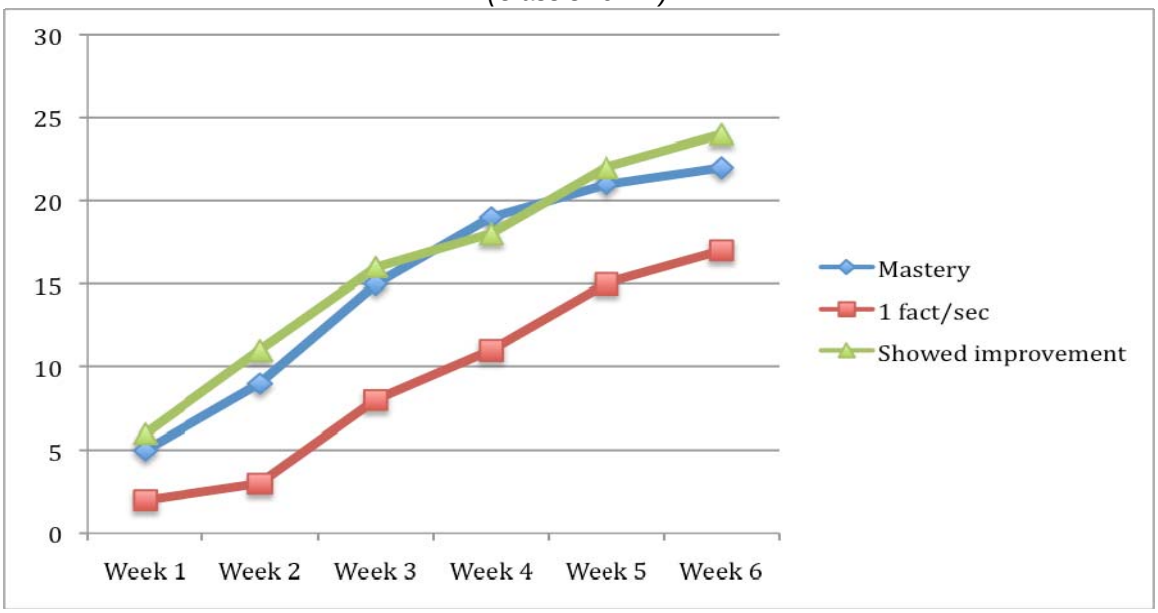
The data I collect from each of these instruments will, together, help me determine which strategy best helps students memorize the multiplication facts. Among the data collected, I will know what percentage of each class reaches the "mastery" level, the rate at which each student increases their memorization, and by what percentage each student improves from before the implementation of each strategy to the end. I will also know how my students feel about each strategy they used and what they feel is the most effective.

Data Analysis

Just prior to the end of the school year, I completed my six weeks of data collection for my action research project. I collected data on three different strategies that were implemented to increase student memorization of the basic multiplication facts: daily usage of student made flash cards, beginning class daily with a multiplication song, and playing interactive games.

I used my second period class to conduct research to answer the research question "to what extent do flashcards (used daily for five minutes) help students memorize the multiplication facts?" Prior to data collection, I had a preconceived notion that this strategy would produce the most success. I was correct. Not only did the use of flash cards most effectively increase student memorization, flash cards also helped students increase their memorization at the fastest rate. It should be noted that the flash cards were used daily, which could very well have played a large role in their success. In this class composed of twenty-four students, 92% of the students reached the mastery level (one fact per three seconds). 71% of the students were able to answer at least one fact per second by the end of the six-week period! 100% of these students made some sort of improvement from week one to week six. The graph below shows week-to-week data about the number of students that reached the mastery level, the number of students that were able to answer one fact per second, and the number of students that showed some sort of improvement from week one to week six.

Effectiveness of Flashcards
(Class size: 24)

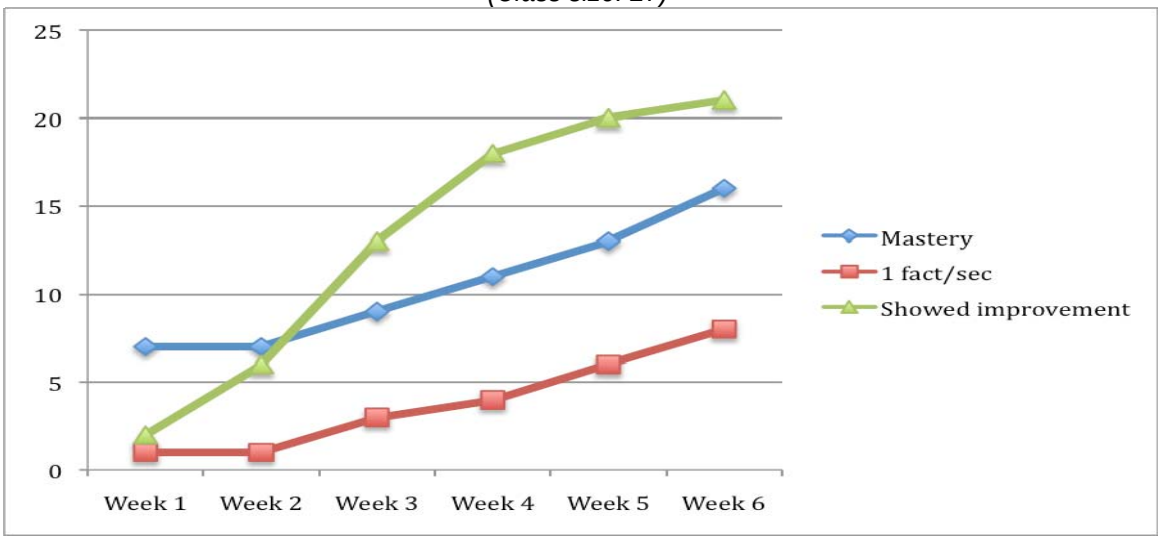


One of my data collection tools was a checklist pertaining to students' ongoing progress, level of mastery, and effort/participation. At the beginning of the project, I had some students that did not want to participate every day. I kept close watch on them and they eventually got into the habit of sitting down and studying their cards for a solid five minutes. Fifth graders are still willing to follow directions and do as they are told for the most part. After the first week, I didn't have many problems with the students' levels of effort/participation. My third data collection tool was a student survey. Although many of the students admitted to not enjoying using the flash cards every day (because it was "boring"), they did admit that they felt the flash cards greatly increased their memorization of the multiplication facts. Some students mentioned that they liked using the flash cards at the beginning of the period because it helped them calm down and get relaxed.

The effectiveness of flashcards was tremendous! While the results were similar to what I was expecting, the results to my next research question, regarding interactive games, was somewhat of a disappointment.

I used my first period study hall class, composed of twenty-seven students, to conduct research to answer the research question "to what extent do interactive games help students memorize the multiplication facts?" The interactive games included Multiplication Bingo, Around the World, Multiplication Cubes, and multiplication chart races. Perhaps because this strategy was only implemented once each week (very time consuming), this strategy generated the least amount of success. In this class, only 59% of my students reached the mastery level. Only 30% of these students were able to answer at least one fact per second. However, 77% of the students made at least some improvement. The graph below shows week-to-week data regarding the number of students that reached the mastery level, the number of students that were able to answer one fact per second, and the number of students that showed some sort of improvement from week one to week six.

Effectiveness of Interactive Games
(Class size: 27)

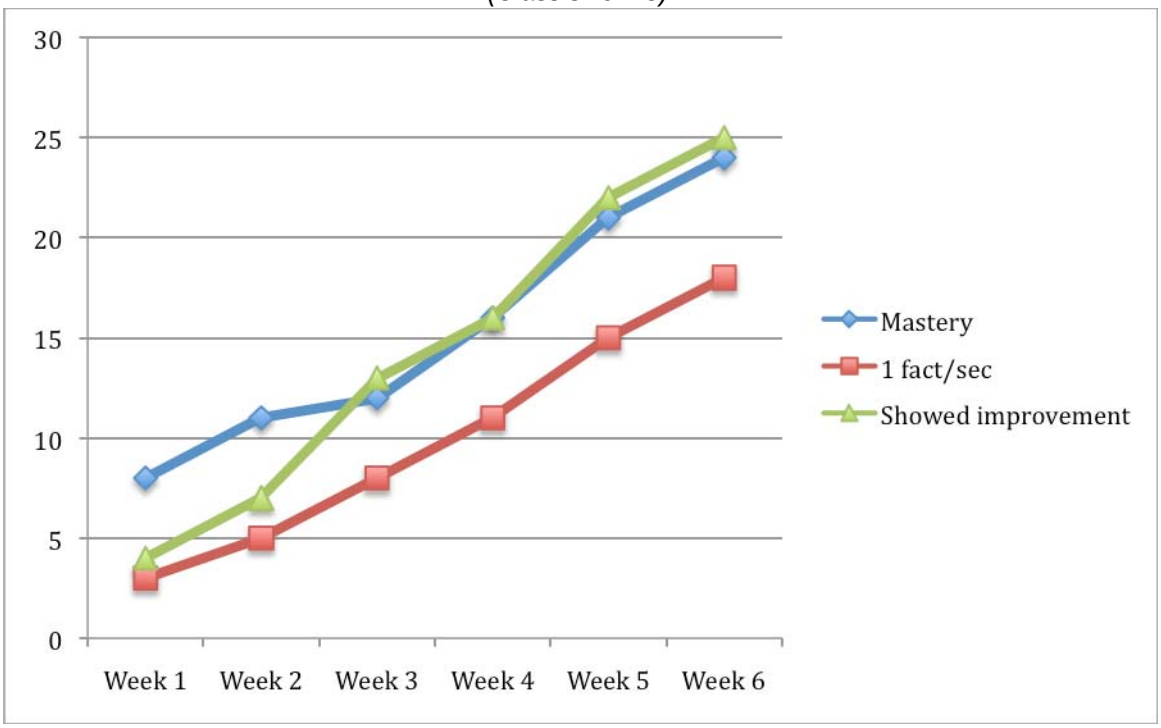


According to my individual checklist tool, this strategy was the most effective regarding students' levels of effort and participation! On the student surveys, my students indicated that they enjoyed playing the multiplication games; they felt that this was the most fun strategy out of the three. When asked if they felt this strategy effectively helped them memorize the math facts, approximately half of them said yes and half said no.

I do believe that had my students been able to play these games more than once a week, the success would have been much greater. The results to the second research question were disappointing; however, I was pleasantly surprised with the results of my third research question, regarding the use of multiplication songs.

In my seventh period class, a class of twenty-eight students, I conducted research to answer the question "to what extent do multiplication songs help students memorize the multiplication facts"? We were supposed to begin class by singing a multiplication song each day; however, due to time restraints and OAT prep, we began class with these songs four days a week. The songs we sang were mostly rap type songs. We sang about a different fact family each day. 86% of my students reached the mastery level and 64% of the students were able to answer at least one fact per second. 90% of the class made at week data regarding the number of students that reached the mastery level, the number of students that were able to answer one fact per second, and the number of students that showed some sort of improvement from week one to week six.

Effectiveness of Multiplication Songs
(Class size: 28)



According to my checklist tool, the level of participation ranged widely. There were several students that didn't enjoy singing, several students that didn't want anyone to hear them sing, and several students that just didn't want to do it. I constantly had to be on their case and speak with them. The student surveys provided a wide range of answers. Approximately 60% of the students felt singing these songs was beneficial. The other 40% felt the songs had little to no effect in helping them memorize the facts. When asked whether or not the students enjoyed singing these songs, the responses were split about 50/50.

The most helpful and effective data collection tools were the multiplication timed tests. Weekly, these provided useful statistical data that was needed to make the above

conclusions. While the multiplication timed tests did not take into account students' feelings or opinions, these tests were an easy way to collect the raw data.

I did experience a few problems. First off, I began a few weeks after my original timeline. With all the pressure that surrounds the OATs, I was cramming in a lot of review material and got side tracked. Also, I had a few students that were out several days in a row. This of course affected their memorization of the facts and threw off their data a bit. As mentioned above, participation was the biggest problem in the class that sang the multiplication songs. This may have had an effect on the final data conclusions. Finally, we did not use any of the strategies during OAT week. We took the week off. This week may have caused the students to back slide in their memorization. However, while time consuming and sometimes stressful, I was able to collect all the necessary data.

Action Plan/Conclusion

As I stated earlier, I believe every student is capable of learning the basic multiplication math facts. The math facts are a foundation for numerous higher-level concepts in math, including developing algebraic thinking (Ortiz, 2003). It is a teacher's job to help students understand the importance of and learn these facts. I tested the three most common strategies that I am familiar with to help students learn the multiplication facts: flashcards, interactive games, and songs.

From this research project, I learned that the most effective method (and for many students the fastest) to help students memorize the multiplication facts is through the daily use of flashcards. As my students entered class each day, they were expected to

quiz themselves using homemade flashcards for five minutes. This proved to be more effective than playing interactive games each week or beginning class with a multiplication song.

As a result of this project, I am changing the way I structure the beginning of the school year. I used to spend the first week of school stressing the need to memorize math facts by playing group multiplication games. I am not going to eliminate playing games from my lesson plans entirely (kids need to have fun in math, too!), but I am going to allot more time for individual flashcard use. I am going to provide each student with index cards to make his own set of flashcards and stress the importance of setting aside time to study these. In addition, after completing this research project, I am altering the "bellwork" routine in my classroom. From the first day of school, I am going to get students into the habit of 1) copying the homework into their planners, 2) getting out the previous night's homework, and 3) studying their flashcards until the teacher is ready to begin class. The better the students know these facts, the fewer problems we will have later in math.

I believe the results of this action research paper need to be disseminated to the professional learning community to help other teachers similar to myself. This action research project has been submitted online to the E.R.I.C. database. In addition, it has been made available to the staff members where I teach.

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Appendix A

Show What You Know! Multiplication Timed Test

Name _____ Date _____

7 x 4 =	6 x 7 =	8 x 9 =	7 x 1 =	4 x 8 =
3 x 2 =	7 x 8 =	5 x 5 =	4 x 3 =	9 x 6 =
8 x 6 =	3 x 3 =	4 x 3 =	6 x 5 =	2 x 2 =
4 x 6 =	7 x 8 =	5 x 1 =	8 x 4 =	9 x 7 =
7 x 5 =	5 x 4 =	7 x 8 =	7 x 5 =	3 x 7 =
9 x 7 =	3 x 6 =	8 x 7 =	4 x 4 =	9 x 6 =
1 x 6 =	9 x 4 =	6 x 8 =	6 x 2 =	3 x 5 =
7 x 4 =	7 x 6 =	4 x 3 =	5 x 9 =	6 x 4 =
8 x 7 =	9 x 3 =	8 x 8 =	1 x 1 =	4 x 4 =
6 x 5 =	9 x 7 =	5 x 9 =	10 x 1 =	2 x 5 =
9 x 7 =	8 x 2 =	4 x 4 =	9 x 4 =	7 x 3 =
9 x 9 =	7 x 6 =	1 x 9 =	7 x 8 =	8 x 9 =
4 x 1 =	9 x 8 =	3 x 8 =	4 x 6 =	10 x 3 =
2 x 10 =	3 x 4 =	7 x 6 =	4 x 10 =	2 x 7 =
3 x 8 =	5 x 8 -	6 x 3 =	2 x 9 =	6 x 7 =
10 x 6 =	2 x 4 =	5 x 10=	8 x 8 =	6 x 6 =
8 x 8 =	6 x 8 =	8 x 9 =	1 x 3 =	5 x 4 =
4 x 8 =	7 x 10 =	8 x 5 =	4 x 7 =	10 x 8 =

9 x 9 =	**7 x 3 =**	**3 x 9 =**	**9 x 10=**	**8 x 1 =**
2 x 1 =	**9 x 5 =**	**7 x 6 =**	**9 x 2 =**	**8 x 4 =**

Record of missed facts (use larger digit in each problem):

1’s _____ 6’s _____

2’s _____ 7’s _____

3’s _____ 8’s _____

4’s _____ 9’s _____

5’s _____ 10’s _____

Appendix B

Name _____ Period _____

____ Mastered multiplication facts 1 2 3 4 5 6 (circle weeks)

____ Completed 1 fact per second 1 2 3 4 5 6 (circle weeks)

Student Improvement:

____ improved from baseline data to week 1 by

____ improved from week 1 to week 2

____ improved from week 2 to week 3

____ improved from week 3 to week 4

____ improved from week 4 to week 5

____ improved from week 5 to week 6

_____ % improvement from baseline data collection to week 6

Effort/Participation notes:

Week 1:	
Week 2:	

Week 3:	
Week 4:	
Week 5:	
Week 6:	

Appendix C

Your opinion counts! ☺

Thank you for all your hard work and great participation over the last few weeks! You have all improved on your math facts so much. Great job! Please answer these questions thoughtfully and honestly. Use the back if you need more room for your answers.

1) Please circle the strategy used in your class:
Flashcards Games Multiplication songs

2) What were your initial feelings about the strategy used in your class?

3) Now that we have reached the end of this "experiment", what are your feelings about the strategy used in your class?

4) Six weeks ago, how well did you think you knew your math facts? Was there much room to improve?

5) Explain whether you feel your recall of math facts has or has not improved over the last six weeks.

6) If I would have given you a grade on how well you knew your math facts six weeks ago, what grade would you have received? (circle one) A B C D F

7) If I were to give you a grade today based on how well you know your math facts, what grade would you earn? A B C D F

8) On a scale of 1 (not at all) to 5 (wow! More than I thought possible!), how much did your memorization of the multiplication facts improve? 1 2 3 4 5

9) On a scale of 1 (not at all) to 5 (gets all the credit), how effective was the strategy your class used in helping you memorize your math facts? 1 2 3 4 5

10) Do you have any comments about the past six weeks and the strategy your class used?