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The Impact of the Flipped Classroom Model: A Study of 5th Grade Students

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The Impact of the Flipped Classroom Model: A Study of 5th Grade Students

A Project Presented to the Graduate Faculty of Minnesota State University Moorhead

By:

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Instruction

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Table of Contents

ABSTRACT..... 4

CHAPTER ONE 5

Introduction..... 5

 General Problem/Issue.....5

Background Information.....5

Purpose of Study.....5

Rational.....6

 Subjects and Setting.....6

Description of Subjects.....6

Selection Criteria.....6

Description of the Setting.....6

 Research Ethics.....7

Permissions.....7

Informed Consent.....7

IRB Approval.....7

 Definitions.....7

CHAPTER TWO 8

Review of Literature 8

CHAPTER THREE 13

Data Collection 13

 Research Questions.....13

 Methods.....13

Data Collection.....13

 Ethical Issues.....13

Protection of Human Subjects.....13

Researcher Bias.....13

CHAPTER FOUR..... 17

 Results/Findings..... 17

 Research Questions..... 17

Research Question One.....17

Research Question Two.....21

 Conclusion.....24

CHAPTER FIVE 25

 Action Plan.....25

 Plans for Sharing..... 25

Appendix A..... 29

Appendix B 30

Appendix C 32

Abstract

The purpose of this research was to determine whether the flipped classroom can improve the impact on student achievement and increase the enjoyment of math and the attitude toward its' instruction. The study aims to look at younger students to see if the flipped classroom can make a positive impact in the classroom. Quantitative and qualitative data was used to determine a positive, negative, or null impact on math instruction. Quantitative data includes chapter tests, while qualitative data includes a survey about the feeling towards math. The data indicated that the flipped classroom can have a positive impact on math instruction.

Chapter One

Introduction

General Problem / Issue

Background Information. In my normal fifth grade math class, students have a typical routine. Students get to class and immediately work on a bell ringer with a few questions from the previous day. From there, we jump into the lesson for the day. A lot of the lesson includes back and forth from myself and the students, but a significant portion is spent on me teaching a new concept and the students watching and listening. As I think back to the way school was growing up, this happened a lot. The teacher would present a lesson and the students would go ahead and work on independent and group work with whatever time was left. Whatever wasn't finished would be homework and due the next day. Quite often, additional homework was handed out as we were leaving the classroom for the day. This just seemed like the norm to me until I began teaching. I tried to phase out homework and stumbled upon the flipped classroom. The flipped classroom aims to “flip” around instruction and activity. The bulk of instruction is done outside the classroom with the activities and work done in the classroom.

Purpose of Study. The purpose of my study is to determine if it is beneficial to my math class and students to change my teaching style in the classroom from a traditional style to the flipped classroom. The traditional classroom uses class time to teach new concepts and uses whatever time is left to practice those new concepts, with whatever is not completed to be done at home. The flipped classroom switches (flips) that around. Class time is strictly focused on activities and practicing new concepts individually, in groups, or as a whole. Students are responsible for watching a video outside of class introducing the new content. My study aims to

find out whether the flipped classroom has a positive effect on learning and the overall feeling towards math from the student's perspective.

Rationale. This undertaking is very plausible in our school. Each student has an iPad when they enter fifth grade. Most of our students have Wi-Fi at home, but this is *not* necessary to participate in this study. We are starting this at the beginning of the school year so it is just a new routine for the students to learn, like they would any year. The learning goals and targets do not change. The way in which we learn, however, does. I want to see if the flipped classroom can maximize the time that I get with each student in the classroom. Eliminating direct instruction and spending all of class interacting and learning through activity can be beneficial for understanding and connecting concepts. Through research, planning and implementation, I can make a decision that is data driven and has the most benefit to our students.

Subjects and Setting

Description of Subjects. Participants for this study will be selected from the population of students in the fifth grade from a central MN school district. Ninety percent of the population in this district is Caucasian. The participants of this study will include thirty two students. Seventeen in first hour and fifteen in second hour. The school district has a free and reduced lunch ratio with about 54% of all students k-12 receiving free and reduced meals.

Selection Criteria. I decided to focus my study on fifth grade math students. These fifth grade math students are getting an iPad for the first time in school. It is theirs for the entire school year and can take it with them wherever they go. This is the perfect age for this study as they are learning to navigate the iPad in school for the first time so we can create some great habits and routines with them. The students who are selected are in my math classes. There are four total math classes in fifth grade and I teach two of them.

Description of Setting. This study will take place in a school district west-central Minnesota. The town has a population of approximately four thousand people. The students that will be in this study are Caucasian. The district in this town has two school buildings; a K-fourth grade Elementary School and a fifth-twelfth grade Middle/Senior High School. The average class size is around eighty students.

Research Ethics

Permissions. A letter of permission will be sent home for the parent/guardian and student to sign. The letter is inviting the student to participate in the study of the flipped classroom. It is conveyed to the parent/guardian and student that they will participate as expected in my 2020 fifth grade class. All information obtained in this study is to remain confidential and will not be disclosed. Pseudonyms will be used for all students. The student, parent/guardian, and myself will all have to sign the document in order to participate. This shows the permission and the granted access for the student to participate in this study. It is made known in the letter that the decision whether or not to participate will not affect the future relationship with me, the teacher. The student is allowed to discontinue participation at any time.

Informed Consent and IRB Approval. Permission for this study will be obtained from Minnesota State University Moorhead and from the school district. Along with that will be permission from the superintendent, middle school/high school principal, parents/guardians, and each student participating.

Definitions

For the purpose of this study, the following terms are defined:

Formal Assessment: Tests at the end of each chapter

Math Attitude Survey: survey students take before the school year and at the end of the study to determine their likeness for math.

Chapter Two

Review of Literature

When thinking about the traditional classroom, there are a few common themes that come to mind. The teacher is at the front of the classroom and the students are sitting in rows, tables, or assigned seats. Instruction is implemented when the group is all together. All eyes are on the teacher while he/she delivers the material for the day. When the lecture/notetaking is over, it is time to start an assignment at the end of class. Whatever is not completed is taken home for homework and the daily process repeats itself day by day. Although that does not describe every traditional classroom, that framework is something that has been in classrooms for years. There is a different teaching style that flips the classroom from the traditional approach. This teaching style is called the flipped classroom, and it is something that is gaining interest as technology becomes greater and greater.

Flipped Classroom Characteristics

The traditional classroom described above detailed a teacher presenting a lesson of information to the students during class and doing assignments at the tail end of class leading into homework after school or at home. The flipped classroom takes that idea and flips it, saying it is often defined more simply as ‘school work at home and home work at school. While flipping the classroom roles around, flipped classroom offers videos of course content outside of class so students can learn through their performance in the classroom. Home assignments do not exist in the flipped classroom. The home “assignment” is to watch videos of course content so students can go into the next day with an idea of what is going on. In a flipped classroom, students watch videos at their own pace outside of the classroom so they can explore actively through cooperation with peers and the teacher at school. One substantial characteristic of the flipped

classroom is that it includes out-of-class learning opportunities. Knowledge in advance and technology are significant pieces to the out-of-class learning modality. Another great characteristic is the ability to maximize time in class. There is much more time with the teacher during activity/assessment and it is very student centered.

Out of Class Learning

One characteristic of the flipped classroom is the continuous learning that happens in and outside the classroom. Teachers prepare lessons through videos or other media sources so students can view the lessons anywhere before attending class. It can be at home the night before, at school before class starts, etc. This type of learning can be categorized as a system which, according to Karabatak and Polat (2020), “enables learners to access the subjects they need to learn outside school with the help of asynchronous systems or resources (course videos and articles, various electronic data sources, images and presentations), thus it provides effective learning.” Students are getting exposed to the lesson and its’ important parts before class even starts, so class can be utilized in a more efficient manner. The use of technology is huge in getting the prior knowledge.

Knowledge in advance. One way to make learning a continuous cycle is to get students thinking about the topics outside of the classroom. In order to maximize the time in the classroom with the teacher, out of class learning has to occur. Teachers prepare videos and lessons for students to absorb basic knowledge of the topic. According to Karabatak and Polat (2020), the flipped system “enables students to learn theoretical knowledge at home and apply what is learned in school.” There are times during a traditional lesson that students are not paying attention to the lesson. A student study that compared the traditional classroom to the blended classroom that used technology to enhance pre-class learning stated that the pre-class

approach "...improved prelaboratory preparation and facilitated student learning." (Jarrett-Thelwell, Burke, Poirier, and Petrocco-Napuli, 2019, p. 22). In this case, each and every student has to view the lesson at their own pace. Since the flipped classroom stays away from homework, students are responsible to watch the videos/lessons. Students can perform learning in the classroom because of their knowledge completed in advance. This prior knowledge could not happen without the use of some sort of technology.

Technology

Technology is imperative to the flipped classroom and out of class learning. One-to-one devices are needed in order for this to live up to its' full potential. Teachers create short videos of course content so students can study and get exposed to the information before class. This creates flexible learning and "these technologies allow learners to learn anytime, anywhere, and provide them with multiple ways of learning throughout the day, and it came to be called ubiquitous learning." (Chen, G., et. al. 2015, p. 353) If the students have one to one devices, which is needed for the flipped classroom, they can watch these videos at school as well if they don't have the proper Wi-Fi or connection at home. If each student comes to class prepared with the proper video lesson viewed, kids can be ready to learn and apply that new knowledge. "The FC (flipped classroom) uses technology-enhanced pre-class learning to transmit knowledge, incorporating in-class interaction to enhance higher cognitive learning." (Chen, K., et al. 2018, p. 910). Along with these videos, other technology can be used to promote out of class learning. This can include any social media, educational games, YouTube, Ted Talk, Kahn Academy, Moodle , etc.

Maximize Time in Class

Another characteristic of the flipped classroom is to maximize the time we have in class. In traditional classroom, a majority of class time is devoted to direct instruction type lessons. According to Jarrett-Thelwell, Burke, Poirier, and Petrocco-Napuli (2019), students became less engaged in the traditional learning environment. The teacher introduces the topic in ten to twenty minutes, with the remainder of time being used by students to work. With the flipped classroom flipping roles, the instruction is already done the moment students get into the classroom. Since instruction normally takes up class time, students now have much more time in class to work and engage in assignments and activities. This includes time with the teacher and time with other students. Activities can be very student centered as well as the time with the teacher is more common.

More time with teacher. Instead of class time as an instructor, the teacher is now there as a distributor and facilitator. “As one of the advantages of flipped learning, it can be ‘a means to increase interaction and personalized contact time between students and teachers.’” (Chen, et al, p. 354). As the students work on the activities, the teacher is there moving around the room helping students. At the same time, students can rewatch instructional videos or rewind them at any time. They came into class with the video watched already, but the students will be able to watch the video again or rewatch a certain part. That can make it seem as if the teacher is there for every student at the same time. The teacher can also evaluate where the students are at in their understanding from watching the home video and place the students into groups when doing problem-based projects in the classroom. Another positive feature of time with teacher includes immediate feedback. “In classroom, the teacher provides for students, facilitates further activities and evaluates their works.” (Elian & Hamaidi, 2018, p. 112).

Student Centered. With the flipped classroom there can be more opportunity for individualized instruction, at their pace. According to Tsai, Shen, & Lu, the advantages of flipped classroom include diversity, increasing discussions in class, and achieving individual learning based on each individual. When the class begins, the teacher can offer help based on each student's specific need. While being student centered, it also is important that students give their full effort. Success of the flipped classroom can depend on the effort of each student. Students can also learn from other students. One motivation for the flipped classroom is to make use of class time for collaborative activities. In collaborative activities, students can learn from other students. Peers could help improve the process of learning and internalizing knowledge.

These benefits include that flipped classroom: 1) guarantees for teacher making good use of classroom period; so, he/she makes use of time in guiding and helping, 2) enhances the critical thinking, self-learning, building experiences, communication skills, and cooperation among students, 3) provides a technique to evaluate the students' understanding because test and short tasks that students perform are indicators of weaknesses and strengths in their understanding of content. Alshahry [4] added some other positives of flipped classroom that include: 1) developing the role of teacher as a lecturer to become a guide and supervisor, and developing the role of student to become a researcher participating in the teaching and learning processes, 2) helping students' self-learning according to their abilities and individual differences, 3) providing students with excited educational environment, and enhancing high thinking skills such as critical thinking skills. (Elian, & Hamaidi 2018, p. 112-113).

Conclusion

The traditional classroom is something that has been in schools for many years, using class time for teaching/lecturing while spending the last bit for activities and work. The flipped classroom aims to change that around, flipping the times of instruction and activity. Students use technology and knowledge in advance to obtain out of class learning. Students also maximize time in class by getting more time with the teacher and creating more student centered activities. It is a different, yet effective, classroom instruction strategy that looks to maximize the use of modern technology.

Chapter Three

Data Collection

Research Questions

Research Question One: How will the flipped classroom impact student achievement?

Research Question Two: How will the flipped classroom increase student enjoyment of math and attitude towards instruction?

Methods

Data Collection. I will use qualitative and quantitative data. Qualitative data will give me experienced based data where I can find out the enjoyment and feeling of the flipped classroom. When talking about academic achievement, quantitative data deals with numbers and statistics. Although that is very important in this study, the well-being and experience my students go through is a big factor in this as well. For the qualitative data and the overall feeling of math, I will use a survey I created on google forms called Math Attitude Survey. Students will take that survey at the beginning of the study and at the end. The data can help make instructional decisions on what is best for the class. Using unit tests and standardized tests will give me a good indication on those numbers. Student data will be compared from the beginning of the school year to the end of the data collection period of approximately eight weeks.

Ethical Issues

Protection of Human Subjects. Pseudonyms will be used for everything that we do in this study. Students' actual names will not be used in order to better ensure confidentiality.

Researcher Bias. I want what is best for my students. There isn't any preference on what way math is taught, as long as it is in the best interest of the kids. I am eager to get this study

going to see if it can have a positive impact on my students. If it does not, it will still be a successful topic to research as I will get a better idea with what is best for my kids.

Limitations. This study was planned to be in the regular classroom setting. Due to COVID-19, there will likely be changes to instructional models that will impact the study.

Chapter 4

Results/Findings

The purpose of this research is to determine whether the flipped classroom can improve the impact on student achievement and increase the enjoyment of math and the attitude toward its' instruction.

Research Questions

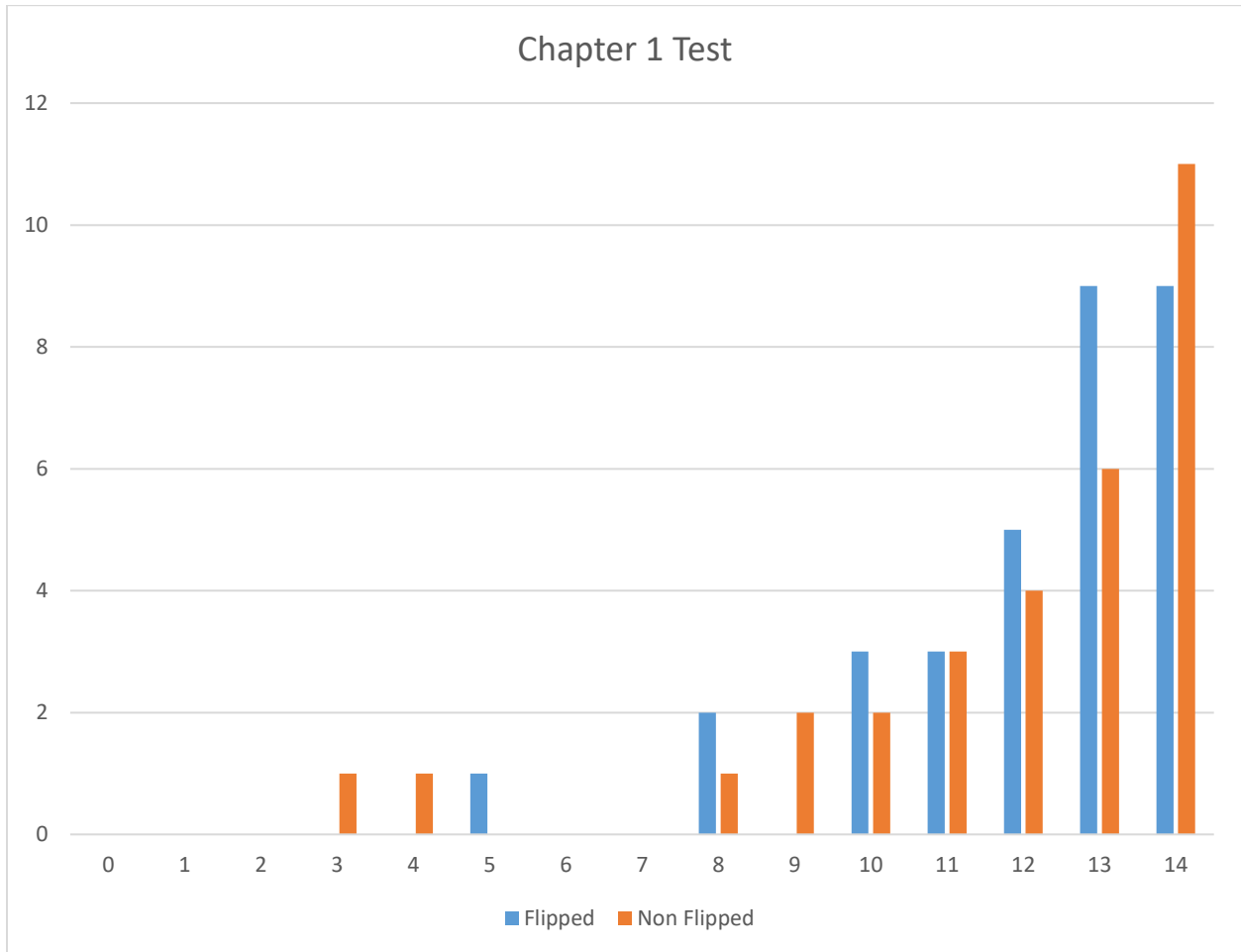
Research Question One: How will the flipped classroom impact student achievement?

There are four different math classes in our grade. There are two classes that belong to me that are participating in my flipped classroom study. The scores of two other classrooms are included in this study as a comparison between classrooms that are flipped and traditional. My two classes have been practicing the routines of the flipped classroom, while the other two classes have not. My two classes (flipped classes) had thirty two kids in total. The other two classes had thirty two students as well.

The first test (Chapter 1 Test) was administered within the first month of school and was out of fourteen points. That unit included operations with whole numbers. The flipped classes had nine students get a perfect paper and twenty nine students get above a seventy percent. The class average was an eighty six percent. The non-flipped classes had eleven perfect papers and twenty six students get above a seventy percent. The class average was an eighty two percent. The total scores can be seen in figure 1.

Figure 1

Chapter 1 Test



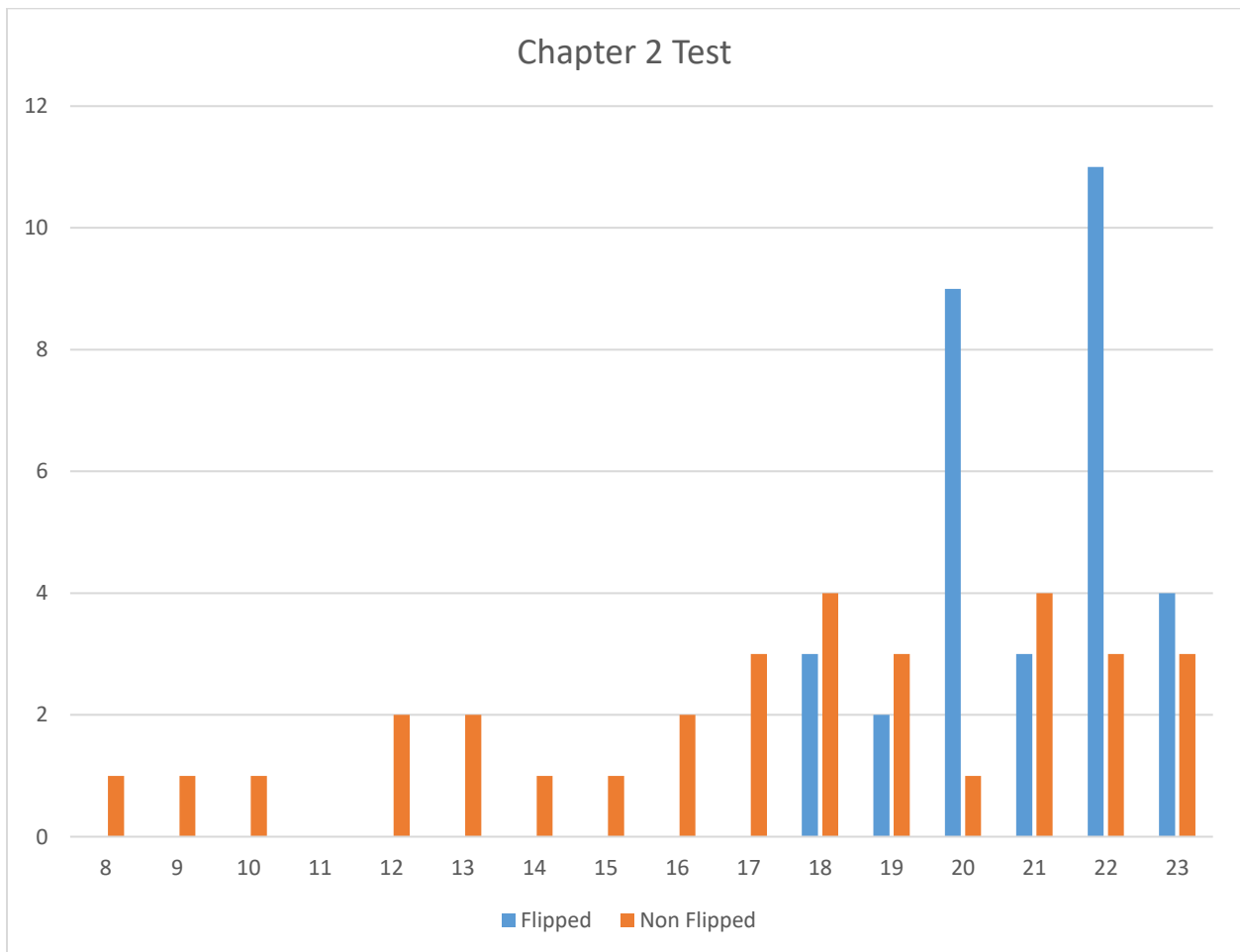
**Note.* This figure represents scores in a chapter test. The flipped classroom includes 32 students, and is represented by the blue color. The Non Flipped Classroom includes 32 students and is represented by the orange color. The scores are listed on the bottom of the figure while the number of students who achieved that score is along the left side.

Figure 1 shows the scores of the Chapter 1 Test. The numbers on the bottom indicate the scores. The maximum score a student could receive was a fourteen. The numbers along the left hand side indicate the amount of student’s who achieved that score. The blue color represents the flipped classroom, while the orange color represents the non-flipped classroom.

The second test (Chapter 2 Test) was given a few weeks after the first. This unit included dividing whole numbers. There were twenty three points. The flipped classes had four students get a perfect paper and all thirty two students get above a seventy percent. The class average was a ninety four percent. The non-flipped classes had three perfect papers and twenty one students get above a seventy percent. The class average was a seventy eight percent. The total scores can be seen in figure 2.

Figure 2.

Chapter 2 Test



**Note.* This figure represents scores in the second chapter test. The flipped classroom includes 32 students, and is represented by the blue color. The Non Flipped Classroom includes 32 students and is represented by the orange color. The scores are listed on the bottom of the figure while the number of students who achieved that score is along the left side.

Figure 2 shows the scores of the Chapter 2 Test. The numbers on the bottom indicate the scores. The maximum score a student could receive was a twenty three. The numbers along the left hand side indicate the amount of student's who achieved that score. The blue color represents the flipped classroom, while the orange color represents the non-flipped classroom.

As I dove into the scores of the Chapter 1 Test, I can see that there are more perfect scores in the non-flipped classroom. But, as a totality of the classes, the flipped classroom had higher scores overall. The average score was higher in the flipped classroom (eighty six to eighty two), and twenty nine students achieved above a seventy percent compared to twenty six. In the Chapter 2 Test, there were similar perfect scores again. The flipped classroom had four perfect papers, while the non-flipped classroom had 3. For the classes as a whole, the flipped classroom outperformed the non-flipped classroom once again. All thirty two students got above a seventy percent, with a class average of ninety four percent. That compares to twenty one students getting above a seventy percent, with an average score of seventy eight percent. These are the results I had expected as I went through my research.

One of the biggest positives about the flipped classroom is the ability to maximize time in class. The benefit of that is having more time with the teacher, and creating more opportunities to individualize the lessons. The kids come to class prepared because they have already watched the lesson (maybe even a few times). This creates more time in class for meaningful activity. The instrument I used gave me accurate results, but if I had to do it again, I would use an instrument

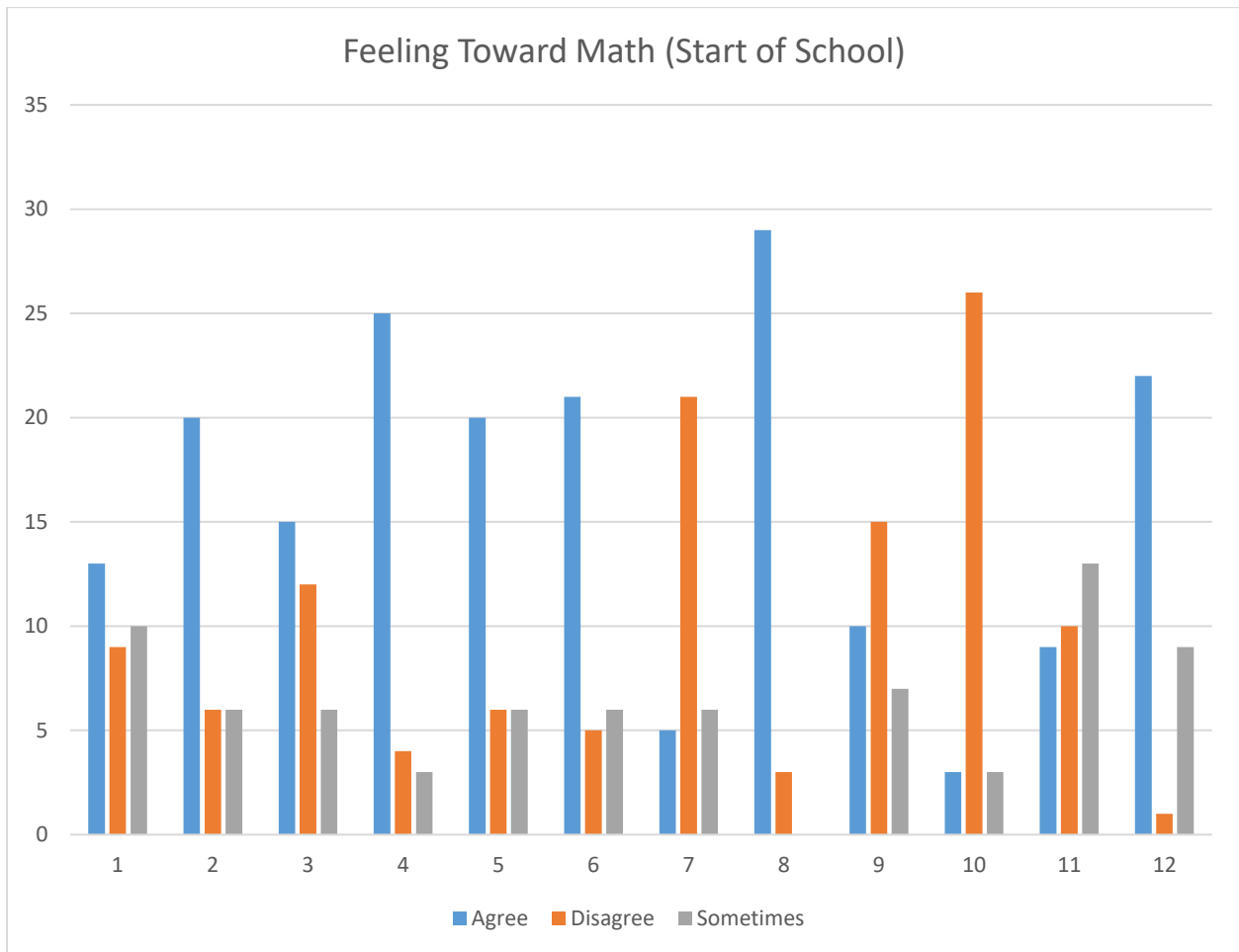
called FastBridge. In that situation, I could set up a baseline and test students on their individual abilities, and not the specific standards that unit tests address.

Research Question Two: How will the flipped classroom increase student enjoyment of math and attitude towards instruction?

This question will only focus on the flipped classroom classes. I gave each student a survey about their attitudes towards math. The survey asked a series of questions regarding feelings towards math. The questions are listed on Appendix C and are listed as numbers one through twelve on the graphs, figures three and four. Thirteen students listed math as their favorite subject to start (out of thirty two). That changed to eighteen at the end of the study. Another statement to note is statement number five. That states “I don’t think math is fun but I would like to get better at it.” Twenty students said that they agree with that statement to start, and nine students said that they didn’t think math is the second time around. The final statement says “I am willing to give math my best shot!” Twenty two students said they agree with that statement to start, and twenty eight out of the thirty two said that they agree with that statement at the end. Figure 1 and Figure 2 show before and after statistics of all twelve statements (questions can be read in Appendix C).

Figure 3

Feeling Toward Math (Start of School)

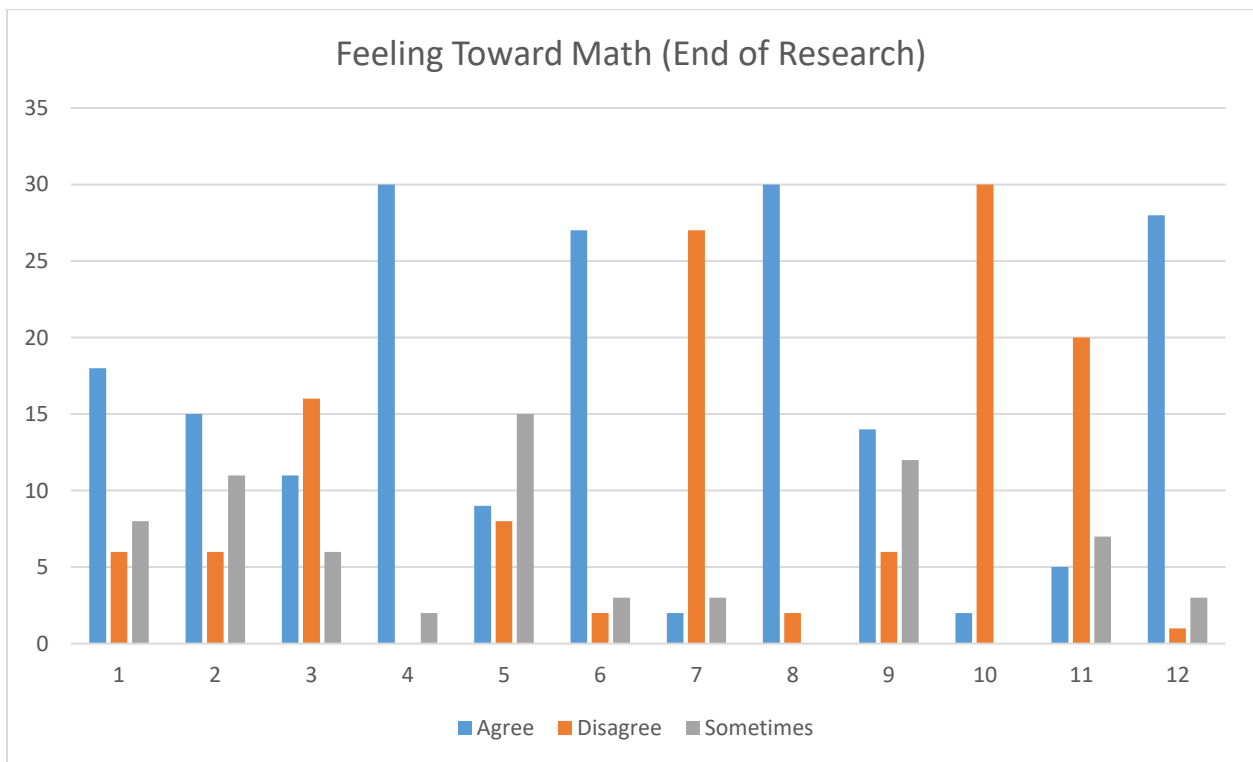


**Note.* This figure represents a survey to 32 math students who are participating in a Flipped Classroom. The survey includes questions about students’ feeling towards math. This survey happened at the beginning of the school year. The question number is at the bottom of the figure and the number of kids who answered the question are along the left side. Blue indicates that they agree, orange indicates that they disagree, while gray indicates that they sometimes agree.

Figure 3 shows the feeling toward math at the start of the school year. There were twelve questions on the survey, and the numbers on the bottom of the figure represent each question (you can see the questions in appendix 3). The numbers along the left indicate the number of students that answered each question.

Figure 4

Feeling Toward Math (End of Research)



**Note.* This figure represents a survey to 32 math students who are participating in a Flipped Classroom. The survey includes questions about students’ feeling towards math. This survey happened after the first 9 weeks of school. The question number is at the bottom of the figure and the number of kids who answered the question are along the left side. Blue indicates that they agree, orange indicates that they disagree, while gray indicates that they sometimes agree.

Figure 4 shows the feeling toward math at the end of the research period. There were twelve questions on the survey, and the numbers on the bottom of the figure represent each question (you can see the questions in appendix 3). The numbers along the left indicate the number of students that answered each question.

As you look at Figure 3 and Figure 4, the most important thing to note is that not one statement went negative from the beginning of the school year to the end of the research. Every single statement either stayed relatively the same or went in a positive direction. I think that this says a lot about the style of the flipped classroom. Students seem to be enjoying this class and I think that it has a lot to do with its' style. Kids come to class prepared, have more individualized learning, have more time to get classwork done (instead of calling it homework), and don't feel as isolated in class.

Conclusions

Throughout this study, I have witnessed great success within the flipped classroom. In the first test, twenty nine out of thirty two students achieved above a seventy percent, with a class average of eighty six percent. In the second test, all thirty two students achieved above a seventy percent, with a class average of ninety four percent. These scores and averages exceeded the class that was not flipped, and had a better success rate from the entirety of the class. According to my survey results, the overall feeling of math improved from the start of the year until the end of the research. The characteristics of the flipped classroom has a lot to do with that. That alone gives me great reason to keep this style of teaching in my daily routine.

Chapter 5

Action Plan

After two semesters of research on the flipped classroom and a great chance to fully implement it into my teaching, I plan to continue this style for the remainder of the year and in the years to come. The way our school is set up for fifth grade, it has all the necessities and tools for this to be successful. We have one to one devices for our students, they have the opportunity to have internet access at home (if they don't have it, they can get access from our school), and we are learning more and more each day that we give this a shot.

The students love it so far, as they seem to have responsibility and freedom at the same time. They are responsible for their out of class learning, but are free to work at their individualized pace at school. Students seem to have gotten to a point where they enjoy math class. They might not necessarily enjoy math in itself, but they enjoy what we are doing and how we go about it. I have already created videos for each lesson in our curriculum, and there is no stopping the things that can be implemented from here on out. My next step would be to potentially flip my social studies classroom and curriculum. Using the same principles in the research, there could be great potential to make the switch.

Plans for Sharing

The flipped classroom is something that can be done in our school district. With the technology that we have, it can be a painless transition. After researching and finding my own results, I am trying to bring this to my fellow fifth and sixth grade teachers. Before I take this to the entire school, I would like to see it work in my own fifth and sixth grade math department. This could get more accurate results before we take it any further, because although I had positive results, having more students involved could get a bigger sample size. I have already

started the process of sharing this with colleagues. If growth can be found within a fifth and sixth grade math department, then I believe that we can find growth at other parts of the school as well. I also believe that since we are a fifth grade through twelfth grade building, there are huge advantages of starting early and continuing this way of learning. I would love to see what that does to the success of our school, and the feelings kids have about it.

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Appendix A

Chapter 1 Test

Operations with Whole Numbers

1. Multiply. 241×323
2. Subtract. $936,550 - 17,999$
3. Add. $54,114 + 32,338$
4. Subtract. $100,000 - 1,000$
5. Multiply. 186×201
6. Subtract. $1,111,101 - 347,529$
7. Add. $88,166 + 999$
8. Subtract. $44,144 - 327$
9. Erin baked 144 cookies for the school carnival. She packaged them in bags of 3 cookies each. At the end of the carnival, she had 14 packages leftover. How many cookies did she have left over in all?
10. Jonathan has \$158 in his savings account. He withdrew \$42 to buy a new skateboard. How much money does Jonathan have left in his account?
11. A chain of hardware stores ordered 248 boxes of pliers. Each box contains 24 pliers. How many pliers did the chain of hardware stores receive in all?
12. Marcy collected seashells every day on their family beach vacation. On Monday, she collected 23 seashells. On Tuesday, she collected 47, on Wednesday, 25, on Thursday, 61, and on Friday, she collected 33. How many seashells did she collect in all?
13. A factory made a profit of \$401,557 in the month of May. In June, they made a profit of \$523,801. How much profit did they make in May and June together?
14. Mr. Wilcox has 27 students in his fifth grade class. If each of his students uses 350 pages of notebook paper in one school year, how many pages of notebook paper will his class use in all?

Appendix B

Chapter 2 Test

Dividing Whole Numbers

In questions 1 - 5, please write whether the numbers are divisible by 2, 3, or 5. *Note, there can be more than 1 correct answer

1. 30
2. 48
3. 52
4. 66
5. 15

In questions 6 – 15, please divide.

6. $355 / 71$
7. $784 / 14$
8. $576 / 32$
9. $240 / 15$
10. $870 / 30$
11. $3,430 / 70$
12. $1,881 / 33$
13. $1,722 / 82$
14. $5,032 / 74$
15. $9,640 / 10$

In questions 16 – 20, please write two division sentences that can be made from the multiplication problems.

16. $42 \times 4 = 168$

17. $21 \times 7 = 147$

18. $13 \times 6 = 78$

19. $6 \times 9 = 54$

20. $5 \times 20 = 100$

In questions 21 – 23, please estimate.

21. $97 \div 9$

22. $44 \div 12$

23. $36 \div 17$

Appendix C

Math Attitude Survey

Name _____

1. Math is my favorite subject
 - a. Agree
 - b. Disagree
 - c. Sometimes
2. I like math, but it is not my favorite subject
 - a. Agree
 - b. Disagree
 - c. Sometimes
3. I am not good at math
 - a. Agree
 - b. Disagree
 - c. Sometimes
4. I think that math is an important subject to learn
 - a. Agree
 - b. Disagree
 - c. Sometimes
5. I don't think math is fun but I would like to get better at it
 - a. Agree
 - b. Disagree
 - c. Sometimes
6. I enjoy going to math class
 - a. Agree
 - b. Disagree
 - c. Sometimes
7. I hate going to math class
 - a. Agree
 - b. Disagree
 - c. Sometimes
8. I enjoy math when I understand how to do it
 - a. Agree
 - b. Disagree
 - c. Sometimes
9. I enjoy trying to solve problems that are difficult
 - a. Agree
 - b. Disagree
 - c. Sometimes
10. Math is NOT important
 - a. Agree
 - b. Disagree
 - c. Sometimes
11. Math makes me feel dumb
 - a. Agree
 - b. Disagree

- c. Sometimes
12. I am willing to give math my best shot!
- a. Agree
 - b. Disagree
 - c. Sometimes