The Flipped Classroom

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Abstract

The flipped classroom pedagogy has been found to help "improve the student learning experience" (Wang & Qi, 2018, p. 1). With the revolution of technological advances in society, being online is simply child's play for innovative 21st century students. To spark an interest in the flipped classroom approach, the researcher created four lessons for which students became masters in multiplying decimals. Two groups of students, a test and control group, were taught two different ways: flipped classroom and traditional teaching pedagogy, respectively. At the end of four lessons for both groups, a determination about whether flipped classrooms having a positive impact on the success of students in a standard sixth grade mathematics class was made. It was concluded that there was insufficient evidence in support of a directional hypothesis that flipping would yield better achievement compared with the traditional method. Instead, the null hypothesis was retained.

CHAPTER I

INTRODUCTION

Overview

Having taught the past seven years in a middle school classroom, the researcher has observed the influence that technology has on the preteen. In addition, technology is at the forefront of many decisions being made by all people, especially educators. In this innovative 21st century, students thrive on the ability to utilize devices in and out of the classroom.

Çevikbas and Argun (2017) expressed that in this day and age, teaching has become more "difficult to draw interest and curiosity of the student" as teaching styles have become "obsolete" (p. 189). Instead, teachers must engage students utilizing the "innovative teaching approaches that address the needs of this age" (Çevikbas & Argun, 2017, p. 189). Technology is a key in keeping students engaged in the lesson; hence sparking the researcher's interest in flipped classrooms. Flipped classrooms give students the opportunity to learn at home, on their devices, so that more engaging, rigorous activities can be collaboratively completed in school.

Statement of Problem

The purpose of this study is to investigate the impact of the flipped classroom teaching approach versus the traditional teaching approach when teaching multiplying decimals to sixth grade students.

Hypothesis

The null hypothesis of this study is there will be no relationship between utilizing the flipped classroom approach and student success in sixth grade multiplying decimals.

Students in the standard mathematics class (X-E) who receive instruction through the

flipped classroom approach will perform the same on average (Y) as similar students (X-C) who receive traditional classroom instruction on the multiplying decimals posttest.

Operational Definitions

The independent variable includes their participation and the researcher's strategic implementation in the flipped classroom approach versus the traditional teaching approach. The dependent variable includes students' success on their assessment in multiplying decimals (in comparison to a class not participating in the study).

One way of operationally defining the dependent variable would be to give the two groups participating in the study the same assessment and see which group of students outperforms the other. One way to operationally define the independent variable is by using observation in the flipped classroom model. For example, the researcher will be able to determine success of the flipped classroom by participation and attendance during the lessons and proficiency of students' work as they practice the skills that were taught in the flipped classroom setting. It will be noticed when students participate in the lesson based on their log-in activity on the Google Classroom platform. The same assessment will be given to both students. However, utilizing a flipped classroom teaching approach will limit the amount of time teaching occurs face-to-face. The researcher will have to rely on in-class practice and problem solving within small group rotations, interventions, and limited re-teaching opportunities.

CHAPTER II

LITERATURE REVIEW

Teachers are creative when it comes to their style of teaching. Some teachers simply lecture—standing at the front of the classroom while speaking at students. Other teachers are more laid back with less talking and fewer interactions with students. Others fall somewhere in the middle – they interact with students, are innovative with their approach to teaching, and can orchestrate meaningful instruction that features collaboration, inquiry, and rigorous experiences that keep students yearning for more.

Ferriman (2014) noted from 2012 to 2014, the percentage of teachers utilizing flipped classrooms rose from 48% to 72% (LearnDash, para 1). When compared to traditional instruction, teachers in the flipped classroom see many benefits, including improved retention, motivation, and collaboration.

The purpose of this literature review is to examine the impact of the flipped classroom teaching approach as compared to the traditional teaching approach in the middle school classroom. Section one will discuss what a flipped classroom is in addition to how the flipped classroom traditionally operates. Section two will observe how student-to-teacher and student-to-student relationships are elevated. In addition, section two focuses on teacher and student perspective of the flipped classroom. Section three will analyze the effect the flipped classroom pedagogy has student motivation and retention of material taught. Finally, section four focuses on the increase of student engagement in the classroom.

The Flipped Classroom

A flipped classroom is defined as "shifting direct learning out of the large group learning space and moving it into the individual learning space, with help from several technologies"

(Unal & Unal, 2017, p. 1). Essentially, students complete their learning at home (as homework) and practice takes place in class. In a flipped classroom, "learning of new content and concepts [occurs] before class in the form of videos [and diving into] complex problem solving, deeper conceptual coverage, and peer interaction" (Çevikbas & Argün, 2017, p. 192) occurs during class time. In the traditional classroom setting, 65% of class time is teacher-centered and 35% is devoted to student-centered activities. However, in the flipped classroom, 20% is teacher-centered and 80% is student-centered. In other words, the flipped classroom is a "blended learning model [where] meaningful and active learning activities… are carried out as part of cooperative and individual work in classroom setting" (Çevikbas & Argün, 2017, p. 192). These phases include "out of class-independent studies [and] in-class inquiry-based activities [for which the out of class activities] prepare a foundation for in class activities" (Cabi, 2018, p. 215).

The flipped classroom model is adaptable to any classroom. Teachers can adjust this style to fit technologically savvy students with the use of YouTube, Face Time, and other avenues that fit students' needs. In a traditional classroom setting, teachers' instructional delivery is limited when it comes to technology.

Typically, in a traditional classroom, most of the "remembering" is done at school, while at home, students are usually practicing and applying what they learned through homework assignments that some tend not to attempt. Most levels of Bloom's cognitive domain come into play at different times in the flipped classroom-teaching model. For instance, most of the "remembering" is done at home while "evaluating" and "creating" (Çevikbas & Argün, 2017, p. 193) happen in the classroom. The theoretical framework of the flipped classroom model "increases the level of participation of students significantly and thus it is possible to realize active and meaningful learning" (Çevikbas & Argün, 2017, p. 194). The flipped classroom

approach, compared to the traditional classroom approach, uses a variety of "cognitive mechanisms [that] enable us to create rich and engaging environment[s] that effectively facilitate the mastery of learning outside classroom" (Wang & Qi, 2018, p. 67).

Student and Teacher Relationships and Perspectives of the Flipped Classroom

Perspectives of both students and teachers in the flipped classroom seem positive and encouraging. When deciding which approach they prefer, students claim they enjoyed the flipped classroom more than the traditional due to the complexity of discussions (online and in the classroom) in which they were engaged (Luminiou, 2018). If teachers reach a level where students evaluate, synthesize, or connect their learning, then students make a more in-depth connection to their learning in a flipped classroom instead of simply recalling information to answer a question. Students work together in order to solve troubling tasks or activities. For example, a cohort of students stated after participating in the flipped classroom that it helped them better prepare for assessments (Luminiou, 2018).

Limniou, Schermbrucker, and Lyons (2018) conducted a study in which two teachers were asked to use either the flipped classroom approach (teacher B) or the traditional teaching approach (teacher A). They concluded that Teacher A did not promote "content mastery through synthesis of ideas and critical analysis as efficiently as teacher B" (p. 814). Teachers seldom hear that students enjoy a particular way of teaching; however, with flipped classrooms, there is consistent evidence of higher levels of student enjoyment.

Flipped classrooms promote a positive community and collaborative culture within the classroom. It is important that teachers build positive relationships with students so that student motivation heightens, and classroom culture remains optimistic. The flipped classroom "promotes an environment which increases the interaction between the students and teachers and

engages the student in learning though application and practice… [it] use[s] a student-centered approach as it focuses on student learning and it places the responsibility for earning more on the shoulders of students than teachers while giving them a great impetus to experiment" (Danker, 2015, p. 3).

Flipped classrooms promote positive relationships among students. However, peer-to-peer relationships are fostered if and only if the "flip" is properly utilized and successful. "When learners do not complete the necessary class preparatory assignments… [this] hinders the development of … relationships…" (McCollum, Fleming, Plotnikoff, & Skagen, 2017, p. 15). Teachers claim that the most effective part of the model is the increase of teacher-student and student-student interactions both in and out of the classroom. In other words, "collaboration became more positive over time due to the variety of class activities, the greater interaction between classmates, and the social aspects of getting to know teammates" (Gomez-Lanier, 2017, p. 7).

Motivation and Retention of Students in the Flipped Classroom

Studies demonstrate that implementation of flipped classrooms increases retention and motivation for all students. In a study (Alsancak Sirakaya & Ozdemir, 2018) that examined the effect on the flipped classroom model and student motivation, "the motivation levels of students while using the flipped classroom model were higher than those in classical blended learning group" (p. 9). Typically, while in the traditional classroom setting, learning takes place with either minimal times to remember or minimal time to analyze, evaluate, or reflect. This leaves little time for remembering the lesson. In the flipped classroom, "inquiry learning [is present and] students make sense of their learning" (Danker, 2015, p. 9). In addition, [they] found learning engaging and were excited [to learn each day] …" (p. 9). In other words, when students

aren't engaged with the lesson, their retention lessens, and they are more inclined to lose all motivation.

Cabi (2018) examined levels of motivation and retention by students in a flipped classroom versus students in the traditional classroom. She concluded that there was a significant increase in motivation as a result of participation in the flipped classroom approach. The flipped classroom "has advantages such as allocating time spent in the classroom to [complete] interactive activities" (p. 203). She also concluded that there is a significant increase in retention from student participation in the flipped classroom approach due to the "learning materials used in the flipped classroom [because the models] appeal to many different sensory organs [which can be] effective in ensuring more permanent learning for students in the flipped classroom" (p. 215).

Increase of Engagement in the Flipped Classroom

Hodgson, Cunningham, McGee, Kinne, and Murphy (2017) completed an observation based on the growing evidence that flipped classrooms are associated with increased levels of student engagement as compared to engagement in "traditional" (p. 1) settings. They took note of how many activities were "teacher led/based" and "student led/based" (p. 7) and found that out of nine activities, the teacher led six and three of them were led by the students (meaning, at that students communicated with one another). In the same 40-minute class period, there were six student-led activities in the flipped classroom, while only three activities were teacher-led. This indicates that motivation plays a vital role in the flipped classroom setting as 66% of the lesson was student-based, as opposed to only 33% in the traditional classroom.

Cabi (2018) also generated evidence that flipped classrooms enrich student learning. While there is no significant difference in test scores between students participating in the

flipped classroom model and those participating in the traditional teaching style, there is a significant difference in students' study skills, test taking skills, and self-learning strategies.

In the traditional classroom setting, teaching is sometimes put on hold when teachers deal with students who are misbehaving. This takes time and meaning from the lesson. In the flipped classroom, however, learning is done at home where perhaps students are alone and can focus more on the lesson, giving it their full attention. While test scores may not increase, frustration to get through a lesson may decrease.

The flipped classroom is a positive development in teaching the learning theory. Properly implemented, it appears to increase retention, collaboration, and student engagement. The goal of a flipped classroom is to enhance student achievement by placing the learning on students. In sum, a flipped classroom encompasses many, if not all the components of an effective lesson, such as learning, reflecting, and evaluating. The flipped classroom approach is at the forefront of instructional practices supported by research.

CHAPTER III

METHODS

The purpose of this study is to investigate the impact of the flipped classroom teaching approach and compare it to the traditional teaching approach when teaching multiplying decimals to sixth-grade students. This study will help to determine whether there is a relationship between student success and teaching method (either being by flipped classroom or the traditional approach).

Design

A quasi-experimental design was used for this study. The quasi-experimental study samples "entire classrooms, not individual students" (Mills & Gay, 2019, p. 307) as treatments. In this case, it included two standard mathematics classes (not randomized), as explained above. More specifically, the nonequivalent control group design was used for this study. The design for this study is given below.

$$\begin{array}{ccc} O & X_1 & O \\ O & X_2 & O \end{array}$$

The independent variable is the flipped classroom approach versus the traditional teaching approach. The terms are operationally defined simply by utilizing two groups of students, an experimental group (who will participate in the flipped classroom) and a control group (who will participate in the traditional teaching approach). In the flipped classroom, the lessons are online for students to view as homework. Then, in the classroom, students participate in group, collaborative-based activities that extend their knowledge of the lesson taught online.

The dependent variable is student performance of multiplying decimals. One way to operationally define the dependent variable is by giving both groups an assessment. The

instrument/assessment will ask students to multiply a three-digit decimal by a two-digit decimal using whichever strategy they prefer (three strategies are taught).

During instruction, the researcher used structured observations, such as a check-in with students, formative assessments (exit tickets), and a "walking clipboard" method to take anecdotal notes on students' progresses throughout this unit. Notes included how students multiply decimals, common mistakes they're making, "highflyers" and struggling students, and so on. The specific task may change on this observation form daily. This data also tells who is completing their homework at home and who isn't based on their level of participating during the class period.

In addition, the study used a descriptive study design. Based on the research study, students were surveyed simply to determine whether they would prefer a flipped classroom approach to the traditional classroom approach. The survey was presented using a Likert Scale. A scale beginning with Strongly Agree and ending with Strongly Disagree (Neutral would not be used), would be options for students to choose. Choices would change based on the question (Q3 would say Extremely Confident to Extremely Uncomfortable, for example). The survey was given at the end of the study. Each student participated in the survey.

Participants

There are 49 students participating in this study. Of these 49 students, 23 are in a first period standard mathematics class and 26 of them are in a third period standard mathematics class. The control group is the first period class, and the experimental group is the third period. Each group is made up students all between the age of eleven and twelve years old. Each group contains students with learning disabilities such as Autism, ADD, and ADHD, and all have IEPs

or 504s to assist with their needs, as a result. Their demographics are displayed in the table (1) below.

Table 1

Demographics of Students in Control and Experimental Groups

Class Period	Class Size	Females	Males	SWD
1 – Standard Mathematics	23	12	11	4 IEP 1 504
3 – Standard Mathematics	26	18	8	2 IEP 2 504

The sampling technique used was cluster sampling. These groups were chosen simply because these two groups are similar in mathematic ability. These two classes are in the same math course unlike other class periods of accelerated math students. Additionally, students were chosen based on their accessibility to technology and comfort level operating Google Classroom.

Instrument

A pretest and posttest were administered at the beginning and end of this study. In addition, a survey was given at the end of the study only to students participating in the flipped classroom (the experimental group). Figure 1 and 2 are the pre- and posttest, respectively. In addition, Figure 3 is the survey used once the study was completed.

Procedure

First, students received a pretest to determine whether they can accurately multiply decimals. Then control and experimental groups participated in the different teaching approaches: X_1 – flipped classroom and X_2 – traditional teaching. Specifically, the experimental group was instructed to view lessons online (prerecorded) on the next day's topic. During that next class period, students participated in collaborative activities such as extensions, additional practice, and application in order to build on their understanding of multiplying decimals. Some

of the lessons are scripted, non-negotiable lessons written by the middle school mathematics department of AACPS, and therefore could not be changed. The same lessons were created online for the test group but had to be adapted for the sake of time. “Homework” was limited to around 15 minutes per group per evening.

The control group participated in the traditional teaching styles that have been utilized throughout the school year. Students participated in lessons that began with a motivation, the lesson component (multiplying decimals), practice and problem solving, and lastly, a formative assessment at the end of the class period to assess what was taught. These students, on the other hand, were not given the opportunity to participate in many group activities, extension activities, etc. thus, the advantages of a flipped classroom. Both groups were given this lesson throughout the span of four days and the posttest was given on day five.

Observations of students while in the flipped classroom were taken, as well as student feedback. It was evident who was not completing their “homework” because their participation during group activities depended on that. After administering the posttests to both groups of students, data will be analyzed accordingly in order to determine if the flipped classroom approach is correlated to the success of students and their ability to multiply decimals.

CHAPTER IV

RESULTS

The purpose of this study was to investigate the impact of the flipped classroom teaching approach versus the traditional teaching approach when teaching multiplying decimals to sixth-grade students.

This study sampled two intact classrooms of sixth graders taught by the same instructor. These students were those in the first period mathematics class and third period mathematics class. The first period class consists of 23 students, while the third period (experimental group) consists of 26 students. Except for the method of teaching multiplying decimals, the two classes were similar in using the area model-to-model multiplication of whole numbers, in addition to using base ten blocks to model all numbers, including rational numbers. One class was designated for the flipped method (treatment) and the other class was used as a comparison, instructed in the customary method. This method simply is the instructor teaching one skill, during class, per day for four days, and then students would practice the skill taught by completing practice problems and/or being pulled to work in a small group with the instructor. The experimental group (the flipped group) was determined based on observations of homework completion and based on their capability of using technology to complete assignments outside of class. To determine this, the class was surveyed. If a different class were to be chosen, there may not be enough participation during the study, defeating the purpose of a flipped classroom. The results of this study are outlined below.

Table 2

Test of Null Hypothesis 1

Null Hypothesis 1: There is no difference in the population mean pretest score for the comparison group and the population mean pretest score for the flipping group.

Method

μ_1: mean of pre when group = C
μ_2: mean of pre when group = E
Difference: $\mu_1 - \mu_2$

Equal variances are not assumed for this analysis.

Descriptive Statistics: pre

group	N	Mean	StDev	SE Mean
C	23	0.3913	0.6564	0.1369
E	26	0.3846	0.6373	0.1250

Test

Null hypothesis H_0: $\mu_1 - \mu_2 = 0$
Alternative hypothesis H_1: $\mu_1 - \mu_2 \neq 0$

T-Value	DF	P-Value
0.04	45	0.9714

There is insufficient evidence to reject the null hypothesis at the 5% alpha level. Therefore, the control and experimental classes did not differ on average pretest scores.

Figure 1

Boxplot of Pretest Scores

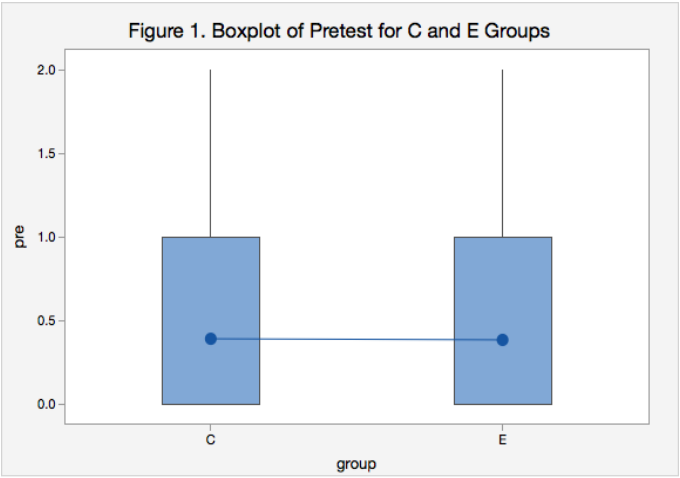

Figure 4 displays the percentile distributions for the pretest, comparing the control (C) and flipped (E) groups. Clearly the two groups have similar quartile ranges.

Table 3

Test of Null Hypothesis 2

Null Hypothesis 2: There is no difference in the population mean posttest score for the comparison group and the population mean posttest score for the flipping group.

Method

μ_1: mean of post when group = C
μ_2: mean of post when group = E
Difference: $\mu_1 - \mu_2$

Equal variances are not assumed for this analysis.

Descriptive Statistics: post

group	N	Mean	StDev	SE Mean
C	23	8.6957	1.6078	0.3352
E	26	9.1923	1.0961	0.2150

Test

Null hypothesis H_0: $\mu_1 - \mu_2 = 0$
Alternative hypothesis H_1: $\mu_1 - \mu_2 \neq 0$

T-Value	DF	P-Value
-1.25	38	0.2200

There is insufficient evidence to reject the null hypothesis at the 5% alpha level. Therefore, the control and experimental classes did not differ on average posttest scores.

Figure 2

Boxplot of Posttest Scores for Control and Experimental Groups

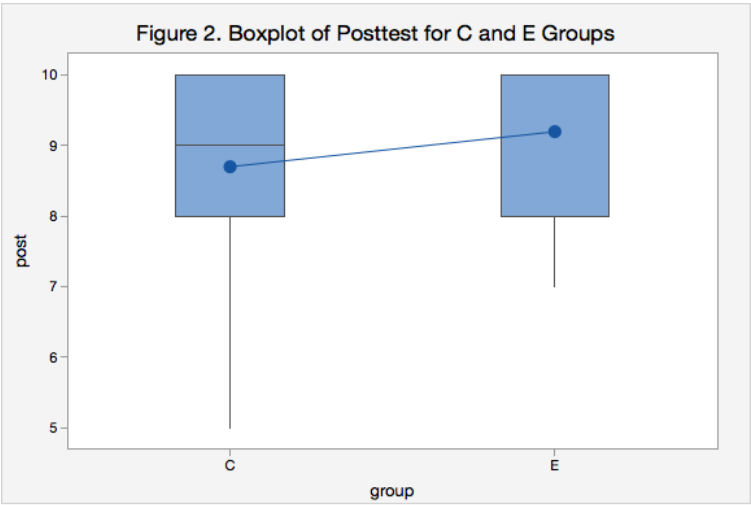

Figure 6 displays the percentile distributions for the pretest and posttest, comparing the control (C) and flipped (E) groups. The E-group median is half a point ahead of the C group.

Figure 3

Pre- and Post-scores by Control and Experimental Groups

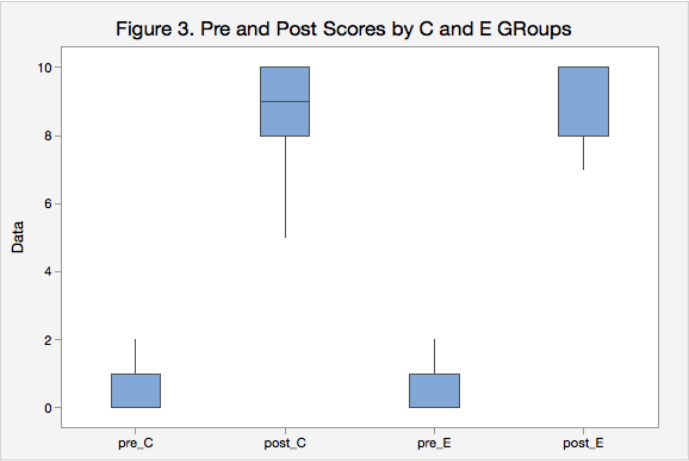

Figure 6 displays the percentile distributions of the pre and post scores for the controls and the flipping groups. Clearly both groups had similar gains from pre-to-post. Therefore, there is insufficient evidence of a differential treatment effect related to whether students received the customary or flipping method to learn multiplying decimals in sixth grade.

Table #??

Test of Null Hypothesis 3

Null Hypothesis 3: There is no difference in the population mean difference score (pre-to-post) between the comparison (C) and the flipping (E) groups.

Method

μ_1: mean of difference when group = C
μ_2: mean of difference when group = E
Difference: $\mu_1 - \mu_2$

Equal variances are not assumed for this analysis.

Descriptive Statistics: difference

group	N	Mean	StDev	SE Mean
C	23	8.3043	1.7434	0.3635
E	26	8.8077	1.2967	0.2543

Test

Null hypothesis $H_0: \mu_1 - \mu_2 = 0$
Alternative hypothesis $H_1: \mu_1 - \mu_2 \neq 0$

T-Value	DF	P-Value
-1.13	40	0.2633

There is insufficient evidence to reject the null hypothesis at the 5% alpha level. Therefore, the control and experimental classes did not differ on average gain scores from pre-to-post.

In summary, the control and flipping groups did not differ, on average, on the pretest, posttest, or the gain from pre-to-post. There was a small effect size (on a scale of none, small, medium, larger, and very large) in favor of the flipping group using the mean gain score from pre-to-post (effect size=0.29). The effect size measures the standardized mean difference between the two samples independent of the sample size. Effect size can be useful descriptively especially with small samples (when significance tests are unable to detect a true mean difference) or with extremely large samples (when significance tests may magnify trivial observed differences).

Survey Results

Students in the flipped classroom were asked to complete a survey so that the instructor could see how they felt after their participation of the flipped classroom. All 26 students participated in the survey. Their results are shown below. A Chi-Square Goodness of Fit Test was utilized to compile the results of the survey (www.socscistatistics.com).

Each survey question has four categories mostly labeled Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD). Chi-square tests the null hypothesis that the population frequencies are equal. That is, under the theoretical null we would expect each category to have 6.5 responses for 26 total cases. Question 6 had 18 responses; therefore, we would expect 4.5 in each category. The expected frequencies are theoretical and do not have to be whole counts.

The following formula is used for calculating the goodness of fit test:

For each category: $(\#observed-\#expected)^2 / \#expected$. So, for item 1, the value for SA is $(21-6.5)^2 /6.5 = 32.5$.

The researchers repeat the calculation for each category of question 1. They then add the calculated values, yielding Chi-square = 45.7 with three degrees of freedom (because there are four categories; one fewer is the degrees of freedom). The p-value for the chi-square statistic = .00001 < .05. Therefore, the statistics show a rejection of the null that the population frequencies are equal. In the sample of 26 students, the modal category was SA.

Table of Survey Results

Chi-Square Goodness of Fit Tests for Flipping Survey Results

Question	Chi-square	p-value	Decision @ .05	Sample Mode
1. Watch videos on time	45.7	.001	Reject null	SA
2. Class discussions helpful	37.1	.001	Reject null	A
3. Confident after video; before class	5.4	.146	Do not reject null	None
4. Lot of effort at home to do work	32.2	.001	Reject null	A
5. Lot of effort in class to do work	12.5	.006	Reject Null	A
6. Flipped class helped me understand content	19.8	.001	Reject null	A
7. In-class work helped me understand	37.1	.001	Reject null	A
8. Prefer traditional way instead of flip	35.2	.001	Reject null	SA

*The rejection of the null shows there is a modal category not only for the sample but also for other similar classrooms.

In summary, the results from this survey lead to the conclusion that students felt the flipped classroom was a lot of additional work, hence their response to question 8. On the other hand, students agree that the flipped classroom did help them learn the material taught. While they didn't feel confident learning the material, they claimed to be engaged in the material and with the videos displayed in the Google Classroom forum. If the flipped classroom were utilized in the future, the researcher would include a variety of assignments such as games and technologically interactive activities.

CHAPTER V

DISCUSSION

Prior to studying the academic effect of flipped classroom pedagogy, it was hypothesized that the flipped classroom model would relate to the success of students in all grade levels, specifically sixth grade. In other words, the researcher hypothesized (in research form) that students in the standard mathematics class (X-E) who receive instruction through the flipped classroom approach will perform better on average (Y) than similar students (X-C) who receive instruction through traditional classroom instruction on the multiplying decimals posttest. The research hypothesis was not supported by the data found in this study because there was no statistically significant difference in gain such that students in the flipped classroom outperformed students in the control group, also known as the traditional teaching group. Therefore, the null hypothesis of no differential achievement on average between the flipped and traditional methods could not be rejected with a small chance of an incorrect decision (e.g., p=.05).

Implications of the Results

This study began on an even field. This occurred because results from the pretest given to both classes showed similar results, even though these groups were not randomly selected to receive the flipped method. Unfortunately, there is not enough evidence to detect a differential in score between the groups, after this study was performed. The posttest given did not show a favorable differential for the flipped classroom.

Theoretical Consequences

The pre- and posttest instruments were used to measure the results of this study. In addition, data from a survey was compiled in order to gain feedback from students on the flipped

classroom. Consequences for such data collected showed that students believe the flipped classroom pedagogy did contribute to their success of learning how to multiply decimals. On the other hand, the students complained about the excess amount of work at home under the flipped treatment.

Threats to Validity

While both groups of students performed remarkably on the posttest on multiplying decimals, the reason for insufficient evidence to support the research hypothesis could have been the complexity of the test itself. Perhaps, a different posttest assessing decimal multiplication could be given. The assessment given (pre- and post-) had no context; rather, this skill could be assessed, by giving students a multi-step problem or one with a story. These types of questions would allow the researcher to see not only if students could multiply decimals, but also given the level of complexity in the problem, the depth of comprehension of students in the experimental group versus control group would be evident.

In addition, a smaller group was chosen for this study. Precision of an outcome test and the power of the statistical hypothesis test are diminished when the sample size is too small to detect a real effect. Larger sample sizes could be choosing to flip two classes instead of one or perhaps seeing the flipped classroom performed during all four classes during the first semester and then not during the second.

Time was of the essence during this study. For example, in the middle school mathematics curriculum, specified time is allotted during each unit to teach each lesson. With a different unit that allows time for exploration, that would benefit the researcher in order to see if the research hypothesis could be confirmed. To extend, the pretest and posttest were only four days apart. With that said, this could have been too premature. Waiting a week or two to see

results could prove the effect of retention the flipped classroom has, as it has been proven to be in literature.

Implications for Future Research

Implications for future research arose while conducting this study such as the longevity of flipped classrooms. In completing this study, there was an overwhelming amount of preparation, simply to conduct two classroom lessons at the same time. In knowing this, the thought became: What would happen if flipped classrooms occurred in more than one class, throughout an entire semester? In doing so, the researcher would teach two classes (control) and two classes would be taught online. Sample size, mentioned above, would then increase and significant gains, if there were to be any, could be evident from pre to post test. It was evident, based on feedback from the "Flipped Classroom Survey" that students enjoyed watching videos at home in addition to completing additional assignments in class.

Another implication would be the sample size. Perhaps utilizing multiple classes and/or a larger group of students for this study would allow the researcher to pinpoint the validity of flipped classroom versus the traditional classroom approach. In addition to sample size, requesting the support from other teachers in the building will prove effectiveness if flipped classrooms were to be utilize across multiple content areas.

Conclusion

While this study did not prove a directional research hypothesis, it has opened new doors to teaching that can be continued and enhanced. Students enjoyed the interaction, independence, and engagement a flipped classroom allows them to have. This study has allowed the use of student interest, such as in technology, to the development of lessons that meet their needs and their desired. A new appreciation for teaching online versus face-to-face has been gained. While

flipped classrooms give students the opportunity to be independent, it does not allow the teacher to answer questions until students are sitting in front of him/her, in the classroom. It is convincing that students can be effective and learn material through the flipped classroom, however, it has yet to be confirmed with data~~,~~ that this flipped classroom (learn at home, practice in class) contributed to the success of sixth-grade students when teaching multiplying decimals more than the customary method (learn in class, practice at home).

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Appendix A

Multiplying Decimals Pre-Assessment

Directions: Complete the question by showing all work.

1. What is the product of **45.4 x 5.3**? Show whichever strategy you prefer.

A. 240.62

B. 2406.2

C. 24062

D. 2.4062

Area Model

Traditional Way/Partial Products

$$\begin{array}{r} 45.4 \\ \times \quad 5.3 \\ \hline \end{array}$$

Appendix B

Multiplying Decimals Post-Assessment

Directions: Complete the question by showing all work.

1. What is the product of **52.7 x 6.6**? Consider using area model or partial products to solve.

A. 3478.2

B. 347.82

C. 316.20

D. 59.30

Area Model

Traditional Way/Partial Products

$$\begin{array}{r} 52.7 \\ \times \quad 6.6 \\ \hline \end{array}$$

Appendix C

Flipped Classroom Survey

Flipped Classroom Survey (Optional) Name: _____

Directions: Using the scale, answer each question truthfully. Circle your response to each question. Thank you for participating in a flipped classroom. ☺

Did you watch the videos on time?	Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
Did you find the in-class discussions helpful?	Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
How confident did you feel AFTER watching the video, but BEFORE coming to class?	Very Confident	Confident	Somewhat Confident	Not Confident
I had to put in a lot of effort at home in order to complete the assignments.	Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
I had to put in a lot of effort in class in order to complete the assignments.	Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
The flipped classroom helps me understand the content.	Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
The in-class work made me understand the content.	Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
I prefer to learn the traditional way. (When Mrs. Stanley teaches during class instead of online.)	Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree

Flipped Classroom Survey continued…

Directions: Answer the following questions in complete sentences.

1. What have you liked about the flipped classroom?

_____

_____

2. What part of the flipped classroom would you change?

_____

_____

3. What could I (we) do to better support you in the flipped classroom?

_____

_____

4. What is the most helpful part of the flipped classroom?

_____

_____