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Flipped Classrooms and the Video Creator's Impact on Achievement

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Flipped Classrooms and the Video Creator's Impact on Achievement

Abstract

This action research study investigated the correlation between the creator of a flipped instructional video and the math achievement of the students. The researcher designed a study to examine the pre- and post-test math scores of 19 7th grade participants who viewed instructional math videos created by their classroom teacher and instructional math videos available via YouTube. After students completed one math unit with each video type, they also completed a voluntary survey investigating their video preference. Quantitative data collected from the pre- and post-tests were analyzed and the researcher found the results to be inconclusive for student achievement. The researcher also found that students were divided evenly based on their preference of video type. The results of this study did not provide significant preference for the use of classroom teacher-created instructional videos compared to YouTube videos.

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Flipped Classrooms and the Video Creator's Impact on Achievement

By

Kailee Davelaar

B. A. Dordt College, 2014

Action Research Report
Submitted in Partial Fulfillment
Of the Requirements for the
Degree of Master of Education

Department of Education
Dordt College
Sioux Center, Iowa
May, 2018

Flipped Classrooms and the Video Creator's Impact on Achievement

By

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Abstract

This action research study investigated the correlation between the creator of a flipped instructional video and the math achievement of the students. The researcher designed a study to examine the pre and posttest math scores of 19 7th grade participants who viewed instructional math videos created by their classroom teacher and instructional math videos available via YouTube. After students completed one math unit with each video type, they also completed a voluntary survey investigating their video preference. Quantitative data collected from the pre and posttests were analyzed and the researcher found the results to be inconclusive for student achievement. The researcher also found that students were divided evenly based on their preference of video type. The results of this study did not provide significant preference for the use of classroom teacher-created instructional videos compared to YouTube videos.

"Our mission is to provide a free, world-class education for anyone, anywhere" (Khan, 2017). This mission provided by Khan Academy has been the launching point for bringing the classroom into homes, on the road, in school classrooms, on an iPad, on cell phones, and more. Today's students constantly have a form of technology in front of them, enabling them to reach any information they want with the use of a search bar. Khan Academy takes advantage of this reality by providing a video-based platform that provides students with the capabilities to search for any type of information that the narrator, Salman Khan, can teach them (Khan, 2017).

Utilizing video-based instruction in the classroom did not begin with Khan, however; in fact, teachers have used this method in flipped classrooms since 2007. The flipped classroom is one in which the teacher creates a video for their students to watch at home. This video is the lecture or instruction portion of students' learning. Students then return to class to complete what would traditionally have been the homework assignment activity. The teachers is there to assist students with questions and work. Students learn the information at home and practice it with the assistance of the teacher at school (Bergmann & Sams, 2012).

Along with the video-based instruction, Hall & DuFrene (2016) found that students must be given a tool, such as a quiz or outlined questions, to complete while viewing the video. Tools such as outlined questions or a quiz are given alongside the videos to provide evidence of students' understanding gained from the video. In the classroom setting, the students express their understanding of the video-based instruction through interactive activities. These hands-on experiences in the classroom allow for application, face-to-face interaction, and instructor and peer feedback (Hall & DuFrene, 2016).

The flipped classroom provides many benefits for student learning. First, the flipped classroom provides the opportunity for students to move at their own pace. Second, having

students work on assignments in class gives teachers more insight into student understanding as well as creating a more effective and creative classroom environment. Third, the curriculum becomes more customizable as teachers include what they wanted in the videos. Fourth, parents also have a window into what the students are working on in class and have resources to learn themselves and to help their student. Finally, teachers have seen an increase in both student achievement and engagement in their classes as a result of the flipped classroom (Fulton, 2012).

Although the flipped classroom has been a great addition for many classes, it also has some barriers that can negatively impact student learning. For example, educators have found issues with students being unprepared when arriving to class. The success of the flipped classroom is strongly dependent on students viewing the videos to be prepared for class activities (Hall & DuFrene 2016). Educators are learning that the flipped classroom takes thoughtful implementation.

While the flipped classroom has both benefits and barriers, the 21st century classroom requires an approach that recognizes that today's students live in a technology-infused world. Educators are looking for approaches to reach students as they use technology continually throughout their day. The flipped classroom supports the reality of information anywhere and anytime (Fulton, 2012). As educators move forward with the flipped classroom, they must look for ways to best meet the needs of their 21st-century students.

Problem

Now that the flipped classroom has been used for around a decade and teachers know that the flipped classroom can be useful, educators are looking for ways to make the flipped model work for their specific classroom. Since video-based instruction is a significant component of the flipped classroom, teachers can focus on how the video instruction can be constructed to meet

the needs of their 21st-century learners. The choice of who narrates the video may be an important decision for a teacher who is implementing the flipped classroom. Teachers may decide to use video-based instruction that is created by their math curriculum company, by YouTube, by Khan Academy or they may decide to create their own video-based instruction.

Many educators use video instruction platforms such as Khan Academy for their convenience and for the opportunity to have a different "voice" for students in math instruction. Students may benefit from receiving information from another teacher or resource in order to gain further understanding. Students who struggle with the explanations of their classroom teacher may find success from a second voice (Fulton 2012). On the other hand, teachers utilizing flipped classrooms may create their own videos to produce a video specific to their classroom needs. By creating and narrating their own videos, teachers can customize their content, ensuring that students gain the content that they need for their specific needs (Bergmann & Sams, 2012).

According to Fulton (2012), most students prefer to watch the videos of their classroom teachers; however, most students benefit from hearing multiple voices and perspectives. Could the voice behind these flipped classroom videos affect students' success? Do students have a preference from whom they receive their instruction?

Purpose of the Study

The purpose of this research study was to discover whether the videos created by the classroom teacher would enhance the achievement of students in a middle school math flipped classroom more than those videos created by outside sources. This study also sought to discover whether students had a preference on the video narration. To address this purpose the following questions were asked:

1. Does the use of a teacher-created math instructional video increase student achievement in the flipped classroom more than the use of a YouTube math instructional video?

2. Do students prefer teacher-created videos more than YouTube-designed videos?

Definition of Terms

For the purpose of this study, the following definitions will be used. Unless otherwise noted, the definitions are those of the author.

Flipped Classroom: "that which is traditionally done in class is now done at home, and that which is traditionally done as homework is now completed in class." (Bergmann & Sams, 2012, p. 13)

STEM: The study of Science, Technology, Engineer, and Math.

Educreations: an iPad app used to record interactive whiteboard activities.

Literature Review

History of the Flipped Classroom

In 2007, two Colorado teachers decided to change the format of their Chemistry classrooms. These teachers filmed their lectures and posted them online for students to view. The idea started when students were unable to attend class; however, this change created a new form of class structure for these teachers (Bergmann & Sams, 2012). Based on the structure of the learning environment, the flipped classroom is also known as an inverted classroom. The flipped classroom is centered on structuring the learning process to be opposite of that of the traditional classroom. The student learns the information or watches a lecture outside of class and then returns to the classroom to do the learning activity (Mok, 2014). Although teaching strategies

similar to the flipped classroom had been used for years, it was not until 2007 that the flipped classroom was regularly implemented in classrooms (Bergmann & Sams, 2012).

Since students are now receiving content through videos at home, the role of the teacher in the flipped classroom has shifted from one of direct, whole class instruction to an interactive role in an active classroom where one-on-one support is possible. Instead of teachers spending their entire class time lecturing, they are now working alongside students during active learning activities (Chen & Chuang 2016). Students are able to learn at their own pace, while the teacher is there to assist and guide students to reach their learning targets.

The Structure of the Flipped Classroom

The first component in the structure of the flipped classroom is the short video that students view and from which they receive information. Teachers can choose from pre-recorded videos already found online or can create their own videos. Regardless of where these videos are obtained, they should be designed as a resource for students to retain information, to review the material as needed, and to prepare for the assignment and activities in class. These videos are usually approximately ten minutes in length in order to keep students' attention and to keep them engaged (Hall & DuFrene, 2016).

Alongside the videos, a tool is needed to engage students while watching the video recording. The tools assigned can also help teachers assess what students know as they enter into the learning segment. Teachers often assign a worksheet, questions, or quiz for students to use while watching the video to keep the students accountable for the viewing and to ensure understanding of the video. The assignments can be turned in the next day, emailed to the teacher the night before, or written on an online discussion board. These materials can then be used to guide the activities in the classroom the next day (Schmidt & Ralph, 2016).

The following day, students and teachers have the opportunity to participate in an active learning environment with collaboration between peers and between the teacher and her students. The classroom is converted into a type of workshop where students can ask questions about the video and apply what they learning in an activity or assignment. Teachers become guides for students during this portion of the learning segment and have the time to work closely with each student (Chen & Chuang, 2016). The teacher mentors the students while also giving immediate feedback so that students are on the correct track to understanding (Logan, 2015). Students also have time to collaborate with one another during this time with group discussions and projects (Chen & Chuang, 2016).

Current Use and Understanding of the Flipped Classroom

According to Hayes Jacobs (2010), we are currently teaching students who have never lived without the internet, Google, or text messaging. The growth in technology and social networking has developed an era of social learning where students feel most comfortable working together in their growth. Additionally, the need for instant information is requiring a change in our classrooms. This change points to more use of technology with students leading their own learning in a collaborative way (Logan, 2015).

The flipped classroom encourages students to use technology to receive information in their own time and at their own pace. The instructional videos allow students to choose their viewing time and how fast or slow to take the process of learning (Fulton, 2012). Once students have received this information, they can come back to class and participate in a collaborative environment with peers and instructors. Students receive much more peer-to-peer interaction and teacher-to-student interaction (Bergmann & Sams, 2012).

To fully utilize the potential of the flipped classroom, research on its usefulness is necessary. A study by the Flipped Network in 2012 found that at the middle school and secondary school level, 99% of teachers who used the flipped classroom would continue using it. Sixty-seven percent of teachers found improvements in their students' performance and 80% found improvement in student engagement. Ninety-five percent of the teachers in this study were at the secondary level. Forty-six percent of the flipped classrooms were in science, 30% were in math, and only 12% were in English/Language Arts. The flipped classroom has found its place in many classrooms with teachers choosing to continue its use as they find many benefits in its application (Schmidt & Ralph, 2016, p. 3).

As noted in the Flipped Network study, the influence of the flipped classroom can vary depending on the subject area of the classroom. Zengin (2016) used the flipped classroom design in his college mathematics class and found an increase in student achievement. In his study with 10 male students and 18 female students ranging in age of 22 to 26, participants watched Khan Academy videos as a part of their course work. They then returned to the classroom and used GeoGebra and Maxima software as part of their in-class activities. The professor acted as a guide to students during the in-class activities. Zengin (2017) found that the mean scores before the study were at 1.69 and after the study they were 21.82. The study illustrated the success of using the Khan Academy video learning alongside an active software program within a flipped classroom.

Contrary to Zengin's (2017) success, when used in a psychology course, Roehling, Root Luna, Richie, and Shaghnessy (2017) found that the learning environment was not as successful or preferred with all students. The study was completed with 131 undergraduate students in an Introduction to Psychology course in 2014. The study utilized two separate Introduction to

Psychology courses taught by two professors. The comparison group used was the 126 students

from the 2103 Introduction to Psychology course, taught by the same professors. In both years,

the classes were split into groups that used a traditional lecture class, a flipped classroom with

activities, and a flipped classroom without activities. The study was conducted while covering

content that had been the most difficult for the 2013 class.

When comparing the data from the 2013 and 2014 classes, the 2013 class scored higher

with a mean of 80.88 to 78.6 in 2014. In 2013, researchers found a 3% increase in performance

while using the flipped classroom. However, there was also a 3.6% decrease when an activity

was not included with the flipped classroom, indicating that the activity was a significant

component to the flipped classroom learning. In 2014, all groups decreased in performance

except for the group which took part in the flipped classroom with activities. When doing a

further comparison between their data and the demographics of their group, the researchers

found that students who had lower GPAs and first-year students did not benefit as much from the

flipped classroom environment in either year (Roehling, et al., 2017, p. 188).

When using a three-point Likert-scale survey for student preference: 1 (very useful), 2

(slightly useful), and 3 (not useful), 56.2% of the psychology students preferred the traditional

lecture style of teaching. Although 57 % of students found the flipped classroom to be more

interesting, their preference stayed with the traditional lecture. The researchers encouraged the

use of the flipped classroom in the STEM fields; however, in discussion-based classes, such as

Psychology, they concluded that the flipped design is not as effective (Roehling, et al., 2017, p.

186-187).

Roehling, et al. (2017) also found that achievement using the flipped classroom was

impacted by students' previous experience with the flipped class format. The researchers

expressed the need for students to learn the skills of the flipped classroom learning approach before using it in their class. Once students have an understanding of the flipped learning environment, they have a better opportunity to receive the benefits of the approach.

Advantages of the Flipped Classroom

Clearly, the flipped classroom model has many benefits for students, teachers and parents. The first notable benefit of flipped classrooms is the benefits to student pacing (Fulton, 2012). Many different learners make up a classroom and some students need more time while others can move through material quickly. The flipped classroom gives students the ability to learn at their own pace. In a semi-structured survey of five traditional lecturers led by Hajhashemi, Caltabiano, and Anderson (2016), the researchers found that students felt they were given more time to work through the content in the flipped classroom. They could start and stop the video to make sure they understood the concepts. Students' ability to get a better understanding of the content through the flipped classroom has increased achievement. In their research, Buch and Warren (2017) had a 67% pass rate in their flipped classroom compare to a 53% pass rate before flipping their college mathematics class. The flipped classroom continues to show that it positively affects the understanding of students.

Teachers also find many benefits from the flipped classroom such as the ability to receive better insight into student learning, the opportunity to customize curriculum, the option for professional development by viewing other videos, and more classroom time to spend with students. First, by having students complete the math assignment in class, teachers get a better picture of students who are confident in their work and those who are struggling. Teachers can monitor their students while they work and notice when a student does not understand. They can immediately help these students to master math concepts. The immediate assessment and

feedback allows teachers and students to have a better understanding of the learning segment sooner (Fulton 2012).

Flexibility is another benefit as teachers are able to customize how to teach within the flipped classroom. Teachers customize their videos by creating them themselves and by choosing what is included in the videos and what the students receive (Fulton, 2012). Without direct instruction, teachers also have more free time in their classrooms to create unique and meaningful learning activities for their students. Mok's (2014) trial of the flipped classroom showed that the class had more time to practice the math concept that was taught in the video instruction. Mok (2014) conducted his research on a class of 46 students in an information systems undergraduate course. The class was formatted for students to view videos while completing five multiple-choice and fill-in-the-blank quizzes outside of class. When students returned to class, they took part in paired programming activities. Mok found that students were able to learn by doing as the teachers work alongside them. As Hajhashemi, Caltabiano, and Anderson (2016) found in their surveys, "It therefore frees up the classroom time for the actual engaging instead of delivering content. To him, flipping the classroom means that, students can demonstrate problem solving in there, so that's a benefit" (p. 8).

Within Mok's (2014) study, students were also more likely to ask questions. The class environment became one of high collaboration where students were focused on class work. The videos empowered students to take ownership of their learning and the in-class collaboration created a close community of learners. This type of in-class environment turned a lecture-style class into an active learning environment. At the end of the study, Mok (2014) surveyed the 46 students on their opinions of the flipped classroom. Thirty-seven of the 46 students responded to

the survey and 100% implied a good learning experience within their answers. Students made comments that included "effective," "efficient," "helpful," and "useful" (p. 9).

Finally, parents find benefits within the flipped classroom by having access to the course work and seeing how it affects their student. Many parents struggle to help their students with their homework at home, especially when students reach higher grade levels. Having the classroom time dedicated to practicing, teachers are able to assist students with questions that many parents may struggle to help their child with. The videos also gives parents a look into what their child is learning so that they may be more prepared if students ask questions at home (Fulton, 2012). In Fulton's study (2012) 84% of parents in the Byron School district where flipping took place, said that they preferred the flipped classroom instruction for their student (p. 23).

The Relationship between Teacher and Student in the Flipped Classroom

Over the past decade, the flipped classroom has been studied and researched; however, there is a lack of research that focuses on how the creator of the video may affect student achievement in the classroom. Schmidt and Ralph (2016) suggested that videos with different creators have different benefits. The use of videos from a creator other than the classroom teacher may keep the students interested because multiple voices help engage students and keep the information fresh. However, students may also benefit from videos created by their teacher since they are then more connected to the creator.

The importance of the teacher and student relationship is an important aspect of students' success in the classroom. In their research on the impact of relationships on performance, Hosan and Hoglund (2017) tested how important students' relationships with their teachers and their friends were to their learning. The researchers studied 461 students from kindergarten to the third

grade along with their 57 teachers. The teachers rated their relationship with the participating

children on two subscales: closeness with the student and conflict with the student. They rated

these relationships on a 5-point scale. The students were given a questionnaire on their

relationships with their friends and how engaged they were during class. The students used

scales to explain their friendships and how they focused during school. After collecting the data,

Hosan and Hoglund (2017) found that a positive relationship between students and their teachers

on average showed low levels of relationship with conflict and also fostered moderate writing

skills. The researchers also tested the relationship between student relationships and school

engagement. Although there were little signs of correlation between the relationship between

student and teacher with school engagement, students' relationships with their friends did affect

their engagement in school. These results point to a direct link between how students' personal

relationships affect their school work and focus.

Roorda, Koomen, Spilt, and Oort (2011) also completed research on the effects of

teacher-student relationship by evaluating current research using a meta-analytic approach.

Using the PsycINFO and Educational Resources Information center databases, the researchers

retrieved relevant studies using a multitude of keywords that represent effective teacher-student

relationships. The sample included 92 articles describing 99 studies from the years 1990 to 2011.

The studies included samples of students that varied in number from 42 to 39,553 to include a

total of 129,423 students analyzed. Student samples were in both primary and secondary school

from countries located in North America, Europe, Asia, Australia, and Africa.

After analyzing the articles and their research on teacher-student relationship, the

researchers found that there was a positive association between positive teacher-student

relationships and a negative association between negative relationships when analyzing student

engagement and achievement. They also found that the negative association was just as impactful on students as the positive association. These findings explain that fostering a positive relationship with a student is just as important as staying away from a negative relationship.

In a flipped classroom, the two key elements are the video instruction and the students' practice time inside the classroom walls. In considering the importance of relationships and students' achievement, the idea of a formed teacher-student relationship and the teacher-created video becomes an important variable to student learning. Must the student have a formed relationship with the creator and narrator in order to gain the greatest academic achievement?

Methods

Participants

The research participants in this study were 19 seventh grade students attending a small Christian school in the Midwest during the 2017-2018 school year. The group included 10 female students and 9 male students. The participants' make up was largely homogeneous within a middle class socioeconomic status and Caucasian ethnicity. The 19 students were randomly divided into two groups in which they remained for the course of the study.

Materials

For this study, participants viewed YouTube instructional math videos for their flipped classroom learning and instructional math videos created by the classroom teacher using Educreations, an online software tool used to create online videos. Before starting the first module unit and watching the videos, students took a pretest found in the curriculum *Go Math*, as located in Appendix A. Once each group completed the unit using either the YouTube videos or classroom teacher created videos as assigned to them, they took a posttest which was created by their math teacher with the curriculum *Go Math* as a reference, found in Appendix B. Before

Unit 2 students took a pretest found in the curriculum *Go Math*, located in Appendix C. Students

completed the second unit with their assigned videos and then took a posttest which was created

by their math teacher with the curriculum *Go Math* as a reference (See Appendix D).

In order to measure student preference on the videos used in the research study, students

completed a survey created by the classroom teacher using Google Forms (See Appendix E). The

survey included questions on students' preference on different aspects of both videos such as

which video they found the most helpful for assignments and quizzes as well as how engaged

they were with the video. The surveys targeted students' perception of the relationship they had

with the creator of the videos and if that made a difference in their preference of learning.

Design

The quasi-experimental study measured students' math achievement scores comparing

the scores of students who viewed flipped classroom videos created by their classroom teacher to

the scores of students who viewed math videos found on YouTube. The independent variable of

the research study was the creator of the flipped classroom video. The dependent variable was

the comparison from students' pre and posttests.

Procedure

All students had previously been instructed on and had used the flipped classroom model

in their seventh grade math class. Students also had prior knowledge and had used YouTube

videos such as Khan Academy within their math classroom. Students were randomly divided into

Group A and Group B. Before starting the module unit, both groups completed the same pretest

which was created by the *Go Math* curriculum. The results were scored and recorded as a

baseline for students' prior knowledge.

During Unit 1, which was three lessons long, Group A viewed instructional math videos provided from YouTube throughout their math unit. Group B viewed instructional math videos created by the classroom teacher. Students viewed these instructional math videos at home for their homework assignment. While watching the instructional math video, students completed a number of example problems from their math book. The following day students returned to class and reviewed the problems they completed with their classmates and classroom teacher. After the review, students completed the same assignment found in their math books during class time. At the end of the module unit both groups completed the same posttest which was created by their math teacher with the curriculum *Go Math* as a reference. The results of the posttests were then compared.

In a second module unit, which was also three lessons long, another pretest was taken by both groups to establish a as a baseline measurement for the unit. This test was taken from the curriculum *Go Math*. Group A viewed instructional math videos created by the classroom teacher and Group B viewed instructional math videos from YouTube. Throughout the unit both groups completed the same example problems while watching their respective video type and reviewed the problems as a class the following day. They also completed identical *Go Math* curriculum assignments. At the end of the unit both groups completed posttests that were created by the classroom teacher with *Go Math* as a reference.

Once students had completed their second unit, they were given a survey created by their classroom teacher in Google Forms to test their preference of the videos used. The questions in the survey were based around students' preference on the creator of the video, the way the example problems were explained, and how their relationship with the creator of the video affected their engagement with the video and understanding of the lesson.

The survey was piloted by the eighth grade class that attends the same school in order to gauge how the questions could be perceived by middle school students. Based on the pilot, no changes were made to the student survey. The survey was given to the participants by another classroom teacher of the school without the math teacher present.

Results

The study was designed to answer two questions: Does the use of a teacher-created instructional math videos increase student achievement in the flipped classroom more than the use of a YouTube instructional math video? Do students prefer teacher-created videos more than YouTube-created videos?

A quantitative analysis was conducted within a 7th grade math classroom and data was collected and analyzed for the students' pretests and posttests for two math units after watching math videos from YouTube and math videos created by their classroom teacher. A student survey was also taken and analyzed for students' preference for watching a YouTube math video or a math video created by their classroom teacher for their flipped classroom.

Student Achievement

For each unit completed by the class the difference from the pretests and posttests was calculated. A two-tailed t-test was run for each unit to compare student achievement in each of the units. Table 1 shows the results of the first unit completed by the 7th grade math class. Group A completed Unit 1 in a flipped classroom using videos provided by YouTube. Group B participated in the same flipped classroom using videos created by the classroom teacher using *Educreations*. The results for Unit 1 indicated in Table 1 show that although Group A had a higher increase in their pretest to posttest achievement (M=0.20) compared to Group B (M=0.10), the results did not have a statistically significant difference (P(T<=t) one-tail = 0.09, P(T<=t) two-tail = 0.18).

Table 1

t-Test: Two-Sample Assuming Unequal Variances Unit 1

	YouTube Group A	*Classroom Teacher Group B*
Mean	0.204575163	0.09513435
Variance	0.030964349	0.027103476
Observations	10	9
Hypothesized Mean Difference	0	
df	17	
t Stat	1.400335845	
P(T<=t) one-tail	0.089699917	
t Critical one-tail	1.739606726	
P(T<=t) two-tail	0.179399833	
t Critical two-tail	2.109815578	

Table 2 shows the summary for the second math unit where Group A used videos created by their classroom teacher and Group B used videos provided from YouTube. The results for Unit 2 indicated in Table 2 show that Group A had a more significant change from their pretest to posttests (M=0.14) compared to Group B (M=0.09). However, the results from Unit 2 were not statistically significant in their change (P(T<=t) one-tail = 0.13, P(T<=t) two-tail = 0.26)

Table 2

t-Test: Two-Sample Assuming Unequal Variances Unit 2

	YouTube Group B	*Classroom Teacher Group A*
Mean	0.085311318	0.136842105
Variance	0.008837694	0.009972299
Observations	9	10
Hypothesized Mean Difference	0	
df	17	
t Stat	-1.158303553	
P(T<=t) one-tail	0.131377089	
t Critical one-tail	1.739606726	
P(T<=t) two-tail	0.262754177	
t Critical two-tail	2.109815578	

A paired t-test comparing the total difference in achievement for both Groups A and B

for the use of YouTube videos and for the classroom teacher videos was also run. As indicated in

Table 3, although YouTube videos had a slightly higher difference in achievement scores

(M=0.15) compared to the classroom teacher videos (M=0.12), the results were also found to be

statistically insignificant (P(T<=t) one-tail = 0.21, P(T<=t) two-tail = 0.45).

Table 3

t-Test: Paired Two Sample for Means of YouTube and Classroom Teacher

	YouTube Difference	Classroom Difference
Mean	0.148081763	0.1170858
Variance	0.023153161	0.017489912
Observations	19	19
Pearson Correlation	0.346025837	
Hypothesized Mean Difference	0	
df	18	
t Stat	0.826590446	
P(T<=t) one-tail	0.209646003	
t Critical one-tail	1.734063607	
P(T<=t) two-tail	0.419292006	
t Critical two-tail	2.10092204	

Student Preference

After completing Units 1 and 2, all participants took a voluntary survey comparing their

experience with the instructional math videos provided from YouTube and those created by their

classroom teacher. Students felt equally prepared for their assessments with both types of

videos. As noted in Figure 1, the results of the survey showed that students felt slightly more

drawn to the YouTube videos with 72% enjoying the YouTube videos over the videos created by

the classroom teacher. Fifty percent of students felt that the YouTube videos explained the

concepts best and 50% felt that the classroom teacher was better at explaining the concepts.

When asked about how prepared students felt for the posttests, students were again evenly split

on whether they preferred the YouTube video or the classroom teacher's video. However, as

shown in Figure 2, 55.6% of students preferred the YouTube videos for their daily assignments.

Overall, 50% of students preferred the videos created by the classroom teacher and 50%

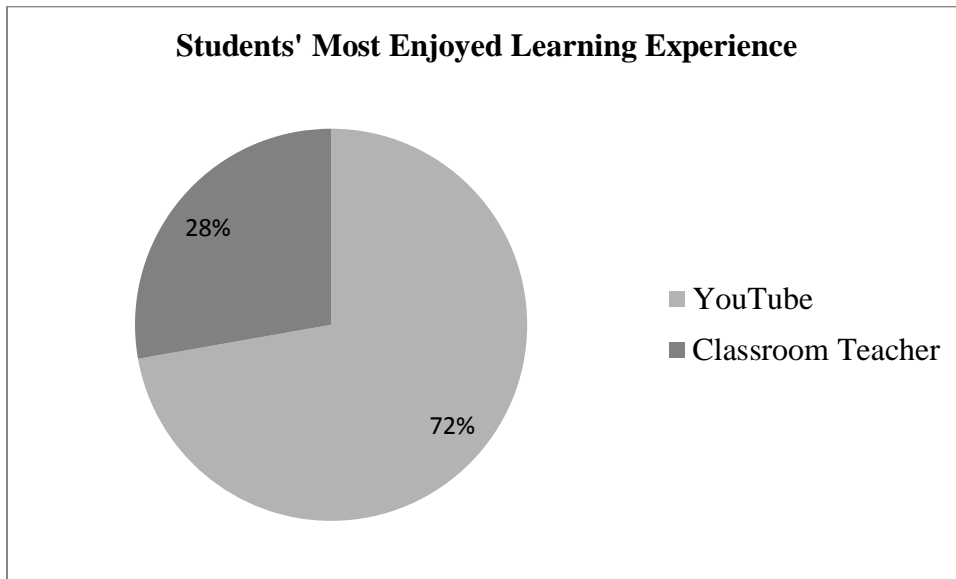preferred the YouTube videos.

Figure 1. The circle graph showing which video students enjoyed the most during their flipped
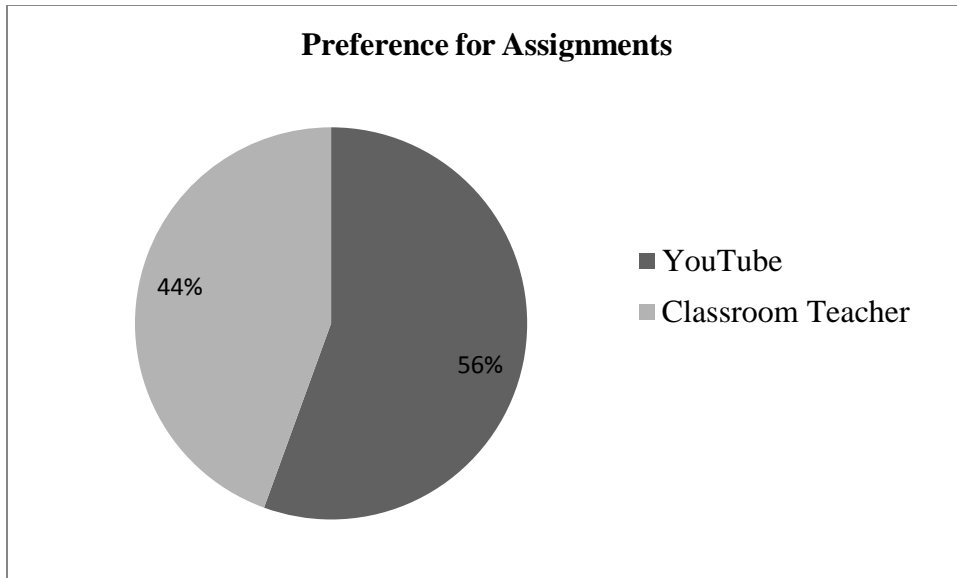
classroom learning.

Figure 2. The circle graph showing students' preference of videos to prepare them for their
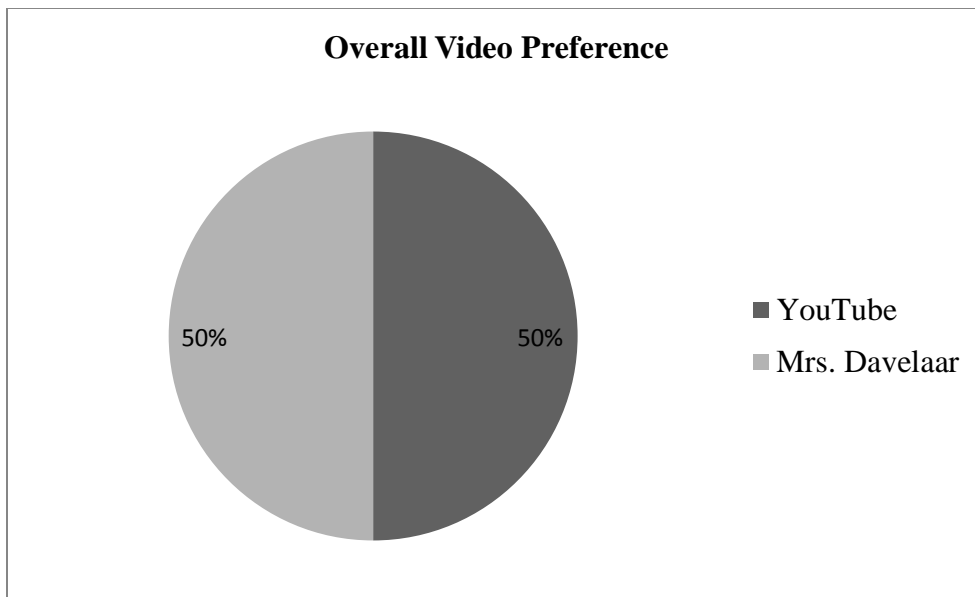
homework assignments

Figure 3. The circle graph showing students' overall preference for which type of video they

prefer to use for a flipped classroom.

Discussion

The purpose of this study was to investigate if the creator of the flipped classroom video would impact student achievement in the math classroom. Students were given pretests before participating in the flipped classroom math units. During the first unit, students watched an instructional math YouTube video or a math video created by their classroom teacher. After the unit was completed, all students took the same posttest. For the second unit, the groups watched the opposite video format. Again, they took a pretest before the unit began and a posttest when they completed the math unit. After participating in two units and using both YouTube videos and videos created by their classroom teacher, the students shared their preference on the videos as well.

Prior research by Hosan and Hoglund (2017) found that a relationship between the teacher and student can have a direct effect on student achievement. This research led the researcher of this study to hypothesize that the videos created by the classroom teacher would reflect a positive increase in student scores for achievement. However, the results illustrated in Table 1, Table 2, and Table 3 all show a statistically insignificant difference in the scores found for both YouTube videos and the videos created by the classroom teacher. The results of this study did not show a direct correlation between the videos watched by students and their achievement on their math assessments.

The second research question sought to determine if students had a preference between YouTube videos and videos created by their classroom teacher. The researcher hypothesized that the students might have found the YouTube videos more interesting, but would prefer the classroom teacher videos because of the relationship already built between the educator and student. Although 72.2% of students preferred the YouTube videos, the class was split evenly

when ask about how well they were prepared for assignments and quizzes. They felt that both of

the videos were useful for learning the unit's content. Figure 3 shows that 50% of the

participants preferred the classroom teacher videos and 50% preferred YouTube videos. In

conclusion, the 7th grade math class found the YouTube videos just as useful as the videos

created by their teacher.

Based on the results of the study, the researcher has found benefits in using both the

teacher-created videos and YouTube videos. However, the results show no statistically

significant difference on student achievement or preference.

Limitations

While the researcher carefully planned out the action research, there were some factors

that could have affected the findings. The first factor that may have limited the study was a small

sample size. The group was made up of only 19 students with 10 participants in Group A and 9

participants in Group B. This small sample size limits the variety and diversity of the student

surveys and test scores. With a small sample size data is easily affected by small changes and

anomalies.

A second limitation found in the study was time constraints. Due to scheduled activities

within the school, the researcher conducted the research over the course of 2 weeks. With more

time, students could have had more opportunity to work with each unit to receive an even clearer

understanding of the material. The short time span may have impacted post-test scores as

students did not have a sufficient amount of time to work with and review the material as desired

by the researcher.

A third limitation found in the study was the lack of diversity of backgrounds found in

the participants of the research. The data was collected only from a small, Midwest school with

students from similar backgrounds. This one seventh grade math class could have different

curriculum, expectations, and demographics compared to other schools found nationally or even

around the world.

Recommendations

In order to get a better understanding on the impacts on student achievement, the

researcher recommends conducting the study over a longer length of time. Increasing the length

of the study would likely yield a greater increase or decrease in the results of the students'

scores. This would allow the researcher to determine if the creator of the flipped classroom video

played a role in student achievement throughout multiple units.

The researcher also recommends using a larger sample size. Having a larger sample size

would give the researcher a more data to compare and analyze. Using students from multiple

grade levels and a wider range of backgrounds and demographics would also yield a wider

variety and range of data.

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Appendix A

Unit 1 Pre-Test

Name _____   Date _____

MODULE 12

Experimental Probability

Module Quiz: B

1. Denise rolls a number cube that has sides labeled 1 to 6 and then flips a coin. What is the probability that she rolls an odd number and flips heads?

   A $\frac{1}{8}$ C $\frac{1}{2}$

   B $\frac{1}{4}$ D $\frac{3}{4}$

2. There are 4 jacks in a standard deck of 52 playing cards. If Patricia selects a card at random, what is the probability that it will be a jack?

   A $\frac{1}{52}$ C $\frac{1}{2}$

   B $\frac{1}{13}$ D $\frac{12}{13}$

3. The experimental probability that Kevin will catch a fly ball is equal to $\frac{7}{8}$. About what percent of the time will Kevin catch a fly ball?

   A 55%   C 77%

   B 66%   D 88%

4. Janelle's Office Supply shop sells 2 types of notebooks. Each notebook is offered in red, blue, or yellow. If a notebook is selected at random, how many different possibilities are in the sample space?

   A 4   C 8

   B 6   D 16

5. Morgan saw 10 blue, 8 red, and 42 white cars drive by her house in 1 hour. What is the experimental probability that the next car that drives by her house will **not** be a white car?

   A 0.3   C 0.6

   B 0.5   D 0.7

6. If the probability of an event is 0.99, which of the following best describes the event?

   A The event will never occur.

   B There is a small chance that the event will occur.

   C The event is likely to occur.

   D The event will definitely occur.

7. A rectangle has a width of 10 inches and a length of 12 inches. A similar rectangle has a width of 15 inches. What is the length of the similar rectangle?

   A 12 in.   C 16 in.

   B 14 in.   D 18 in.

8. The experimental probability that Jessica will hit the ball when she is at bat is $\frac{2}{5}$. If she is at ball 50 times in a season, how many times can Jessica expect to hit the ball?

   A 15   C 25

   B 20   D 30

9. Philip has a box of crayons. 45 are yellow, 12 are green, 25 are blue, and 7 are red. If Philip selects a crayon at random, which color crayon would he be **most** likely to select?

   A green   C red

   B blue   D yellow

10. Celine flipped a coin 100 times. She flipped heads 41 times and tails 59 times. What is the experimental probability that the next flip will be heads?

   A $\frac{41}{100}$ C $\frac{59}{100}$

   B $\frac{1}{2}$ D $\frac{3}{4}$

MODULE 12

Experimental Probability

11. A number cube has sides labeled 1 to 6. Connie rolls the number cube 12 times. She rolls a 5 three times. What is the experimental probability that her next roll will **not** be a 5?

_____

12. Suki has 54 rock songs, 92 dance songs and 12 classical songs on her playlist. If Suki's music player randomly selects a song from the playlist, what is the probability that the song will **not** be a classical song?

_____

13. **Dominick's Survey Results**

Food	Number of Students
Pizza	8
Hamburger	12
Pasta	14
Steak	6

Dominick recorded the favorite food of students in his class. Based on the results of his survey, what is the experimental probability the next student he surveys will respond "Pizza" or "Steak"?

_____

14. The experimental probability of rain in a certain town is 20 percent. In the next 45 days, how many days can one expect it to rain?

_____

15. Alessandro painted $\frac{1}{3}$ of a wall in 45 minutes. If he keeps painting at the same rate, how much longer will it take him to finish painting the wall?

_____

16. **Cathy's Color Picks**

Color	Frequency
Red	10
Yellow	5
Blue	12
Orange	28

Cathy conducted an experiment in which she placed red, yellow, blue, and orange pieces of paper in a hat and drew them out without looking. The number of times Cathy drew each color is shown in the table above. What is the experimental probability that the next slip of paper Cathy draws will be orange?

_____

17. The experimental probability that Amir will make a basket is 0.4. The experimental probability that Juju will make a basket is 0.6. If Amir and Juju each shoot 150 baskets, about how many more baskets will Juju be expected to make?

_____

18. Daria selected a number from the positive integers less than 10. What is the probability that she selected a prime number?

_____

Appendix B

Unit 1 Post-Test

Module 12 Quiz

1.Denise rolls a number cube that has sides labeled 1 to 6 and then flips a coin. What is the probability that she rolls an even number and flips head?

A.   1/8   B. 1/4   C. 1/2   D. 3/4

2. There are 4 queens in a standard deck of 52 playing cards. If Patricia selects a card at random, what is the probability that it will be a jack?

A.   1/52   B. 1/13   C. 1/2   D. 12/13

3. The experimental probability that Kevin will catch a fly ball is equal to 5/8 . About what percent of the time will Kevin catch a fly ball?
A.   55%   B. 63%   C. 77%   D. 88%

4. Janelle's Office Supply shop sells 3 type of notebooks. Each notebook is offered in red, blue, or yellow. If a notebook is selected at random, how many different possibilities are in the sample space?

A.   4   B. 6   C. 9   D. 16

5. Morgan saw 10 blue, 8 red, and 42 white cards drive by her house in 1 hour. What is the experimental probability that the next car that drives by her house will NOT be a white car?

A.   0.3   B. 0.5   C. 0.6   D. 0.7

6. If the probability of an event is 0.23, which of the following best describes the event?

A.   The event will never occur.   B.There is a small chance that the event will occur.
    C. The event is likely to occur.   D. The event will definitely occur.

7. A rectangle has a width of 10 inches and a length of 12 inches. A similar rectangle has a width of 30 inches. What is the length of the similar rectangle?

A.   12 in.   B. 24 in.   C. 16 in.   D. 36 in.

8. The experimental probability that Jessica will hit the ball when she is at bat is 3/5 . If she is at bat 50 times in a season, how many times can Jessica expect to hit the ball?

A.   15   B. 20   C. 25   D. 30

9. Philip has a box of crayons. 45 are yellow, 12 are green, 25 are blue, and 7 are red. If philip selects a crayon at random, which color crayon would he be **least** likely to select?

A.   Green   B. Blue   C. Red   D. Yellow

10. Celine flipped heads 45 times and tails 52 times. What is the experimental probability that the next flip will be heads?

A.   41/100   B. 1/2   C. 59/100   D. ¾

11. A number cube has sides labeled 1 to 6. Connie roles the number cube 12 times. She rolls a 5 three times. What is the experimental probability that her next roll will NOT be 5.

12. Suki has 50 rock songs, 86 dance songs, and 10 classical songs on her playlist. If Suki's music player randomly selects a song from the playlist, what is the probability that the song will NOT be a classical song?

13. Dominick's Survey Results

Food	Number of Students
Pizza	8
Hamburger	12
Pasta	14
Steak	6

Dominick recorded the favorite food of students in his class. Based on the results of his survey, what is the experimental probability the next student he surveys will respond "Pizza" or "Steak"?

14. The experimental probability of rain in a certain town is 40 percent. In the next 45 days, how many days can one expect it to rain?

15. Alessandro painted ⅕ of a wall in 45 minutes. If he keeps painting at the same rate, how much longer will it take him to finish painting the wall?

16. Cathy's Color Picks

Color	Frequency
Red	12
Yellow	7
Blue	15
Orange	30

Cathy conducted an experiment in which she placed red, yellow, blue, and orange pieces of paper in a hat and drew them out without looking. The number of times Cathy drew each color is shown in the table above. What is the experimental probability that the next slip of paper Cathy draws will be orange?

17. The experimental probability that Amir will make a basket is 0.4. The experimental probability that Juju will make a basket is 0.6. If Amir and Juju each shoot 150 baskets, about how many more baskets will Juju be expected to make?

18. Daria selected a number from the positive integers less than 20. What is the probability that she selected a prime number?

Appendix C

Unit 2 Pre-Test

Name _____ Date _____ Class_____

Theoretical Probability and Simulations

Module Quiz: B

1. What is the probability of flipping a coin 3 times and getting 3 heads?

    A $\frac{1}{8}$ C $\frac{1}{2}$

    B $\frac{1}{4}$ D $\frac{3}{4}$

2. Two number cubes each have sides that are labeled 1 to 6. Isis rolls the 2 number cubes. What is the probability that the sum of the numbers rolled will equal 4?

    A $\frac{1}{36}$ C $\frac{1}{12}$

    B $\frac{1}{18}$ D $\frac{1}{6}$

3. Dustin has a spinner that is divided into 5 equal-size sections colored red, blue, orange, white, and green. What is the probability that Dustin spins pink on the next spin?

    A 0   C 0.5

    B 0.25   D 0.75

4. Isidro flips a fair coin 40 times. How many times can he expect heads to appear?

    A 4   C 15

    B 10   D 20

5. A number cube has sides labeled 1 to 6. Hannah rolls the number cube 18 times. How many times can she expect to roll a number less than 3?

    A 2   C 6

    B 3   D 8

6. Flavia has a bag with 8 white balls, 9 red balls, 14 green balls, and 10 orange balls. If she chooses a ball from the bag without looking, which color ball will Flavia be **least** likely to choose?

    A white   C green

    B red   D orange

7. Without looking, Tammy takes a marble out of a bag that contains 10 red marbles, 15 green marbles, and 25 blue marbles. She records its color and returns the marble to the bag. If Tammy repeats this process 90 times, how many times can she expect to pull out a red marble?

    A 5   C 15

    B 10   D 18

8. Caelin drives at 30 miles per hour. How many hours will it take him to drive 210 miles?

    A 5 h   C 7 h

    B 6 h   D 8 h

9. Alexander spins a spinner with four equally-sized regions and flips a coin. How many outcomes are possible?

    A 2   C 8

    B 6   D 36

10. Scarlett selects a card at random from a deck that contains 18 red, 12 yellow, and 20 blue cards. What is the probability that she does **not** select a red card?

    A $\frac{13}{25}$ C $\frac{18}{25}$

    B $\frac{16}{25}$ D $\frac{24}{25}$

11. Bella rolls 2 number cubes 60 times. How many times can she expect the sum of the numbers to be greater than 10?

    A 3   C 10

    B 5   D 12

12. Glen has 3 pairs of shoes, 5 shirts, and 4 pairs of pants. How many outfits consisting of 1 pair of shoes, 1 shirt, and 1 pair of pants can he make?

    A 12   C 30

    B 20   D 60

Name _____ Date _____ Class_____

MODULE 13 **Theoretical Probability and Simulations**

13. Two number cubes each have sides labeled 1 to 6. Ann rolls both number cubes. On the first roll, the sum of the numbers was equal to 10. On the second roll, the sum of the numbers was equal to 7. Which sum was more likely to occur? Explain.

_____

_____

_____

14. **Simran's Simulation Results**

Trial	Numbers Generated	Trial	Numbers Generated
1	1, 1, 3, 3	6	4, 5, 5, 5
2	3, 4, 5, 5	7	3, 4, 4, 5
3	2, 3, 4, 4	8	2, 2, 2, 1
4	1, 3, 4, 4	9	4, 5, 5, 3
5	3, 4, 4, 5	10	3, 3, 3, 3

Simran used a simulation to predict the number of defective parts that are produced in a factory. Random numbers are generated. A number 1 indicates that the part is defective. Numbers 2, 3, 4, or 5 indicate that the part is not defective. Of the next four parts produced, what is the experimental probability that none of the parts are defective?

15. Fatima bought a video game that has a regular price of $45. The game was on sale for 15 percent off, and she paid sales tax of 7 percent. What was the price Fatima paid for the video game?

16. Constantine walked 4 miles in 50 minutes. If he continues walking at this pace, how many minutes will it take him to walk 6 miles?

_____

17. **Simran's Simulation Results**

Trial	Numbers Generated	Trial	Numbers Generated
1	1, 1, 3, 3	6	4, 5, 5, 5
2	3, 4, 5, 5	7	3, 4, 4, 5
3	2, 3, 4, 4	8	2, 2, 2, 1
4	1, 3, 4, 4	9	4, 5, 5, 3
5	3, 4, 4, 5	10	3, 3, 3, 3

Simran used a simulation to predict the number of days of rain in his town. A number 1 or 2 indicates a week in which it rained. Numbers 3, 4, or 5 indicate a week in which it did not rain. The results of the simulation are shown above. What is the experimental probability that it will rain in Simran's town in at least 1 of the next 4 weeks?

_____

18. Each student in a class of 25 students wrote down a random digit. What is the predicted number of students who wrote a digit that is greater than 7?

_____

19. A special deck of cards consists of 5 red cards, 20 blue cards, and 25 green cards. Svetlana selects 1 card from the special deck 500 times. How many times can she expect to draw a red card?

Appendix D

Unit 2 Post-Test

Module 13 Quiz

1. What is the probability of flipping a coin 4 times and getting 4 heads
   A. ⅛   B. ¼   C. ½   D. ¾
2. Two number cubes each have sides that are labeled 1 to 6. Isis rolls the 2 number cubes. What is the probability that the sum of the numbers rolled will equal 2?
   A. 1/36   B. 1/18   C. 1/12   D. ⅙

3. Dustin has a spinner that is divided into 5 equal-size sections colored red, blue, orange, white, and green. What is the probability that Dustin spins yellow on the next spin?
   A. A. 0   B. 0.25   C. 0.5   D. 0.75

4. Isidro flips a fair coin 30 times. How many times can he expect heads to appear?
   A. 4   B. 10   C.15   D. 20

5. A number cube has sides labeled 1 to 6. Hannah rolls the number cube 18 times. How many times can she expect to roll a number less than 4?
   A. 2   B. 3   C. 6   D. 9

6. Flavia has a bag with 8 white balls,12 red balls, 14 green balls, and 6 orange balls. IF she chooses a ball from the bag without looking, which color ball will Flavia be **LEAST** likely to choose?
   A. White   B. Red   C. Green   D. Orange

7. Without looking, Tammy takes a marble out of a bag that contains 10 red marbles, 15 green marbles, and 25 blue marbles. She records its color and returns the marble to the bag. If Tammy repeats this process 90 times, how many times can she expect to pull out a blue marble?
   A. 5   B. 10   C. 15   D. 18

8. Caelin drives at 30 miles per hour. How many hours will it take him to drive 175 miles?
   A. 5 h   B. 6 h   C. 7 h   D. 8 h

9. Alexander spins a spinner with five equally-sized regions and flips a coin. How many outcomes are possible?
   A. 36   B. 10   C. 8   D. 12

10. Scarlett selects a card at random from a deck that contains 18 red, 12 yellow, and 20 blue cards. What is the probability that she does **not** select a blue card?
    A. 13/25   B. 16/25   C. 15/25   D. 24/25

11. Bella rolls 2 number cubes 60 times. How many times can she expect the sum of the numbers to be greater than 10?

          A. 3   B. 5   C. 10   D. 12

12. Glen has 3 pairs of shoes, 6 shirts, and 4 pairs of pants. How many outfits consisting of 1 pair of shoes, 1 shirt, and 1 pair of pants can he make?

          A. 12   B. 24   C. 36   D. 68

7.   Two number cubes each have sides labeled 1 to 6. Ann rolls both numbers cubes. On the first roll, the sum of the numbers was equal to 10. On the second roll, the sum of the numbers was equal to 8. Which sum was more likely to occur? Explain.

14.   Simran's Simulation Results

Trial	Numbers Generated	Trial	Numbers Generated
1	1, 1, 3, 3	6	4, 5, 5, 5
2	3, 4, 5, 5	7	3, 4, 4, 5
3	2, 3, 4, 4,	8	2, 2, 2, 1
4	1, 3, 4, 4,	9	4, 5, 5, 3
5	3, 4, 4, 5	10	3, 3, 3, 3

Simran used a simulation to predict the number of defective parts that are produced in a factory. Random numbers are generated. A number 2 indicates that the part is defective. Numbers 1, 3, 4 or 5 indicate that the part is not defective. Of the next four parts produced, what is the experimental probability that none of the parts are defective?

15.   Fatima bought a video game that has a regular price of $65. The game was on sale for 20 percent off, and she paid sales tax of 7 percent off, and she paid sales tax of 7 percent. What was the price Fatima paid for the video game?

16.   Constantine walked 4 miles in 50 minutes. If he continues walking at this pace, how many minutes will it take him to walk 6 miles?

17.   Simran's Simulation Results

Trial	Numbers Generated	Trial	Numbers Generated
1	1, 1, 3, 3	6	4, 5, 5, 5
2	3, 4, 5, 5	7	3, 4, 4, 5
3	2, 3, 4, 4,	8	2, 2, 2, 1
4	1, 3, 4, 4,	9	4, 5, 5, 3
5	3, 4, 4, 5	10	3, 3, 3, 3

Simran used a simulation to predict the number of days of rain in his town. A number 1 or 5 indicates a week in which it rained. Numbers 2, 3, or 4 indicate a week in which it did not rain. The results of the simulation are shown above. What is the experimental probability that it will rain in Simran's town in at least 1 of the next 4 weeks.

18.   Each student in a class of 25 students wrote down a random digit. What is the predicted number of students who wrote a digit that is greater than 6?

19.   A special deck of cards consists of 5 red cards, 20 blue cards, and 25 green cards. Svetlana selects 1 card from the special deck 500 times. How many times can she expect to draw a green card?

Appendix E

Student Video Preference Survey

1. Overall, which type of video did you prefer?
      a.   Mrs. Davelaar
      b.   YouTube
2. Which author did you enjoy learning from the most?
      a. Mrs. Davelaar
      b. YouTube
3. Which author did you feel explained the concepts better?
      a. Mrs. Davelaar
      b. YouTube
4. Which video helped you feel most prepared for your math assignment?
      a. Mrs. Davelaar
      b. YouTube
5. Which video helped you feel most prepared for your math quiz?
      a. Mrs. Davelaar
      b. YouTube
6. How helpful were the Mrs. Davelaar videos in explaining the lesson?
      a. Very Helpful
      b. Helpful
      c. Slightly Helpful
      d. Slightly Helpful
      e. Not Helpful
7. How helpful were the YouTube videos in explaining the lesson?
      a. Very Helpful
      b. Helpful
      c. Slightly Helpful
      d. Slightly Helpful
      e. Not Helpful
8. How prepared did Mrs. Davelaar's videos make you feel for your assignment?
      a. Very Helpful
      b. Helpful
      c. Slightly Helpful
      d. Slightly Helpful
      e. Not Helpful
9. How prepared did the YouTube videos make you feel for your assignment?
      a. Very Helpful
      b. Helpful
      c. Slightly Helpful
      d. Slightly Helpful
      e. Not Helpful

10. How prepared did Mrs. Davelaar's videos make you feel for your math quiz?
    a. Very Helpful
    b. Helpful
    c. Slightly Helpful
    d. Slightly Helpful
    e. Not Helpful

11. How prepared did the YouTube videos make you feel for your math quiz?
    a. Very Helpful
    b. Helpful
    c. Slightly Helpful
    d. Slightly Helpful
    e. Not Helpful