

“The Flipped Classroom: An Inverted Way to Teach”

An Honors Thesis

by

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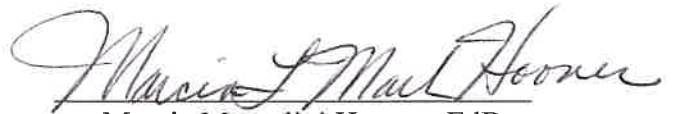
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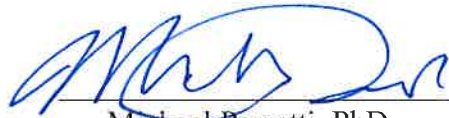
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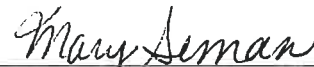
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Abstract

The lecture method of teaching continues to be among the most widely used pedagogical techniques in schools today as a result of tradition and habit. The flipped classroom challenges this idea of the traditional lecture by inverting the setup of the class activities. This shift from a teacher-centered teaching approach to a student-centered approach changes the structure of the class. The students watch the lectures at home and actively engage in activities during class. This has shown proof of increasing student achievement, motivation, engagement, interaction, and responsibility, in addition to the many positive aspects for the teachers. The research for this study was conducted at a middle school in southwestern Pennsylvania to analyze the student and teacher perceptions of the flipped classroom. This research helped to determine if the flipped classroom is an effective teaching strategy that should be encouraged in all secondary mathematics classrooms.

Keywords: flipped classrooms, student perceptions, teacher perceptions, mathematics

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The Flipped Classroom: An Inverted Way to Teach

If you search “flipped classroom” on Google, it yields approximately 653,000 results (Simonson, 2017, p. 1). The reason the flipped classroom has become more popular in education today is because educators are finding it increasingly difficult to be able to capture the attention of their students in our digital society (Roehl, Reddy, & Shannon, 2013, p. 44). The flipped classroom is a teaching method in which the activities that take place inside and outside of the classroom are flipped. Therefore, the students receive the instruction of the content at home through a video and complete the practice and application of the content inside the classroom. Millennial students, also referred to as digital natives, are individuals born between 1982 and 2002 that have been exposed to technology since they were young (Roehl et al., 2013, p. 44). In a research study conducted by Prensky, they found that “millennials reared on rapidly evolving technologies demonstrate decreased tolerance for lecture-style dissemination of course information” (Roehl et al., 2013, p. 44). They also found that millennials have shown a preference for classroom environments that support multitasking along with group activities that uses more of the social aspects of learning. According to Roehl, Reddy, and Shannon in the article “The Flipped Classroom: An Opportunity to Engage Millennial Students through Active Learning Strategies,” students are shifting the manner in which they think and process information as a result having greater access to technology and digital media (2013, p.44-45). Therefore, educators should consider redesigning their teaching to best fit the preferences of their students. The increasing popularity of the flipped classroom may be a result of the perceived and demonstrated effectiveness of this pedagogy (Simonson, 2017, p. 1). This thesis project

analyzes the aspects of a flipped classroom and explores research conducted on student and teacher perceptions in the secondary mathematics classrooms. Additionally, research was specifically conducted to determine if students and teachers in a school located in southwestern Pennsylvania exhibit positive perceptions of the flipped classroom.

What is a Flipped Classroom?

The flipped classroom instructional model, which is also referred to as the inverted classroom, is a model in which the “events that have traditionally taken place inside the classroom now take place outside the classroom and vice versa” (Lo & Hew, 2017, p. 4). Hamdan, McKnight, McNight, and Arfstrom define the flipped classroom as “shifting direct learning out of the large group learning space and moving it to the individual learning space, with the help of one of several technologies” (as cited in Unal, Z. & Unal, A., 2017, p. 145). The teacher uses technology to create videos for the students to learn new concepts at home. Some technologies teachers can use to create or obtain their instructional videos is Screencast, YouTube, or Khan Academy (Lo & Hew, 2017, p. 5). The students then watch the video before coming to class in order for the practice and application to happen in the classroom. This gives the students the opportunity to engage in complex problem solving with their peers and develop a deeper conceptual coverage of the classroom materials (Unal, Z. & Unal, A., 2017, p. 145). Therefore, there are two parts to this pedagogy. The first part is the computer-based individual instruction the students complete outside of the classroom, and then the second part is the interactive group learning activities that occur inside the classroom (Unal, Z. & Unal, A., 2017, p. 147). This pedagogy allows for active

learning to take place in the classroom. Students are able to take ownership of their learning by working independently and participating in group activities that help to stimulate deeper thinking (Smith, 2018, p. 26). The role of the teacher shifts in the classroom as they go from being the “sage on the stage” to the “guide on the side” (Kelly & Denson, 2017, p. 43). During the class, the teacher facilitates the instruction instead of directly delivering the content through a lecture (Kelly & Denson, 2017, p. 43).

Out-of-Class Activities

One of the ways this pedagogy differs from the traditional methods of teaching is in the way activities are conducted outside the classroom. According to Bloom’s Taxonomy, these out-of-class activities fall under the lowest levels of the cognitive domain, such as remembering and understanding (Zainuddin & Halili, 2016, p. 315). The purpose is for the students to engage with the content materials outside of the classroom in order to prepare for class, where the more active learning experiences happen. The students are expected to watch a short online instructional video at home that the teacher has created themselves or selected from another source (Unal, Z. & Unal, A., 2017, p. 146). Meanwhile, the teacher may also have the students complete a variety of other activities outside of the class in addition to the video. The teacher may ask the students to take notes or read specific text materials related to the instructional video. The students may also be asked to complete online exercises or participate in online discussions pertaining to the video for the students to begin familiarizing themselves with the content before coming to class (Unal, Z. & Unal, A., 2017, p. 147). The students are learning the basic building blocks of the content that usually does not

require the presence of the teacher for this learning process. Through these out-of-class activities, the students begin to work their way through the lower levels of skills described in Bloom's Taxonomy.

In-Class Activities

The in-class activities require more of the higher cognitive levels of Bloom's Taxonomy, which include applying, analyzing, evaluating, and creating (Zainuddin & Halili, 2016, p. 315). This is another way in which the flipped classroom model differs from the traditional lecture model. When the students come to class, the teacher can deliver either a brief content review or a short lecture furthering the content provided in the instructional video the students were expected to watch at home the night before. This helps the students recall the material and ask any questions they may have had. The students will then be given more opportunities to apply their knowledge during class (Unal, Z. & Unal, A., 2017, p. 147). They can participate in individual or large group activities with the guidance of the teacher (Unal, Z. & Unal, A., 2017, p. 146). The students will be able to work toward solving more advance problems given the opportunity to partake in hands-on activities (Lo & Hew, 2017, p. 14). With this classroom model, the teacher is able to use additional tools and supplemental technologies to aid the students with their learning (Smith, 2018, p. 27). The students will have additional time toward the end of class for self-evaluation or reflection activities to connect and think about their learning (Unal, Z. & Unal, A., 2017, p. 147). The flipped classroom is the opposite of the traditional model; it focuses on the lower cognitive tasks outside the classroom and the higher cognitive tasks inside the classroom (Zainuddin & Halili, 2016, p. 316).

Learning Theories

Lage, Platt, and Trelia theorized that the flipped classroom engages students of all learning types more than the traditional lecture does (as cited in Allen, 2014, n.p.). The flipped classroom may be beneficial to students because it uses a combination of several learning theories. Vygotsky developed the theory that children would reach a higher level of development by working collaboratively with their peers. This theory, known as the “zone of proximal development”, describes how the learning potential of students is greater when they are working in groups rather than learning on their own (Allen, 2014, n.p.). This theory is utilized in the flipped classroom during the in-class activities when the teacher allows the students to work collaboratively to apply their knowledge of the content from the video. Benjamin Bloom, an educational psychologist, proposed another model called the ‘master learner’ model, which is also utilized in the flipped classroom. In this ‘master learner’ model, students receive the instruction individually with the ability to work at their own pace, while obtaining formative assessment from the teacher (Allen, 2014, n.p.). The flipped classroom reflects this model as it provides students with the instruction individually at home through the instructional videos while the students work at their own pace through new content. Then, the students are formatively assessed by the teacher during the class activities.

Another theory the flipped classroom uses is the Keller Plan, developed by Fred Keller. This plan encouraged teachers to chunk longer lectures into smaller units to help the students master the content (Allen, 2014, n.p.). The instructional videos used in the flipped classroom is one way teachers can chunk the material they are presenting

the student with at one time. B.F. Skinner developed theories for sequential learning. These theories state that students should master one concept at a time before advancing to the next while they are provided with immediate feedback from the teacher (Allen, 2014, n.p.). With the flipped classroom, teachers are able to provide immediate feedback for the students while they are participating in activities during class. The students also have the ability to master the content with the ability to apply their learning in the classroom. Overall, the flipped classroom make use of all of these learning theories, in addition to several others, through the activities used inside and outside of the classroom.

Benefits

There are many benefits for both the students and the teachers when the flipped classroom method is implemented. This method enables students to participate more in active learning activities during class, which allows for more opportunities for teacher-to-student mentoring as well as peer-to-peer mentoring (Roehl et al., 2013, p. 44). Additionally, the students are able to build on their interpersonal skills as a result of more opportunities to engage and communicate with their peers and teacher (Unal, Z. & Unal, A., 2017, p. 146). This gives the students more of an opportunity to ask questions and work through challenging assignments with the support of their peers or teacher (Mohamad & Alwani Zolkifli, 2016, p. 133). With the additional support available, more of the students are able to reach content mastery. They are also able to engage more with the content, as well as spend more time developing their critical thinking and problem-solving skills as they work through more challenging problems in the classroom (Unal, Z. & Unal, A., 2017, p. 146). With the extra time available in class,

the students have time for reflection on their learning. This enhances their metacognition as they make connections of the content between the out-of-class video and in-class activities (Simonson, 2017, p. 3). Another benefit for the students is that they are able to watch the instructional videos on their own time and at their own pace (Roehl et al., 2013, p. 46). This means the students have the ability to replay the instructional video as many times as they choose. By giving the students more freedom, the students benefit by becoming more aware of their learning process (Roehl et al., 2013, p. 47). This pedagogy also increases student interest and engagement in the classroom (Unal, Z. & Unal, A., 2017, p. 148). Marum says, “When students are offered interest-based choices, given self-paced boundaries to demonstrate mastery, and are using multiple modalities of creating new knowledge, this empowerment naturally begets engagement” (Smith, 2018, p. 27-28).

One way this pedagogy benefits both the teacher and the students is by addressing situations in which a student or teacher is absent. It allows for a student to continue learning the material if they are not in school, and it allows the students to continue with their learning in the case that the teacher is not in class (Roehl et al., 2013, p. 47). The teacher benefits from the flipped classroom by having the opportunity to gain better insight into which concepts their students find challenging in order to provide additional guidance. The teacher is able to gain better insight of their student because they have more available time to get to know their students during in-class activities. Therefore, the teachers are able to customize their curriculum for their specific students (Unal, Z. & Unal, A., 2017, p. 147). Another benefit for the teacher is that once the groundwork is completed of creating the video lectures, preparation time

for class is significantly reduced. The teacher is able to focus on creating classroom activities intended to help students deepen their knowledge (Roehl et al., 2013, p. 46). A benefit of gaining more time during class is for the teacher to cover more topics or to spend time giving assistance to the lower achievers in the classroom (Bhagat, Cheng-Nan Chang, & Chun-Yen Chang, 2016, p. 135). As Simonson says, “Flipping the classroom allows the instructor to better assess and monitor student learning, to teach content, to encourage application of the content, and to help students develop process, or soft, life-long skills,” (2017 p. 1). The ability to improve students’ communication skills, as well as promote more independent learning proves how not only the students, but also the teachers are greatly benefited with the implementation of the flipped classroom (Lo & Hew, 2017, p. 2). The implementation of the flipped classroom not only benefits the students but also allows the teacher to provide quality instruction for them.

Challenges

The flipped classroom has several challenges and limitations teachers need to be aware of before implementing this model. The students may have a difficult time adjusting to the new model and environment since they are not accustomed to this style of teaching (Roehl et al., 2013, p. 48). Therefore, students may resist participating or may not be motivated to complete work outside the classroom (Simonson, 2017, p. 3). The best way to overcome this challenge is for the teacher to open up communication between them and students in the classroom about what a flipped classroom is. The students are mostly likely not familiar with the arrangement, routine, and procedures expected of them in the flipped classroom. The teacher can take time to explain the

rationale of the teaching and learning activities that will be occurring. The teacher should also provide clear instructions, in addition to teaching the students about how to work collaboratively. This can help promote the acceptance of the students with the implementation of this new approach. The students can express their concerns about the flipped classroom, such as the new expectations or class structure. The teacher has the opportunity to address these worries and provide guidance in the transition (Lo & Hew, 2017, p. 14-15). The teacher can play a crucial role in helping the students become acclimated. The self-determination theory proves that students will feel motivated to learn when the assignment is within their abilities, they feel in control, and they are socially connecting to others. The teacher can help to use these factors to motivate their students to see the benefit of flipping the classroom (Simonson, 2017, p. 3). The students will be more willing to participate in class and complete the out-of-class work if the teacher explains the rationale and highlights the student benefits to using the pedagogy (Simonson, 2017, p. 6).

Another challenge of switching to the flipped classroom is that the students may have a hard time not being able to ask questions while watching the video since they have been accustomed to asking the teacher questions during the lecture (Lo & Hew, 2017, p. 11). The teacher can overcome this challenge by creating an online discussion forum in which the students would be able to post their questions and discuss with their peers (Lo & Hew, 2017, p. 16). A different challenge the flipped classroom poses is that the students may not have the motivation to watch the videos if they are long or uninteresting (Lo & Hew, 2017, p. 11). The teacher can address this challenge of students being disengaged by dividing long presentations into smaller portions (Lo &

Hew, 2017, p. 15). It was found that “students’ median engagement time of watching instructional videos was 6 minutes” (Lo & Hew, 2017, p. 15). Therefore, teachers should strive to keep their videos as short and concise as possible to be able to keep the students’ attention while watching. It can likewise be difficult for the teachers to make sure the students are watching the videos. However, there are techniques the teacher can use to address this challenge. One way is for the teacher can embed quizzes into the video or have the students take a follow-up quiz on the instructional videos to ensure that the students watched and comprehended the information. The teacher can also use this to monitor the data of the students’ learning. The teacher could add digital game elements to the videos to help increase the students’ motivation and engagement in the out-of-class activities (Lo & Hew, 2017, p. 17)

An additional challenge of the flipped classroom is that not all teachers are knowledgeable of the procedures and techniques of the flipped classroom pedagogy. If teachers choose to use the flipped classroom, they will need to make sure they utilize current technology for creating the flipped video lessons (Roehl et al., 2013, p. 48). To address this challenge, the teachers in the school district can share their knowledge and experiences of the flipped classroom. It is also beneficial if the school district can provide trainings or professional developments on flipped classrooms to help the teachers strengthen their skills (Lo & Hew, 2017, p. 16). The preparation of creating the flipped lessons can be another challenge the teacher may face. The teacher might need to spend more time planning the instructional materials and preparing more material than in previous years, given more available time in the classroom (Kelly & Denson, 2017, p. 43). Teachers need to adapt their current lessons into a flipped lesson

to post it online for the students to watch. It is also challenging for the teacher to make changes to the video once it is recorded if they need to add material or further explain one of their lessons (Roehl et al., 2013, p. 48). Thus, teachers may have a larger workload their first year of conducting the flipped classroom model (Kelly & Denson, 2017, p. 43). Teachers can overcome this challenge by starting small and accumulating their flipped learning materials slowly over the years by flipping a few lessons each year. The teacher can proceed at a reasonable pace for themselves while they learn and experiment with the flipped classroom (Lo & Hew, 2017, p. 17).

Lastly, there are financial limitations teachers need to be aware of. The school district may not have the funding for the tools to create the videos or implement the flipped classroom. This model relies on the availability of computers and internet access for the students at home to watch the lecture videos outside of the classroom (Roehl et al., 2013, p. 48). The teacher needs to take into consideration the students' socioeconomic status to make sure every student has access to the learning materials. The teacher may allow for the students to use computer facilities at school before, during, or after the school day to complete assignments, or the teacher could even provide the materials on flash drives for the students if they do not have internet access at home (Lo & Hew, 2017, p. 17). Therefore, this model does require a greater amount of time and resources to prepare the lessons, record the videos, distribute the lectures to the students, and plan the in-class materials. These obstacles can be overcome as the teacher works to make the necessary modifications to the classroom. In the end, the benefits of this model prove it worthy (Kelly & Denson, 2017, p. 43).

When to Flip Instruction

After taking into consideration all of the benefits and challenges of integrating the flipped model into the classroom, one of the most frequently asked questions is, how does a teacher know when to flip instruction? The flipped classroom may not be appropriate for every class or every teacher. Active learning strategies have shown to increase student success, but the flipped classroom is not the only strategy that can be used (Simonson, 2017, p. 1). There are four important factors to consider when deciding to flip a classroom. These include: the course and content, the students, the instructor, and the situational factors. Flipping the classroom is most appropriate when the teacher wants the students to be able to recall the information in the future and engage in activities requiring higher-order skills. Therefore, it is important for the teacher to consider the learning outcomes they would like their students to take away from the lesson. When the content is factual or procedural, the students are able to learn the facts at home from watching the instructional videos before coming to class. Then, they have the opportunity to practice and apply their factual knowledge during the in-class activities. The flipped classroom may not be the instructional norm for the school district. The teacher may also feel pressure to follow the norms of their department, especially when it comes to maintaining consistency with the grading and assignments (Simonson, 2017, p. 2). However, teachers should not be nervous to implement new pedagogies and advocate for a style of teaching that could be the most beneficial for their students.

Another factor teachers should be aware of is that flipping a classroom requires the teacher to give some control to the students in this student-centered approach. This can be threatening or even uncomfortable for some teachers to do (Simonson, 2017, p.

4). They must be prepared to facilitate the instruction and maintain organization in the classroom to manage their classroom accordingly. All of these factors are important for the teacher to take into consideration before making the decision to flip their instruction.

Literature Review

A variety of research studies have been conducted on the effects of implementing the flipped model into secondary mathematics classrooms. A study was conducted by Bhagat, et al. (2016) on eighty-two high school students in a Chinese trigonometry classroom for a six week time period. Students, ranked as high, average, or low achieving, were split into two groups. One was an experimental group placed in a flipped classroom, and the other was the control group placed in a classroom where the traditional lecture was used. Both groups were given a pretest and posttest using the Mathematics Achievement Test (MAT) to measure the performance of the student in each of the classroom models. Additionally, a Course Interest Survey (CIS) was used to measure the motivation of the students. The experimental group were given video lessons 15 to 20 minutes long, and the students engaged in activities during the class time about the topics from the videos. The students would be divided into groups, and the teacher would be able to provide support for the lower achieving students. The students in the control group attended lectures lasting 30 to 40 minutes with the remaining 10 to 20 minutes devoted to problem-solving activities. Then, the students would complete their homework for the following class. Comparing the scores on the pretest between the experimental and control groups for each of the different levels of students showed no significant difference. However, when comparing the student achievement scores of the pretest and posttest of the control and experimental groups,

the experimental group exhibited better performance than the control. There was a significant difference found in the posttest scores for the average and low achievers in the experimental group (Bhagat et al., 2016, p. 136-138). This outcome could be a result of the teachers providing more attention to the low achievers when the flipped classroom model was used. The results of this study showed that students in the experimental group outperformed the students in the control group for the posttest. This provides evidence that the flipped classroom environment improved the learning achievement of the students. Using the results from the CIS motivational questionnaire, it presented how students in the experimental group also had increased learning motivation (Bhagat et al., 2016, p. 140). The students in this study had positive results related to achievement and motivation when participating in the flipped classroom.

Another example of a research study conducted on flipped classrooms was done in Florida K-12 schools by Z. Unal and A. Unal (2017) to look at student performance, student perceptions, and teacher satisfaction using this method. Sixteen teachers implemented the flipped classroom for the first time in this study. A pretest and posttest were used to measure the performance of the students in the flipped classroom. Z. Unal and A. Unal also used surveys to determine the student perceptions and teacher satisfaction of the flipped classroom (2017, p. 145). In this study, each teacher selected two of their classes to use the flipped classroom model and two of their classes to use the traditional lecture model for five of their lesson plans. The sixteen teacher used a variety of tools to create their flipped instructional videos. Seven teachers used a presentation software with added commentary, such as PowerPoint; six teachers used screen capture software, such as Screencast; and three teachers videotaped themselves

at a whiteboard. All the videos were between 15 to 25 minutes long and were uploaded to the classroom website (Unal, Z. & Unal, A., 2017, p. 149-150). It was found that 81% of the students watched the video at home rather than at school or another public location. The students used a variety of technology to view the flipped lessons, such as a desktop computer, laptop, tablet, iPod, or smartphone (Unal, Z. & Unal, A., 2017, p. 154).

Overall, the study resulted in high student gains, more positive student perceptions, and higher teacher satisfaction in the flipped classroom compared to a classroom using the traditional lecture (Unal, Z. & Unal, A., 2017, p. 145-146). The results of this study showed that 94% of the students claimed the flipped classroom model was a successful new learning format (Unal, Z. & Unal, A., 2017, p. 153). The advantages of the flipped classroom teaching approach showed that students performed significantly better in the flipped classroom compared to when the traditional lecture method was used. The students found the flipped classroom more enjoyable and motivational (Unal, Z. & Unal, A., 2017, p. 156). On a scale of one to five, with five as the highest ranking, the student average was 4.79 when asked if the flipped classroom was more enjoyable than the traditional classroom. There was an average of 4.73 for how motivated the students were to learn in a flipped classroom (Unal, Z. & Unal, A., 2017, p. 154). The results showed 88.46% of the students most liked the ability to work at their own pace (Unal, Z. & Unal, A., 2017, p. 153). The students also saw an increase in the interaction with their peers and teacher, in addition to a decrease in the amount of wasted class time. Some challenges to the flipped classroom were that students were not familiar to learning at home. A solution to overcome this challenge

would be for teachers to describe the goals, routine, and procedures of the flipped classroom to help with the transition of this new technique. Another challenge was that 5% of students reported the videos were too time consuming to watch. A solution to this problem would be for the teachers to make videos shorter and more concise. It is also beneficial for the teacher to create instructional videos that are more creative and engaging for students (Unal, Z. & Unal, A., 2017, p. 156).

The teachers had a very positive, enjoyable, and motivational experience with the flipped classroom. On the scale of one to five, with five as the highest ranking, the teachers averaged a score of 4.93 for enjoyable, 4.8 for motivational, and 4.86 for recommending the flipped classroom to another teacher (Unal, Z. & Unal, A., 2017, p. 155). The teachers in this study found that the flipped classroom provided their students with “better personalized learning, improved mastery retention of information, and better opportunity for communication and collaboration for their students,” (Unal, Z. & Unal, A., 2017, p. 157). The results showed 93.75% of the teachers said they most liked that their students learned better and scored higher (Unal, Z. & Unal, A., 2017, p. 155). However, the teachers found the heavy front-end preparation to be challenging and time consuming. A solution to overcome this challenge is to progressively develop the flipped classroom and gradually redesign the class. Teacher found they had a difficult time ensuring their students were watching the flipped instructional videos. (Unal, Z. & Unal, A., 2017, p. 157). If the student understood the purpose and rationale of the flipped classroom, then they could see the value in participating in the activities. The conclusion of this study showed the significant learning gains of the flipped classroom compared to traditional lecture methods of teaching.

Kelly and Denson conducted a study that investigated the impact flipped classroom have on teacher efficacy in STEM subjects (2017, p. 43). Teacher efficacy is defined as “teachers’ belief in their ability to impact student outcomes,” (Kelly & Denson, 2017, p. 43). Research has proved that teacher efficacy levels are positively associated with student achievement and academic outcomes. It also has a strong association with teacher persistence, commitment to the profession, morale, and teaching practices. The reason it is important to see how the flipped classroom effects teacher efficacy is because teachers with higher levels of efficacy tend to be more persistent and less critical of student errors and better equipped to address student learning and behavioral deficits in the classroom. Teachers with higher levels of efficacy have greater levels of planning, organization, and an openness to new ideas and teaching methods (Kelly & Denson, 2017, p. 43). The participants in this study were three STEM teachers with 2 to 3 years of experience with the flipped model from a charter school in North Carolina. They taught classes in the subjects of chemistry, environmental science, calculus, and engineering with an average of 24 students per class, totaling 341 students. The school functioned with a “bring your own device” policy with computers available to loan if a student did not have a device. Students without internet access at home got an opportunity to do their assignments before, during, or after school (Kelly & Denson, 2017, p. 44). The method for this study was semi-structured interviews of the teachers to determine their perceptions of the flipped classroom approach and how it has affected their teacher efficacy (Kelly & Denson, 2017, p. 45).

The results from this study showed that the teachers had high levels of observed

teacher efficacy (Kelly & Denson, 2017, p. 46). It also showed that the flipped classroom had a positive impact on their teaching and student learning (Kelly & Denson, 2017, p. 47). These positive perceptions of this teaching approach was due to increased class time that allowed the teacher to cover more material and address any misconceptions the students might have had. The teachers found that even though this method required more preparation time for the lessons, they still saw how positive the gains were for the students. The teachers would also see the rewards in the following years once the collection of videos was created (Kelly & Denson, 2017, p. 48). Overall, the results from this study showed how the flipped classroom not only benefited the teacher and their efficacy levels, but how it benefited the students as well.

Lo and Hew conducted a study looking at the activities of the flipped classroom in grades K-12 and the effects in those classrooms, such as the student attitudes (Lo & Hew, 2017, p. 2). The research was conducted in the United States, Taiwan, Canada, and England with seven of the fifteen schools in the United States. Most of the research was conducted in the STEM field with six cases conducted in the mathematics classroom, and thirteen cases were conducted in a high school setting (Lo & Hew, 2017, p. 7). The study showed that all the students in the flipped classroom either performed overall significantly better than in a traditional classroom or they found no significant difference in the student achievement (Lo & Hew, 2017, p. 9). The students liked watching the videos better than being asked to read text-based materials because they had the ability to set their own pace to pause, rewind, or review the instructional video. Students liked the ability to develop teamwork skills as they could “discuss and clarify learning goals in a collaborative manner” (Lo & Hew, 2017, p. 10). The students

reported that the flipped classroom helped them to be prepared for the in-class activities. Overall, the students were generally satisfied with the flipped classroom (Lo & Hew, 2017, p. 9).

One study, conducted by Eisenhut and Taylor, looked at three flipped mathematics educators in grades 7-12 from the Mid-Atlantic region of the United States (2015, p. 19). Two of the teachers had fully flipped classrooms, and one teacher flipped the instruction periodically. Two of the classrooms were one-to-one, in which each student had a technological device; one classroom had a class set of desktop computers, and the other classroom had laptops provided for each student by the district. The third teacher did not have regular access to technology (Eisenhut & Taylor, 2015, p. 19). This study was unique because it looked specifically at the mathematical purposes for using the flipped classroom in regards to the “relationship with the Common Core State Standards for Mathematics and NCTM’s ‘vision of high school classrooms in which the majority of the activity involves students working on rich mathematical problems and engaging in mathematical discourse’” (Eisenhut & Taylor, 2015, p. 20).

The study found three mathematical purposes for educators to be using the flipped classroom. The purposes were to help the students develop introductory content knowledge, build their understanding of the mathematical topics, and increase their problem-solving skills (Eisenhut & Taylor, 2015, p. 20). The teachers used the videos as tools to introduce new material in an independent learning space that gave students more time during class to engage with the content. Students in the flipped classroom were given the opportunity to practice their mathematical skills in a variety of mediums. This meant the students were repeatedly exposed to the mathematical ideas through

written, verbal, and digital mediums. Additionally, the teacher would expose the students to multiple methods of solving problems, which would help to further their knowledge and understanding of solving mathematical problems (Eisenhut & Taylor, 2015, p. 21). The student has the flexibility to choose the problem solving method they want to use that makes the most sense to them (Eisenhut & Taylor, 2015, p. 22). The teachers in this study were able to introduce projects related to Science, Technology, Engineering, and Mathematics they would not have had the time to do in the traditional classroom. They did projects such as working with LEGO gears, tangible bicycle gears, and online websites to build a functioning clock. The teachers in this study liked how the flipped classroom provided them with the opportunity to spend more time with the students developing their mathematical problem-solving skills. The teachers were able to engage the students in the problem-solving process. They would prompt the students with questions and encourage them to creatively investigate their theories on their own without the teacher immediately providing them with the correct answer. This helped students develop high-order, problem-solving skills that could be taken with them in the future (Eisenhut & Taylor, 2015, p. 23). The study found that the flipped classroom provided an environment that was collaborative, differentiated, and student-centered, which benefited the students in learning mathematics (Eisenhut & Taylor, 2015, p. 20).

Research Question

After taking into consideration the research from the previous studies described, research was conducted for this thesis project in a middle school located in southwestern Pennsylvania. This research was conducted to determine the teacher and student perceptions of the flipped mathematics classroom. The school selected for this

research study used a modified version of the flipped classroom in one of the seventh grade Mathematics classrooms. The middle school has 506 students enrolled with 96% of them identifying as white and 35% qualifying for free or reduced lunch. Overall, the middle school ranks 50% in Pennsylvania for math proficiency scores and 70% for reading proficiency. The school district is one-to-one with technology, in which every student is provided an iPad to use inside and outside of the classroom. The middle school currently has a student-to-teacher ratio of 12:1 (Public School Review, 2018).

Methods

The methods used for this study was a twenty question survey using Google Forms that was given to students to determine what their perceptions and experiences were participating in the flipped classroom. A twenty-five question interview was conducted of the teacher that mirrored the student survey. This was used to determine how the perceptions of the teacher implementing the flipped classroom correlated to the perceptions of the students. These survey and interview questions asked about demographics, how both the student and teacher perceived the workload and benefits of the flipped classroom, as well as their favorite and least favorite aspects of the model. This research specifically looked at the perceptions of fifty-six students from four class periods taught in a seventh grade mathematics classroom with one teacher. The student population in this study were 64.3% female, 33.9% male, and 1.8% preferred not to disclose their gender. The teacher interviewed in this study had a total of eighteen years of experience teaching with thirteen of those years teaching in this school district. The teacher had learned about the flipped classroom pedagogy six years ago and had been implementing the model into their classroom for the last four years.

Classroom Observations

Observations were conducted to determine what the classroom environment was like for the students, where they engaged with their learning and interacted with their teacher and peers. For a typical day of instruction in this classroom, the students would enter the classroom and sit at tables with four or five other students. The teacher would spend a few minutes describing the schedule for the day, and then the students would be on their own for the remainder of class time. The students were expected to use their iPads to watch an instructional video the teacher had pre-recorded and uploaded to the classroom page on Edpuzzle. The videos were approximately twenty minutes in length, and the students would spend the beginning portion of class watching the video silently at their seats. Throughout the video, the teacher embedded questions for the students to answer as they watched the video. The students would be notified of the correct answer and an explanation of why that was the correct answer. The teacher would obtain the scores of all the student responses to assess how much the students were retaining from the video. If the students finished watching the instructional video early, the teacher would permit them to begin their homework. This classroom routine occurred in about 25% of the classes when a new topic was introduced. On the days the students were not learning a new topic and watching the instructional videos, the teacher would spend time in class further explaining a mathematical concept in class or facilitating activities for the students to practice and apply their knowledge of the content.

The students used their iPads for a large majority of their work inside and outside of the classroom. The teacher provided all of the assignments homework, and notes on their classroom page in the application, eBackpack. If the student chose, they

were permitted to complete the classwork or homework using paper and pencil; however, most of the students in the classroom chose to complete all assignments digitally. Additionally, a unique aspect to this digital classroom was the homework review portion of the class was an optional video the students could watch outside of the classroom. Once the students completed their homework assignment, they had the ability to watch an instructional video created by the teacher that thoroughly explained how to solve each of the homework problems. The teacher would only review the homework during class time if the students had a specific question about the assignment that was not answered in the video.

Results

After surveying the students and interviewing the teacher in these classrooms, there were several common themes between the perceptions of both the students and the teacher of using the flipped classroom. All of the students surveyed reported to have WiFi at home, which the teacher was aware of. It was found that 83.9% of the students had a computer or laptop at home, and 96.4% of the students reported to have a cellular device that had internet access. With this knowledge, the teacher was able have the students watch their homework review videos at home on their own time since a large majority of the class has access to a computer or cellular device with internet access. When asked if the students ever ran into technical difficulties when watching the flipped lessons, 41.1% of the students said they sometimes ran into difficulties, and 48.2% of the students said they rarely ran into difficulties. Only 3.6% of the students reported to always have difficulties with the technology. The teacher discussed how the students would claim that Edpuzzle would switch the multiple choice answer options

when the students went to select the correct answer choice, which caused the students to miss questions frequently. Therefore, this could be the reason the students reported having technical difficulties. However, the teacher could not find evidence that the application was switching the answers on the students. The teacher found that they ran into minimal technical difficulties in the classroom, and if there were an issue, the district provided ongoing technical support.

To create the flipped videos the teacher used QuickTime on a MacBook to record the videos that were then uploaded to Edpuzzle where the students could access them. The teacher reported to spend approximately 45 minutes to create each flipped video. The instructional videos were about 20 to 25 minutes long, plus it would take extra time to prepare what would be taught or explained in the video. The teacher would sometimes take multiple attempts to record a video to ensure there were no mistakes in the fluency or presentation of the information in the video. Therefore, the teacher found that by using the flipped classroom model, it required more time spent in the forefront to record and prepare the videos for the students. The teacher found the time to be their least favorite part of using this teaching method because it was one of the biggest challenges to overcome when flipping the lessons. The teacher believed that the extra preparatory work was worth the effort in order to have the ability to work more with students in the class. The teacher felt they had additional class time to teach more content, especially since they did not spend class time reviewing homework.

The teacher tried to use the instructional video lessons as much as possible because of how useful and beneficial they were for both the teacher and the students. The teacher liked that the students had the capability to rewatch the videos if they did

not fully understand the content the first time watching the video. With the Edpuzzle application, the teacher was able to access the statistics of which students rewatched a videos and the specific portion of the video they replayed. The teacher found that some students would watch portions of the video at least five times before feeling comfortable to continue watching the video. The results from the student surveys showed that: 5.4% of students reported they always rewatched the flipped lesson, 39.3% of the students reported they sometimes rewatched portions of the flipped lesson, 23.2% of the students rarely rewatched the lessons, and 32.1% of the students never rewatch the videos. The teacher also preferred to flip the classroom because they found that students were less likely to zone out during a video instruction compared to in traditional lecture. The students are required to answer questions throughout the video, and the students could not continue with the video without answering the questions. Therefore, the students feel pressure to pay attention in order to answer the questions accurately.

The teacher specifically liked this ability to embed questions throughout the videos to determine if the students understood the content material presented in the video. The teacher was able to obtain the student data from the embedded questions to identify if any of the students struggled with certain concepts in the video. The teacher said that their favorite part of the flipped classroom was this ability to have every student answer every question during the instructional portion of the class. In a traditional classroom, the teacher is able to ask questions to check for understanding during the instruction; however, usually only one student gets the opportunity to answer. This leaves the teacher unsure if every other student in the classroom also

understood the content to be able to answer the question. With the instructional video lesson, the teacher is able to check the understanding of every student for every question to see the progress their students are making. This helps the teacher when making educational decisions in the classroom because they know more about what skills each of their students need development of.

The students in the study were asked to describe what they believed a perfect flipped classroom would look like. There were several common themes among the responses from the students. They described the perfect classroom as having fun, energetic, and interactive videos that were between 10 to 20 minutes long. When asked their opinions of a flipped classroom, one student said, "I like that it gives me a visual understanding". Another student described the perfect flipped classroom by saying, "[There would be] questions in it to keep me doing something throughout the video". The students liked having questions in the videos with thorough explanations. Another student said, "It tells the lesson in a way that kids will understand it". This is important because not only should the teacher thoroughly explain the concepts in the video, but they should be explained in a manner that the students will best understand it. A different student described the perfect flipped classroom with "the teacher carefully explaining each problem, but possibly having shorter videos for the more advanced kids with longer, more detailed [videos] for the others". Overall, the students agreed that the perfect classroom would be fun and short, with questions and explanations of the content in the instructional videos.

The students were also asked to describe their favorite parts of the flipped classroom they currently participate in. One student enjoyed the ability that they "could

rewind to help [them] get better understanding”. The students liked how well the teacher was able to explain the material and prepare them for the in class lessons. One of the students described that they preferred that “you can go at your own pace. If you have to go back and look at something you can,” and another student said they preferred “that [they] can do it independently”. The students also liked that they could watch the videos whenever and wherever they chose. A student said, “I like how you can do work that you would normally do at school, at home”. This shows that some of the students understood and preferred the idea of the flipped classroom. With the questions embedded into the video, a student liked that “it lets you answer all the questions rather than other people answering and, [then] you can’t learn from your mistakes”. As described earlier, this was also an aspect of the flipped classroom that the teacher valued. In general, the students liked the explanations provided, the ability to rewatch the videos anywhere and anytime, and the independent aspect of this method. The students reported they did not like the length of the videos, saying that they were too long or boring. Another common theme among the student insights is that they did not appreciate that they could not ask the teacher questions while watching the video. As previously described, these are two common challenges the flipped classroom poses, yet they are challenges that can easily be addressed by the teacher.

Discussion

Conclusion

Both the students and the teacher had positive perceptions of the flipped classroom. The teacher specifically enjoyed using this teaching approach and was continuing to find ways to make it more effective in the classroom for the students. The

students also seemed to like how the class was structured and saw the benefit of the activities done inside and outside of the classroom. The positive perceptions could be a result of the teacher informing the students about why they are learning in this manner and accepting the students' feedback when they saw ways to improve the model. This teacher found a unique way to adapt the flipped classroom idea that most maximized the student learning in their classroom. The results from this study are still important to reflect upon when considering different pedagogies and activities to be used in the classroom.

Therefore, specifically looking at the secondary mathematics classroom, the flipped classroom can be beneficial to the students. As Wilkins and Ma state, "In the present quantitatively complex society, a person needs a functional knowledge of mathematical content to make informed decisions as a citizen and worker" (as cited in Bhagat et al., 2016, p. 134). Teachers tend to teach mathematics as a robotic subject. Therefore, students have a hard time understanding mathematics when they reach the high school level (Bhagat et al., 2016, p. 134). The flipped classroom approach in the mathematics classroom gives the students more opportunities to apply their knowledge to problem-solving (Lo & Hew, 2017, p. 10). In conclusion, both the research previously conducted and the research completed for this thesis project show how positively perceived the flipped classroom pedagogy is with students and teachers. The benefits for both the teachers and the students highlight why this model is valuable to use in secondary mathematics classrooms.

Limitations

Although the study conducted at this middle school in southwestern

Pennsylvania provided positive results, they cannot be compared to other research that has been conducted on flipped classrooms. The teacher in this study did not use the same model of the flipped classroom in consideration to the activities conducted inside and outside of the classroom. Therefore, when considering both the student and teacher perceptions reported, they do not accurately represent perceptions of the flipped classroom since the students watched the instructional videos during class time rather than outside class time. This was one limitation of the research conducted.

In the early stages of this research, finding a secondary mathematics classroom in southwestern Pennsylvania that used a flipped classroom was challenging. This research was limited by the area and school districts available to conduct the study. This pedagogy seemed to be uncommon in this specific area. There may have been teachers in surrounding school districts that have attempted to implement the flipped classroom. The teacher from this study discussed how local school districts may find it challenging to facilitate a successful flipped classroom given the experience of the teachers and the resources provided.

Another limitation to this research was the time available to conduct the research in the school district. The schedule of the teacher was challenging to work around to find available class time for the surveying of the students. As a result of the limited time frame, a majority of the students were not able to obtain parental consent to participate in the study, which therefore, limited the number of possible students participating in the study.

Future Research

In the future, there are several possibilities for this research to be expanded

upon. Using the same survey and interview questions, further research could be conducted in other schools in the southwestern Pennsylvania area, where the flipped classroom is used to the full extent. This could allow the research to be compared to other studies on student and teacher perceptions to determine if the results are similar. Additionally, this research could be broadened to see how perceptions of the flipped classroom compare to schools across Pennsylvania, the United States, or even around the world. It would be interesting to see how the statistics compare around the world with the variations of educational systems.

There are numerous factors that can be studied further in relation to the flipped classroom to determine the impact flipped classrooms have on student and teacher perceptions. One factor to take into consideration is the percentage of lessons a teacher flips. The students may have positive perceptions of the flipped classroom overall, but what number of instructional videos is too much for the students to be expected to watch throughout the duration of a unit? Another factor would be the length of videos. It would be beneficial for teachers to know how long their instructional videos should be, making sure they are short enough to keep the students engaged, but also long enough to include detailed explanations of the content. It would also be possible that the length of the videos would vary depending on the grade level of the students. Therefore, conducting research of the flipped classroom in different grade levels could show a shift in student perceptions as well.

Future research can also look at the socioeconomic status of students to determine if students that have a lower socioeconomic status perceive the flipped classroom as positively as the students in a higher socioeconomic status. An additional

factor would be to compare the perceptions of students that are low, average, and high achieving. These factors would help teachers make the decision to integrate flipped instructional videos into their classroom if the research shows that their specific type students would positively perceive it. This allows the teachers to tailor their instructional techniques to their students if the teachers know their students would be likely to perceive the flipped classroom positively.

The success and perceptions of the flipped classroom could be affected by several other factors as well. Parent participation might play a role in how their student perceives the flipped classroom. Depending on how supportive the parents are of the new approach and how well the teacher communicates with the parents could determine if the students would perceive the flipped classroom positively. The participation and support of the school district would have the possibility of playing a role in the perceptions of the teacher. Depending on if the flipped classroom is widely accepted in the school district or the percentage of other teachers in that district flipping their instruction, teachers may have different perceptions of implementing this approach. All of these factors would be beneficial aspects for future research to be conducted on to help teachers become more knowledgeable of when flipped classrooms would produce the most positive perceptions.

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Appendix A: Permission Forms

Dear Teacher:

My name is Amanda Andrews, and I am a student at California University of Pennsylvania. I am completing a research project for my Honors thesis titled, "The Flipped Classroom: An Inverted Way to Teach". You have the option to be among 3 teachers able to help me with my project as a research participation.

Participating in this research will not require any extra work from you. You will not be asked to provide any personal information, and your name will not be included in the study. For my research project, I will be interviewing you to determine if the flipped classroom is helping your students to learn and is an effective teaching strategy to be using in the classroom. You currently use the flipped classroom in your instruction, in which you have your students watch the video lessons at home before attending class. I will be conducting 3 observations of the classroom environment, in addition to conducting the interview for my research. I will be observing the classroom management techniques utilized during instruction. I will also be observing the interaction between students and between you and the students, and how the students complete their work and engage in the classroom activities.

There are minimal risks anticipated for participating in this study. Your participation is completely voluntary. This means that you do not have to participate if you do not want to. Even if you agree to participate, you may change your mind later. You have permission to review the transcript of the interview and the final copy of the research paper and make changes if necessary. If you wish to participate, please sign on the line below.

Thank you for your time,

Amanda Andrews

Email: AND1648@calu.edu | Phone: 412-719-2725

My thesis advisor at California University of Pennsylvania is Dr. Marcia Hoover.

Email: hoover_m@calu.edu | Phone: 724-938-4528

I, _____, would like to participate in this study described above.

(Teacher Signature)

(Date)

Approved by the California University of Pennsylvania Institutional Review Board. This approval is effective 10/02/2018 and expires 10/01/2019.

Dear Student:

My name is Amanda Andrews, and I am a student at California University of Pennsylvania. I am completing a research project for my Honors thesis titled, "The Flipped Classroom: An Inverted Way to Teach". You have the option to be among 100 students able to help me with my project as a research participation.

Participating in this research will not require any extra work from you. You will not be asked to provide any personal information, and your name will not be included in the study. For my research project, I will be determining if the flipped classroom is an effective tool. Your teacher already uses the flipped classroom in their instruction to have you watch the video lessons at home before attending class. I will be conducting 3 observations of the classroom environment, in addition to administering an online survey using Survey Monkey for my research. I will provide you with the URL for the online survey through the educational platform the teacher uses in the classroom or in the manner the teacher suggests would be most familiar for you. For the classroom observations, I will be observing the interaction between students and between you and the teacher. I will also be observing how you complete their work and engage in the classroom activities.

There are minimal risks anticipated for participating in this study. Your participation is completely voluntary. This means that you do not have to participate if you do not want to. Even if you agree to participate, you may change your mind later. By participating in this study, it will not affect your grade for this class in any way. You will not receive any rewards or compensation for your participation. If you wish to participate, please sign on the line below.

Thank you for your time,

Amanda Andrews

I, _____, would like to participate in this study described above.

(Student Signature)

(Date)

Approved by the California University of Pennsylvania Institutional Review Board. This approval is effective 10/02/2018 and expires 10/01/2019.

Dear Parent/Guardian:

My name is Amanda Andrews, and I am a student at California University of Pennsylvania pursuing a degree in Secondary Mathematics Education. I am involved in the University Honors Program.

As a part of my requirement to graduate with the University Honors Program, I am writing an Honors thesis on flipped classrooms titled, "The Flipped Classroom: An Inverted Way to Teach". I will be asking 100 students to complete a survey online through Survey Monkey to obtain their perspective on their experience with using flipped classrooms to determine if it is an effective teaching strategy for teachers to use. The teacher already uses the flipped classroom in their instruction, in which they have the students watch the video lessons at home before attending class. I will provide the students with the URL for the online survey through the educational platform the teacher uses in the classroom or in the manner the teacher suggests would be most familiar for the students in the classroom. I will be conducting 3 observations of the classroom environment, in addition to administering a survey for my research. I will be observing the interaction between students and between the teacher and the students. I will also be observing how the students complete their work and engage in the classroom activities.

There are minimal risks anticipated for the students participating in this study. Your child will not be identified in any way in any of the reports. Participation is completely voluntary, and your child may discontinue to participate in the study at any time. The information collected will be confidential, and it will not affect the students' grade for the class in any way. You will not receive any rewards or compensation for your participation.

There will be no change to the classroom curriculum. The students will not be penalized for not participating in the survey.

Please feel free to contact me with any questions you might have about my study. Your willingness to permit your son/daughter to participate in this study would be greatly appreciated.

Thank you for your time,

Amanda Andrews

Email: AND1648@calu.edu | Phone: 412-719-2725

My thesis advisor at California University of Pennsylvania is Dr. Marcia Hoover.

Email: hoover_m@calu.edu | Phone: 724-938-4528

I, _____, permit my son/daughter
 _____ to participate in the research study
 described above.

 (Parent Signature)

 (Date)

Approved by the California University of Pennsylvania Institutional Review Board. This approval is effective 10/02/2018 and expires 10/01/2019.

Appendix B: Interview Protocol

Introductory Script for Teacher Interview

The following will be read to the participants prior to the beginning of the interview.

Good morning (afternoon, evening). Thank you for agreeing to participate in this study.

This study is an attempt to gain insight into your perceptions of the flipped classroom and how it has affected the instructional and learning practices in the classroom. The information gathered through this study will be used to fulfill the requirements for my University Honors Program thesis project titled, "The Flipped Classroom: An Inverted Way to Teach".

I want to point out several things before we start, and please feel free to interrupt me at any time if you have any questions.

1. Your participation is entirely voluntary.
2. You may refuse to respond to any of the questions.
3. Your responses or lack thereof, will be kept confidential.
4. Your answers to the questions will not be labeled with your name.
5. Participation in this study will not affect your status with the Elizabeth Forward School District.
6. I would like to audio tape this interview, but if you prefer not, you may exercise the right to refuse to be audio taped.
7. The tapes and transcripts of the interviews will not be labeled with your name.
8. You have permission to review the transcript of the interview and the final copy of the research paper and make changes if necessary.
9. The interview will take approximately 45 minutes to complete.

Participants are encouraged to answer all questions truthfully, and to elaborate or provide any additional information or feedback if possible. Please feel free to ask me questions at any point. Thank you again for your participation.

Introductory Script for Student Surveys

The following will be read to the participants prior to the beginning of the survey.

Good morning (afternoon, evening). Thank you for agreeing to participate in this study.

This study is an attempt to gain insight into your perceptions of the flipped classroom and how it has affected the instructional and learning practices in the classroom. The information gathered through this study will be used to fulfill the requirements for my University Honors Program thesis project titled, "The Flipped Classroom: An Inverted Way to Teach".

I want to point out several things before we start, and please feel free to interrupt me at any time if you have any questions.

1. Your participation is entirely voluntary.
2. You may refuse to respond to any of the questions.
3. Your responses or lack thereof, will be kept confidential.
4. The teacher will receive the final results of the study.
5. Your answers to the questions will not be labeled with your name.
6. Participation in this study will not affect your status with the Elizabeth Forward School District or your grade in the class.
7. By submitting the survey, you are giving consent for me to use the data, unless you specify otherwise.
8. The survey will take approximately 20 minutes to complete.

Participants are encouraged to answer all questions truthfully, and to elaborate or provide any additional information or feedback if possible. Please feel free to ask me questions at any point. Thank you again for your participation.

Teacher Interview Questions

1. How many years have you been teaching?
2. How long have you been teaching at Elizabeth Forward School District?
3. When did you first learn about the flipped classroom technique?
4. When did you first start using the flipped classroom?
5. Does your school require you to use the flipped classroom?
6. What access do your students have at home to WiFi, a computer, or cellular device?
7. How often do you flip your lessons?
8. What tools do you use to create the lessons?
9. What is included in your flipped lessons?
10. What is the average time length of your flipped lessons?
11. How much time do you spend preparing each lesson?
12. Do you feel there is a difference in the amount of time spent preparing a flipped lesson compared to a traditional lecture? If so, how?
13. Do you feel you are able to cover more or less of the class content with the flipped classroom?
14. What difficulties have you experienced while creating flipped lessons?
15. What technology limitations do you face in your school district that restricts your capability with the flipped classroom?
16. Is ongoing technical support available to you?
17. Why do you choose to flip your lessons?
18. What is your favorite part of the flipped classroom?

19. What is your least favorite part of the flipped classroom?
20. Do you prefer flipping your classroom or traditionally lecturing? Why?
21. How do you feel your students perceive the flipped classroom? Why?
22. How has using a flipped classroom impacted student performance?
23. Do you feel your students understand the videos? How do you know?
24. Do all your students watch the videos? How do you know?
25. Do you have any additional comments or opinions of the flipped classroom or your experience with it that you would like to share?

Student Survey

**This Survey will be uploaded into a Google Survey for the students to complete. The instructions from the introductory script will also be provided at the beginning of the survey.*

Directions: Please check or complete the following questions that most appropriately answers the question.

1. What is your gender?

Female Male Prefer not to say

2. What grade are you in?

6th Grade 7th Grade 8th Grade

3. Do you have WiFi at home?

Yes No Unsure

4. Do you have access to a computer or laptop at home?

Yes No Unsure

5. Do you have a cellular device that can access the internet?

Yes No Unsure

6. How much time do you spend out of class working on the flipped lesson and other assignments for this class per night?

0-10 minutes 11-20 minutes 21-30 minutes 31-40
More than 41 minutes

7. Do you feel you spend more time doing work outside of class with the flipped lessons?

Yes No Unsure

8. Have you ever run into technical difficulties watching the flipped lesson?

Always Sometimes Rarely Never

9. Do you prefer the flipped lessons over the traditional classroom lectures?

Yes No Indifferent

10. How would you rank your mathematical ability?

Very strong Strong Average Weak

Very Weak

11. How do you feel you are doing academically in the class?

Very good Good Okay Not Good

Very Bad

12. Do you feel like your grade has increased as a result of the flipped classroom?

Yes No Unsure

13. Do you feel you are learning all the necessary materials for the class with the flipped classroom?

Yes No Indifferent

14. How often do you watch the flipped lessons?

Always Sometimes Rarely Never

15. Do you re-watch the flipped lessons?

Always Sometimes Rarely Never

16. Select all of the classes you feel you would learn best with the flipped classroom.

Math Science Reading History

None

17. Describe the perfect flipped lesson.
18. What is your favorite part of the flipped classroom?
19. What is your least favorite part of the flipped classroom?

Additional Feedback

20. Do you have any additional comments or opinions of the flipped classroom or your experience with it that you would like to share?