IMPLEMENTATION OF THE FLIPPED CLASSROOM: HOW IS THE IN-CLASS TIME
USED?

Laura Christine Brogdon

B.S. University of Kansas, 2008
M.A. University of Kansas, 2010

Submitted to the graduate degree program in the Department of Educational Leadership and
Policy Studies and the Graduate Faculty of the University of Kansas in partial fulfillment of the
requirements for the degree of Doctorate in Educational Administration (Ed.D).

Chairperson   Dr. Jennifer Ng

_____

Committee Members   Dr. Argun Saatcioglu

_____

Dr. Deborah Perbeck

_____

Dr. Lisa Wolf-Wendel

_____

Dr. Susan Gay

_____

May 3, 2018
Defense Date

The dissertation committee for Laura Christine Brogdon certifies that this is the approved version of the following dissertation:

Implementation of the Flipped Classroom: How is the in-class time used?

_____

Chairperson: Dr. Jennifer Ng

Date Approved: June 8, 2018

ABSTRACT

The purpose of this study was to examine the design and structure of the flipped classroom instructional model in three mathematics classrooms in the Shawnee Mission School District. Given the premise of this blended learning approach, there is a gap in the literature surrounding what actually takes place during the in-class time. While the existing literature explained what should or could happen when implementing the model, there was no research to describe if the suggestions were actually happening in classrooms. Furthermore, there was no concrete evidence as to whether the benefits and challenges held true in practice, or if these benefits and challenges were just experienced by the creators of the flipped classroom model in their own personal classrooms. This study investigated the in-class time through interviews, artifact analysis, and classroom observations with mathematics teachers who were fully implementing the approach.

Participants were found through a survey of all high school mathematics teachers in the Shawnee Mission School District. Of those who qualified for the study, three teachers were chosen based on the course they were flipping, entry point of implementation of the flipped classroom model (spring 2018), and their willingness to participate. During a 10-week period, I conducted 27 observations, 60 interviews, and analyzed a variety of artifacts presented. The data collected was organized into categories and headings based on the "outside of class videos" and "in-class activities" for each teacher, and then combined across the three teacher participants. The data showed strong connections to the premise as defined through the literature related to the flipped classroom and blended learning models of instruction.

The results of this study show need for improvements in the observed classrooms in the areas of differentiation and application to real-world situations. While each classroom appeared to be more student centered and the structure gave opportunities for student engagement, activities involving differentiation and application components were absent. Implications have been suggested for teachers who currently implement the flipped classroom model, along with those who are interested in adopting and implementing in the future. Because teachers are no longer the center of the learning, they need to increase their abilities of assessing individual student needs and differentiating to meet these needs, including opportunities for application of the content, and being aware of how students are participating in the designed lesson plans.

ACKNOWLEDGEMENTS

TABLE OF CONTENTS

List of Tables

CHAPTER 1

THE RESEARCH PROBLEM

Introduction

Technology continues to revolutionize our world. Everywhere we look we see electronic devices, and most everyone admits to feeling lost without a smartphone, tablet, or laptop. Along with the social aspects, schools must also embrace technology for educational purposes. Tucker, C. (2012) noted the need for technology in the classroom saying, "As the job market changes and the demand for technologically savvy workers grows, providing students with the ability to understand and use key technology tools in school is becoming critical" (p. 1). Computer-generated worksheets and assessments; PowerPoint and SmartBoard lectures for content delivery; e-mail correspondence between teachers, parents, and students—these are the new standards. In specific content classrooms, such as mathematics and science, new software is constantly being developed with more challenging problem sets, accurate and presentable diagrams, and even interactive software to foster the innovative ideas. The integration of technology is an important process for students. "Instead of the information-scarce world we grew up in, our students are growing up in an information-saturated and globally interconnected world" (Bergmann & Sams, 2014, p. 161).

Given the change in learning environments, technology integration can be complex and dynamic (Yildirim & DemIR, 2013). Electronic devices should be considered profitable instruments and should be integrated whenever possible. In our technologically rich world, students already demonstrate the penchant to develop skills that all adults need to succeed. To

support these 21st-century learners, we need to provide them a classroom that engages with the content but also feeds their need for technology (Yildirim & DemIR, 2013).

One recently developed method involving technology is the flipped classroom, where the instruction and practice components switch places, allowing for a more student-centered approach to learning. "The flipped classroom [is] in a nutshell: direct instruction delivered to the individual outside of class, and more strategic use of in-class time for group work and individualized attention" (Bergmann & Sams, 2014, p. xi). Formerly, classrooms were viewed as primarily teacher centered, with students sitting in seats, passively taking notes on the day's material, hoping to gain some knowledge of what the teacher is saying, but often just wishing the instructor would slow down so that they could finish a sentence in their notes. King (1993) described this teacher-centered instructional strategy as the "sage on the stage," where the teacher's goal is to cover a specific set of material in the allotted time so that students can practice it at home and demonstrate understanding in an upcoming assessment. The world of technology has introduced a new model of instruction, the flipped classroom. Bill Tucker, managing director of the online resource Education Sector, focuses on technology and innovation in schools. In his article "The Flipped Classroom," Tucker noted that the goal is to make the lesson more student centered, allowing the teacher to act as more of a coach or advisor to the students as they strive to accomplish the curriculum objectives (Tucker, B., 2012). The main idea corresponds to the constructivist theory of learning, where class time is used for more active learning and engaging activities, while lecturing moves to short videos that the students watch at home before coming to class. The lesson content becomes homework, and the application occurs during classwork—there is the flip.

Another perspective in teaching today is the concept of *blended learning*. Tucker, C. (2012) explained that the term blended learning, while considered a new approach, in reality has been implemented in numerous educational settings throughout the years. "This broad, amorphous term refers to the spectrum of teaching modes that combine traditional face-to-face instruction with an online component" (Tucker, C., 2012, p. 11). The referenced online component refers to various student-driven projects or assignments that do not usually happen during the traditional class time due to time constraints or issues with student focus. Instead, "involvement in a project can take place asynchronously online, allowing students to participate in a time and space that is convenient and comfortable for them" (Tucker, C., 2012, p. 13).

To be sure, teachers who choose to flip must expect major changes. They must relinquish the front-of-the-class command in favor of a more collaborative and cooperative contribution to teaching and learning (Finkel, 2012). King (1993) calls this the "guide on the side" strategy. The teacher must shift from simply presenting the material to incorporating technology, which has been shown to enhance student achievement and attitude (Yildirim & DemIR, 2013). When executed successfully, the flipped technique allows for more useful time in class for furthering student skills. Bergmann and Sams (2014) discussed the importance of the in-class time and asked teachers to consider "what is the best use of the face-to-face time with students" (p. 3). The authors add, "Talking at students each day is not the best use of class time" (Bergmann & Sams, 2014, p. 3). Instead, they suggest giving students more individualized instruction, in contrast to "a more traditional model of instruction, [where] students receive instruction according to the pre-established pace of the class" (Bergmann & Sams, 2015, p. 51). But, "in a flipped classroom, students get assistance with content right when they need it" (Bergmann & Sams, 2015, p. 51).

This is a study of three mathematics teachers in the Shawnee Mission School District who began flipping their College Algebra/Trigonometry classes in the spring of 2018. This research examines the design and structure of the flipped model in these three classrooms and how it relates and connects to the existing literature on flipped classrooms and the practice of blended learning. Completed research studies have reviewed the model from the student perspective in areas such as achievement, perceptions, critical thinking skills, and attitudes (Bell, 2015). Other studies have looked at the method from the teacher's perspective in areas such as student engagement, teaching effectiveness, and teacher experiences. In a qualitative case study as part of her doctoral dissertation, Fatimah Alebrahim (2016) reported on five implementation evaluation elements from online and in-class observations, student focus group and faculty interviews, and the examination of artifacts. Elements examined are part of the evaluation process developed by Patton (2008) and include effort, monitoring, process, component, and treatment specification. Alebrahim (2016) evaluated the effectiveness of a flipped classroom on student engagement and concluded that the flipped classroom enhances student engagement. Alebrahim (2016) observed that "instructors had an awareness of each student's performance and feelings toward the class and their student's engagement and outcomes, not just from their grades but because of the nature of the flipped classroom model—their relationship and role in the class made it easier for them to understand" (p. 120). Alebrahim (2016) contended that a change in the teaching approach can affect the entire learning for the students and impact the future of teaching. In addition, Bergmann and Sams (2015) concluded there is not just one way to flip a classroom, nor should there be just one way. "The flipped class needs to be customized and contextualized for each teacher's class, for their school population, and for each teacher's personal style" (Bergmann & Sams, 2015, p. 87). Furthermore, in looking to answer the

question about the best use of the in-class time, Bergmann and Sams (2014) claimed, "There are many different answers, because each student is different and comes to you with a different set of gifts, abilities, passions, and interests" (p. 4).

Research is lacking in what the model affords during the in-class time. Given the premise of what the flipped classroom is supposed to be, this study explored how the in-class time changed after implementing this model of instruction.

Research Setting

The Shawnee Mission School District (USD 512), unified in 1969, is in suburban northeast Johnson County, Kansas, about ten miles from downtown Kansas City, Missouri, and it is the third largest school district in the state. Shawnee Mission's nearly 4,200 employees serve approximately 27,695 students attending 33 elementary schools (grades kindergarten-six), five middle schools (grades seven-eight), five high schools (grades nine-twelve), an early childhood center, a Head Start program, and seven signature programs offered at all three levels of academics throughout the district.

In the fall of 2014, the Shawnee Mission School District implemented a one-to-one digital learning initiative to put an iPad or MacBook in the hands of every student for educational purposes. Additionally, each teacher and administrator were given a MacBook and iPad for curriculum and instructional planning and delivery of content.

Rationale and Personal Connection

The rationale for this study included a personal connection to the flipped classroom model. Having adopted the model in my own mathematics classroom, I had seen firsthand some of the benefits to the flipped classroom and its effects on student engagement and achievement. In researching this topic, I noticed a gap concerning the in-class time. While we know what the originators have said *should* happen during the in-class time, I have conducted a study to observe what was actually taking place. Although studies had been conducted to determine academic differences between flipped and nonflipped classrooms, I wanted to examine their implications. By interviewing teachers to discover their motivations for implementing the flipped model and questioning and observing how they utilized the instructional in-class time, I hoped to gain insights into why this instructional practice has become so popular and is found to be successful for many students.

Research Question

Implementation of the Flipped Classroom: How is the in-class time used? This question gave specific attention to the in-class time because the current writing and literature examines mostly the potential, while this study focused on what is actually happening during the in-class time.

Summary

Technology continues to change our world today. As these changes entered the world of academia, teachers and students alike needed to be prepared to properly utilize technology and incorporate its offerings into the classroom. While research does exist reviewing the flipped classroom model from both the student and teacher perspectives, a gap exists regarding the use of time in the classroom. Due to the nature of the instructional model, the in-class time becomes vitally important to the success of the students. But is it truly happening as the creators of the instructional model described? The connection between myself and the Shawnee Mission School District will authenticate a successful and focused study. Because I was also well versed with the details of the SMSD Digital Learning Initiative, interviews and observations were able to focus on the implementation of the model and how the in-class time was being used, rather than on the details of the tools and resources made available. Finally, my background with implementation of the model in a mathematics classroom allowed for intentional questions and purposeful observations.

CHAPTER 2

REVIEW OF LITERATURE

Introduction

The review of literature section introduces the research that currently exists on the flipped classroom instructional model and clarifies the purpose of this qualitative research study. Most of the sources in this review of literature are not research studies, but instead they define the premise of the flipped approach, including the potentials offered by the approach according to the creators. An in-depth look comparing the classrooms that are not flipped to the flipped classroom identifies significant characteristics of this innovative approach. Finally, benefits and limitations of the flipped classroom model are reviewed as they exist in the current literature. Benefits include expanding a teacher's instructional toolbox, incorporating students' desire for technology, and improving mastery of curriculum concepts through self-paced instruction on videos and more individualized learning opportunities during in-class time. Limitations such as the creativity of design for teachers, access to Internet and devices for students, and the large responsibility being placed on students should be carefully considered prior to implementing the instructional model. This review of literature reveals the current gap and the need to evaluate how the use of in-class time aligns with the flipped classroom model.

Premise

Currently, limited research exists involving flipped classrooms. Finkel (2012) described a small pilot study between traditional and flipped classrooms, asserting that the methodology

did not affect the results on test scores either way, but it has enabled teachers to cover two more weeks of material. Finkel (2012) also described the engagement and motivation observed in students in the flipped classroom approach when compared to other instructional methods typically seen in classrooms. It is important to note that in all contexts the content must remain the same and must align with state standards; however, the significance lies in the changes in delivery between the two models (Acelajado, 2011). C. Tucker (2012) has written about blended learning and touched briefly on the flipped classroom but did not go into many specifics regarding the in-class time.

Within the existing research, multiple gaps exist relating to all aspects of the flipped approach. While some researchers are working to fill gaps about student academic growth and mindsets (Finkel, 2012), this research study will focus on changing the model of instruction.

Classroom instruction

Prior to the inception of the flipped classroom model, teachers employed a variety of instructional practices to teach content standards. While the most common strategy seen in the classroom may have been direct instruction or lecture-based teaching, more recently, instructors have been incorporating other strategies, such as discovery-based or project-based learning (Leat, 2017).

In classrooms where flipped has not been implemented, the teacher tends to convey the content in class, and the student completes practice of that concept outside of class. In essence, the teacher does the active work as the students follow along by listening (Fulton, 2012). Delivery varies, depending on the presentation options available. A teacher may prefer

to sit or stand in front of the students to present the material. To display information, a teacher may use a screen with a projection device and any one of numerous computer software options or videos. Similarly, a teacher may write on the board to model lesson content or prepare an activity, such as a graphic organizer, to keep students engaged throughout the lesson delivery. In addition, a lesson may include small amounts of group work, partner challenges, or individual practice.

Whatever the exact design of the class time, the students are mostly responsible for listening, participating, and answering questions over the material being presented. At the end of class, typically the teacher assigns some type of homework for individual practice over the day's objectives. Due to the absence of teacher help, often an assignment results in a battle of memory and application. Johnson (2012) argued that this method of homework is difficult, and while a struggle itself is not a negative, too much frustration is unfair for students who do not have the opportunity to ask for help. Consequently, the parent becomes the homework helper, which for many parents is a struggle. An online survey of parents in August of 2013 revealed "nearly 50 percent of parents making an almost taboo admission: they struggle to help their children with their homework" (p. 01). The survey further revealed that "many parents – 46.5 percent – simply don't understand the subject matter" (p. 01). "Should Parents Help" (2014) addressed the parental help topic by questioning its effect on learning and acknowledging the stress that students feel, as well as the increasing pressure to do well. The article referred to a multitude of extracurricular activities, such as music lessons, sports practices and religious classes, that could result in homework turning into a team effort between kids and parents.

Despite these ideas of team effort, teachers caution that too much parent help defeats the purpose of homework. One teacher interviewed about homework in the article stated, "I give

homework for students to practice what they have learned" (Should parents help, 2014, p. 20). If students struggle with the homework assignments, the teacher needs to know so that further instruction can take place to ensure that students get the extra help they need.

The Flipped Classroom

Bergmann and Sams (2012a), two science teachers from Colorado, officially defined the flipped classroom in 2007. Stated simply, this method calls for the typical lecture and homework elements of a course to be reversed. B. Tucker (2012) explained the flipped approach: the teacher records lectures on some type of video for students to watch prior to class, allowing in-class time for students to work through problems, improve knowledge of concepts, and engage in collaborative learning. Some have used the synonyms "integrated" or "blended" instead of flipped, but in actuality, all represent the same type of model with just a few variations. Bergmann and Sams (2012b) began their journey to the flipped classroom by asking one simple question: "What is the best use of face-to-face time with students?" (p. 25). Bergmann and Sams decided that lecturing for 30 to 50 minutes was not the best use of class time; instead, they preferred more time to observe practice and to interact with students during the time in class.

Bergmann and Sams (2015) discussed the importance of keeping students engaged and the importance of needing a balance between the activity time and the process time. While it is important to incorporate hands-on activities to apply the content, make connections to real-world situations, differentiate for varying student needs, and be engaged with the learning, students also need time to process and practice the material. A good mix of these two will allow students to best make the connections to the desired content through deeper, more engaging activities. "If

the only change you make is flipping the time of day you deliver direct instruction and have student's complete worksheets, you have not made pedagogical changes; you have merely made temporal changes" (Bergmann & Sams, 2015, p. 31). C. Tucker (2012) went on to suggest a specific design for a flipped lesson that begins with an inquiry-driven activity to get students interested in the concept and wanting to know more. The next step is to transfer knowledge by pairing it with discussion or an activity outside of class to prepare for the next in-class session. Finally, in the classroom students engage in a student-centered extension activity to practice with the material and deepen their learning of the concept.

Another advantage lies in the variety of implementation choices. Johnson (2012) maintained that a teacher can mold key parts of the model to fit student and classroom needs. For example, at home, students watch a teacher-created video featuring central concepts of a lesson to be more fully explored the next day. This allows class time for teachers to deliver differentiated activities that could include opportunities for application, so students could better understand and practice the material from the lesson at varying levels and interests. Additional perspective and support may also occur when students work with peers in class and have the opportunity to ask questions of someone other than the teacher. The instructor is afforded the flexibility to work with individual students or groups of students who may need extra practice. In addition, the teacher can also formatively assess the student learning and adjust activities or groups as needed. By the end of the class period, students should be able to demonstrate how the classroom practice enhanced their basic understanding of the targeted concept. For the next day's lesson, the teacher then creates another video for students to watch at home. Moreover, a flipped classroom can empower the parent, who can also learn from the videos, discuss the homework, and thus enhance student comprehension (Fulton, 2012).

Bergmann and Sams (2012b) extend their definition of the flipped classroom approach by making a case for what they call, *The Flipped-Mastery Model*. While the concept of mastery teaching has been around since the 1920's, and gained popularity in the 1960's, Bergmann and Sams believe that combining the concepts of mastery and flipping will create a way for teachers to personalize and differentiate the classroom. "Flipped mastery allows the direct instruction to be asynchronous, so differentiation for each student becomes possible" (Bergmann & Sams, 2012b, p. 62). Bergmann and Sams (2012b) go on to say, "we recognize our students are not programmable machines, but come to us with different backgrounds and needs" (p. 62). To do this, they suggest teachers become aware of student backgrounds and needs, and guide students based on individual expectations, which can be accomplished by using the flipped-mastery model. In addition, Bergmann and Sams (2012b) said the flipped-mastery model provides opportunities for remediation, which exemplifies individualization and differentiation needed for students.

Turning attention to flipped *math* classrooms specifically, Jonathan Bergmann and Aaron Sams wrote a series of books specifically targeting core content areas, including "flipped learning for math instruction." In a chapter titled, "what should math teachers do with face-to-face class time," the authors specifically mention "individualized instruction" and "challenge problems" as areas of strength within a flipped math classroom. "Under a more traditional model of instruction, students receive instruction according to the pre-established pace of the class. In a flipped classroom, students get assistance with content right away when they need it" (Bergmann & Sams, 2015, p. 51). For students who quickly master the daily concepts, they can work on challenging math problems to extend their learning in pairs or small groups to hopefully "find satisfaction as they push beyond the curriculum and take learning deeper" (Bergmann &

Sams, 2015, p. 54). This allows the teacher to offer attention to the individual needs of other learners. In their notes about differentiation practices, Bergmann and Sams always checked for the same essential understanding that would ensure success for all students in future objectives, no matter what the differentiated activities included. In addition to this, they also used their opportunities in class to learn the backgrounds and needs of their students, set expectations based on these needs, and set their students up for daily success.

Benefits of the Flipped Classroom Approach

As technology continues to engulf society, schools must embrace this electronic phenomenon since it is how students learn today (Finkel, 2012). A teacher who succeeds in implementing a flipped classroom can expand his or her own instructional toolbox, incorporate the students' desire for technology, and improve mastery of curriculum concepts. Having the content available around the clock enables students to watch video lessons at their convenience and as many times as necessary (Fulton, 2012). Rather than hearing the material only once in class as they scramble to take notes, in the flipped model the student can pause, rewind, replay, or even fast-forward a video in order to personalize the learning experience. The video replay component places the responsibility for learning and questioning in the hands of the students (Johnson, 2012). One of the most powerful advantages is that students who need more time to process information can have the flexibility to move at their speed without feeling embarrassed or falling behind the rest of the class (Finkel, 2012). Furthermore, an absent student can also keep up with the new material from home by staying current with content explained on the videos. Focused videos from five to ten minutes provide manageable units that hold a student's

attention and facilitate review, all thanks to the power of technology. Bergmann and Sams (2012b) commented on their own experiences, "We try to keep our videos under 15 minutes and really shoot for under 10 minutes" (p. 44). C. Tucker (2012) suggests breaking lectures up into 5-10-minute intervals or embedding tasks every so often to change the pace and recharge the brain for learning. In any case, teachers should not assume students know how to correctly watch and learn from videos. Bergmann and Sams (2015) stressed the importance of teachers showing students *how* to watch videos before assigning them. They say, "We suggest you watch the first few videos in class with your students while modeling how you want them to interact" (p. 22). Bergmann and Sams (2015) further add, "Pause the video frequently and discuss how they should be listening, viewing, and thinking about the subject matter" (p. 22). Finally, they explain that "the point of the video is to introduce content so that students can master the content *in class* with the real expert present-- the teacher" (p.22).

Fulton (2012) claimed that a flipped classroom leads to less lecture time for the teacher and more actual time teaching and facilitating; thus, the teacher has more time to meet the needs of the students. While attention has been given to the video lesson portion of the flipped classroom model, Bergmann and Sams (2015) explained that "From the outside, it can appear that a flipped classroom is only about watching videos before class and then doing other things during class time," but in reality, teachers "realize that the real benefit of flipping the classroom is reinventing the class time" (p. 43). Students should no longer be passive note takers in a teacher-centered environment. Instead, the students should be engaged in the activities and motivated to work through the curriculum in a more problem-based learning approach. The teacher can develop more hands-on activities and projects, team challenges, and cross-curricular innovations (Fulton, 2012). Just as students could move at their own pace with the video lectures

at home, the teacher has more flexibility to differentiate in-class activities so that students can continue to learn the objectives on their ability level. Furthermore, with differentiated instruction during class time, students who would normally breeze through the material can be presented with more challenging problems to take their thinking to a higher level (Finkel, 2012).

Bergmann and Sams (2015) suggest that the ideal flipped classroom is one centered around choice. While some students learn best from a video, others may learn better through reading a passage or scripted notes, while others need hands-on activities to fully master the content. In an effort to meet the needs of all types of learners, Bergmann and Sams (2015) suggest implementing choice into the classroom through the use of a choice board. These boards offer different choices for students to select for their own learning, without allowing students to only choose easy activities. In the models suggested, "students must do one knowledge-level activity, followed by an application-level activity, followed by an analysis-level activity" (Bergmann & Sams, 2015, p. 47). While choice boards are quite a bit of work, they are a powerful tool that ultimately gives students choice, which will help them be more engaged in the learning process.

Finally, the relationships created within the flipped classroom model can be incredibly beneficial to the social and academic growth of students. B. Tucker (2012) credited the new arrangement with fostering better relationships within the classroom, enhancing student engagement, and increasing the levels of motivation for all students. "The relationship that a teacher develops with his or her students is what makes teaching good, regardless of whether or not a teacher flips a class" (Bergmann & Sams, 2014, p. 21). During the in-class work time, the teacher is available to walk around and gauge student understanding on the different concepts. Rather than lecturing to the students at the front of the room, the teacher moves about-

-observing, guiding, and helping with the material by making contact with the students. The teacher should not be the center of the stage but instead should be available to help, prod, inspire, encourage, and support students (Johnson, 2012). To stretch their thinking, higher level learners can receive more challenging questions, while struggling students can benefit from one-on-one work time with the teacher or a student peer. By working in smaller groups and not as a whole class, students feel more comfortable asking questions for clarification without feeling embarrassed. Engaging all class members in active participation enhances both the social and academic growth of students. This is not to say relationships are the only component within a learning environment. Bergmann and Sams (2014) believe that curiosity and content are two other important components of good education. The current education system of standardized tests and standardized curricula does not leave much room for connections and curiosity. Because of this, teachers need to go out of their way to give students choices for their learning and to positively impact their educational experiences whenever possible. "Teachers should teach within the context of content, curiosity, and relationship, which allows them to take their students deeper and further in their learning than they have ever been before" (Bergmann & Sams, 2014, p. 27).

In addition to the relationships that grow between teacher and students, many parents also favor flipped classrooms (B. Tucker, 2012). After working in a flipped classroom for a year, one teacher's voluntary parent survey revealed that 84% preferred this model of instructional delivery for their children (Fulton, 2012). Bergmann and Sams (2012b) commented on how they used back-to-school night in addition to writing a letter home to explain the new instructional strategy in their classes. "The flipped classroom is very different from what our parents have experienced, but the vast majority of them are appreciative" (Bergmann & Sams, 2012b, p.

102). In addition to many benefits, teachers should be ready for occasional misconceptions surrounding the model, such as the classes being only online, or that the model is a way for teachers to get away from actually teaching the students. In a personal story, Jonathan Bergmann explained a time when a parent had these very concerns and needed further explanation from the teacher (Bergmann & Sams, 2012b). Once he explained the model and his expectations for the course, both inside and outside the classroom, the parent emailed and "thanked him for actually *increasing* the interaction with her daughter" and noted-that "her daughter was able to access her teacher more easily than under a lecture model" (p. 102).

Limitations within the Flipped Classroom Approach

Despite the growing popularity of the flipped classroom as a choice for teachers today, the more traditional style of teaching still prevails. In addition to all the positive aspects associated with the flipped approach, definite challenges and obstacles also remain for teachers, students, and parents.

The first challenge is the creativity of design for the teachers. B. Tucker (2012) acknowledged that course redesign can be a hard job. While adhering to the curriculum, teachers must carefully prepare to ensure that videos are concise and understandable. Although some online resources already exist, such as Khan Academy, students have commented in the research that they favor videos of their own teachers instead of others (Tucker, B., 2012). To lessen the workload, Finkel (2012) suggested that teachers collaborate to create videos and resort to online resources as backup. In addition to the planning, creating, and posting of videos, teachers need time and resources to develop meaningful activities for the students to accomplish during class.

These activities should be differentiated to help students at various ability levels, which requires work on the teacher's part. The final part of the design challenge is to have the necessary support for the teacher (Bergmann & Sams, 2012a). Teachers who choose to flip their classrooms should consider partnering with other educators. Teachers interested in flipping should seek the support of a building colleague or connect online to other teachers across the nation. Bergmann and Sams (2012a) suggested national collaboration, such as a website they created, http://flglobal.org/communityhome/, where nine thousand people contribute to ongoing discussions about flipping classrooms.

Moreover, teachers who try the flipped approach need support from building administrators and district resources whenever possible; this may come in the way of technology resources or professional development opportunities for continued learning. Bergman and Sams (2012a) recommended that educators attend a one- or two-day flipped learning workshop, followed by a one-day training on screen casting, before beginning the process. Finally, good relationships with information technology (IT) personnel are paramount to a smooth beginning. When contemplating the flipped model, all these details must be taken into consideration.

Research indicates that better and faster learning occurs in a technology-aided environment; however, the issue of availability for all students still remains (Yildirim & DemIR, 2013). Once videos are created and available for viewing, student access becomes vital. Johnson (2012) posed two questions regarding these barriers: The first was "What do you do when a student doesn't have a computer or Internet at home?" (Johnson, 2012, p. 18). Do all students have the means to obtain a technology device such as smartphone, tablet, or computer of any kind? This question also considered the ability to connect and view videos on the

Internet. Johnson's second question was "What do you do when a student doesn't watch a video at home?" (p. 18). Possible reasons for failure to view the videos include participation in extracurricular activities, family restrictions on the Internet, and/or a computer that does not allow the student enough time for viewing. Researchers offered solutions to each one of these issues.

Fulton (2012) suggested that those without devices utilize external resources such as available devices in the classroom, the school library, or other school equipment to check out and take home. These devices can be used before school, after school, on a lunch break, or during a study hall, depending on the student's schedule. Finkel (2012) offered another option for students who lack the necessary technology. The instructor can put the videos on CDs or DVDs so that more devices such as DVD players and MP3 players could be used. For Internet issues, many restaurants, coffee shops, and even retail businesses provide WIFI access for patrons with devices. Finally, all local libraries offer computers with Internet access to all visitors. Nevertheless, it is important to remember that just because the world is becoming more technologically astute, concerns remain regarding cost and availability of the necessary equipment for a flipped classroom.

One final concern of the flipped classroom is the amount of responsibility placed on students. At home, students must watch the videos--taking notes or using other tools to gain a general understanding of the content--and then come to class ready to ask questions and actively participate in the day's assignments. Acelajado (2011) posed concerns about lower-level students' ability to responsibly watch videos and effectively process the important concepts of the material. Furthermore, struggling students tend to benefit more from an in-person approach where the instructor can keep them on track with the material. This is a very real concern that

needs much attention from the teacher and support from other staff members, administration, and the parents of struggling students. Some teachers could see the responsibility issue as more of an opportunity to re-engage students and improve their motivation skills within the classroom (Tucker, B., 2012). Teachers using the flipped model need to remember that the setup is not cookie-cutter and should be altered and tweaked to fit the needs of their students. Some suggest that students watch the videos on their devices at the beginning of class before moving into the day's activities. Other teachers provide access for the students to use when they get to the classroom if they were not able to--or chose not to--watch the videos at home. C. Tucker (2012) suggested two options for answering the question about what to do when students don't do their homework. Her first suggestion was to have students read and annotate an article on the information they missed in the video, and then work in the back of the room to complete a reflection about what they learned from the article while their peers engaged in a creative hands-on activity. Another strategy to use when students do not watch the video, according to Tucker, C., (2012), is to strategically place the students in groups to listen and take notes in order to learn from their peers. Although the students do not get to actively participate, which can be frustrating, this gives them a good incentive to complete the homework in the future. On a more positive note, once students become familiar with the expectations of the flipped model, they prefer the group participation over the isolation that results from a failure to watch a video.

Summary of Literature

Given the importance of technology, the flipped classroom model facilitates the opportunities for a variety of instructional strategies during the in-class time. By executing the

flipped classroom approach, teachers have the freedom to dedicate more in-class time for activities other than direct instruction. Within this chapter, the premise of the flipped classroom was deliberated through comparing the nonflipped and flipped classroom models. Diving more into the flipped classroom model, the current body of research identified the benefits and the limitations of the instructional model.

CHAPTER 3

METHODOLOGY

Introduction: Aim of the Study

The purpose of this study was to provide an in-depth account of what three teachers in the Shawnee Mission School District are doing during the in-class time of their flipped classrooms. This was completed by gathering information through pre- and post-observation interviews, analysis of artifacts, and observations of in-class time in flipped classrooms. Through the introduction and literature review, information has been presented about the importance of the flipped classroom instructional approach, in addition to its benefits and limitations within the classroom. Current literature speaks highly of the flipped classroom compared to a nonflipped structured classroom, but this study evaluated further the official practices of the model. The research question being addressed looked specifically at the time in the classroom and exploring what teachers who are flipping do with in-class time.

The information gathered from this study can be shared with teachers who currently implement a flipped classroom, teachers who do not currently implement the flipped classroom, and administrators at both building and district levels. The consequences of this material could promote more training and professional development with the flipped classroom model.

Participants

I conducted a survey of the 65 high school mathematics teachers in the Shawnee Mission School District. Questions asked participants their experiences with the flipped classroom,

whether they were currently flipping (fall 2017), whether they were planning to flip the semester of data collection (spring 2018), what courses they would be flipping, and if they were willing to participate in my research study. Of the 65 surveyed, 35 responded, and 20 of those 35 claimed to have had experience with the flipped classroom. Of the 20 with experience, five were currently flipping in the fall 2017 semester, and eight of the 20 planned to implement a flipped classroom in the spring 2018 semester. All eight of the qualified teachers who intended to flip in the spring semester agreed to participate in the research study. Table 1 provides a summary of the data collected from the survey. Commonalities existed in the following courses: geometry (three teachers), Algebra 2 (three teachers), and College Algebra & Trigonometry (three teachers).

Table 1: Data collected from participant survey

Are you flipping in fall 2017?	What course(s) are flipped fall 2017?	Are you flipping in spring 2018?	What course(s) are flipped spring 2018?	Teacher Name
Yes	Algebra 2 (reg/honors)	Yes	Algebra 2 (reg/honors)	Teacher 1
Yes	Geometry (reg/honors)	Yes	Geometry (reg/honors)	Teacher 2
Yes	Algebra 3	Yes	Algebra 3	Teacher 3
Yes	Algebra 2 (reg/honors)	Yes	Algebra 2 (reg/honors)	Teacher 4
Yes	Geometry (reg/honors), Algebra 2 (reg/honors)	Yes	Geometry (reg/honors), Algebra 2 (reg/honors)	Teacher 5
No	None	Yes	College Algebra/ Trigonometry	Teacher 6
No	None	Yes	Geometry (reg/honors), College Algebra/ Trigonometry	Teacher 7
No	None	Yes	College Algebra/ Trigonometry	Teacher 8

In an effort to provide a rich analysis of classroom data through observations and interviews, three teachers were selected-- all with a common course of College Algebra/Trigonometry. These teachers were selected based on their common curriculum and their recent practices with the flipped classroom instructional model. While all three had experience in the past school years with the flipped classroom model, they chose to wait to implement until the second semester of the current school year. All three teachers were employed by the Shawnee Mission School District and followed the same curriculum maps designed by the Curriculum and Instruction Department for the district. According to the 2017-2018 Shawnee Mission School District High School Program of Studies, "students apply and extend their understanding of trigonometric, logarithmic and exponential functions" (p. 42) in the College Algebra/Trigonometry course. In addition to covering a variety of topics above the Algebra 2 level, students have the option to take the course for College Now Credit through Johnson County Community College (JCCC). To be considered for college credit, students must apply to attend JCCC, take a placement test to assess current level of skills, enroll in the course at JCCC, and pay tuition.

Because the teachers were promised confidentiality, pseudonyms have been chosen to protect their identities. From this point forward, they will be referred to as Ms. Kristen Anderson, Ms. Sarah Bendel, and Ms. Lisa Campbell. Below is a brief introduction to each teacher participant. A more detailed description of the teachers and their classrooms is presented in the research findings section.

Ms. Kristen Anderson's story. Kristen has taught for 31 years. With the exception of her first year, where she taught 7th-grade geography, she has taught a variety of math courses, ranging from remedial to upper level. Two years ago, Ms. Anderson experimented with the

flipped classroom model in her College Algebra/Trigonometry class. She did not use it during

the fall semester of the current school year, but did implement during the spring semester of the

2017-2018 school year, and overall enjoyed the benefits she saw with individualized learning for

students.

Ms. Sarah Bendel's story. Sarah Bendel has taught five years. With her experiences

mostly in upper level math courses, including the university level, she also has certification in

Spanish and is currently teaching Spanish I, Geometry, and College Algebra/Trigonometry. Ms.

Bendel has used the flipped classroom sporadically over the last three years in both math and

Spanish classes, and she was excited to implement it in her College Algebra/Trigonometry class

for the second semester of the 2017-2018 school year.

Ms. Lisa Campbell's story. Lisa Campbell has been teaching mathematics for 24

years. She taught her first ten years in a middle school, and the last 14 years in high school. In

addition to math, Ms. Campbell has taught engineering classes for the last six years. While she

had her engineering students watch videos for additional content understanding, her experiences

implementing the flipped classroom model are with her College Algebra/Trigonometry

classes. She was excited to transform her classes from first semester and hoped to increase

student engagement by switching to the flipped classroom in the spring of 2018.

Research Setting

Data for this research was collected in the Shawnee Mission School District (USD 512)

between January and March of 2018. Arrangements were made with various departments within

the district to provide appropriate access to classrooms of teacher participants during the 10-

week data collection period. As previously mentioned, the Shawnee Mission School District implemented a one-to-one digital learning initiative in the fall of 2014. The goal was to increase the use of technology for instructors through instructional planning and content delivery with the use of an iPad or MacBook. More importantly, each student was given either an iPad or MacBook to enhance their educational experiences and academic understandings. All students in the high school classes observed had been given their own MacBook devices, and instructions and expectations varied by building and teacher. These instructions and expectations will be explained further in the discussion section.

Procedures

The research process for this study began with completion of the necessary steps for the University of Kansas Institutional Review Board (IRB). This process included filling out various forms requesting approval to conduct Human Subjects Research. One of these forms was the Human Research Protocol, which requested information regarding subject information, recruitment details, compensation, project information, risk and benefits, data collection and security measures, and informed consent. In addition to filling in the necessary information to explain the study in detail, a copy of the consent letter (Appendix A), and potential questions for all interviews were attached. Once approval was received, I moved on with the study and data collection.

Data was collected over a 10-week time span, January through March in 2018, by means of interviews with teachers along with classroom observations. In addition to these, artifacts were evaluated throughout the course of the study.

Prior to any observations of class time, I conducted an initial interview with each teacher participant. I met with each teacher to gain knowledge and understanding of the instructor's educational background and teaching style with flipped and nonflipped instruction, goals for implementation of a flipped classroom, and strategies and techniques within the instructor's flipped classroom.

In addition to eight regular classroom observations of the in-class time, I conducted observations of the first day in each classroom. This was an observation of the very first class period of the semester. Since the flipped classroom method had not been implemented into the participants' classrooms prior to the observed semester, the teachers gave an introduction or explanation of the model on the first day of the semester.

Classroom observations consisted of multiple components, the first being the analysis of artifacts. Prior to any classroom observations, I was provided with artifacts related to the upcoming observed in-class time. Artifacts included copies of video lessons, notes, worksheets, activities, answer keys, written lesson plans, and/or seating charts. The purpose of these was to provide more details related to the implemented model in relation to the in-class time. I watched the videos and made notes based on the information cited in the literature, such as length, technology used to record and share, organization of assigning and communicating with students, academic content, and references to the flipped classroom model. In addition to making notes while watching Ms. Campbell's videos, I also participated in the individual questions that were asked.

After analyzing artifacts, I conducted an interview before observing each classroom session. The pre interview consisted of questions related to the goals for the class time and teachers were asked to define their expectations for the beginning, middle, and end of the

period. The teachers were also asked to state the specific topic or "I-can" statement for the

lesson.

Observations were scheduled and conducted throughout the first half of the semester, and

I was physically present to collect data via note-taking of the visual and auditory

processes. With access to the background of the content and familiarity with the instructional

model, I made notes of classroom activities, engagement levels for both students and teachers,

differentiation of the lesson, application and relevance within the content, formative assessment

tools, and individualized learning techniques. Furthermore, I noted the classroom design and

student placement, introduction or "bell work" activities, references the teacher made to videos

or the flipped classroom model, the volume of conversation in the room throughout the

observation, and the conclusion of class time. Priorities to note included how the organization

and culture of the classroom affected the instructor's lesson delivery, as well as how the level of

student engagement reflected the students' reception of the content. After each classroom

observation, I conducted an interview to debrief the teacher on the various aspects of the in-class

time. The teacher was expected to reflect on the specific class period and provide thoughts about

the flipped classroom model overall, focusing on its effects on in-class time. Questions included

"What do you think went well?" and "If you could go back in time, what would you change

about the lesson?" The final area for response asked teachers for "other comments."

After the completion of ten weeks of in-class observations, final interviews were

conducted with each instructor.   The purpose of the final interview was to gain knowledge and

understanding of the implementation of the flipped classroom during the semester. Participants

reflected on the questions and answers from the initial interview and spoke to the successes and

struggles they experienced when implementing the flipped classroom instructional model.

Data Collection Tools

Interview questions. Initial and exit interview data was collected at off-campus locations in the Johnson County area. I recorded each initial and exit interview, later transcribing them for evaluation purposes. The data was then analyzed for commonalities and differences among the teacher participants.

The pre- and post-observation interviews were conducted both on paper and through informal conversations with the classroom teachers. These paper interviews were filled out before and after each observation and shared with me through electronic mail. These documents were collected and organized with the classroom observation data before being evaluated for data findings. The pre-observation interview questions, (see Appendix C) consisted of a general plan for the in-class lesson. Teachers were asked to outline the general expectations for the beginning, middle, and end of the class period. The post observation interview (see Appendix D) included two reflective questions asking teachers to examine the benefits and challenges from the lesson. A section for additional comments was also included as part of both pre- and post-observation interviews. In addition to the paper interviews, I conducted informal verbal interviews with teachers before and after the class observations. While the data spoken about in these interviews very closely resembled what was written on the paper interviews, I was able to gather more reactions and impressions from the face-to-face conversations and added comments to the paper interviews for later inclusion.

Artifact analysis. Video artifacts were viewed by gaining access to each teacher's shared platform for the class. Ms. Anderson and Ms. Bendel shared the access codes to their Google Classroom accounts, so I could locate messages posted to students, copies of worksheets and notes, and links to the videos to watch before each lesson. Ms. Campbell did not use the Google

Classroom, but instead set up accounts for her students using the website Edpuzzle. Prior to conducting any observations, Ms. Campbell gave me the same access as students, so the videos could be watched, and I could engage with the enhanced questioning features. Prior to attending the in-class observation, I viewed the assigned video, took notes, and answered questions for Ms. Campbell through the Edpuzzle software when needed.

Observation tool. Observation data was collected using an observation instrument (Appendix E), which I developed, and field tested with mathematics teachers from Shawnee Mission School District. Two teachers from the initial interview with flipped classroom experiences who were not chosen for the study offered to help with my instrument design. These teachers welcomed me into their classrooms in December to observe and practice with the observation instrument. The instrument was created using the data collected in the literature review regarding the premise of the flipped classroom and potential benefits for both teachers and students when implementing this model of instruction. On the first page, an area was created for notes about the videos watched prior to coming to class. In addition, space was allowed on the first page for a sketch of the classroom design, and a small area for me to track movement of students and teacher. On the second page, five teacher "look-fors" and four student "look-fors" were enumerated at the top, with the rest of the space open for notes. Pages three and four continued the blank space for note taking throughout the observation. The space for notes was split into two columns: the far left was shrunk to fit only the time, numberings, or specialty symbols to highlight important references to return to; and the right column--the rest of the width of the pages--was designated for observations, both visual and auditory. At the end of each observation, I revisited the list of teacher and student "look-fors" and circled the corresponding numbers of any that were observed during the class session.

Data Analysis

Because the goal of this study was to gather information to share with an increasing number of professionals in education, the analysis of the data was essential. After collecting data from various interviews and classroom observations, I sorted the information by teacher: Ms. Anderson, Ms. Bendel, and Ms. Campbell. Then, I analyzed the data to gain an understanding of what the flipped classroom model looked like in each of the three different classrooms.

I began the analysis by separating data into major areas: initial interviews, first-day observations, outside of class (videos), and in-class observations. The in-class observations were enhanced by the pre- and post-observation interviews, and the exit interview data served as teacher reflections, complementing the other collected data within the analysis. Within each of the major areas, I outlined headings that related to the premise of the flipped classroom model, items that aligned to the benefits or limitations stated in the literature review, or items that seemed intriguing to myself as the researcher. Looking at each teacher separately, I began to summarize the interviews and observations into the headings described. After completing full individual teacher profiles for each of the major areas and headings discussed, I melded the profiles within the same titles. In addition to rich description within the headings, similarities and differences among the three teacher participants were highlighted and analyzed throughout the findings chapter.

Finally, after the data had been analyzed, I developed major conclusions and contributions of the research that relate back to the literature on flipped classrooms, and more importantly, the in-class time of a flipped classroom. In conclusion, I declared possible future implications for groups such as teachers who flip, teachers who do not flip, and administrators at the building and district level. Further research opportunities exist and should be considered.

Role of the researcher

With an initial sample set of 65 high school mathematics teachers in the Shawnee Mission School District, the decision to study three classrooms may not have seemed like a good representation of the sample set. Of the 35 responses to the informal survey, eight teachers qualified and were interested in participating in the study. From these eight, only three were chosen, due to their connection through the College Algebra/Trigonometry content. It was the decision of the committee, along with my opinion, that due to the limited number of qualified mathematics teachers who use the flipped classroom method, these three study participants represented a useful sample of high school mathematics teachers who were implementing the flipped classroom in the district.

Employed by the Shawnee Mission School District, I previously taught high school mathematics for eight years, implementing a flipped classroom model for the last four. While some may consider this a bias for the design of this study, I viewed the background knowledge as a benefit to the understanding of the topic. Due to the connection to the district, I was able to comprehend the details of the digital learning initiative, the support offered for implementation of instructional practices such as the flipped classroom, and the curriculum mappings that have been developed to align to the Kansas state standards. With knowledge and experience in the Shawnee Mission School District mathematics program, I understood the specific standards that align with the content as well as the depth of knowledge that students were expected to master within each standard. Additionally, I was well versed in the eight mathematical practices designed by the state of Kansas to empower teachers to teach not only the content standards, but also a set of life skills that expand the proficiencies of students in postsecondary experiences. Finally, my involvement with the flipped classroom model provided an additional

lens for interviews and observations. Having encountered benefits and challenges of the

instructional model firsthand, I was able to provide concrete observation data that might have

been missed by someone lacking knowledge of the model. Consequently, this personal practice

enriched the data analysis with valuable details.

In the fall of 2017, I embarked on a new assignment as an instructional coach for the

Shawnee Mission School District. While this was not an evaluative position, the purpose of the

position was to work closely with teachers to improve instruction. In following best practices for

the duties of the coaching role, a teacher must agree to work with an instructional coach; it

cannot be a forced process. Additionally, more often than not, a teacher initiates the coach's

assistance, which gives the coach the opportunity to make suggestions for improvement with

curriculum, instruction, or both. Again, some may perceive bias because I worked with

colleagues in the district for this study; on the contrary, I saw this position as a benefit. Serving

as an instructional coach allowed for flexibility in scheduling, giving myself more opportunities

to observe teachers who were implementing the flipped classroom model. That being said,

during the data collection period, I did not in any way alter or interfere with the structure or

design of the participants' classrooms. Participants were told this during the initial interview,

and this practice was maintained throughout the interviews and observations.

Validity

"Although methods and procedures do not guarantee validity, they are nonetheless

essential to the process of ruling out validity threats and increasing the credibility of [the]

conclusions" (Maxwell, 2013, p. 125). With this in mind, I referred to the checklist provided by

Maxwell (2013) to test the validity of the research and address any potential threats that may exist.

The first item on the checklist related to the intensive, long-term involvement of the research. This research study occurred over a 10-week span and included analyzing 19 videos, completing 27 observations and approximately 60 interviews. The data collection required intense commitment and comprehensive involvement which helped minimize validity threats.

Another suggestion to increase the validity of the study conclusions was the importance of collecting rich data. The accumulated data was detailed and bountiful, meeting the requirements for sufficient observation. This was accomplished by transcribing interviews, along with taking detailed and descriptive notes of "specific, concrete events that [I] observed" (Maxwell, 2013, p. 126). To ensure a valid research study, I created an observational instrument centered on various aspects of the flipped classroom model, including a section for notes from the video lesson, a section for classroom design, and ample designated space for recording the sights and sounds of the classroom.

Intervention was the third strategy implemented to address threats to the validity of the study. Maxwell acknowledged that the "the researcher's presence is *always* an intervention in some ways" in field research (Maxwell, 2013, p. 127). While I made it clear to participants that help could not be given during the data collection time, teachers occasionally requested assistance during pre- and post-observation interviews, but quickly remembered I could not answer, and retracted their questions.

The next suggestion for testing the validity of conclusions was to "identify and analyze discrepant and negative cases" (Maxwell, 2013, p. 127). To accomplish this, I examined all data collected--the supporting and discrepant--to determine what data best answered the research

question. The supporting evidence was included in the conclusions, while the discrepant data was left out. For example, one of the observations noted that in one instance Ms. Campbell did not assign a video for homework because the previous class period had been a unit test, and the students would be starting a new unit during that class period. Without a video, the teacher preferred to teach the lesson in class and therefore chose to use direct instruction. After the lecture, the students were left with very little work time on the practice worksheet. Because this observation was inconsistent with the rest of the observations, I did not include the details of the findings. In addition to this, I also enlisted the assistance of the dissertation advisor for feedback on the conclusions in order to identify biases and limitations, and to check for flaws in logic or methods.

The fifth strategy employed to examine validity threats was "Triangulation--collecting information from a diverse range of individuals and settings, using a variety of methods" (Maxwell, 2013, p. 128). To accomplish this strategy, I collected data and analyzed artifacts from three individuals at different times in different buildings in the Shawnee Mission School District. The analyzed artifacts included teacher recorded video lessons and worksheets of practice problems given during class. In addition to the classroom observations, the pre- and post-observation interviews illuminated the variations among the participants' approach to the implementation of the flipped classroom.

The final approach for ensuring the validity of the study was the perspective of comparison. This was important due to the nature of this project as a qualitative, multicase, and multisite study. Comparisons of the three participants related directly to the research question. In an effort to develop concrete evidence to support answers to the research question, certain parts of the study were constant across all three cases. Examples of these constants included the

following: selecting participants who taught the same course, College Algebra/Trigonometry; selecting participants who had comparable prior experiences with the flipped classroom instructional model; selecting participants who would be implementing at the same stage, in this case for the first time at the beginning of second semester; and finally, conducting the same amount of interviews, observations, and artifact analyses across all three participants. After data was collected, findings were presented comparing and contrasting the three teacher cases.

CHAPTER 4

RESEARCH FINDINGS

Introduction

The research question guiding this study was to explore what teachers who are flipping do with in-class time. To answer this research question, teacher interviews, classroom observations, and artifact analyses were completed over the course of ten weeks. Participants consisted of three teachers--Ms. Anderson, Ms. Bendel, and Ms. Campbell--in their three different classrooms, all in the Shawnee Mission School District. While collecting data, similarities and differences surrounding the implementation of the flipped classroom began to emerge among the three teachers. Data were sorted into five main categories, with each being described in detail. Within each category, headings have been defined to further highlight similarities and differences among the teachers as they connect back to the literature.

Initial Interview

Prior to the start of the second semester, initial interviews were conducted with each instructor. The purpose of the initial interview was to gain knowledge and understanding of the instructor's background and teaching style with flipped and nonflipped instruction, goals for implementation of a flipped classroom, and strategies and techniques within the instructor's flipped classroom. A protocol was used for each initial interview (Appendix B).

Background and thoughts about flipped instruction. Ranging from five to 31 years, teacher participants have a wide range of experiences with teaching mathematics. While Ms.

Anderson and Ms. Campbell are veterans of teaching multiple math courses, Ms. Bendel has taught at the university level and had the most experience with implementing the flipped classroom instructional model. Ms. Bendel has implemented the model sporadically over the past three years in her math and Spanish courses, but this year is the first time in the College Algebra/Trigonometry course. Ms. Bendel learned about the flipped classroom strategy during her undergraduate years at the University of Kansas. Ms. Anderson, on the other hand, experimented with the flipped classroom model in her College Algebra/Trigonometry class two years ago after she read an article in her graduate classes written by Jonathan Bergmann and Aaron Sams. The article was an introduction to flipped learning and she thought the model looked interesting enough to give it a try in her classroom. Ms. Campbell learned about the model at an engineering conference and quickly implemented it in her College Algebra/Trigonometry course last year. Teacher participants know to find supports from fellow colleagues who flip across the district or through the building instructional coach. None of the three teachers used the flipped classroom model during the fall semester of the 2017-2018 school year, but all three chose to implement it during the spring semester.

When asked to further explain what initiated the transition from a nonflipped to a flipped style of instruction, each said she wanted to better meet the needs of the students. Ms. Anderson commented, "I really like to see the kids do math in class." She added that completing the self-guided parts on their own would allow more class time for practice, collaboration, and her individual assistance. Ms. Bendel recalled learning through traditional lecture in her own studies and concluded that there are more effective ways to get information across to students today. In reflecting on her own practices, Ms. Bendel remarked, "What I had been doing previously was not effective, and I wanted to give something new a try." She went on to explain that her

previous teaching style had not been effective because she had spent all the time talking and not giving the students a chance to discuss the material in any way. Ms. Bendel also noted her desire to better formatively assess students during the in-class time and adjust when necessary to meet student needs. Ms. Campbell said she has recognized the value in students having the class time to work individually as well as to collaborate on problems and listen to each other. She now has come to value hearing her students process the material and talk through steps so that she can see how they learn. Furthermore, she likes being able to add to their learning by correcting when necessary. More importantly, the flipped setting could allow time for the teacher to praise individuals and groups and thus create positive relationships, which the pace of the traditional setting rarely allows due to the difference in teacher-student interactions. In her nonflipped environment, Ms. Campbell felt tethered to the front of the room, teaching to the whole class at once and unable to make much individual contact. Now in her flipped classroom, being able to move around allows her to boost relationships through personal connections with students.

Goals. Teachers set goals for the ten-week observation period surrounding the out of class videos and the in-class time. All the goals for the out-of-class videos seemed contingent upon the amount of time: Ms. Anderson set a goal of no more than 30 minutes of outside class work, and Ms. Bendel wanted her videos under ten minutes. Ms. Campbell had a slightly different approach to her video goal, indicating she would like videos to be shorter, which would require her to talk faster. She explained that students can always rewind to listen again, but because they cannot fast forward, she would need to pick up the pace. Ms. Campbell also commented that she thinks her voice is low and mundane and she would like to perk it up a bit in the future. Each teacher admitted that videos from previous flipped class experiences ranged from 15-20 minutes. The goals for timing show a common trend between the three

teachers. Upon further questioning through pre- and post-observation interviews, teachers conceded that their students, while juniors and seniors in an upper level math course, did not complete much work outside of class time. Because the observation period for this study occurred halfway through the year-long course, the teachers had each taught a semester in a nonflipped model of instruction and had witnessed the lack of homework completion. Teacher participants hoped that students would consider watching videos and taking notes a more manageable homework task than completing problems. Nevertheless, each teacher still set a goal for short videos, attributing this need to the difficulties students have maintaining long-term focus.

For the in-class time, each teacher set goals for the practice of the content. Ms. Anderson wanted to see students following mathematical procedures and striving to grasp how concepts link together. Ms. Campbell spoke to wanting to incorporate more activities to get students out of their seats. She hoped to increase engagement by having students work on whiteboards around the room solving real world problems by applying mathematical content and problem-solving strategies. Ms. Bendel, on the other hand, mentioned that she would like for students to first review the video in class and then expand upon the material through application of the content. All three teachers expressed goals for students to work together with partners or in small groups to help extend their learning. By working with peers, the teachers were hopeful that students would hear a variety of perspectives that could deepen their knowledge of the content. With this, a student's learning can also be extended when they explain the concept or topic to another student. Ms. Anderson described her opinion of the best working group model between students: teach once, learn twice.

Outside of class (videos). In describing how they record and share their videos, the teachers noted a variety of similarities. As employees of the Shawnee Mission School District, each was provided the same technology devices: a MacBook computer, an iPad, and access to the same software applications, such as Google Apps for Education.

For recording videos, both Ms. Bendel and Ms. Campbell chose the Explain Everything application on their iPads.   This allowed them to upload PDF files and call attention to text and examples with colored pens and highlighters. Each file was accompanied by the teacher's own verbal explanation of the material on the screen. Ms. Anderson placed her MacBook computer on a stool as she stood in front of the whiteboard, using colored whiteboard markers to complete and explain problems step by step. This method of recording enabled Ms. Anderson to point to various items and/or use hand gestures to clarify visuals while also verbally explaining the content.

For sharing videos, two teachers delivered content via the Google Classroom. Ms. Anderson uploaded a link to the video through Google Drive, while Ms. Bendel uploaded video to YouTube and then shared the link with students on Google Classroom. Ms. Campbell, however, uploaded videos to the Edpuzzle website and showed students how to log in and watch there. She selected Edpuzzle for these advantages: the login system tracks the time and number of times a video was watched, and it does not let users fast forward through the video. Moreover, Edpuzzle allowed Ms. Campbell to embed questions or comments into the video whenever she deemed them necessary.

Inside class. When asked what a typical class period looked like in the teacher's flipped model of instruction, each spoke about the beginning, middle, and end of the class period. Ms. Anderson described these procedures: students entered, picked up the assignment, sat down, and

started to work. Each class began with a BOB (beginning of block) set of problems related to the previous night's video and/or material from the past. Both Ms. Bendel and Ms. Campbell began their classes with a review of the assigned video by asking the students questions. Ms. Campbell jotted a few notes on the board as she received feedback. Ms. Bendel listened to student questions and comments, occasionally modeling a few problems, or having students move to the whiteboards if she sensed they needed to see more before practicing themselves.

Moving into the practice time, Ms. Anderson urged students to work on the assignment posted on Google Classroom. Commenting on her assignments with unique types of problems, she remarked, "Generally, the new material is anywhere from three to five problems, with 20-25 problems from past review items." Ms. Anderson considered this strategy as a way to provide constant review of past concepts so that students would not be tempted to give up if they grew frustrated by the first few problems. In Ms. Bendel's classroom, the students moved to some type of project after a quick review discussion of the video. "It's usually a worksheet," she said, "but also sometimes more abstract like a discovery lesson, interactive activity, or some type of riddle they can complete to practice the material from the video." After the quick review, Ms. Campbell directed practice time in groups of three to four students. With desks arranged in groups or with partners, the classroom arrangement facilitated a ready to-work atmosphere. At times she distributed problems on a worksheet where students were required to show their work. At other times she projected problems from her iPad, and they copied the problem, showing their work in their notebook. Likewise believing that group work was more effective, Ms. Bendel encouraged students to work with a nearby partner or two.

Each teacher's class concluded a little differently. Ms. Anderson set a timer to sound with three minutes remaining in the period. This alerted students to finish the current problem,

pack up their belongings, and leave when the bell rang. Ms. Anderson also had the opportunity

in that last three minutes to give announcements or reminders about out of class

assignments. Ms. Bendel described the conclusion in her classroom this way: "We come back

together for a review, and perhaps if the students are ready, we will take the material one step

further with a challenge problem or application of the material." If the teacher felt students were

still confused, instead of doing an extension problem, she demonstrated another basic problem to

review the content. At the end of class, Ms. Campbell referred to the remaining practice

problems: "If the students do not finish the problems before the end of the period, they need to

finish them at home as extra homework on top of the new video." She did not always have a set

number of problems in mind at the start of the class period; instead, she monitored progress and

adjusted assignments in accordance.

Each teacher also addressed the expectations for their roles during the class period. To

facilitate learning, all three teachers aspired to walk around--answering questions, asking more

probing questions, and assessing student knowledge. Ms. Campbell further stated, "to listen to

how they explain it to each other, provide additional feedback as necessary, and answer

questions as they arise." Additionally, Ms. Anderson noted that walking around gave her an

opportunity to build relationships with the students because one-to-one conversations occur more

often than when she was standing in front of the classroom.

Parent feedback. When asked about parent feedback from their previous experiences,

Ms. Anderson and Ms. Campbell concurred that they had not heard much from parents. Both

teachers alluded to the fact that the College Algebra/Trigonometry course is mostly a junior or

senior level course, and therefore parents are not as involved for older students, who should be

more responsible for their own grades.

In speaking about the parental role and feedback received, Ms. Bendel said she had definitely received more inquiries revealing curiosity, not criticism, regarding the new style. Ms. Bendel encouraged parents "to ask their students if they have watched their math video yet, and to remind students that the video and taking notes is the homework." Ms. Anderson admitted that the parents do not need to be as involved with actually doing the math since all that is now done in class; however, parents can support students by reminding them of the obligation to watch videos and take notes.

First Day Observation

The "first day observation" occurred during the first class period of the second semester. Since the flipped classroom method had not been implemented into the participants' classrooms prior to the observed semester, each teacher introduced the model. Due to scheduling conflicts and absences for Ms. Campbell because of a shoulder injury, I was not able to observe Ms. Campbell's classroom until the third class period of the semester. Prior to the class period observed, Ms. Campbell had told students they would start watching videos for homework and therefore have more time in class to complete the practice problems. The assignment would be a video to be watched before the next class period. In addition to this, during the first semester Ms. Campbell had created the Edpuzzle website and shared optional videos with students at irregular intervals. Although this was not an implementation of the flipped model, it was beneficial because students already had Edpuzzle accounts set up and some beginner steps explained.

Ms. Anderson gave a detailed explanation of the flipped classroom model on the first day. She began with an overview of the model, including the video portion where she highlighted the supports of pausing, rewinding, and rewatching. In addition to this explanation of the outside of class videos, she also called attention to the benefits of the in-class time, highlighting the individualized work time and teacher assistance that would be available.

Ms. Bendel verbally introduced the flipped classroom model to the students on the first day of the second semester. She began with a description of the class, both at home with the outside of class work and in class with assignments and practice. A few students asked questions for clarification, and Ms. Bendel answered so that all students could hear, and everyone could reach the same level of understanding regarding the model.

Explanation of videos. Unlike Ms. Bendel and Ms. Campbell, Ms. Anderson explained the flipped classroom by modeling the outside of class time for her students just as the literature suggested. Asking students to take out their devices and put themselves in an environment free of technology distractions, such as other browser windows and noise, she had students get out paper and pencil to take notes as they watched the video on the large screen, just like they would need to do at home. While showing the video, Ms. Anderson modeled the features by occasionally pausing and giving suggestions for working ahead, asking questions, and rewinding to watch again.

While not the same type of modeling as Ms. Anderson, Ms. Bendel began her explanation of the flipped classroom with how to watch a video outside of class. This was suggested by the literature, along with addressing technology issues early to prevent problems. Before beginning the explanation of logistics, Ms. Bendel asked students if anyone had issues with Internet connection at home. One student raised his hand but told her there would be no

issues with watching the videos. Like Ms. Anderson, she commented on the importance of the surrounding environment when viewing videos and taking notes. She cautioned students, "Try to find a place away from other noises, including your siblings, pets, or other distractions you may have at home." Ms. Bendel highlighted the available features for accessing the lesson on a video, including pausing, rewinding, and repeating as many times as desired. Ms. Bendel also addressed the protocol for asking questions from the video by suggesting students email her or come in early before school with questions.

Ms. Campbell presented an informal introduction at the beginning of the semester. In just a few minutes, she explained the importance of watching the videos and taking notes to ensure they would be prepared for practice in class the next day. Having assigned a video as homework, she then used the next class period to demonstrate this importance by making connections between the in-class time and the previous night's video. After using bell work and practice problems throughout the class period to stress the importance of watching the videos, she assigned another as homework and told the students, "Remember we talked about the importance of watching the videos and taking the notes, so please meet the expectation."

Explanation of the in-class time. Each teacher took a slightly different approach to explaining the in-class time of a flipped classroom. Ms. Anderson continued to model by having students pack up all their belongings and leave the classroom as if the class period had ended. Once all students had physically left the classroom and were standing in the hallway, she invited them all back in to pretend it was the start of the next class period after they had watched an assigned video at home. The students practiced turning in their entrance ticket video notes into the box at the side of the room. She then took time to explain the individuality of the flipped classroom process and how the teacher would be more available in class for what the students

47

needed, telling students, "There will be an assignment posted in the Google Classroom for you to work on during the in-class time while I walk around and have individual conversations Instead of teaching the same thing to the whole class, I will be available to help at your individual levels and with your individual needs."

Ms. Bendel defined her flipped classroom procedures with a verbal explanation of in-class time. She told the students they would work in groups on an assignment and they needed to ask each other or the teacher for assistance. At that time, Ms. Bendel moved away from the conversation about the flipped classroom and on to the day's lesson. With a lesson to be taught and no video prepared, Ms. Bendel reverted to the traditional model for the lesson, and gave homework to watch the first video of the unit.

Ms. Campbell used the bell-work problems as a way to reinforce the importance of watching the assigned videos as homework. She said, "As you are working through the practice, you will want to look at the notes you took while watching the video." She continued, "And if you didn't watch the video, you are going be lost with the material and not have notes to look at as guidance, so you need to watch the videos." She repeated this refrain throughout the allotted time to practice problems, and with ten minutes left in the period, she told students they had a new video for viewing and notetaking that night.

While each teacher took a different approach to the introduction and explanation of the flipped classroom, each was able to articulate many of the benefits found in the current literature on the topic. Students seemed to have understood the gist of the model prior to leaving class with the assignment to watch a video. The main goal for each introduction to the model was to communicate to students that the structure of the class would be changing but, if used correctly, they would see major benefits from the change. All three participants established expectations

for the outside of class videos and the in-class time, including how to troubleshoot technology issues and how to ask the teacher questions that arose while watching the video. These expectations were readdressed on the Google Classroom announcements and verbally repeated throughout the rest of the observed class periods.

Out-of-Class (videos)

Prior to observing in-class sessions, I analyzed the "out-of-class video lessons" that had been assigned prior to the in-class observation. For each video, I watched and made notes on these characteristics: length of video, technology used for recording and sharing, organization for assigning and communicating with students, and structure of the videos in relation to definitions, notes, and example problems.

Length of videos. According to the literature, the creators of the flipped classroom, Jonathan Bergmann and Aaron Sams, recommended that videos be kept under 15 minutes and ideally under ten minutes. According to Table 2, Ms. Anderson recorded eight videos for the eight observations, extending the time over 15 minutes on two occasions. Ms. Bendel recorded four videos for eight observations, exceeding 15 minutes one time. Finally, Ms. Campbell recorded seven videos for eight classroom observations, surpassing 15 minutes two times. The class periods with no video lessons assigned for homework consisted of review and extension of previous concepts or the summative assessment for the unit.

Recall that each teacher set a goal for shorter videos due to homework completion rate from first semester experiences and ongoing difficulties with long-term focusing. This was challenging for teachers, especially when students had trouble remembering past concepts

needed to understand the new content. For example, when teaching three-variable systems, students need to remember how to solve a two-variable system from Algebra 2, along with the concept of substitution from Algebra 1. Knowing that the literature suggests keeping videos under 15 minutes, teachers were able to meet the suggestions of the literature most of the time, and therefore show progress with their goals.

Table 2: Length of videos

	1	2	3	4	5	6	7	8	Average
Anderson	9:56	13:59	8:42	12:20	7:04	15:34	15:58	4:22	10:56
Bendel		13:46	None	9:12	19:54	None	9:51	None	None	13:14
Campbell	None	8:25	11:58	11:58	13:34	5:15	15:48	15:48	11:47

Technology and organization (recording and sharing). In regards to recording videos, all three teachers used district-provided devices and applications included with the technology. Ms. Anderson recorded her videos using her MacBook and the QuickTime software. Placing her device on a table, she set it to record the whiteboard in her classroom as she stood in front of it. Thus, students could see the visual models or her hand gestures. In a few of the videos, the teacher had already written notes, graphs, or example problems on the board. Ms. Bendel and Ms. Campbell recorded by using the Explain Everything application on the iPad. The teachers uploaded PDF files into the software and used a stylus to write over the text with a variety of colors and highlighters. All the teachers verbally explained the steps throughout each video as they addressed vocabulary, theorems, and example problems.

Ms. Campbell went one step further and uploaded each recorded lesson to the Edpuzzle website. In this website, the teacher embedded various pauses during the video. These mandatory stops could be messages to the students, short answer questions where students filled

answers in text boxes, or multiple-choice questions that were graded immediately. Ms. Campbell's videos had anywhere from three to six pauses.

Once videos were recorded, teachers focused attention on sharing and communicating expectations to students for watching. Ms. Anderson and Ms. Bendel used the Google Classroom to share videos with students. Using a code specific to their class, Ms. Campbell had each student create an account on the Edpuzzle website.

In addition to the video link, Ms. Anderson posted steps for completing entrance tickets and notes to be copied into the students' composition notebooks. Also, in videos five, seven, and eight, Ms. Anderson added to the post on Google Classroom, "Please write down questions or concerns you have from the video." Each post in the Google Classroom was created as an "assignment" in the software and required students to click "open" and "turn in" to submit electronically when finished. Ms. Bendel also used the Google Classroom, but first she uploaded videos to her YouTube channel and posted that link. She also included messages in her posts with video titles, due dates, and occasionally a personal note or suggestion for students.

Within the Edpuzzle website, Ms. Campbell posted videos with due dates. Each student's home screen showed a list of videos filtered by month, including the assignment name, completion stage (marked yes or no), and status of each video. The status was represented by symbols changing colors depending on the completion of a video and the accuracy of questions within the video. The first symbol represented the percentage of the video that had been watched, the second stated the amount of questions correctly answered, and the third gave the score out of 100 for the gradable questions.

Structure (content within video). Across all teacher participants, the structure of the recorded videos was quite similar. Lessons consisted of review or recall information from the

past, a few notes for new content, and between three and six practice problems. Ms. Anderson and Ms. Bendel explained the expectations for what final answers should look like; Ms. Bendel went further and discussed the process for checking to ensure answers were correct. Ms. Campbell often began each video with reminders and key points from previous lessons that would help students make connections and solve problems.

The example problems in the videos were either from the textbook and referenced by page number, or they were created by the teacher. As the teachers verbally explained how to solve each problem, they wrote steps either on the board or on the screen so that students could see the work and copy it into their notes. Each teacher was challenged by the need for a calculator at least once in the set of videos. Similarly, all three teachers carefully explained and wrote steps to guide students to the correct buttons to push on their individual calculator devices.

Ms. Campbell's unique use of the Edpuzzle website incorporated an average of five question-mark pauses in each video. Some pauses included statements telling students to "take notes" or "have previous notes out for reference as you complete the example problems." Other question marks asked students to finish the rest of the problem and give their answer before watching Ms. Campbell complete the rest. Additional question marks included multiple choice items for quick checks of content understanding. With possible choices of "I'm good, I really understand," or "I'm kinda good but have questions...," or "I am lost so I better get in for extra help ASAP," the teacher formatively assessed and was able to base the in-class practice on how well the students felt they were doing. If a majority of students said they were confused or lacked confidence, then Ms. Campbell began by modeling more practice problems; however, if

the majority of students appeared to be confident with the material, the teacher moved directly into the day's activity, which challenged their learning or allowed additional practice.

Within the structure of the video content, occasional references were made by Ms. Anderson and Ms. Campbell to reinforce the features of the flipped classroom model. Ms. Anderson reminded students in the second video to pause, rewind, and replay when needed. She also told students in video three to pause about two minutes in so that they could copy information from the board behind her into their notes. In video three, Ms. Campbell reminded students of the importance of watching the lessons by saying, "You guys really need to watch the videos because you are missing out and getting farther and farther behind." Ms. Campbell also embedded a question mark in video seven to stop students and have them read a reminder note: "Take notes and be sure to number your equations and organize your work as shown." Of the four video lessons watched with Ms. Bendel, no references were made for the viewer in regard to the flipped classroom.

In-class Observations

The "in-class observation" findings are comprised of details from a variety of areas. The collection of findings includes classroom design, class introduction or bell work, references to videos, classroom activities, volume of the room, student engagement and motivation, differentiation, application and relevance, teacher engagement, formative assessment, individualized learning, and class conclusion. Pre- and post-observation interviews were conducted with each in-class observation and are referenced throughout the collection summary analysis.

Classroom design. Before comparing and contrasting the research data for the in-class observations, it is important to note the design and setup of each of the classrooms.

Ms. Anderson's classroom was located on the second floor and opened to a busy hallway. The room had windows along the back wall, large whiteboards along the front, and one side board. The other side board was covered with posters, important information, and objectives for the class. There were 28 desks arranged in seven rows and four columns. I sat in the back left corner desk, and the teacher used two desks in the front left corner by the door for her MacBook and for a seat while taking attendance. Table 3 shows that typically there were 18-19 students in class each day.

Ms. Bendel's classroom was located on the second floor of the building in what is known as the Foreign Language hallway. The room had two big windows along a side wall that look out into the courtyard below. The windows were separated by a wall with a large whiteboard. There were also whiteboards going along the full back wall and across the front of the room. The fourth wall was a bulletin board full of brightly colored posters full of mathematical content, classroom expectations, and Ms. Bendel's personal decorations. There were ten tables with two chairs at each table, and ten single desks facing the center of the room with an aisle between, from the front to the back of the room. On one side of the room, four tables were separated into two rows with five desks and another row in front. On the other side, six tables were separated into two rows, but the tables were all pushed together, making two long rows of tables. There were five single desks in front of these rows. These two sides faced each other, and students could look to the right or left to see the front of the room. According to Table 3, there were 22-24 students in class each day.

Ms. Campbell set up her classroom to promote collaboration. The furniture consisted of single desks with the chairs attached, but the teacher had pushed them together in groups of four, making the shape of an X. There were seven clusters of four desks, and a small pair of two desks in the middle that faced each other. In sixth hour, the students typically sat in two clusters of four students and one cluster of three students. Since the class was smaller, the students migrated closer together in order to collaborate during work time. In seventh hour, each cluster had a maximum of three students. Six of the seven clusters had three students each, and the table of two seats remained empty. The total number of students on the 6th-hour roster (days three and seven) was 11, while the 7th-hour roster had 23 students total. Table 3 shows the number of students present each day.

Table 3: Number of students present

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8
Ms. Anderson	19	19	18	18	19	19	19	18
Ms. Bendel	23	22	22	24	21	24	24	22
Ms. Campbell	20	23	*10	19	20	22	*11	22

*NOTE. Ms. Campbell's days three and seven were observations of the 6th hour class with 11 total students on the roster.

Structure of class: Introduction. Each teacher participant structured her in-class time a little differently. Ms. Anderson had a routine bell-work activity every day, while Ms. Bendel and Ms. Campbell occasionally had activities for practice to start off the period. For each class period, all three teachers had at least one set activity that centered around the new material or a review of past lessons. This activity was always some type of practice for the students, facilitated by the teacher, and it took up a majority of the in-class time. Closing activities varied by teacher and by class period. While Ms. Anderson was never observed with an activity for the

55

closing time, there was a defined period of conclusion for every class in her room. In Ms. Bendel's and Ms. Campbell's classrooms, students worked to complete the content activity until the very end of the period, which oftentimes left the teachers giving final announcements as students walked out the door.

The volume in each of the rooms also varied by classroom and by class period. Ms. Anderson's classroom was silent for the whole class period, except when the teacher gave announcements and directions to the whole class, or when the teacher was having a one-on-one conversation with a student. Ms. Bendel's and Ms. Campbell's classrooms, on the other hand, were rarely silent. Conversations always seemed to be focused on math and learning the concepts for the day. In these classrooms, if the teacher was talking, the students quieted down and gave her their full attention. However, when students were expected to be working, they were encouraged to have conversations with others around them. When moving to activity work time, the volume slightly decreased, and conversations remained mostly about math. Ms. Bendel had meaningful conversations with students as well--both academic and personal--showing that she truly cared about them. Some students wore their headphones in class because they chose to listen to their own music during work time or to watch videos in class, despite the teacher's multiple requests to view the videos for homework instead of in class.

At the start of the period in Ms. Anderson's room, the students were seated in their assigned seats, working on their "Beginning of Block" (BOB) activity. The paper to complete these problems was provided as they turned in their entrance tickets when they entered the classroom. The entrance tickets consisted of the notes that had been completed while watching the video the previous evening. Because the BOB was a formative assessment of the students' knowledge, the students were not allowed to use electronics while completing the BOB, and they

did not receive help. The students were allowed, however, to use their spirals (practice assignments) and composition notebooks (teacher notes) for assistance. As the students worked, the teacher took attendance and collected the entrance tickets from the tray. Exactly ten minutes (or 15 on block days), an alarm would sound for the BOBs to be passed to the left for collection. At that time, students moved to individual work time on the practice assignment listed in Google Classroom.

Ms. Bendel's and Ms. Campbell's classrooms included occasional bell work, but not in every class period, and in various formats. When the bell rang in Ms. Bendel's classroom, students were either sitting or standing near their seats, waiting for teacher direction for the day. This was much the same practice in Ms. Campbell's classroom, with the addition of some conversations not related to math taking place until Ms. Campbell called for student attention for the day. Most of the time, Ms. Bendel and Ms. Campbell called for attention within the first 30 seconds of the class period, and students settled into their seats and waited for directions. Ms. Bendel began the period by reviewing the content from the video and asking students questions to check understanding. When needed, Ms. Bendel would give the students additional practice problems to solve at their seats before beginning the practice for the day. Ms. Campbell began class periods similarly, but she would usually admonish the students who had not watched the video and praise those who had. On day two she said, "Thank you to those who watched the video." She then continued by saying, "If you are not watching the videos, you are only hurting yourself." In addition to seeing who had and had not watched on the Edpuzzle website, Ms. Campbell could also see the answers to the question marks and thus gauge how much practice was needed for students to master the content.

Following these introductory comments and modeled practice, Ms. Bendel would occasionally shift to giving students three to five practice problems to complete as a class before moving into the day's activity. Typically, seven to nine students moved out of their seats to work on the large whiteboards around the room to complete the problems. Other students remained at their seats, some working on paper, while others elected to use small whiteboards. Students discussed the problems with people around them, but each student showed his or her own work on a personal board or paper. The teacher moved around, answering questions and offering solving suggestions based on the visuals she saw on the boards and on the individual student progress. After giving ample time to complete the problems, Ms. Bendel would model the correct steps and answers on the front board so that all students could ask additional questions. Ms. Bendel believed that "the bell work served as a good check for understanding and as a review of the video."

Introductory practice in Ms. Campbell's classroom was usually connected to the worksheet from the previous day or to the upcoming worksheet for that period's activity time. Typically, Ms. Campbell would model one or two problems on the big whiteboard, asking for verbal assistance from the students while they completed the same problems on their worksheets. Ms. Campbell occasionally asked open-ended questions and gave the students think time before taking responses. During this wait time, she walked around checking on students' progress. Every so often, the teacher would put answers on the board before working out the steps so that students could see if they were on the right track with solving. If their answers were correct, they knew they were solving correctly; however, if their answers did not match what was on the board, they were encouraged to try again. Although introductory activities varied between

classrooms, Ms. Bendel began each class period with an opportunity to review learning from past content and/or to prepare for practice of new content.

Structure of class: Middle. After the introductory activities, students transitioned to the core activities for the day. In Ms. Anderson's classroom, the students were given an assignment every day via Google Classroom and were expected to work individually until three minutes before the end-of-class bell. The students in Ms. Bendel's and Ms. Campbell's classrooms, while also being given an assignment to complete in class, were encouraged to work with partners or in small groups until the very end of class. While Ms. Anderson's assignments were electronic and Ms. Bendel's and Ms. Campbell's hard copy, students were given practice problems in worksheet form every day. Teachers explained this as not ideal, and they would have preferred incorporating activities into the learning, but math takes practice, and the best way to practice is with pencil and paper. In all three classrooms, the teachers were engaged the entire time, moving around to assist students with questions. Every day, multiple times a day, the teachers helped students set up problems, retaught parts of the lesson if needed, and provided strategies for problem solving. Occasionally the teachers explained to individuals or small groups the same way as in the video lesson but this time focusing solely on the parts the students were misunderstanding. In other instances, the teachers found different ways to explain concepts or problems that were unique to the misunderstandings of the individual or group of students.

Most of the time, the support was given individually, but occasionally Ms. Bendel and Ms. Campbell called the class back together for additional whole-group instruction by asking students to find a seat, not necessarily theirs, to address concerns or challenges found within the activity. Students obeyed and quieted down, giving the teacher full attention for further explanation through reteaching or observing the modeling of a practice problem. Teachers knew

the whole group instruction was necessary when multiple students asked the same questions and further assistance was needed. For example, during one observation in Ms. Bendel's room, the volume of the room increased with frantic questions and student concerns when she passed out a worksheet of practice problems. Rather than try to move around to each student and answer the same questions individually, Ms. Bendel was able to secure the attention of the whole class so that she could verbally explain the directions, including a few hints and connections to the videos. After this brief explanation to the whole class, the students were able to get to work with their partners or small groups.

The practice problems assigned in Ms. Anderson's classroom could be found in the textbook, which was online or available in hard copy in the classroom; or some of the problems were posted on Google Classroom as PDF worksheets. Students worked individually as the teacher moved around the room, spending between one and three minutes with each student. In a post observation interview, Ms. Anderson commented on the success she was seeing with having one-on-one conversations with students. In referencing one problem missed by quite a few students, she stated, "I think talking to each one of them individually had a better impact than trying to explain to the whole group." While the quantitative data was not directly assessed, evidence for the success of this practice existed as a result of the one-on-one conversations, which increased student confidence and understanding. Because she was able to start with a specific gap in the understanding for a specific student, she could tailor the explanation to fit the individual needs. Conversely, explaining to the whole group at once can be challenging to meet specific needs and fill individual gaps. Furthermore, according to the teacher during an interview, when working individually with a student, they are less afraid to ask questions and more willing to admit when they do not understand something.

Ms. Bendel and Ms. Campbell did not use the textbook for practice problems but instead offered paper worksheets, one for each student. While Ms. Campbell's desks were already arranged to promote small group work, Ms. Bendel encouraged her students to find partners to work with. While some students chose to work individually, other students created groups and tended to work together on a regular basis. The first group consisted of a male and the two females sitting behind him. A pair toward the front of the room included a boy and a girl. In that pair, the boy tended to get off track, but the girl always brought him back to the math by asking questions about the assignment. One individual male student would occasionally move to the hallway to work individually. Two female students sitting in individual desks always slid their chairs closer together. Finally, one female student seemed to always be reteaching a male student the notes from the video as they moved through the practice problems on the worksheets. No matter how the groups were formed, Ms. Bendel and Ms. Campbell set expectations to complete the practice during the course of the class period.

Technology was a must in Ms. Anderson's classroom since it was where the students found the specific assignment, online textbook and PDF worksheet of problems. On the contrary, Ms. Campbell's classroom did not require any technology, and students were told to put away cell phones or MacBooks if they were seen in use. Ms. Bendel's classroom varied by the day and by the student. While the practice problems were not given electronically, after the worksheet was passed out and most students got to work, a few students would take out their MacBooks to watch the video and take notes because they had not done so the night before. The videos would occasionally be watched in Ms. Anderson's room as well, but never during the class periods of Ms. Campbell. For the students who did choose to watch the video lessons in Ms. Anderson's or Ms. Bendel's classes, it was not as review, but instead because they had not

watched it prior to coming to class and therefore were lost with the practice problems. Ms.

Bendel showed great frustration with this and often made announcements to her classes

reminding them to watch the videos outside of class to ensure the full class time for practice with

peers and help from the teacher. It was not until Ms. Bendel started having personal

conversations with students who were watching the assigned videos in class that the behavior

changed. Consequently, the majority of students could start the day working with peers on

problems, and not watching the videos. Ms. Anderson was also frustrated that students were not

completing the videos outside of class; however, she allowed students to watch the videos in

class because they would only be hurting themselves by taking away practice time. While Ms.

Bendel did not have any methods in place to check whether students had watched the videos, Ms.

Anderson knew on a daily basis because she had students turn in their video notes as entrance

tickets as they came into the room.

Prior to an assessment day, each teacher conducted some version of a review to prepare

students for the exam. Ms. Campbell conducted her own version of a review by having students

complete problems on the white boards. Ms. Anderson gave an assignment that spiraled through

everything that had been taught in the unit. Ms. Bendel, in addition to a review packet given one

week prior to the assessment date, also took time to review problems with students on individual

whiteboards. As the students completed the problems, they would hold up their boards for a

visual check from the teacher. As she scanned the room, she was able to nod yes or no to student

answers without others knowing. In addition to this, she could also call out a few pointers or

suggestions to help students along with solving. After two to three minutes, she would turn back

to the big whiteboard and solve the problem, explaining the steps as she moved through. Ms.

Campbell also had students use whiteboards for review, but she had them split into partners with

one member at a large whiteboard working with the teacher, and the other member sitting in a desk working out the same problem on an individual whiteboard. As the teacher gave the problems verbally, she checked to see that each student standing at the large whiteboards had it written correctly, and if the students were working the proper steps for solving. After a few problems, Ms. Campbell had the partners switch places so that each had a turn getting teacher help at the big whiteboards.

Structure of class: Conclusion. As each class came to a close, the three teacher participants took different approaches to bringing the in-class time to a close.

With three minutes left in every class period, an alarm from Ms. Anderson's cell phone would sound, telling students they should finish the problem they were on, put away borrowed supplies such as calculators and textbooks, and pack their belongings. During that time, Ms. Anderson would make final comments to the students aloud and give reminders about the outside of class homework. A typical statement was "Tonight you need to watch a video, complete your entrance ticket, and catch up on any notes you are missing."

While there were no formal procedures for the end of class, students in Ms. Bendel's classroom remained engaged and worked until approximately two to three minutes before the bell. At that time, they began packing their belongings and stood at the door, patiently waiting for the bell to ring. Much like Ms. Anderson, Ms. Bendel also used the last few minutes of class to make announcements regarding the out-of-class assignments. During one class period she admonished, "You guys need to be watching videos prior to coming to class!" On their way out the door, Ms. Bendel gave one last plea: "Bye everyone. Don't forget to watch the video for tomorrow."

Unlike Ms. Anderson and Ms. Bendel, Ms. Campbell's students continued working on the practice problems until the bell rang. However, similar to Ms. Anderson and Ms. Bendel, Ms. Campbell also took advantage of the last few minutes to give closing comments and reiterate expectations for the out-of-class class time to the students.

Critical Analysis

Student participation. Student participation varied in the three classroom settings observed. Some students cooperated with the expectations because they enjoyed learning or had external motivators that require participation, such as parents, extracurricular activities, or future ambitions like college or a specific career. Other students, who were not as inclined to participate, needed a model like the flipped classroom with more motivating and engaging class time, resulting in increased participation in the learning.

In Ms. Anderson's classroom, participation was defined as being on task with the expectation and working on mathematics. While students remained in their seats and only spoke when working one-on-one with the teacher, they were participating as long as they were working on the expected math assignments. Those not participating in Ms. Anderson's classroom were those who were distracted by things like cell phones and/or technology websites not related to the mathematics coursework. Even though the model did not include peer collaboration, students did have the opportunity to work at their own pace and to ask the teacher for individualized support when needed. To be successful, students were required to participate fully in their learning by avoiding distractions.

Throughout the eight classroom observations in Ms. Anderson's room, students tended to participate more during the shorter class periods than during the longer block days. Also, on most days students tended to participate more at the beginning of class than at the end. Due to the silence of the room and the nature of the practice, students often struggled to focus for the full period without peer interaction. The only interactions came when the teacher stopped for a few minutes to address misconceptions on previous assignments. When the students lost focus, they were usually turning to programs on their devices, such as Netflix, SnapChat, or Instagram. Especially on block days, when the teacher modified the practice problems by adding additional work to fill up the extra time, students had difficulty participating in Ms. Anderson's classroom with full focus. About 30 minutes into the work time on day three, a block day, two students were watching Netflix while doing math, and five students were on their cell phones, not doing math. At 45 minutes into work time on that same day, five students were watching Netflix only, two students were watching Netflix while doing math, and three students were on cell phones, neglecting the math assignment. On day five, Ms. Anderson noticed students off task and working on homework for other classes. In the post observation interview she stated, "It was unfortunate that it was not for my class, but at least it was for another class and not the most recent Netflix series." She went on to say, "I know I could hound them to work on my classwork, but I have found that usually doesn't see a marked improvement in their work but generally causes more behavior issues than it helps."

Student participation in Ms. Bendel's classroom differed from the participation in Ms. Anderson's classroom. In Ms. Bendel's class, students were following directions and participating when they were on task and working on any one of a variety of math activities. While most students participated by completing bell-work problems, answering the

teacher's questions, and working with fellow classmates during activity time, a few students chose to participate in the math by individually watching the videos in class first and then completing problems individually.

For the most part, all students participated in the expected activities during the class periods in Ms. Bendel's classroom. During the activity time, most students chose to work with others on the assignment. Cooperative learning increased participation and engagement in Ms. Bendel's classroom. Nevertheless, there were always a few students who chose to work individually, although they were still participating in the math. The teacher supported student participation by moving around the room and keeping students on task. On day two, Ms. Bendel began the class with three bell-work problems. Students all participated by completing the problems on the large whiteboards, small whiteboards, or individual notebook paper. Small group conversations were productive, and students learned from each other when they get stuck. And any time the whole group was stuck, the teacher was able to give instruction to get them back on track. On day five, there were a few students attempting to multitask with music or Netflix in the background as they individually worked on the assignment. Also, on day seven, the teacher monitored student participation by having students solve review problems on small whiteboards and then raise their final answers. It was apparent that all students were engaged and motivated to solve the review problems when Ms. Bendel announced this was good practice for the test that would take place later in the week. By having students do the work on individual whiteboards and raise final answers for immediate verbal and visual feedback from the teacher, students were held accountable for their participation and efforts with the content and were therefore motivated to try their hardest on each problem.

In Ms. Campbell's classroom, student participation was defined as engaging with other students and the teacher through bell-work problems and content practice problems. There was no reason in Ms. Campbell's classroom to have a device out because all videos were watched before coming to class and all problems were written on the board or passed out on a worksheet.

All students participated in the activities because they were being held accountable by the instructor as well as by their fellow classmates at their tables. On day four, as the teacher modeled problems on the front whiteboard, all students copied the steps into their notebooks, and a few responded back to questions asked, or they asked questions of their own. In her post observation interview on day eight, Ms. Campbell mentioned a method she had tried for the first time in the observed class: she posted the answers to the current assignment so that students knew what they were looking for when solving. By doing this, she felt all students participated fully, and the students were more inclined to keep working until they found the correct answer that matched, even when it meant they needed to look for mistakes and ask questions of others. Throughout the eight classroom observations, there were a few times when student conversations moved away from the content and into personal topics that were interesting to the students, but off topic of math. Although these conversations distracted their learning, they were often cut short because the teacher would move closer as she was circulating throughout the room answering questions. The teacher's proximity and engagement with the students helped to keep these off-task and unfocused conversations to a minimum. While the teacher did not address this during the interviews, her actions were purposeful and successful in minimizing the distractions and keeping students participating in class.

Individualism and differentiation. Within the literature, the flipped classroom model is said to promote individualization for student learning and the opportunity for differentiation within lessons. Throughout the observed lessons, Ms. Anderson, Ms. Bendel, and Ms. Campbell provided students with opportunities for individual support in both the video lessons and throughout the in-class time. While there was an opportunity for differentiation, the approach was not observed on a regular basis.

The video lessons provided the opportunity for students to individualize their learning of content. By using the video features of pause, rewind, and replay, students were able to receive the direct instruction at their individual pace and watch multiple times if desired. In addition to this, Ms. Campbell gave students the opportunity to self-assess their understanding of the video content and share it with the teacher in confidence. In two of the video lessons, she ended the video with a multiple-choice question about the students' perception of their learning. By checking these results at the beginning of class, as the teacher did on day seven, she was able to see whether students were feeling "fairly confident, but have questions ready for tomorrow," or "a bit lost so coming in for extra help in the morning," or "I am pretty confident and feel ready to finish during class tomorrow." By having the student response data in her mind, she was able to alter her lessons and accommodate the needs of the majority of the students. While she did not change the worksheet, she could focus on certain problems--or complete more or fewer problems--depending on the overall needs of the class. In a post observation interview, Ms. Campbell discussed completing more problems with the observed class than she had done with a class earlier in the day. The results from the Edpuzzle data between the two classes showed different needs. For seventh hour, which was the class observed, more students selected the choice "a bit lost" with the content, and therefore the teacher chose six practice problems to

complete on the front board to start the class. She had only done three problems with her fourth hour, where the majority of responses indicated students were confident or fairly confident with the material. By adjusting the amount of problems completed as a whole group, the students had a better opportunity to see teacher instruction based on their needs. In any case, after the whole group instruction was complete, Ms. Campbell could move around the room, provide the individualized and differentiated instruction to those who required it.

The teachers in the observed classrooms individualized learning for students by offering support to students one on one. Staying true to the flipped classroom model, the instruction in each classroom took place on video prior to coming to class. While all three teachers maintained daily lesson plans that included content practice surrounding the objectives, they did so with very little direct instruction. Each of the teachers could be seen moving around the classroom during work time, checking in with students individually or answering questions for partners or groups who raised hands in need of support. On day five, Ms. Bendel approached a male student who usually moved to the hallway to work alone but had chosen to stay in the classroom. Even though he did not raise his hand with a specific question, the teacher stopped to ask if he was doing OK and if she could offer any help. He asked her a few quick questions and then continued on his own. Ms. Anderson used practice time to move around the room and pass back prior assignments. With each assignment she returned, she took time to explain the individual mistakes the student had made and also gave suggestions on how to improve for the next assessment of the concept. On day six, Ms. Campbell called three students back to her desk during the practice time. She had identified the three students from a previous quiz as needing individualized help with a particular concept. In just a few short minutes, Ms. Campbell was able to go over a few specific problems from the quiz, highlighting the mistakes the students had

made. She gave additional support and strategies to improve understanding for the students so that they would not make the same mistakes on the summative assessment.

In addition to academic conversations, Ms. Anderson and Ms. Bendel were also observed engaging in other conversations with students and seemed to have a good rapport with them. These teachers posed questions in regard to athletics, activities, other courses, personal lives, etc. On day two, Ms. Bendel passed out retake forms to six students with whom she had discussed retaking the previous test. She said to each of them, "You will need to complete this retake form and come in early on the Thursday late-start day."

Methods of answering questions and assisting students with content varied among the three teachers. In Ms. Anderson's classroom, the teacher used a variety of strategies and tools to help the students. To assist with mathematical steps, she used the large whiteboards around the room, or a hand-held whiteboard, to show specific steps. When verbalizing procedures, Ms. Anderson prompted the learning with additional questions to help make connections to content students already knew, or she further explained concepts to facilitate future learning. Ms. Campbell commented in a post observation interview that she was hopeful the flipped classroom model would increase understanding of the concepts because it allowed students to work at their own pace.

To provide individualized help with a practice problem or two, Ms. Campbell arranged students on day five to work in pairs with one member from each partnership joining her at the big whiteboard in the back of the room. The partner not at the big whiteboard was still completing the problem at the table and waiting for guidance when finished. After a few problems with one partner, they switched, and the teacher was then able to work with the other half of the class at the big whiteboard.

The literature indicates an increased opportunity for differentiated lessons upon implementation of the flipped classroom model. None of the observed classrooms implemented differentiated assignments to meet the varieties of academic levels of students. However, even though the assignments were not differentiated, the teachers offered differentiated instruction and different levels of support, based on the students' individual needs.

In addition to differentiating instruction with individual support, Ms. Bendel and Ms. Campbell allowed students to work in pairs or in small groups, depending on their learning levels and needs. Ms. Campbell also went on to incorporate partner work into some lessons as another example of differentiating the instruction based on her students' needs.

Application and relevance. Literature about the flipped classroom suggested an increase in opportunity for teachers to teach lessons that included application and relevance to better enhance comprehension of the material. While various problems throughout the assignments in all three observed classrooms may have included connections to real-world application or relevant topics, there were no lessons observed that included students needing to outwardly apply their new knowledge or make connections to relevant topics outside the world of procedural mathematics. On day five, Ms. Bendel gave students an assignment of application problems that related directly to the mathematical content they had learned and practiced in the previous class period. While the problems were application based, the presentation was still in worksheet form and required students to read word problems to set up the equations and then solve by completing the procedural steps. When discussing with teachers the lack of application or real-world connections, each said they would love to incorporate more of those kinds of problems but did not feel they could unless students understood the procedural steps first. And

with the amount of time it took the current students to understand the procedural, there was no spare time for application because the class needed to move to the next topic within the content.

  Choice. Throughout the lessons observed for all three teacher participants, the idea of student choice seemed to come up often, but it varied across the different classrooms. While expectations were stated each day in every classroom, and all three teachers moved around the room offering proximity to promote focused work time, students had a certain degree of choice in what they accomplished and learned during the in-class time. In Ms. Anderson's classroom, students had multiple opportunities to choose whether they would complete the assignment posted on the Google Classroom or become distracted with other technology options. Rather than get upset or pose consequences, Ms. Anderson continued to help the students who were asking for her help, and she let the others make their own choices. In Ms. Anderson's and Ms. Bendel's classrooms, students had the choice to watch the video before getting to work on the day's assignment. In Ms. Bendel's class, students had choices to make as to whom they would work with that day. Students could choose to work individually, work with one partner, or work in a small group of three or four students. In addition to choosing partners in Ms. Bendel's class, in both Ms. Bendel's and Ms. Campbell's classrooms, students who were working with others could choose to be active and contributing members, or they could choose to copy work and answers from peers, only hindering their own learning. In addition to this, despite the instructor's engagement and offerings of support, students had the choice whether or not to raise their hands and ask questions of the teachers. While some students took advantage of the support--staying engaged during teacher direction, participating in partner or group work with practice problems, and acting on the opportunities to ask for teacher support--other students did not pursue these opportunities and missed out. Students who did not take advantage were most

likely not noticed on a regular basis since the teachers often put their efforts and attention into those who requested assistance. In discussing grading practices with teachers, they indicated that the students' grades were heavily weighted with the summative assessment, and not the day-to-day practices or homework videos. The teachers used these items as formative checks for understanding throughout the unit, leading up to the summative assessment. Connecting the idea of student choice with these grading practices, teachers confirmed in the final interview that those students who made good choices by watching videos and utilizing class time did earn better grades on the summative assessment than those who chose to make bad choices and not use the flipped model appropriately. Furthermore, in Ms. Bendel's class, those who chose to work with peers and actually work to complete the practice problems performed better on assessments than those who worked in groups that were often distracted or relied on one partner to do all the work.

Assessment. All three teacher participants implemented both formative and summative assessment practices into their classrooms. While major summative assessments only occurred at the end of the unit in the form of a unit test, students were formatively assessed on a regular basis during the in-class time.

Throughout all observed class periods, all three teachers moved around the room for a majority of the time, checking on student progress and offering support and suggestions for solving when necessary. In addition to offering more one-on-one support, the teachers were able to formatively monitor student progress and suggest additional, individualized assistance if necessary. After day one, Ms. Anderson commented, "Walking around and working with individual students, it appeared all were working diligently on the assignment." During day two, Ms. Anderson was able to connect with *all* students in some capacity to discuss BOBs, entrance

tickets, or answer assignment questions. In addition to walking around the room to monitor work time, Ms. Bendel collected the practice worksheets within a day of when they were assigned. She graded on completion but was aware of how students worked during class and chose specific problems for the worksheets accordingly. In Ms. Bendel's post observation interview from day six, she stated, "I thought the worksheet included a lot of skills, so it was a good, diverse check to see how they're doing with the material." Ms. Campbell used bell work on day two as a way to formatively assess student understanding. As students finished a problem, she would have them raise their hands so that she could review their work and final answer, making suggestions if needed. Throughout all of these in-class practices of formatively checking student understanding, teacher participants made mental notes of student progress, both individually and as a whole class. As the teacher prepared lessons, she reflected back to these mental notes and planned accordingly. This, for example, might result in an extra day of practice, specific types of problems to practice, or additional time to review before the unit test.

Teacher engagement. Due to the premise of the flipped classroom model, a majority of the direct instruction should occur prior to the in-class time. This leaves opportunities for the instructors to engage with the students and the content in a variety of ways. King (1993) would call the teacher in a flipped classroom the "guide on the side," instead of the "sage on the stage," due to the increased opportunities to facilitate and assist students with their learning rather than spending the majority of class directly instructing while students listen passively.

All three teachers observed in this study remained fully engaged during each class period, but in slightly different ways. Ms. Anderson moved around the room, weaving through all rows and columns to pass back papers and talk to students as they were working quietly at their assigned seats. She did not always wait for students to call for her; instead, she would check in

with the ones she had not spoken to, saying, "You doing all right?" Ms. Anderson remarked that the in-class time was "more impactful when it is one-to-one because they seem to ask questions more than when I was teaching at the front of the room." Ms. Bendel and Ms. Campbell were also engaged throughout the class period by moving around the room, having conversations with individuals and groups about practice problems, and encouraging the students to ask partners and table mates for support as well. During bell work on day five, as Ms. Bendel circulated among the students, she pointed to mistakes and called out corrections to be made on big whiteboards, while she also praised another students' work that had been completed correctly. Ms. Campbell used her iPad to project notes and example problems on the board for all students to see as she moved around the room assisting students. This gave her the flexibility to stop anywhere in the room and complete the steps for solving while giving verbal explanation. Rather than just giving students the answers after a brief work period, she took time to explain each problem and allowed students to assist out loud.

When specific questions on the assignment arose, all teachers were fully engaged and took time to supply an explanation, sometimes in a different way from what they had said in the video. On day two in Ms. Campbell's classroom, she adjusted her instruction when she realized students needed more modeled practice from her. Rather than forcing students to struggle through, she decided to stimulate students by modeling a few more problems from their homework assignment.

Exit Interview

At the conclusion of the data collection, interviews, artifact analysis, and classroom observations, teachers sat down for a final interview. A final interview protocol (Appendix F) was used to ask teachers to reflect on their experiences during the observation time and to speak to the goals they had set during the initial interview prior to full implementation of the flipped classroom. Teachers were also asked about the future with the flipped classroom as an instructional strategy in their classrooms.

Ms. Anderson noted a major success with giving immediate and individual feedback to students on their entrance tickets and BOBs. While she saw much more personalized instruction for the students, she alluded to the fact that she still wanted to increase her relationships with students. In reflecting on her goals from the initial interview, she commented that her students were not working more than 30 minutes outside of class, as the goal had suggested, but it could be because they were choosing to fast forward to the end of the video and write all the notes on the screen, instead of watching the video to hear the explanation with the teacher as she wrote the notes. Therefore, students finished the work much more quickly because they were not watching the video. While this may have seemed like a good option to them because their homework was done quicker, they missed out on the instruction and therefore will need more supports for understanding in the classroom. Because of this, Ms. Anderson set a new goal for herself to use Edpuzzle next year and embed questions throughout the videos to hold students more accountable for watching. Even though the entrance ticket submission rate was 80-85% during the first unit of the semester, as time progressed through more units, the turn-in rate decreased to around 50%. In conclusion, Ms. Anderson was proud of some parts of the flipped classroom and the effects it had on her classroom, but she was equally frustrated with the students' lack of

motivation to use the model appropriately, both videos and in-class time, to meet their needs. She was unsure at the time of the exit interview if she would implement the flipped classroom model in the future. If she decides to implement in the future, she asked for assistance with creating more activities to foster more collaboration and engagement.

Ms. Bendel expressed success and challenges from her flipped classroom experiences in her exit interview. First complimenting herself for recording shorter videos, which met one of her initial goals, she also expressed her excitement for using the Explain Everything application because it was "amazing to record and post videos." Even though she faced challenges with expanding the practice beyond assigning problems on a worksheet and sometimes keeping students on task, she would continue to implement the flipped classroom in the future with the hope of addressing her challenges. In addition to the challenges mentioned, she would also like to find a more organized way of giving reminders for watching videos and be more strategic in creating student groups for practicing problems.

Finally, Ms. Campbell expressed similar successes and challenges as Ms. Anderson and Ms. Bendel, but from her own perspective. Ms. Campbell stated that both she and her students favored the flipped classroom over the nonflipped approach due to the video features and interactive nature of the in-class time. While she claimed students enjoyed being able to pause and take notes at their own pace, Ms. Campbell also noted that one of her challenges was getting students to watch the videos. Unlike Ms. Anderson, who saw a decline in video watching as the semester progressed, Ms. Campbell saw an increase as they moved further into the semester. She thinks this is because students were catching on to the importance of the videos, not just for the points from the Edpuzzle questions, but also because they understood more of what was going on in class when they watched. Ms. Campbell believed the benefits outweighed

the challenges and she would like to continue to use the flipped classroom approach in the future.

In conclusion, each teacher was able to reflect on and assess their experiences implementing the flipped classroom model of instruction. Upon reflection, teachers noted benefits they encountered while using the model, in addition to a few challenges to fix in future implementations. Overall, the three teachers took their previous knowledge of the model, paired it with their experiences during this research, and they will decide what path to take in the future.

CHAPTER 5

DISCUSSION

Study Overview

The flipped classroom is an instructional model where the instruction and practice components switch places, allowing for the potential of a more student-centered approach to learning. While the premise of the flipped classroom model shows potential for major changes in classroom instruction and beneficial gains for students, the findings from this study reveal a deeper look into the actual implementation of these major changes in three mathematics classrooms and describe what is happening during the in-class time of a flipped classroom.

Research Question. Implementation of the Flipped Classroom: How is the in-class time used?

Literature review. As discussed in chapter 2, the literature addressed the premise of the flipped classroom by defining the flipped classroom model. The literature also provided benefits and limitations to implementing the model. The benefits included having 24-hour access to the video lessons with individualized experiences when watching, and the potential for increased engagement in the classroom. With the lectures on videos watched prior to coming to class, the teacher has the opportunity to expand activities that could increase student motivation through more hands-on activities and projects, team challenges, and cross-curricular innovations. Opportunities for differentiation could increase, along with options to present students with application practice or making relevant connections to the material. Finally, there is potential for the relationships created within the flipped classroom model to be beneficial to the social and academic growth of students.

The limitations addressed in chapter 2 included the creativity of design with videos and in-class lessons for teachers, access for students with internet and/or devices, and the unknown factor with student responsibility. In a comparison of the benefits and the limitations of the flipped classroom approach, one constant remained: it takes effort for students to understand and meet expectations set by the teacher.

Methodology. The goal of this study was to conduct interviews and classroom observations of three mathematics teachers implementing the flipped classroom model in the Shawnee Mission School District to see if what was actually happening corresponded with what the literature defined as the premise of the approach. Study participants were identified through a survey and teachers were selected based on their entry point of flipping (spring 2018), course taught (College Algebra/Trigonometry), and their willingness to participate. Each teacher participated in an initial interview, nine pre-observation interviews, nine observations, nine post observation interviews, and a final exit interview.

Summary of findings. Ms. Anderson's classroom, while silent and not particularly active for students, allowed for individualized instruction for all students and gave the teacher the opportunity to formatively assess each student on a regular basis. Ms. Bendel's classroom revealed an active environment because students had options of working individually, with partners, or in small groups. Ms. Bendel engaged with students the whole time answering questions and offering further explanation when needed. Ms. Campbell's classroom was slightly more structured. In class, students worked together in table groups to solve and explain problems given by the teacher. Sometimes the teacher would give problems on a worksheet, while other times students practiced on large whiteboards around the room or on individual whiteboards at their seats.

Concluding Discussion

Throughout this research, connections emerged between the presented literature and study outcomes. Many of the benefits and challenges posed by the research were found to also be present in the interviews and classroom observations of the teacher participants. However, some items noted in the premise of the flipped classroom were not observed the same in the data collected. With this, the literature lends to a possible shift in the role of the teacher. He or she is no longer the center of the learning, however the ability to make this shift depends on the ability to assess individual student needs and differentiate to meet these needs, the ability to include opportunities for application of the content, and awareness of how students are participating in the designed lesson plans.

  Differentiation. As cited from Universal Design for Learning (2013), "differentiated instruction can be defined as a way for teachers to focus on the student and be responsive to individual differences via a process of adapting and modifying teaching, learning activities, and what students are required to do and produce in a classroom" (Thousand, Villa, & Nevin, 2015, p. 2). Jacqueline Thousand, Richard Villa, and Ann Nevin gave five rationales for differentiated instruction and why the practices should be implemented into classrooms as soon as possible. "Differentiated instruction helps teachers (1) to meet the needs of diverse learners, (2) to meet legal mandates, (3) to be ethical in implementing democratic values, (4) to dispel myths that abound in education, and (5) to be more effective in teaching all students" (Thousand et al., 2015, p. 3). In addition, the inventors of the flipped classroom, along with other authors of flipped classroom literature, say the model should promote differentiation in the classroom. They say the teacher role changes and he/she should be able to provide personalized lessons and assignments for the variety of learners in the math classroom.

Despite what the literature says, I did not see the practice of differentiated instruction in my observations of the in-class time of the three teacher participants. While I witnessed each teacher staying engaged, students were all given the same video lessons, same assignments, and same assessments. Bergmann and Sams (2015) note the possibility of offering challenge problems to students who quickly master basic concepts to push them beyond the curriculum and take the learning deeper. This practice was not seen in any of the observed classrooms because the expectations of students were the same for each member of the class, no matter what their level of success with the content might have been. While the observed teachers were able to provide individual assistance to students struggling with the content, the assignment expectations did not differ to match the individual needs of the students.

Although I find the lack of differentiated instruction interesting because the research seems so powerful and the model lends itself well to the opportunity for the instructional practice, I have to admit I understand why teachers are not differentiating the way the research says they should. Differentiation, if done correctly, can be quite challenging. It is more than just adding a few challenge problems or creating practice that assesses the essential understandings. Proper differentiated instruction requires getting to know each individual student, along with his or her strengths and weaknesses, passions and motivators, and finding a way to assess all of these on a daily basis. Because there are so many standards in the mathematics curriculum, students may understand a specific concept in the beginning of the week and need to be challenged, but then struggle later on in the week on a totally different concept and need additional supports or a modified assignment to show understanding.

Teachers who are currently flipping, along with those who are considering adopting the model, should understand that everything cannot happen with full success in the first year of

implementation. Increasing the differentiated instruction of the in-class time is something that can and should be a goal for all flipped instructors, but it is something that comes with time and experience. Providing students with learning opportunities that meet them where they are and promote growth, is something all educators should strive for. To those teachers already flipping, I challenge you to make differentiation a goal for the near future. Look closely at your current in-class activities and brainstorm ways to make items more challenging for your extended learners. Also take time to identify the essential understandings within the activity, for students who are working to show mastery, but need modifications. Of course, there will still be plenty of students who are adequately challenged completing the activity as is and should continue to grow in their learning through the assigned practice.

Application. As a former math teacher, the goal of instruction was always to take the daily content and find ways to relate it to real-world situations that students could find interesting and *want* to learn more about. To take the mathematical concepts and apply them to circumstances or settings that meant something to the students, so they could move from just having the procedural knowledge to follow a list of steps, into the conceptual understanding of applying the math to situations in life. The authors and inventors of the flipped classroom have said the instructional model should assist with providing these types of opportunities for students. Because the content delivery moves to outside of class, students should come in with basic knowledge and be ready to apply what they have learned. Fulton (2012) discussed teachers using class time to make the contact with students more meaningful by trying new things. He suggests, "including more hands-on activities and problem-based learning" (Fulton, 2012, p. 23). He goes on to highlight math classes and the possibilities of incorporating project0based activities, team challenges, and cross curricular innovations, all which give students the

opportunity to apply the concepts they are learning. Bergmann and Sams (2014) expressed the power of three categories: content, curiosity, and relationship. Because the design of the flipped classroom model allows for more time in class to be spent on practice, Bergmann and Sams (2014) think the learning should be able to go *deeper* and *further* by making *connections* with students. Application, or the third level of Bloom's taxonomy, should no longer be a struggle to get to when remembering and understanding, levels one and two, are taken care of prior to coming to class through the video lesson. With this, Bergmann and Sams (2014) encouraged instructors to foster student curiosity and give students opportunities to go further with their understanding through applying what they've learned in scenarios they can relate to.

Like differentiation, I did not observe application of content during my visits to classrooms. Through introductory bell-work, content practice, and concluding activities, application was rarely utilized. Students were charged with completing problems where they tackled the procedural processes of the mathematical content. In the event that an occasional problem was worded in such a way it told a story that could require conceptual understanding, it rarely was relatable to a high school students life, and therefore, not an appropriate *real-world* connection.

Problems involving application of the concepts, that relate to a high-school students real-world connection, can be hard to find. This may be the reason why this practice was not observed in the classrooms, even though the literature premised this option as being so valuable. That being said, I was interested to see that students did not mention the lack of application of the content by asking the age-old question- when am I ever going to use this. In fact, the few times application problems did appear in assignments in Ms. Bendel's class, students struggled to make the connection between the problem written in words, and the procedural steps that

needed to be followed. I believe this is due to the inconsistency and lack of practice with these types of problems. Students are so used to seeing math problems with numbers and letters and being asked to "solve for x" they don't realize they are really exercising the muscles needed for problem solving. While it may be true that students won't need to solve a system with three variables or graph a function noting the end behaviors, the process of using pieces of information given to find and calculate the missing part is what the real world is actually all about.

To teachers out there, flipping or not, we have to start increasing our student's ability to apply mathematical content in situations, real-world and not. For those who flip, I challenge you to find a few problems for each concept, that can be given to students during the in-class time, and allow them to collaborate, discuss, and exercise the problem-solving muscles. The basic levels of procedural understanding can be given in the video lesson; it's time to push students to the next level and give them conceptual understanding that can be applied to a variety of situations.

Implications for building and district level administrators. In addition to suggestions for teachers who currently flip and teachers who want to flip in the future, there are implications for administrators at the building and district levels to assist in supporting the flipped classroom instructional model. As leaders promote professional development opportunities to encourage teachers to use best instructional practices for student success, sessions surrounding the flipped classroom could be added to teacher training. Best practices can be defined by strategies that increase student success, such as cooperative learning and partner work, activities where students are interacting with the material, and application with real-world connections that enhance the content. Literacy strategies integral to mathematics--such as vocabulary and reading comprehension, listening and discussing skills--should also be emphasized.

As suggested by the original creators of the flipped classroom, Bergmann and Sams (2012a) recommended that educators attend a one- or two-day flipped learning workshop, followed by a one-day training on screen casting, before beginning the process of implementing the flipped classroom model. Knowing this, building and district leadership could invite consultants in at the beginning of the school year to assist instructors with the various aspects of implementing the flipped classroom model successfully. Moreover, districts could establish or improve existing online teacher resources to share video lessons or post demonstrations of flipped classrooms. In-service meetings or late-start collaboration time could include coaching sessions for those who are interested.

Conclusion

This study of three Shawnee Mission School District mathematics teacher's implementation with the flipped classroom instructional model was designed to explore what teachers who are flipping do with in-class time.   Within this study there were a variety of connections made to the current body of literature that exists regarding the flipped classroom instructional model, as well as the need for boosting technology use in the classroom. Throughout this study and the discovery of findings, significant conclusions and contributions have been noted, along with addressing future implications for teachers and administrators.

Further research in this area could include looking through the lens of a content area other than math or exploring more deeply *why* certain aspects of the literature were observed and successful, while others were not. Perhaps another district utilizing flipped instruction might share training ideas. Furthermore, in partnering with this qualitative approach, a quantitative

study could be completed looking at the performance of the students in the three mathematics classrooms or between districts who have had varying levels of training with the instructional model. This would add depth to the current study and give additional statistical data of why or why not specific strategies should be used within a flipped classroom, or if a flipped classroom is just a different approach to instruction that yields the same results.

References

Acelajado, M. (2011). Blended learning: A strategy for improving the mathematics achievement of students in a bridging program. *Electronic Journal of Mathematics & Technology, 5*(3), 342-351.

Alebrahim, F. (2016). *Implementation evaluation study: Flipped classroom professional development with faculty members to enhance students' engagement in higher education* (dissertation). University of Northern Colorado, Greeley, Colorado.

Bell, M. (2015). *An investigation of the impact of a flipped classroom instructional approach on high school students' content knowledge and attitudes toward the learning environment* (master's thesis). Brigham Young University, Provo, Utah.

Bergmann, J., & Sams, A. (2012a). Before you flip, consider this. *Phi Delta Kappan, 94*(2), 25.

Bergmann, J., & Sams, A. (2012b). *Flip your classroom: Reach every student in every class every day*. Eugene, OR: International Society for Technology in Education.

Bergmann, J., & Sams, A. (2014). *Flipped learning: Gateway to student engagement*. Eugene, OR: International Society for Technology in Education.

Bergmann, J., & Sams, A. (2015). *Flipped learning for math instruction*. Eugene, OR: International Society for Technology in Education.

Finkel, E. (2012). Flipping the script in K12. *District Administration, 48*(10), 28-34.

Fulton, K. (2012). 10 reasons to flip. *Phi Delta Kappan, 94*(2), 20-24.

Johnson, G. (2012). Students, please turn to YouTube for your assignment. *Education Canada, 52*(5), 16-18.

King, A. (1993). Sage on stage to guide on the side. *College Teaching, 41*(1), 30-35.

Leat, D. (ed.). (2017). *Enquiry and project based learning: Students, school and society.* New
York: Routledge.

Maxwell, J. (2013). *Qualitative research design: An interactive approach.* Thousand Oaks, CA:
SAGE Publications.

Patton, M. Q. (2008). *Utilization-focused evaluation* (4th ed.). Thousand Oaks, CA: Sage
Publications.

Shawnee Mission School District. (2017). *College Algebra/Trig* [Program of Studies]. Retrieved
from http://www.smsd.org/parents/pages/curriculum.aspx

Should parents help with homework? (2014). *Scholastic Incorporated,* December. Retrieved
from http://www.lakeview.provo.edu/Site_School/0024/ShouldParentsHelp.pdf

Thousand, J. S., Villa, R. A., & Nevin, A. (2015). *Differentiating instruction: Planning for
universal design and teaching for college and career readiness.* Thousand Oaks, CA:
Corwin.

Tucker, B. (2012). The flipped classroom. *Education Next, 12*(1), 82-83.

Tucker, C. (2012). *Blended learning.* Thousand Oaks, CA: Corwin.

Yildirim, I., & Demİr, S. (2013). Use of technology assisted mathematics education and
alternative measurement together. *Cukurova University Faculty of Education Journal,
42*(1), 65-73.

Appendix A

The flipped classroom: How is the in-class time used as a result of implementing a flipped classroom?

Dear Educator,

The Department of Education, Leadership, and Policy Studies at the University of Kansas supports the practice of protection for human subjects participating in research. The following information is provided for you to decide whether you wish to participate in the present study. You may refuse to sign this form and not participate in this study. However, if you refuse to sign, you cannot participate in this study. You should be aware that even if you agree to participate, you are free to withdraw at any time. If you do withdraw from this study, it will not affect your relationship with this unit, the services it may provide to you, or the University of Kansas.

As technology continues to revolutionize our world, schools must look to embrace these changes and understand that the integration of technology is an important process for students. One example of implementing technology into the classroom setting is called the flipped classroom. Jonathan Bergmann and Aaron Sams officially defined this new approach as the typical lecture and homework elements of a course being reversed. In order to learn more about this instructional method, I am looking for individuals like you, who have had some experience with this approach, and are willing to take part in a research study looking at the in-class time of a flipped classroom.

Would you be willing to share your insights and experiences with me through interviews and classroom observations during the Spring 2018 school year? With your permission, the interviews will be audio recorded and transcribed for later analysis. While the observations will not be digitally recorded, I will be taking detailed notes of the activities and involvement of the instructor and students during the in-class time. I will store all data collected during the study in a secure, password protected computer and/or iPad device. Responses shared during the interviews, and collected during classroom observations, will be treated in a confidential manner. Your name will not be associated in any publication or presentation with the information collected about you or with the research findings from this study. Instead, I will use a study number or a pseudonym rather than your name. Your identifiable information will not be shared for any reason unless a) it is required by law or university policy, and b) you give written permission.

Involvement in the study should pose no risks as there are no right or wrong answers— I just want to see and hear your thoughts and experiences with implementing the flipped classroom model.

The information gathered from this study will be shared with the participating teachers in this study, along with other mathematics teachers in the district, teachers of all content areas, administrators at both building and district levels, and members of the curriculum and instruction department at the district level who show interest in the results. The promotion of more training and professional development with the flipped classroom model would be an anticipated benefit

of this research. This study will also help to fill the gap of the how the in-class time is used within the flipped classroom model.

You will not be paid for your participation in this research study.

You may withdraw your consent to participate in this study at any time. You also have the right to cancel your permission to use and disclose further information collected about you, in writing, at any time, by sending your written request to: Department of Educational Leadership and Policy Studies, Joseph R. Pearson Hall, Rm. 421, 1122 West Campus Rd. Lawrence, Kansas 66045-3101

If you cancel permission to use your information, the researchers will stop collecting additional information about you. However, the research team may use and disclose information that was gathered before they received your cancellation, as described above.

Thank you in advance for your willingness to participate in this study. If you have any questions or concerns, please feel free to contact the researcher, or faculty supervisor, at the contact information listed below.

_____
I have read this Consent and Authorization form. I have had the opportunity to ask, and I have received answers to, any questions I had regarding the study. I understand that if I have any additional questions about my rights as a research participant, I may call (785) 864-7429 or (785) 864-7385, write the Human Research Protection Program (HRPP), University of Kansas, 2385 Irving Hill Road, Lawrence, Kansas 66045-7568, or email irb@ku.edu.

I agree to take part in this study as a research participant. By my signature I affirm that I am at least 18 years old and that I have received a copy of this Consent and Authorization form.
_____

_____   _____
Print Participant's Name   Date

_____   _____
Signature of Participant   Date

Researcher Contact Information

Laura Brogdon   Dr. Jennifer Ng
Principal Investigator   Faculty Supervisor
ELPS Doctoral Student   ELPS Department
8925 Craig Drive   1122 West Campus Road
Overland Park, KS 66212   University of Kansas
(913) 530-6223   Lawrence, KS 66045
LauraBrogdon16@gmail.com   (785) 864-9660
                                                 jcng@ku.edu

Appendix B

Initial Interview Protocol

Name: _____ **Date:** _____

Purpose: To gain knowledge and understanding of instructor's background and teaching style with flipped and non-flipped instruction, goals for implementation of a flipped classroom, and strategies and techniques within the instructor's flipped classroom.

1) Tell me about your background in education, and your initial implementation of the flipped classroom model.
- How long have you taught?
- What subjects/contents have you taught?
- How long have you taught using the flipped classroom?
- What made you switch from a non-flipped to a flipped style of instruction?

2) What are your goals for instruction when implementing the flipped classroom model?
- What are your goals for your students when using the flipped model?
- What are your goals for the in-class time when using the flipped model?

3) Can you describe your implementation strategies and techniques with this method?
- How do you create/record videos?
- How do you share videos with the students?
- How do you communicate with the students about videos and/or classroom activities?
- Describe for me a typical in-class session?

4) Are there any other comments that you would like to make about the flipped classroom approach?

Appendix C

Plan for Classroom Observation
Pre-Observation Form
Please fill in the following information as much as possible. Also, please provide any handouts AND videos associated with the lesson to be observed.

Teacher Name:

Date of Observation:

Topic/Standard/I-can Statement:
This does not have to be anything formal, just a general idea will do.

Beginning

| |
| |

Middle

| |
| |

End

| |
| |

Additional Comments:

Appendix D

Reflection from Classroom Observation
Post-Observation Form

Teacher Name:

Date of Observation:

What do you think went well?

If you could go back in time, what would you change about the lesson?

Other comments

Flipped Classroom Observations

Date:	
Teacher:	
Lesson:	

Before class

Goal: Lecture/content recorded on a video for students to watch so that the central concepts of the lesson can be more fully explored the next day. Content available all the time = convenience. Students have the ability to pause, rewind, replay, fast-forward
Notes:

Classroom Design

During class

Teacher look-for's with Flipped Classroom	1) <u>Relationships</u>: teachers should interact with students, hopefully every student, during the class period. This is beneficial to the social/emotional growth of the students. 2) <u>Differentiation</u>: teachers have the ability to deliver activities for students to better understand and practice material at their varying ability levels. Higher achievers should be presented with more challenging material to take thinking to a higher level and struggling students should be provided with 1-1 support from teacher or student peer. 3) <u>Instructional Practices</u>: teachers have the ability to design problem-based practice, cross-curricular innovations, or use a multitude of different instructional practices including working in small groups, working in large groups, hands-on activities, projects, team challenges, etc. 4) <u>Time</u>: teacher has time to act as a facilitator and observe, help, prod, inspire, encourage, and support students. 5) <u>Assessment</u>: Formatively asses student learning individually, every day, and adjust activities or groups as needed.
Student look-for's with Flipped Classroom	1) <u>Individualized Learning</u>: students have the ability to work through problems and improve knowledge of concepts with teacher assistance 2) <u>Collaborative Learning</u>: working with peers gives students additional perspective and support for different levels of learning 3) <u>Engagement</u>: students should have increased engagement because they are an active participant in the learning and being afforded the assistance and relationship from the teacher. 4) <u>Motivation</u>: students should have increased motivation because they have choices in the learning and have consistent contact with the teacher.
Time	Notes:

Time	Notes

Time	Notes

Appendix F

Final Interview Protocol

Name: _____ **Date:** _____

Purpose: To gain knowledge and understanding of instructor's experiences with implementing the flipped classroom during the third quarter. Teachers should reflect on the questions and answers from the initial interview and speak to the successes and struggles they have experienced from implementing the instructional model.

According to the goals that you set at the beginning of the semester, how do you feel about using the flipped classroom?
- Successes
- Challenges
- Videos
- In-class time