A Dissertation

entitled

Caring in a Flipped Mathematics Classroom

by

Kendra R. Dafoe

Submitted to the Graduate Faculty as partial fulfillment of the requirements for the

Doctor of Philosophy Degree in Curriculum and Instruction

______________________________
Dr. Leigh Chiarelott, Ph. D., Committee Chair

______________________________
Dr. Debra Johanning, Ph. D., Committee Member

______________________________
Dr. Judy Lambert, Ph. D., Committee Member

______________________________
Dr. Mark Templin, Ph. D., Committee Member

______________________________
Dr. Amanda Bryant-Friedrich, Ph. D., Dean
College of Graduate Studies

The University of Toledo

December, 2016
An Abstract of

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The purpose of this qualitative research was to use a case study methodology to
explore how the flipped mathematics classroom enables teachers to develop a caring
relationship with their student’s in order to foster students’ cognitive, emotional and
behavioral engagement. There has been very little research on the affective domain of a
flipped classroom. Understanding how teachers create and maintain a caring relationship
with students in a flipped classroom is vital to understanding the learning that occurs in
this setting. It was also imperative to understand a student’s perspective to validate
whether or not a caring relationship exists. Data were collected from two teachers and
six students through interviews, journals, and descriptive field notes from classroom
observations. Five categories emerged from the data that contain the results of this study:
(a) teachers’ perceptions of creating a relationship in a flipped mathematics classroom,
(b) teachers creating and maintaining relationships in a flipped mathematics classroom,
(c) students’ view of the teacher-student relationship in a flipped mathematics classroom,
(d) teachers’ view of cognitive, emotional, and behavioral engagement in a flipped
mathematics classroom, (e) students’ view of cognitive, emotional, and behavioral
engagement in a flipped mathematics classroom.
Dedication

Thank you to all of the people who knew I could accomplish this. The first person I met when thinking about this process was Dr. Leigh Chiarelott. He’s what every teacher, human being should strive to be. He encouraged me every step of the way and made this daunting process seem achievable!

But, I also couldn’t have done this without my family. To my husband who spent a lot of hours taking care of mom stuff! To my own mom who deserves half of this doctorate degree. For all the dinners she made, articles she proofread, and games of Monopoly or Right, Left, Center she played with the boys!

Finally, to the three little guys who were little when I started this! Brendan is now almost taking drivers ed, Drew is a 7th grader, and Tyler is my strong headed, but lovable 9 year old. Thank you for running into my room and asking “what page are you on?” or just saying “good job, mom!” I hope you all three can see that if you put in hard work and perseverance, anything can happen!
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Chapter One

Introduction

The importance of close, caring teacher-student relationships is important for students’ academic self-perceptions, school engagement, motivation, learning, and performance (Pianta, Hamre, & Allen, 2012). Academic knowledge and skills are important to developing children’s minds. However, because of the demands of accountability and testing now affecting the American education system, opportunities and time are rare to develop meaningful, caring relationships between teachers and their students. As a result, we are losing the chance for children to become emotionally healthy, well rounded, and productive citizens. There is a sense of urgency to create an opportunity for caring relationships because of the many issues facing students today. Research has shown that 80% of students feel good about themselves when entering school, but only 20% continue this feeling after the fifth grade (Opalewski & Unkovich, 2011). In addition, not only do nearly 62% of adolescents claim that suicide is a common thought to them, but suicide has increased 124% in the 10-14 age group in the last ten years. Finally, the high school dropout rate at the end of 2007-2008 was 20% and rose another 5% in the year 2010 (Opalewski & Unkovich, 2011).

According to Arum (2011), the relationship between the teacher and students has been overlooked and underdeveloped even though it has a major factor in changing student outcomes. While there have been numerous reform movements throughout the decades, nearly all of them have focused on formal curriculum or the professional development among educators, ignoring the affective domain of teaching. Caring teachers have shown to be a contributor to higher levels of student engagement (Brewster
& Bowen, 2004). According to Ito and Smith (2006), a positive school climate where students feel secure, respected, nurtured, and supported was the single best predictor of school satisfaction. Martin and Downson (2009) stated teachers who enjoyed teaching in their content area, respected students, involved students in decision making, and cared about students, raised the engagement levels of students. Engaging students has shown to lower drop-out rates and increase levels of achievement among secondary students. Therefore, it is important to understand the characteristics necessary for students to experience caring in the classroom that has the potential to lead to student engagement. Martin and Downson (2009) claim that “positive relationships with significant others are cornerstones of young people’s capacity to function effectively in social, affective, and academic domains” (p. 351).

Nel Noddings has been a proponent of developing caring relationships between teachers and their students. Her primary philosophy from an educational standpoint is that of caring. Noddings stresses the importance of not only knowing good, but doing it. Her effort is grounded in the works of John Dewey to expand ethical and moral education, promote the needs and interests of students, and to educate the whole child. She emphasized that we should want our children to develop intellectually, morally, socially, emotionally, artistically, and spiritually (Noddings, 2007). While her research is rooted in the feminist ideal of caring, needs, and relationships, according to Bergman (2004) “she is no gender essentialist” (p. 151). Noddings believes that caring people in caring communities can create an environment where people are able to fully develop and express themselves.
*Stand and Deliver* is a well known movie based on the true story of a mathematics teacher who successfully inspired underprivileged students to pass an advanced placement calculus test, despite many obstacles in their lives. The teacher, Jaime Escalante, demonstrates how a caring teacher can have an impact on his or her students. Escalante must have been a believer in Edward Thorndike’s theory of connectionism. As part of Thorndike’s connectionism theory, he maintained “the attitudes and abilities of learners could change (and improve) over time through proper stimuli, instructional experiences could be designed and controlled, and it was important to select appropriate stimuli or learning experience that were integrated and consistent – and that reinforced each other” (Ornstein and Hunkins, 2004, p. 101). Escalante was able to change the attitudes and beliefs of his students through proper stimuli. Simply put, he showed these students that he was committed and cared about them! He made connections with his students through humor, sometimes embarrassment, but usually through caring. These were characteristics other teachers in the Los Angeles school district weren’t willing to invest in because they did not believe these students could be successful.

As a secondary teacher for twenty years, I have met many students who feel that *who* they are and *what* they want to become does not matter to teachers and schools. We require our students to fit into a restrictive school structure, culture, and curriculum. As a result, students are disinterested, unmotivated, disengaged and not given the opportunity to develop caring relationships with their teachers. In this dissertation, I will define the flipped classroom and research that shows how this teaching method presents opportunities to provide an environment where a caring relationship can be created between students and teachers. Interviews and data collection including participant
observations from students and teachers in a flipped mathematics program will be conducted.

Statement of Problem

*A Nation at Risk* was published in 1983 and generated recommendations for mathematics education reform as well as laid the groundwork for standards-based reform. Nearly twenty years later in 2002, *No Child Left Behind* (NCLB) was enacted and it came with a new definition of school reform. This was a turning point for the standards movement. Up until this point, academics standards were set to raise the quality of instruction, but now the focus turned to the testing movement and accountability. Despite *A Nation at Risk* not being a legal mandate, NCLB was a federal law. Any school district that chose not to follow the new rules risked losing funding (Ravitch, 2010). Under NCLB, students were to be tested in math and reading annually in grades three through eight, and at least once in high school. Every school was expected to make adequate yearly progress (AYP) starting in 2001-02, reaching 100% proficiency in 2013-14 (Noddings, 2007). The testing and accountability movement thus began.

According to Jennings (2012) the standards and testing movements brought many positive things. There were now clearer expectations for what should be learned in school. It also promoted equity among students by requiring the same academic expectations for all students. This ultimately had good intentions of narrowing the achievement gap between various groups of students. However, all results were not constructive outcomes. Elementary teachers began spending large portions of classroom time on reading and math. As a result, other subjects such as history, science, the arts, and sometimes even recess, were put aside (Ravitch, 2010). Another major disadvantage is with all of the expectations there was only one way to measure success: tests. Educators clearly understood the repercussions if their students did not pass the state
accountability tests. Schools that did not pass would be labeled as “failing.” Consequently, because of the penalties prescribed by NCLB, a school may fail to make Adequate Yearly Progress (Jennings, 2012). As a result, many teachers began “teaching to the test” (Noddings, 2013, p. 145).

Tests are necessary and helpful. But tests must be supplemented by human judgment. When we define what matters in education only by what we can measure, we are in serious trouble. When that happens, we tend to forget that schools are responsible for shaping character, developing sound minds in healthy bodies, and forming citizens for our democracy, not just for teaching basic skills. We even forget to reflect on what we mean when we speak of a good education. Surely we have more in mind than just bare literacy and numeracy. And when we use the results of tests, with all their limitations, as a routine means to fire educators, hand out bonuses, and close schools, then we distort the purpose of schooling altogether. (Ravitch, 2010, p. 167)

Under NCLB, states were held accountable for student proficiency, but they were also allowed to set their own bar for what "proficiency" meant. Many states intentionally lowered the bar to avoid consequences under NCLB. During the NCLB era as well as the decades leading up to it, each of the 50 states had its own standards and tests. Despite having the National Council Teacher of Mathematics (NCTM) standards, some paid attention to thinking mathematically while other states focused on rote memorization and low-level skills (Noddings, 2013).

The movement to standardize the U.S. mathematics curriculum led to the 2009
Common Core State Standards Initiative (CCSSI). The authors of the Common Core State Standards (CCSS) developed the standards based on research regarding the teaching and learning of mathematics as well as standards and curricular frameworks of high-performing states in the United States and countries around the world (Dingman, Teuscher, Newton, & Kasmer, 2013). Proponents of the CCSS believed in order to prepare our students for college, careers, or even globally, we needed to have a consistent curriculum (Schoenfeld, 2014). Proponents included people like Bill Gates who poured millions of dollars into the groups that wrote the Common Core standards (Ravitch, 2010).

With the focus on accountability, standards, and testing, it is understandable that teachers feel obligated to focus their attention on the cognitive requirements placed on their students. After all, the penalties of underperforming on standardized assessments as mandated by local, state, and federal officials can be very high. However, concentrating on a standards-based reform, validated by test scores, has not been successful. According to the National Center for Education Statistics (NCES), the results from both 2009 and 2011 have shown achievement gaps continue to exist among students. In addition, the Program for International Student Assessment (PISA), coordinated by the Organization for Economic Cooperation and Development (OECD), has measured the performance of 15-year-old students in mathematics, science, and reading literacy every 3 years since 2000. The most recent PISA results, from 2012, placed the U.S. 35th out of 64 countries in math and 27th in science. Among the 34 members of the Organization for Economic Cooperation and Development, which sponsors the PISA initiative, the U.S. ranked 27th in math and 20th in science (NCES, 2015).
The influence of the teacher’s relationship to the student is never mentioned by current government programs and policies. Instead, the government demands accountability, more testing, and stronger sanctions for poor performance. The pattern in our education system has always been to look for the “quick fix.” Over the past century, there have been numerous proposed programs in different content areas. In mathematics, specifically, we have been on a pendulum swinging back and forth between rote memorization to project based learning. However, as much as a strong, caring relationship between teachers and their students has shown to make a positive difference in student lives, cognitively and emotionally, it continues to be ignored by national and state lawmakers. According to Daggett and Jones (2014), students are more likely to make a personal commitment to engage in rigorous learning when they know that teachers, parents, and other students actually care about how well they do. Results based on the National Survey of Student Engagement (NSSE) annual report show engagement is the single greatest factor in student success in secondary, as well as post-secondary educational settings Yazzie-Mintz (2010). Schools need to become caring communities because “for too many young people, the home is no longer a place of security and love but a battleground where economic and emotional survival is a daily reality” (Wolfgram, 1995, p. 520).

In addition to the focus on accountability and testing, another dilemma with being able to concentrate on caring in the classroom is the current structure of our schools. Despite the importance of caring and student-teacher relationships in classrooms and schools, the current makeup in many schools offers minimal chances for students to experience a connection with their teachers. Both the structure and climate of secondary
schools can create obstacles to the development of caring teacher–student relationships. At the secondary level, students begin to experience interactions with multiple teachers who teach different subjects and are expected to transition from one classroom to another each day. Such a structure does not allow for much feasible contact between any one teacher and his or her students. Furthermore, curriculum at the secondary level requires more time demands on students (Mercer & Pullen, 2005). Additionally, a much greater emphasis is placed on academic achievement compared to social and emotional development (Rathunde & Csikszentmihalyi, 2005).

In an ethnographic study of caring among young students in a second-grade classroom, Noblit (1993) noted students’ need to connect with their teacher as a priority. The problem with the forming of relationships is described as: “There is an insatiable demand for attention and connection, and in some ways every decision to connect with one child is a decision to not connect with another” (p. 33). Noblit (1993) adds,

If such tradeoffs are experienced in the small, self-contained classrooms of second grade, then the high school teacher’s inability to establish connections with the ever-rotating series of students coming through their classroom in a school day is even more distressing. (p. 33)

The rigid nature of secondary schools can suppress the development of a positive, caring relationship among teachers and students that can ultimately discourage students’ desire to learn and attend school. In order to focus of caring in a flipped classroom, it is important to research the opportunities for a caring relationship that a flipped classroom affords a teacher and his or her students.
Defining the Flipped Classroom

The term “flipping” or “flipped” the classroom has become widespread and common terminology among education. In 2006 Jonathon Bergmann and Aaron Sams, science teachers at Woodland Park High School in Woodland, Colorado, began to use screencasting technology as an educational tool to deliver instruction to students who missed class (Kachka, 2012). They soon realized that these videos can be used for all students to view the lesson outside of class, allowing more time for students who need assistance when working on homework. They felt that class time should be spent on learning rather than teaching (Sams, 2011). An increasing number of teachers have been turning to “flipping” their classrooms to differentiate instruction, achieve mastery learning and to have greater class time to address individual student needs. Not everyone agrees this is satisfactory.

It is important to define what is meant by the flipped classroom as well as how the flipped mathematics curriculum at Summerfield High School is constructed. While there is no single model of the flipped classroom, the flipped classroom model is implemented by rotating on a fixed schedule between face-to-face teacher guided practice during the standard school day and online delivery of content from an outside location. It combines two essential components of education including the lecture and active learning. In class, the educator “guides students as they apply concepts and engage creatively in the subject matter” (Flipped Learning Network, 2014, p.1). The flipped classroom can be better understood by defining blended learning. Staker & Horn (2012) define blended learning as “a formal education program with face-to-face instruction, in which a student learns at least in part through online delivery of content and instruction, with some element of
student control over time, place, path, and/or place” (p. 3). More opportunities are created in the flipped classroom. Students have an opportunity to develop foundational knowledge before coming to class. During class time they can “…work together to solve local or global challenges – or other real-world applications – to gain a deeper understanding of the subject” (New Media Consortium, 2014, p. 36). According to Bergmann and Sams (2014),

Flipped learning is a pedagogical approach in which direct instruction moves from the group learning space to the individual space, and the resulting group space is transformed into a dynamic, interactive learning environment where the educator guides students as they apply concepts and engage creatively in the subject matter (p. 6).

This approach can vary from classroom to classroom, but there are similarities that are common amongst any form. In this review of literature, these parallels will be discussed including the students and teachers’ role, experiences of the student, the redesign of the school, and how these are all related to the four pillars of the flipped classroom.

There are four key pillars that comprise the framework of the flipped classroom. According to Flipped Learning Network (2014), for flipped learning to effectively occur, these four pillars must be applied as best practices. These four pillars of good practice include: (1) flexible environments; (2) learning culture; (3) intentional content; and (4) professional educator.

The first pillar discusses the idea of required flexible environments. Whereas a traditional secondary mathematics classroom may find rows more conducive to learning
when the teacher is lecturing, the flipped classroom is more favorable to students working in groups or pods. A classroom needs to remain flexible so that a teacher can maneuver easily around a classroom and work within these pods, or conference with a student away from noise. In a flipped classroom, it is expected that students are not quiet, as in a traditional lecture format. Students are working with one another, asking questions, and the environment may be chaotic or noisy (Hamden, McKnight, McKnight, & Arfstrom, 2013). Teachers are not only flexible with their environments in terms of logistics, but also flexible with student performance. “Educators who flip their classes are flexible in their expectations of student timelines for learning and how students are assessed” (Flipped Learning Network, 2014, p. 5).

Regardless of the style of the flipped classroom, the role between teacher and student is reversed. Bennett (2012) states the teacher is no longer the center of attention. The environment created by the flipped classroom is one that is supportive where students are encouraged to ask questions and work together to uphold their solutions. Teachers focus on spending time to address individual needs. Students are not thought of as inferior or secondary, but instead are a main component of the learning process. Students are changed from passive listeners to active learners.

The second pillar of flipped learning requires a shift in the learning culture. The teacher no longer spends an extensive amount of time in front of the classroom giving direct instruction or lecturing at the student. Instead, he or she now becomes part of the learning process with the students. The teacher must feel comfortable in the role as guiding instead of being the sole distributor of information. “In the flipped learning model, there is a deliberate shift from a teacher-centered classroom to a student-centered
approach, where in-class time is meant for exploring topics in greater depth and creating richer learning opportunities” (The Flipped Learning Network, 2013, p. 5).

According to Bergmann and Sams (2014), the teacher is not standing in front of the room, but circulating and having conversation with every student. Through these conversations, the teacher can provide immediate feedback or encouragement to the student, as well as provide one-on-one instruction if necessary. The teacher’s role is more of a facilitator than instructor. The students are active participants in the learning process. The teacher helps to guide the students, manage their activities, and direct their learning. In this student-centered type of atmosphere, the teacher is a member of the class as a participant in the learning process (Jones, 2007, p. 2). In an example provided by Fulton (2012), a pre-calculus teacher in a flipped mathematics classroom moves from student to student between the classroom pods in order to determine which students need help. He listens to students and watches them, analyzing each situation and establishes a plan to help individual students. However, if he notices that enough students are having difficulty on one specific area, he may work through more examples as a group. The type of feedback that this mathematics teacher can provide his students is instantaneous which can allow for group discussion and peer instruction. This will help to target and revise instruction on concepts that students find difficult (Fulton, 2012). Bergmann and Sams (2013) state,

There is something about getting the teacher away from the front of the room that changes the dynamic in a flipped classroom. Moving the attention away from the teacher and onto the individual learner allows the teacher to know her students better than ever before, both cognitively and personally. When teachers are in
among their students, conversing with them and listening to them, teachers get to
know their students’ struggles with content and can lead them to the place of the
aha moment! As teachers are interacting more closely with students, they get to
know them more as individuals. Teachers learn of their struggles, their hopes, and
their fears. Teachers are able to develop a mentoring relationship with students
and are able to know them more, and thus teachers have more opportunities to
care for them and reach out to them in their times of need. (p. 25)

At the core of flipped learning is individualized learning. “Flipped learning is
fundamentally learner centric” (Bergmann & Sams, 2014, p. 7). This occurs because
students are given choices on which activities they want to work through. The teacher
can help tailor that path to the strengths and weaknesses of each student or group
(Bennett, 2012). A teacher is not sitting at his or her desk watching students watch
videos of their taped lectures, or watching the students work together in groups. Instead,
the teacher has the time and opportunity to work one on one or with a small group of
students who may be struggling. In every classroom, there are students who struggle
with a concept more than others. Because homework can be done in the classroom rather
than at home, a student can ask for help when they are having difficulties, instead of
waiting until the next time they have class (Jenkins, 2012).

In fact, the growing amount of teacher-student interaction during class time is one
of the main reasons the flipped classroom has been successful (Kachka, 2012). In
addition, according to Liles (2012), because students are able to access the lessons at their
convenience, those who have learning problems, especially reading difficulties, are able
to learn at their own pace. Students are less frustrated in this environment. In the
traditional classroom, students are expected to complete their independent practice outside of the class. If they are not clear on how to complete this, work may be left unfinished. The flipped classroom allows students to work on the practice during class and allows them time to ask questions, thus reducing frustration levels. Students are more eager to continue to work if they are less frustrated (Krueger, 2012).

The third pillar of flipped learning is that it requires intentional content. Intentional content refers to an educator’s informed judgment on what information should be conveyed through direct lecture. “Educators use intentional content to maximize classroom time in order to adopt methods of student-centered, active learning strategies, depending on grade level and subject matter” (Bergmann & Sams, 2013, p. 2). A trained educator in his or her field of study will know the important parts of a concept that can be explained through a video lecture, as compared to ideas that are better learned through discovery or self-actualization. Using videos or technology is not the purpose of the flipped classroom. The technology is used as a tool to support the curriculum in order to allow opportunities for active learning strategies, peer instruction, problem-based learning, or mastery of the material.

The final pillar of the flipped classroom requires professional educators. It has been mentioned that the flipped classroom is a student-centered environment, where students are able to work at their own pace and teachers can differentiate instruction. While it may seem that the teacher is being replaced, the exact opposite is true. Through the flipped approach, a teacher’s expertise and teaching style are key elements (Hamden et al., 2013). In fact, in a flipped classroom, the teacher is demanded even more than in a traditional one. One of the main advantages to the flipped classroom is the one-on-one
interaction that can occur between student and teacher. The teacher must establish when and how to move direct instruction from the group to the individual learning space, and determine how to maximize the individual experiences between a teacher and student.

Jenkins (2012) states the biggest disadvantage to the flipped classroom is not every student has access to the technology that is required. Some students who are from lower income families do not have access to the internet and would have to find alternatives to watching the podcast from the convenience of their own home. She argues that having personal access to technology is imperative for the flipped classroom to be successful. One of the main components of the flipped classroom is that students can learn on their own time and in their own way.

Besides not having access to technology, there are a variety of other reasons some teachers are choosing not to flip the classroom. Because students are learning at their own pace, there is a strong dependence on student motivation. Collaboration is an imperative part of the flipped classroom; therefore students are generally grouped together so that peer learning can occur. Some students who are not as motivated as others will tend to get less accomplished. The flipped classroom may allow students to slow down their engagement of classroom material. This casual atmosphere also lends to difficulties when the teacher needs students at a specific level in order to be introduce a new concept. If a teacher needs to introduce a new lesson and some students do not have the pre-requisites, the new learning will be difficult to achieve. Lastly, critics of the flipped classroom have stated that it is difficult to assess students. In the traditional classroom, every student takes the test at the same time. However, if students are
working at their own pace, it poses a problem that they will all need to be tested at different times (Jenkins, 2012).

The flipped classroom leads to the redesign of the school, a redesign that is necessary if we want caring relationships to develop between teachers and their students. Students are changing. The students of today are growing up in a world very different than the one that existed ten years ago. They are growing up with social media, information at their fingertips, and technology that continues to change. The way educators were taught is not necessarily the way they should be teaching students.

Schools need to be redesigned. We need to become a place where learning is supported rather than a place where content is simply delivered from one to all (Bennett, 2012). Flipping the classroom is one way that provides this opportunity.

**Purpose of the Study**

The purpose of this research is to explore how the flipped classroom enables teachers to develop a caring relationship with their student’s in order to foster students’ cognitive, emotional and behavioral engagement. According to Glesne (2011), “You tap into your subjectivity, of which passion is a part, to find topics appropriate to your interests” (p. 29). I am very passionate about the flipped classroom approach and how this classroom setting can provide an environment where a caring relationship can develop between teachers and their students. Approximately five years ago, I transformed the mathematics curriculum at Summerfield Schools and flipped the program including Algebra 1, Geometry, and Algebra 2.

An increasing number of teachers have turned to “flipping” their classrooms to decrease the focus of rote instruction and modify the learning experience by creating
student-centered learning. When students are given the tools they need to explore and examine material away from the class, they come to class more prepared to contribute to discussions and group activities. The teacher is no longer the center of attention or sole distributer of the lesson, but rather a facilitator who now can use class time to develop relationships with their students. Relationships based on care, which can possibly lead to student engagement.

**Significance of the Study**

It was surprising to hear from Noddings, a former mathematics teacher, that she believes our society does not need to make its children first in the world in mathematics and science. Instead, she contends that our focus should be on caring for our children in order to reduce violence, ensure a place for every child and emerging adult in the economic and social world, to produce people who can care competently for their own families, and can contribute to their communities (Noddings, 2002). Noddings (2005) explains,

> On a given day, most students in any class have watched murder, assault, love-making, war-making, and/or competitive sports on television the previous night. For many, especially at the secondary level, their classrooms are located in large schools, 1,200-2,000 students, and sometimes more. Teachers in these schools often cannot distinguish students from strangers on campus. In some such schools there are security guards and rigid rules about entering and leaving the campus. It is not surprising that the single greatest complaint of students in these schools is, “They don’t care” (p. 2).
Although it is unlikely for a curriculum to be centered around the notion of care, especially in today’s world of accountability and testing, Noddings argues that caring needs to find a way into subject matter because of the record levels of violence facing school children today (DeVitis & Yu, 2011). She argues that if a school is going to achieve its academic goals, then it must play a major role in raising healthy, competent, and happy children by providing caring and continuity for students (Noddings, 2005). The notion of caring is not just about expressing concern for students, but developing a relationship with them. Teachers may “feel” like they are caring for their students, but the students may not reciprocate these feelings. Teachers not only have to create caring relations, but they also have a responsibility to help their students develop the capacity to care. This capacity is difficult to achieve when adolescents are trying to find their place in the world. According to Noddings (2005), “For adolescents these are among the most pressing questions: Who am I? What kind of person will I be? Who will love me? How do others see me? Yet our schools spend more time on the quadratic formula than on any of these existential questions” (p. 20).

In order for themes of care to be integrated into our schools, an alternative curriculum is necessary where student interests and capacities are the center of attention (Noddings, 2005). “We see it in the insistence that all students study algebra and geometry but not parenting, even though most of us become parents and relatively few use algebra” (Noddings, 2003, p. 11). Researching the role of the flipped classroom and how it can provide an avenue for caring relationships to develop is significant in that it can be an alternative to the traditional mathematics classroom, thus allowing for caring

Studying caring in the classroom and how it relates to academic engagement is also important due to the external constraints currently affecting classrooms. Financially, public schools are suffering. In addition, there are a surplus of reform initiatives and band-aid fixes that continue to hover over teachers. These reasons, in addition to local issues within schools, have amounted to an increased demand on teachers, including increased class sizes. In these challenging circumstances, it is even more important that today’s teachers have tools for improving relationships and engagement in the classroom (Rushton & Juola-Rushton, 2008).

Research has shown that when a caring relationship is developed between a teacher and his or her students, the opportunity for engagement increases. Long-term, student engagement is a predictor of student learning and achievement, retention and graduation from high school, and entry into and success in college (Fredricks, Blumenfeld, & Paris, 2004). Student engagement is an important product of the classroom that is valuable to both teachers and students. Without student engagement, it is difficult for students’ to enjoy their classes. When students are engaged, they are able to cope with the challenges of schoolwork (Martin & Marsh, 2009). Engagement has been researched for decades because of its importance to the classroom. It is also extremely critical to study because engagement has shown to decline throughout a student’s academic career, with the greatest decline occurring within the transition from middle school to high school (Wigfield, Eccles, Schiefele, Roeser, & Davis-Kean, 2006). Noddings’ work has changed my view of knowledge creation and dissemination,
teaching, and learning by validating that a caring relationship between a teacher and student is the most important component of education. Therefore, the following research questions were examined.

**Research Questions**

The first purpose of this study was to identify the opportunities for a caring relationship that a flipped classroom affords a teacher and his or her students. Specific attention was given to the perceptions of caring in the classroom as experienced by classroom teachers in a flipped mathematics environment. However, because research has shown that what a teacher interprets as caring may be different than a students’ perception, a focus was also placed on a students’ viewpoint. The second focus investigated whether or not these affordances affected the cognitive, behavioral, or emotional engagement of students.

Two specific questions guided this study:

1. What opportunities for a caring relationship does the flipped classroom afford a teacher and his or her students?

2. To what extent do these experiences shape the cognitive, behavioral, or emotional engagement of students?

**Definition of Terms**

**Care (Caring)** - as described by Noddings “is a way of being in relation, not a set of specific behaviors” (Noddings, 2005, p. 17). Due to her definition being primarily relational, Noddings uses the term caring relation interchangeably with the term care or caring. Noddings states that a caring relation “is, in its most basic form, a connection or encounter between two human beings-a carer and a recipient of care, or cared-for. In
order for the relation to be properly called caring, both parties must contribute to it in characteristic ways” (Noddings, 2005, p. 15). In addition, Stronge conveys caring as a broad term and that its characteristics include more than just knowing the students but includes teacher attributes such as “listening, gentleness, understanding, knowledge of students as individuals, warmth and encouragement, and overall love for children” (Stronge, 2002, p. 14).

Behavioral/Social engagement - Social or behavioral engagement involves student levels of conduct, persistence, and participation in school activities. Participation in school activities includes those activities in and out of the classroom that are sponsored by the school (Fredricks et al., 2004).

Cognitive engagement - This dimension of engagement involves the thoughtfulness and willingness students have to comprehend complex ideas and master difficult skills. It includes student investment in problem solving, work styles, perceptions of success or failure and the preference for challenge (Fredricks et al., 2004).

Emotional engagement - This dimension of engagement includes student reactions to teachers, classmates, academics and school; it also involves the student’s willingness to work in the learning environment (Fredricks et al., 2004).

Flipped Classroom - a model used for classroom-based courses, in which lecture no longer takes place during class time. Instead, course content is shared online, allowing for a more interactive and participatory experience in the classroom. Course videos were created by the instructor. Students were not expected to search for videos relevant to the material. They were also not exposed to videos created by other instructors.
Organization of the Study

Chapter I began with an introduction of the importance of a close, caring teacher-student relationship. Chapter I is organized into the following areas: Introduction, Statement of Problem, Purpose of the Study, Significance of the Study, Research Questions, Limitation and Delimitations of the Study, and Definition of Terms.

Chapter II summarizes a review of the research and literature. Included in this chapter is the research and literature regarding the specific topic under study including the theoretical framework, the importance of teacher caring, teachers’ perceptions of caring, students’ perceptions of caring, defining student engagement, and defining the flipped classroom.

Chapter III describes the assumptions and rationale for a qualitative study, including the type of design and role of the researcher, setting and participant selection procedures, informed consent and permission procedures, data collection methods, explanation of interview questions, data collection procedures, data analysis strategies, and trustworthiness features. Subheadings also included in this section include validity, rapport, and subjectivity.

Chapter IV includes a detailed analysis of the data collected, the nature of the study, the interview questions, and the results of the observations, interviews, and journals.

Chapter V summarizes this study and includes a discussion of the data. It also includes recommendations for future research, limitations, and implications. Following this chapter is a list of references and appendixes.
Chapter Two

Research and Literature Review

Teacher-student relationships are at the heart of learning. “Strong nurturing relationships support youth, engage them in learning, and focus them on positive thinking and behaviors” (Scales & Taccogna, 2000, p. 74). Research has shown that teachers’ caring behaviors significantly influence students’ behavior, education, motivation, education, and engagement. Continued research on caring in the flipped classroom, including teachers’ and students’ perceptions, could influence a school to make the necessary changes to improve the educational environment.

When we bridge the gaps and connect with our students—when we manage our classroom with heart—we move closer to the vision of the teacher we want to be and the classroom we want to have. Once students know what we care about them, that we are on their team, they will learn any grammar rule and read any book. (Ridnouer, 2006, p. 10)

In order to effectively review, summarize, and present the relevant literature, this chapter is divided into six sections. The first section begins with a review of the theoretical framework for the influence of teachers’ caring behavior. This section will also address the definitions of caring. The second section will address the importance or influence of teacher caring. The third section reviews literature on teachers’ perceptions of caring, while the fourth section discusses literature on students’ perceptions of caring teachers. Defining what is meant by engagement is important, and therefore explained in the fifth portion. Finally, the last section identifies studies that are related to caring behaviors of teachers and how this affects student motivation and grades.
Theoretical Framework

Interpersonal relationships and students’ perceptions of teachers’ behavior in the classroom are important determinants for student engagement. Therefore, the underlying framework for this study is based on the theory of caring by Nel Noddings. The theory of caring as defined by Noddings provides a conceptual framework for this study’s investigation of the influence of teachers’ caring behavior in a mathematics flipped classroom on students’ engagement. The theory of caring offers a framework for understanding the social interactions involved in caring relationships. Noddings is internationally known across many professional fields for her contribution to the ethics of care. Almost every one of her writings involves the topic of care and teaching. Noddings (1995a) argues her educational philosophy to be a marriage between care, relationships, and academics.

A child’s place in our hearts and lives should not depend on his or her academic prowess. Lots of young people see through today’s educational slogans. We preach constantly that ‘all children can learn’; we even suggest strongly that they all can learn anything the school has to offer if they are taught well and they try. If they don’t try, they are made to feel like traitors, even though they might work very hard at tasks over which they have some control and choice. Thus, despite our determined optimism and insistent everyone-can-do-it, students complain, ‘They don’t care!’ They suspect that we want their success for our own purposes, to advance our own records, and too often they are right. (p.13)

Educators are given the opportunity to have caring encounters with their students on a daily basis. However, it is very easy to avoid these situations by overusing lecture
without discussion or by grading quantitatively and not providing feedback (Noddings, 1988). In order to successfully implement themes of care into any curriculum, it is important to understand how education can contribute to the moral life of students. Noddings describes the means of nurturing and ethical ideal through four components: modeling, dialogue, practice, and confirmation.

In education, modeling is not only important, but vital to an education based on care (Bergman, 2004). Educators need to show what it means to care through their own behavior. It is not enough to tell students how to care. The action must be genuinely demonstrated (Noddings, 2012a). Noddings (1988) stresses when teachers model caring they continue to be concerned with their students’ academic achievement, but also encourage self-affirmation. The teacher models worthy examples of intellectual activity, but also desirable ways of interacting with people. Students are treated with respect by teachers and are encouraged during the modeling stage to treat each other with respect as well. Finally, in order to encourage a nurturing environment during this piece, the educator uses teaching moments as caring occasions. These teaching moments should also include stories about caring that demonstrate how important caring is and how it is done (Lockwood, 1999). It is also important to not put too much emphasis on the modeling component of caring that we lose sight of the cared-for (Noddings, 1995a).

In addition to modeling what it means to care, educators must also engage students in dialogue about caring since caring can be displayed in very different ways. Dialogue is the most fundamental element of the care model because it is through this component that teachers and students consider each other’s perspectives, which leads to building trustworthy relationships. Mutual understanding is sought out by the teacher
and student (Noddings, 1988). Dialogue may not always give attention to the topic being discussed, but always involves awareness to the other participant (Noddings, 1995a). It is real conversation between participants, open-ended, and does not require a specific goal for the discussion (Lockwood, 1999). The participants must engage in interpersonal reasoning through the dialogue. According to Witherell and Noddings (1991),

In contrast to logico-mathematical reasoning that proceeds step by step according to a priori rules, interpersonal reasoning is open, flexible, and responsive. It is guided by an attitude that values the relationship of the reasoners over any particular outcome, and is marked by attachment and connection rather than separation and abstraction. (Witherell & Noddings, 1991, p. 158)

By having dialogue, we learn more about each other, which is needed to act effectively as carers and to contribute to growth of the cared-fors (Noddings, 2012b). Is a teacher showing care by having higher expectations and displaying a sense of toughness with them? Does a teacher show care by having strict behavioral rules? These topics can be discussed between the student and teacher through open and respectful dialogue in order to create a caring environment. In addition, effective dialogue will contribute to critical thinking skills by allowing different points of view and questioning these different perspectives (Lockwood, 1999). Engaging in open and respectful dialogue and critical thinking are all vital in building a caring classroom.

Besides modeling and dialogue, students must also have practice in caring. Opportunities for practice can occur through peer interaction. “In a classroom dedicated to caring, students are encouraged to support each other; opportunities for peer interaction are provided, and the quality of that interaction is as important (to both
teacher and students) as the academic outcomes” (Noddings, 1988, p. 223). Noddings also suggests using cooperative learning to promote competence in caring as well. While the aim of cooperative work in schools is usually for academic learning, it can also be used to support practice of care (Noddings, 1995a).

Students can also extend into the community in order to practice caring with other people such as the school’s custodians, groundskeeper or kitchen staff (Bergman, 2004). “Children need to participate in caring with adult models who show them how to care, talk with them about the difficulties and rewards of such work, and demonstrate in their own work that caring is important” (Noddings, 2012a, p. 239). Some high schools have started to require community service as a means of giving their students practice in caring. However, like the classroom, just because a student is required to spend these hours in service activities may not mean they are taking part in demonstrating caring. They will need to be placed so that they have an interest in the community to which they should care for.

Finally, the confirmation component of moral education is what distinguishes it from other forms of moral education. “To confirm others is to bring out the best in them” (Noddings, 1995a, p. 316). Through the confirmation component we are able to identify a better self by assisting students in the construction of their ethical ideal. As adults, educators have the experience to value ethical strengths and to encourage those that are appropriate (Noddings, 1988).

When we attribute the best possible motive consonant with reality to the cared-for, we confirm him; that is, we reveal to him an attainable image of himself that is lovelier than that manifested in his present acts. In an important sense, we
embrace him as one with us in devotion to caring. In education, what we reveal to a student about himself as an ethical and intellectual being has the power to nurture the ethical ideal or destroy it. (Noddings, 1984, p. 193)

However, for this to occur, trust and continuity are required. Many children lack continuity in their family lives. To develop continuity, Noddings suggests that teachers and students stay together for several years so the teachers can understand their students well enough to know what it is they are trying to accomplish (Noddings, 2012a).

The hard work of getting to know 25 to 30 children has little payoff in one short year, but over several years a relationship of trust can be established, and teachers can talk to students in ways that would seem intrusive in shorter periods of time. (Noddings, 2002, p. 27)

Continuity is important in the elementary schools, but just as vital in middle and high school levels. The structure of our schools makes it almost impossible for students to see that their teachers do really care about them. Unless a secondary school is on block scheduling or an alternative schedule, most teachers see over a hundred students in a single day for at most fifty-five minutes. Caring relationships might have a chance to develop if this were not the case. Noddings has suggested in many of her writings that our schools need to be restructured so that they are not only an academic resource, but also serve many other purposes. “If we want children to learn how to be cared for, so that eventually they will have the capacity to care for others, we must make it a primary goal of schools to care for them” (Noddings, 2002, p. 28). One example Noddings suggests is for mathematics teacher to acquire a group of students when they enter high school and guide them through their entire high school mathematics curriculum. With this scenario,
an environment is made possible where moral education can occur and a teacher and student can develop a relation where confirmation is possible (Noddings, 1988). It is not a simple task, but one that requires imagination, perseverance, changes in training, and diligence to implement. Many schools are under financial constraints and are unable to restructure their school system due to lack of funding. The flipped classroom can be created within the regular schedule of a school system and can allow this “restructure” that Noddings refers to.

**Figure 2.1** Noddings four components of theory of caring

![Diagram showing the four components of Noddings theory of caring: Dialogue, Practice, Confirmation, Modeling. Each component is connected, indicating their interdependence.](image)

*Figure 2.1.* The above diagram shows the four components of Noddings (1984) theory of caring and how they are related to each other. It is possible to have one component without others. One section is not dependent on another. Each element is not a step, but rather a part of the theory of care. In addition, each piece is just as vital as another.
The Importance of Teaching Caring

Strong relationships between teachers and students are vital elements to the healthy academic development of all students in schools (Hamre & Pianta, 2001). When these strong relationships are formed between a student and teacher, the student enjoys school more and is able to get along better with their peers (Hamre & Pianta, 2006). When caring communities have been established successfully, students reap the benefits.

In the article ‘The Caring Classroom’s Academic Edge’, authors Lewis, Schaps, and Watson (1996) state, “students work harder, achieve more, and attribute more importance to schoolwork in classes in which they feel liked, accepted, and respected by the teacher and fellow students” (p. 20). The following review of literature will describe studies that have shown the importance of the student-teacher relationship and teacher caring in a classroom and its effect on academic achievement, behavior, valuing the content, motivation, and engagement.

A study conducted by Pianta, Steinberg, and Rollins (1995), involved students in kindergarten through second grade who were considered at academic risk based on their kindergarten screening scores. It was found that students who were promoted to the next grade level, or not referred for special education, had far more positive relationships with their teachers than their high-risk peers who were retained or referred. While this study involved early elementary students, it has been shown that the need for positive relationships with teachers does not lessen as children develop.

Students’ relationships with teachers change from elementary to middle school, becoming less personal, more evaluative, and more competitive (Harter, 1996). According to Harter (1996), when middle school teachers created an environment where
personal communication occurred by expressing emotional warmth and acceptance to their students, supportive relationships were formed. These relationships were able to assist students in maintaining their interests in academic and social pursuits, leading to better grades and positive peer relationships.

In studies that research the transition from elementary school to middle, junior high, or high school, students reported less favorable interpersonal relationship with their teachers after the transition than before. In other words, seventh grade teachers were less warm and supportive than sixth grade teachers (Hirsch & Rapkin, 1987). Researchers Midgley, Feldlaufer, and Eccles (1989) suggested that changes in the classroom environment after the transition to middle or junior high school contribute to a decline in achievement related attitudes, values, motives, engagement, and behavior for some children. They sought to determine if changes in students’ perceptions of the teacher/student relationship during this transition from middle to high school influenced students’ academic motivation, thus affecting students value of mathematics. The data were collected over a two year span and were obtained from 12 school districts located in middle-income communities in southeastern Michigan. The sample consisted of 1,301 students who made a transition from a sixth grade elementary school classroom to a seventh grade junior high classroom. The scale used to measure student perceptions of the quality of the teacher/student relationship were scores on a 4-point Likert-type scale.

The results indicated that students whose teachers are perceived to be highly supportive in both sixth and seventh grade, show very little change in the valuing of math across the transition. In both years, the students in this group have the most positive perceptions of the value of math. Students who have perceived teachers to be low in
support in both the sixth and seventh grade, suffer a steady decline in their valuing of math across the two years and have the most negative perceptions of any of the groups. Moving from less supportive to more supportive teachers after the transition enhances the intrinsic value of math during the junior high school year. In contrast, students who move from more supportive teachers in elementary school to less supportive teachers in junior high school value math much more before than after the transition. For these students, there is a sharp decline in both the intrinsic value of math and the perceived usefulness and importance of math during the junior high school year (Midgley et al., 1989).

Besides the elementary and junior high research on teacher-student relationships, there is also an abundance of research at the secondary level. At this stage, students have even less time with their teachers. It has been shown that the relationship formed between student and teacher at the high school level is the most important predictor of success. The National Longitudinal Study of Adolescent Health conducted a study to identify the risk and protective factors at the family, school, and individual levels as they relate to emotional health, violence, substance abuse, and sexuality. A total of 12,118 adolescents in grades 7 through 12 participated in the study. It was found that students who felt connected to their teachers displayed lower rates of emotional distress, suicidal behavior, violence, substance abuse, and early sexual activity (Resnick et al., 1997).

Crosnoe, Johnson, and Elder (2004), examined whether student-teacher relationships predicted two important student behavioral outcomes: academic achievement and disciplinary problems. The study focused on in-school intergenerational bonds which examined students’ general feelings about their teachers. Students were asked how well they get along with their teachers and whether they
perceive them to be caring and fair. It was pointed out in this study that typically research on adolescents focuses on instrumental aspects of student-teacher relationships, such as teaching style, and less on affective aspects.

Three aspects of the schools were the focal point of the study: school structure, composition, and climate. The two key structural elements that were considered were the type of school, public versus private, and class size. Smaller classes would have the potential to bring students and teachers into greater contact. Crosnoe et al. (2004), expected two compositional elements, racial-ethnic composition of the student body and teaching staff, to affect levels of teacher-bonding in schools. Finally, the climate was expected to have implications for students’ ability to trust and form relationships with teachers.

Crosnoe et al. (2004) completed this longitudinal study of adolescents in grades 7 – 12. A stratified sampling procedure was used by approximately 90,000 students in 80 high schools to create subgroups who were selected to participate in two waves of data collection. Crosnoe et al. concluded that “students who had more positive views of their teachers did better and had fewer problems in school, while those with more negative views did worse and had greater problems” (p. 75). They suggested that their findings may be useful for a variety of students who may be at risk of becoming alienated or disengaged in secondary schools.

Besides academic achievement and student behavioral outcomes, motivation has also been researched in terms of its connection with student-teacher relationships. Motivational theorists suggest that students’ perception of their relationship with their teacher is essential in motivating students to perform well (Fan & Williams, 2010).
Studies have shown that teacher-student relationships are very important for high school students (Midgley et al., 1989). Researchers Hardré and Sullivan (2009) investigated high school teachers’ perceptions of the motivational needs of their students and the strategies they used to address those needs. They surveyed 96 teachers in 15 high schools who taught a variety of subject areas. Data were collected through questionnaires addressing teachers’ perceptions of supportive classroom environment, students’ general motivation, causes of student lack of motivation, teachers’ self-efficacy for motivating students, interpersonal style, and motivating strategies. Quantitative results showed that the teachers who focused on internal characteristics were most effective at diagnosing and improving student motivation. These teachers “attribute effectively influencing student motivation to focusing on their interpersonal relatedness with students, and on links between education and things that students value, both now and into their futures” (Hardré & Sullivan, 2009, p. 12). These teachers encourage relatedness and interest. They also were advocates of an autonomy style of teaching which showed to be a more effective motivator as opposed to a more controlling style which were less effective motivators. Teachers’ beliefs about motivational causes did predict how motivational their classroom environments were. In addition, teachers who believed that student motivation was fixed at a certain level had less supportive classrooms than teachers who adopted the internally-focused beliefs described above (Hardré & Sullivan, 2009).

Ryan, Stiller, and Lynch (1994) investigated the predictive value of teacher, parent, and friend relationship interpretations with regard to school performance and self-esteem. Using self-determination as a framework, the study examined teachers’ motivation and behavior as they relate to students’ intrinsic motivation. While previous
studies placed an emphasis on autonomy support, this study paid more attention to the social relatedness component of self-determination theory. Teachers’ care was defined as teachers behaviors derived from the need for relatedness which improve or maintain the quality of interpersonal relationships among teachers and students. A positive interpersonal relationship is possible when teachers build a warm, enjoyable classroom setting where students feel that they are respected (Reeve & Jang, 2006). In a supportive social environment, the teacher assures the necessary time for student questions and problems both inside and outside the classroom. In addition, the teacher shows a personal interest in the problems of the students and facilitates the student with their work (Ryan & Powelson, 1991). This description of care was used in this study. Research in this field has previously found children’s needs for connectedness, or their sense of belonging to a classroom contributed to a student’s motivation.

When the relationship between a student and teacher is characterized by mutual respect and admiration, students are likely to internalize the values and standards of their teacher (Battistich, Soloman, Watson, & Schaps, 1997). However, it is difficult to determine the effect that a teacher makes on this relationship because of the relationships that students have with their parents and well as with their peers. The simultaneous examination of students’ relationships with all three groups including teachers, parents, and peers is scarce. Therefore, Murdock and Miller (2003) chose to examine the degree to which variation in perceived teacher support variables predicted students’ current motivation, after controlling for both prior motivation and the perceived influences of parents and peers. They focused on students in the middle grades and used both variable-centered regression and person-centered clustering.
In order to examine the unique effects of perceived teacher caring on changes in students’ motivation, Murdock and Miller (2003) assessed teacher respect and fairness, teacher expectations, and teacher competence and commitment. They defined teacher caring as displaying interpersonal support and respect towards students, as well as behaviors that demonstrate a commitment to student learning. The commitment to student learning included whether or not the teacher set high expectations and if they were prepared to teach the material. These pedagogic components of caring were chosen based on prior qualitative research that has shown that students perceive caring from teachers as comprising both a demonstrated commitment to student learning as well as general respect and courtesy (Hayes, Ryan, & Zseller, 1994).

Murdock and Miller (2003) found there were significant moderate correlations between the motivational indicators assessed in grade 7 and grade 8. The perceived teacher caring variable was positively associated with each of the three grade 8 motivational variables, accounting for 21% of the variance in academic self-efficacy, 14% of the variance in intrinsic valuing, and 6.8% of the variance in teacher-rated-effort. The study used students’ perceptions of teachers, parents, and peers as predictor variables because the students’ created realities are closer to their motivation and behavior than others. The study confirmed a high consistency between students’ reports of teachers’ “caring” behavior and classroom observations of similar phenomena (Murdock & Miller, 2003; Patrick, Turner, Meyer, & Midgley, 2001).

The positive effects of student teacher relationships on low achieving or at risk students’ engagement has also been studied extensively. One study researched 11,000 adolescents from more than 1,000 public and private high schools found that those
students who reported being supported by their teachers were less likely to drop out of school. It was found that when students perceived their teacher as caring, they expended more effort (as reported by their teachers). The perception of care that the at-risk students experienced lessened the negative effects of being judged at risk (Muller, 2001).

Bulach, Malone, and Castleman (1995) investigated effective school variables, school climate variables, and the socioeconomic status of students, as well as which variables are the most important for student achievement. In order to define school climate, the Tennessee School Climate Inventory (TSCI) was chosen. It has seven subscales which measure order, leadership, environment, involvement, instruction, expectations, and collaboration. Participants included 611 teachers and principals from twenty-seven elementary schools in Western Kentucky. A significant positive correlation ($r = .52, p < .01$) was found between school climate and student achievement. Of all the variables investigated, it would appear that the involvement of parents and the community had the strongest relationship to student achievement. However, it was concluded that school climate scores, including the relationship between teachers and students, can be just as helpful as the socioeconomic status of students in predicting student achievement.

**Teacher Perceptions of Care**

According to Larrivee (1999), caring behaviors are an important component of creating a climate or community for learning. Creating a caring community requires teachers to be proactive and reactive. Being proactive entails that teachers demonstrate the value they place in the quality of relationship with students. They do this by showing their commitment to the classroom, including giving their time, resources, and emotional...
energy. Teachers also need to monitor how students treat each other. In a caring classroom, teachers are authentic, thoughtful, have emotional integrity, and demonstrate respect.

Being authentic means teachers need to let students know it is acceptable to make mistakes, they use self-disclosure, and are open and accepting of students by encouraging students to express their feelings and opinions. Thoughtfulness is developing mutual considerations between parties by accepting each other, collaborating together, and relying on one another to be considerate of each other’s wants, needs, desires, and fears. Having emotional integrity means communicating with emotional honesty. Teachers who have emotional integrity validate a students’ rights to express their feelings, but also are proactive and confront students’ behavior by “respectfully challenging them and calling students to accountability” (Larrivee, 1999, p. 87). Finally, displaying respect means to communicate with students through respectful dialogue. This means talking with students, instead of talking at them. Teachers can communicate respect by considering students’ capacity to manage their own lives successfully, honoring their individual worth, and understanding students’ point of view and opinions (Larrivee, 1999).

Caring is a difficult notion because teachers’ understanding of how they should care for their students may not be the same as their students’ expectations. Backgrounds and life experiences influence teachers’ perceptions of what it means to demonstrate caring to their students. One teacher may perceive caring as showing interest in students outside personal life, while another may view caring as offering a student lunch money when they do not have any. “When we understand that everyone wants to be cared for
and that there is no recipe for caring, we see how important engrossment (or attention) is” (Noddings, 2005, p. 17). It is important to understand the notion of caring; therefore, the following research looks at teachers’ definitions of care and how they show care in their classrooms.

Bartley (2007) looked at the perceived impact of care on students by using the theory of care and the attachment theory. Data were collected from ten elementary teachers through semi-structured interviews. The teachers constructed their definitions of care, explained how they manifested care within the classroom, and discussed the impact of care on students. Two topical questions that were addressed included how students demonstrate that they feel care and how teachers demonstrate care in meaningful ways to all students in a culturally diverse classroom. Purposive sampling was used as part of a phenomenological study. One theme that was repeated by every teacher was care as defined by respect. Demonstrating respect means looking at students in the eyes at their level, and making them feel comfortable and important in the classroom by boosting their self-esteem by building their confidence. Another major theme from the teachers is that care is like love, which includes genuine concern and being sensitive. A minor theme that emerged from four participants included going out of their way to show care for students. Overall, results showed that caring teachers look at each student as an individual, and seek to teach each student with the care most appropriate to them.

A study conducted by Thompson (2010) investigated caring teachers and explored what caring looks like in the classroom. While there was not a particular theory that framed this study, the research question asked what defined a caring teacher. Data were collected through interviews and observations. Participants included four teachers, who
were also asked to identify an adult in the school who could talk about the teacher-participant’s work. Four questions guided the interviews including (1) the role of caring in the teacher’s work with students, (2) the teacher’s definition of caring, (3) how they developed this style of teaching, and (4) what encouraged them to provide support and assistance to students. The data were analyzed case-by-case, followed by a cross-case analysis. The cross-case analysis suggested that six themes were consistent across the four teachers including, the role of the relationships, perspective on at-risk students, providing opportunities for students to develop a positive sense of themselves, the value of a positive classroom experience for both students and teachers, negotiating power, and flexibility. Findings showed that classroom processes that integrate both academic content and caring offer teachers opportunities to meet relational and academic goals.

Other research conducted by Garza, Alejandro, Blythe, and Fite (2014), examined teacher behaviors that demonstrated acts of caring in upper elementary and middle school classrooms. A qualitative study using a grounded theory approach and constant comparative analysis was guided by the following questions: How do teachers demonstrate caring for their students? What is the nature of those behaviors? Four upper elementary and middle school teachers were purposefully selected for this study. Data were collected through teacher interviews, classroom observations, and teacher reflection. Four themes emerged as in the major findings regarding specific caring behaviors perceived by teachers including: fostering a sense of belonging, getting to know students personally, supporting academic success, and attending to physiological needs.

The first theme, fostering a sense of belonging, was created by promoting the classroom as a family, providing positive nonverbal communication, conveying a positive
disposition toward students, and using proximity to support students. When individual contact was made with students, conversations between the teacher and his or her students were personal in nature rather than about grades, missed assignments, or homework. “These positive interpersonal behaviors where teachers spend time talking to students about their personal or social issues promote a sense of belonging and strengthen a bond between teacher and student” (Garza et al., 2014, p. 4). The second theme, getting to know students personally, involved attending theatrical and sporting events and obtaining personal information through student surveys and informal conversations.

Supporting academic success, the third theme that emerged, refers to teacher behaviors that promote their academic success. Teachers perceived caring attributes as verbally communicating high expectations with students, expressing positive statements to encourage student effort, monitoring and assisting students during learning activities, and individualizing learning outcomes. The final theme, attending to physiological and safety needs, refers to behaviors that tend to bodily and safety needs. Teachers in this study perceived caring actions as supplying students’ the necessary resources to help them feel wanted and nurtured in a safe environment. One teacher explained that she provided a student with bus fare, while another offered a student their jacket (Garza et al., 2014).

Students’ Perceptions of Caring Teachers

While it’s important to understand a teacher’s definition of care and how they perceive their own behaviors as caring, it is also vital to look at the perceptions of students to ensure that the care has been acknowledged, accepted, and meets the expressed needs of students (Noddings, 2012a). It has been shown that teachers demonstrate care to their students by taking a genuine interest in getting to know their needs.
students beyond the academic setting and by developing relationships with them. However, a student’s perception of a caring teacher may be more complex. “A caring relation is, in its most basic form, a connection or encounter between two human beings – a carer and a recipient of care, or cared for” (Noddings, 2005, p. 3) Across a variety of studies that were researched, when students were asked how they knew caring was taking place in the classroom, answers varied. Students’ perceptions vary depending on their own needs, values, and expectation. Classroom interactions are affected when there is a difference between teachers’ own personal practice and their students’ perspectives. Therefore, it is imperative to closely examine students’ perceptions of caring.

Nelson and Bauch (1997) interviewed 88 African-American high school seniors and reported that teacher behaviors that were perceived as caring fell into seven different categories. Teachers who were perceived as caring were encouraging by being supportive, motivating the students, inspiring students and showing confidence in students abilities. Teachers were also identified as caring were defined in terms of the word “relationship.” Students identified caring teachers as those that were parent-like, easy to talk to, and emotionally and personally involved. Even though teachers were challenging by being “tough, thorough, hard, strict, disciplined” (p. 13) and demonstrated high expectations by setting high standards and believing in their students, students continued to perceive these teachers as caring. The final three characteristics of a caring teacher, as perceived by students, fell into the following categories: involvement, concern, and help. Teachers who were identified as caring as a result of their involving students were described by the students as having a high degree of interaction with students, creating a family-like atmosphere, creating unity, and helping students help
themselves. Teachers who actively demonstrated concern for the individual student were described by students as recognizing students’ feelings, listening, being available, and noticing if a student is having problems. Finally, “helping” consisted of teacher behavior that actively provided extra help for students by providing equal help to all students, being able and willing to provide extra help, helping students individually, or desiring to help students (Nelson & Bauch, 1997).

Another study by Garrett, Barr, and Forsbach-Rothman (2007), was conducted in a large urban setting, and consisted of 24 African-American, 13 White, and 23 Latino sixth grade students, and 22 African-American, 27 White, and 46 Latino ninth grade students who were asked to comment on how teachers demonstrated care. The qualitative research consisted of two open-ended questions about teachers’ classroom practices including an explanation of why students perceive that their teacher cares about all students in the classroom. Their findings suggested ethnicity did not significantly influence students’ perceptions of caring behaviors. Findings also suggested that students identified the following caring behaviors: willingness to help with homework, showing respect, treating students fairly, and helping students with personal problems. A teacher’s personality had a strong influence over students’ perceptions of their teachers caring for them (Garrett et al., 2007). “Teachers, who make the learning process more fun, more interesting, and less stressful, could be perceived as more caring” (Garrett et al., 2007, p. 517).

Some studies have shown that students perceive their teachers as caring when they exhibit behaviors that indicate teachers care about their learning. Ferreira (2000) studied sixth, seventh, and eighth grade students in two middle schools in a Midwestern
metropolitan area. The urban school was one of poverty (90% or more of the students qualified free or reduced-cost lunches). The other middle school consisted of 12% African American students bussed in from a poor urban neighborhood and an additional 8% were from the poorest part of the county. The participants included 101 students. The students’ responses were characterized into two broad themes: teacher behaviors related to content and pedagogy and teacher behaviors that implied a relationship between the student and the teacher. Six teacher behaviors related to content and pedagogy were identified in students’ descriptions of a caring teacher: helping with work, explaining work, checking for understanding, encouraging, maintaining an orderly classroom atmosphere, and providing fun activities. In addition, students perceived a caring teacher as one who actively ascertained student understanding by asking questions and walking around the classroom.

While this study indicated that most students described caring teachers in rather traditional roles related to content or pedagogy, many students’ responses also demonstrated teacher behaviors that implied a relationship between the teacher and the student. Caring teachers were identified as treating their students as individuals, respecting their students, being a good listener, and extending the relationship between the student and the teacher outside of the classroom (Ferreira, 2000). These findings are similar to other studies where students perceived care from teachers when teachers knew them more personally and understood them as people.

Teven and McCroskey (1996) conducted a study among university students and found this study to support the theory that perceived caring generates more positive teacher evaluations and influences levels of learning of both affective and cognitive
learning in a positive way. Affective learning was measured by asking students to complete two, four-item measures reflecting affect toward the course content and attitude toward enrolling in another course with similar content. Cognitive learning was measured on two scales including one that asked students to indicate how much they felt they learned in the class and how much they believed they could have learned had they had an ideal instructor. The research also provided evidence that teachers who engaged in behaviors that communicated a positive intent toward their students were more likely to influence the students to put forth more effort.

**Defining Engagement**

School engagement occurs on multiple levels. Addressing each level of engagement can increase the chances that a teacher can sustain his or her students’ engagement. While the definition of school engagement is complex, the three dimensions that will be addressed are behavioral engagement, cognitive engagement, and emotional or relational engagement (Fredericks et al., 2004).

**Behavioral Engagement**

A student who is behaviorally engaged always works hard, but continues to struggle with learning. Behavioral engagement encompasses “students’ effort, persistence, participation, and compliance with school structures” (What does it mean, p. 23). Fredericks et al. (2004), defined behavioral engagement as (a) “positive conduct, such as following the rules and adhering to classroom norms, as well as the absence of disruptive behaviors such as skipping school and getting in trouble,” (b) “involvement in learning and academic tasks and includes behaviors such as effort, persistence,
concentration, attention, asking questions, and contributing to class discussion,” and (c) “participation in school-related activities such as athletics or school governance” (p. 62).

**Cognitive Engagement**

Cognitive engagement refers to how students feel about themselves and their work, their skills, and the strategies they utilize to complete their work (Metallidou & Viachou, 2007). According to Appleton, Christenson, and Furlong (2008), cognitive engagement is defined as “self-regulation, relevance of schoolwork to future endeavors, value of learning, personal goals and autonomy” (p. 372). In addition, Fredericks et al., (2004) states that cognitive engagement is expressed by “flexibility in problem solving, preference for hard work, and positive coping in the face of failure” (p. 64).

**Emotional Engagement**

Skinner and Belmont (1993) define emotional engagement as students’ feelings of interest, happiness, anxiety, and anger during achievement-related activities. Sciarra and Seirup (2008) define emotional engagement as the extent to which students feel a sense of belonging “and the degree to which they care about their school” (p. 218). Finally, Yazzie-Mintz (2010), define emotional engagement as representing students’ feelings about the people, policies, and practices of the school environment that include students’ complex relationships to school.
Chapter Three

Methodology

Chapter three contains a description of the methodology used to conduct a qualitative case study of a rural school district’s flipped classroom approach used in the mathematics department. Specifically, the purpose of this research study was to determine teachers’ perception of care as well as students’ perception of care and how these perceptions affect student cognitive, behavioral, and emotional engagement in the flipped mathematics classroom. Pseudonyms were used for the two teachers and the six students that participated in this research study. In addition, a pseudonym was also used for the high school in which the study was conducted. Finally, if any additional people were mentioned by the participants, pseudonyms were also utilized.

Student engagement has become a focus in educational settings as researchers and professionals attempt to find solutions to drop out rates and declines in student academic achievement. This study was conducted in order to assess caring from teachers’ and students’ perspective in two flipped mathematics classrooms, and if the teacher-student caring relationship affects cognitive, behavioral, and emotional engagement. The study focused on student engagement as described by Fredricks et al., (2004). Fredricks, et al. consider three key aspects of engagement: cognitive, behavioral, and emotional. The cognitive engagement domain assesses student motivation, learning goals and effort in their learning. Behavioral engagement is associated with positive conduct, including cooperative and autonomous participation. Emotional engagement focuses on the affective reactions of students in the learning environment or what the student’s value as well as what they are interested in.
The major components of this chapter include the assumptions and rationale for a qualitative study, including the type of design and role of the researcher, setting and participant selection procedures, informed consent and permission procedures, data collection methods, explanation of interview questions, data collection procedures, data analysis strategies, and trustworthiness features. Subheadings are also included in this section include validity, rapport, and subjectivity.

**Research Questions**

Two specific questions guided this study:

1. What opportunities for a caring relationship does the flipped classroom afford a teacher and his or her students?
2. To what extent do these experiences shape the cognitive, behavioral, or emotional engagement of students?

**Assumptions and Rationale for a Qualitative Design**

**Type of Design**

To understand if the flipped classroom provides an opportunity for a caring relationship to develop between a teacher and his or her students and to what extent these experiences shape the cognitive, behavioral, and emotional engagement, it was necessary to conduct a qualitative research study that allowed for the researcher to capture the essence of both teacher and student feelings and beliefs about the flipped classroom structure. According to Hatch (2002), a qualitative study relies on the research as the key instrument in data collection. I gathered close information by talking with students and teachers that are involved with the flipped classroom approach. I also collected data through observing behavior and interviewing participants. Unlike a quantitative study
that tends to rely on a single data source, multiple forms of data was gathered and organized into categories or themes.

A qualitative approach was necessary because I wanted to obtain information completely from the source through direct interaction with the setting and the participants. “For a study focusing on individuals’ lived experience, the researcher can also argue that human actions cannot be understood unless the meaning that humans assign to them is understood. Because thoughts, feelings, beliefs, values, and assumptions were involved, I needed to understand the deeper perspectives that can be captured through face-to-face interaction and observation in the natural setting” (Marshall & Rossman, 2011, p. 91).

Creswell (2013) defines qualitative research as beginning with “assumptions and the use of interpretive/theoretical frameworks that inform the study of research problems addressing the meaning individuals or groups ascribe to a social or human problem” (p. 15). A qualitative approach was used because the data was collected in a natural setting where participants experienced the flipped classroom approach in the mathematics department at Bridgeport High School. Specifically, a case study was selected based on its appropriateness for this particular study. Case study research is a qualitative approach characterized by a bounded case that is explored in time and space. It provides a detailed description of contextual information about the case setting, gathers data from an in-depth collection involving multiple sources of information, and uses the research as an instrument of data collection (Creswell 2013, Yin 2009). Case studies are also good for describing and expanding the understanding of a phenomenon and are often used to study people and programs particularly in education (Stake, 1995).
Self-report survey measures are the most common method for assessing student engagement, therefore studies of student engagement have often concentrated on the easily observable aspects of student engagement, such as “time on task” as a measure of student engagement (Yazzie-Mintz, 2010). The High School Survey of Student Engagement (HSSSE), is one type of assessment that is designed to provide quantitative data based on student perceptions of engagement. Because fewer studies have examined qualitative indicators of student engagement, a case study offers greater explanation of the data that is typically drawn from quantitative studies of student engagement.

Of the four philosophical assumptions discussed by Creswell, the two that were used to conduct this qualitative case study are Epistemology and Methodology. The Epistemology research model looks at the relationship between the researcher and that being researched. The researcher tries to get as close as possible to the participants being studied by collaborating and spending time in the field with the participants, thus becoming an “insider.” The Methodology research paradigm is characterized by being, “inductive, emerging, and shaped by the researcher’s experience in collecting and analyzing the data” (Creswell, 2013, p. 22). It uses an inductive data analysis approach that involves rich descriptions of the case and its setting (Hatch, 2002).

Role of the Researcher

A personal experience can serve as a starting point for a case study. “The energy that comes from a researcher’s high level of personal interest is infectious and quite useful for gaining access” (Marshall & Rossman, 2011, p. 114). According to Patton (2002), the credibility of a qualitative study largely depends upon the researcher’s skill and competence. In addition, Stake (1995) describes qualitative case study research as
highly personal research. My teaching experience in mathematics and being part of the development of the flipped classroom served as a valuable tool throughout this process.

However, Patton (2002) states “the human factor is the great strength and the fundamental weakness of qualitative inquiry and analysis – a scientific double edged sword” (p. 433). I not only work in the school district where the research was conducted, but have also been a major proponent or creator of the flipped classroom that is under review. I needed to consider the concept of reflexivity as a vital component to ensure the reliability of the study. According to Creswell (2013), reflexivity occurs when “the writer is conscious of the biases, values, and experiences that he or she brings to a qualitative research study” (p. 216). Approximately four years ago, I transformed the mathematics program at Bridgeport High School. Because it is such a small district, there are no honors classes, advanced placement classes, or at the other end of the spectrum, classes to individually assist students who struggle with mathematics. The flipped classroom allowed me the time necessary to help struggling students one on one. In addition, it also was a format that allowed the more advanced students to continue with the curriculum without being held back by other students. For this reason, I am a proponent of the flipped classroom; however, I am aware this viewpoint cannot be used to alter participants beliefs. It was important that the teachers and students understand that my beliefs about the flipped classroom approach should not alter their viewpoints regarding this style of teaching. Patton (2002) suggests to, “do the very best with your full intellect to fairly represent the data and communicate what the data reveals given the purpose of the study” (p. 433).
It is important to discuss ethical considerations. For this case study, I reflected on and recorded experiences with the phenomenon to be studied. This is known as bracketing and helped to validate the study by providing an acknowledgement of previous involvement with the phenomenon. My perspective was not exposed during the interview process so that my views did not impact the recording and analysis of the informants’ experiences and meanings (Creswell, 2013). Every effort was made on my part to remain neutral as a qualitative researcher and let the data shape my analysis and interpretation.

**Setting and Participant Selection Procedures**

**Setting**

This research study took place in a small rural public school located in Monroe County in Southeastern Michigan, Bridgeport Schools, which includes 702 students in grades K – 12. In the 2013-2014 school year, the graduation rate was 92.06%, and in the 2012-2013 school year it was 100%. The percentage of economically disadvantaged students is 28.4%. This school was chosen for the study out of convenience. The two classes observed were Geometry courses. The courses include a flipped classroom environment where students watch the instructional lesson outside of class, giving the opportunity for one-on-one instruction to occur during class time.

**Participants**

I selected a convenience sampling method to utilize. Convenience sampling, according to Glesne (2011), “selects cases on the bases of convenience” (p. 45). According to Tayler (n.d), A convenience sample is formed when we select elements from a population on the basis of what elements are easy to obtain. Sometimes a
convenience sample is called a grab sample as we essentially grab members from the population for our sample. According to Creswell (2013), he prefers to “select unusual cases in collective case studies and employ maximum variation as a sampling strategy to represent diverse cases and to fully describe multiple perspectives about the cases” (p. 156). Since the nature of this case study focused on both teacher and student perceptions of caring in the flipped mathematics classroom and its effect on behavioral, cognitive, and emotional engagement, the selection of the student participants were determined by teacher participants as well as standardized test scores from students previous academic year, in order to verify that students chosen were not academically at the same level. Due to the unusually small staff at Bridgeport High School, there are only two other teachers, besides myself, who have facilitated the flipped classroom approach. The limited number of participants was offset by the amount of information that the researcher gathered through the interviews, participant observations, and artifacts.

**Teacher Participants**

The two teachers selected were met with individually to explain the purpose of the study and to determine their interest in participating in the research. The teachers selected agreed to participate in the interview process and also allow for classroom observations during the study. Both participants have been actively involved in the preparation and planning of the flipped mathematics classroom at Bridgeport High School. Participants were informed about their rights as a participant in the research, including the limits of confidentiality and the use of a pseudonym. Pseudonyms were used for both teacher participants.
The first teacher participant, Mrs. Williams has four years of experience teaching high school mathematics with the flipped classroom approach. She has had experience teaching Algebra I and Geometry as a flipped classroom. Mrs. Williams has also taught a seventh grade advanced course in Pre-Algebra that did not incorporate the flipped classroom approach. She has shown to be an effective teacher as evident of her evaluations completed by the building principal.

The second teacher participant, Mrs. Fore has nineteen years of teaching experience with special education students. She has taught various classes that have not been flipped, including English and Study Skills. Mrs. Fore has been teaching in mathematics to special education students for three years. While one hour of her day is comprised of an Algebra I flipped mathematics course, she also serves as a co-teacher in Mrs. Williams flipped Geometry classroom. Like Mrs. Williams, Mrs. Fore has been deemed an effective teacher according to her teacher evaluation completed by the district’s Superintendent. While not a general education mathematics instructor, Mrs. Fore believes that she still has a great deal to learn about the flipped mathematics program and has attended professional development on the flipped method.

Student Participants

The six students identified for this study were selected based on their academic success in Mrs. Fore’s and Mrs. Williams class. All six students were teacher recommended. Prior to the initial interview, Mrs. Fore and Mrs. Williams were asked to select two high performing students, two medium performing students, and two low performing students to participate in this study. Mrs. Fore’s students, Michael, Brock,
and Sara will be described followed by Mrs. Williams’ students, Wess, Angela, and Jenna. Pseudonyms were used for all of the student participants.

**Michael**

Michael is a 15-year-old male who is a special education student. He was chosen for this project because he is a low achieving student. He is a student in Mrs. Fore’s Algebra I class. Michael considers himself to be a poor math student. Michael stated that he likes the flipped classroom better than the traditional way Pre-Algebra is taught in junior high. He feels less anxious, better prepared to make his own decisions, enjoys being able to work with fellow classmates on homework and projects, and likes getting one on one help from Mrs. Fore when he needs it. Michael is involved in many sports at Bridgeport and understands it is important to maintain passing grades in order to play. He described himself as a quiet and shy student.

**Brock**

Brock is a 14-year-old student in Mrs. Fore’s Algebra I class. He is a freshman at Bridgeport and is involved in many sports and activities including basketball, football, baseball, and student government. Brock was chosen for this study because he is a high performing student. Brock enjoys how the flipped mathematics classroom is set up. Up until this year, the math classes that Brock has taken have been taught the traditional way. Brock is very self-driven and motivated. He described himself as always being a disciplined math student who strives to earn an A.

**Sara**

Sara is a 15-year-old female. She is a freshman who enjoys school. She is involved in cross country and track and also participates with student government. Sara
stated in the initial interview that she considers herself to be a motivated and “decent” math student. She likes the flipped classroom because of being able to make her own decisions about when and how to complete the material. Sara is one of only twelve students out of 63 who completed more than the required work. She is a student in Mrs. Fore’s Algebra I class. Sara was recommended by Mrs. Fore because she is a medium performing student.

Wess

Wess is a 15-year-old while male. He is a high school sophomore who described himself as a poor mathematics student. Upon graduating from high school, Wess would like to attend some type of trade school. He does not enjoy school, but rather views it as something he has to get through in order to stay involved with sports at school. He described himself as very social and outgoing. Wess also stated that he is easily distracted during all of his classes. His least favorite subject is math because it is such a struggle for him. However, because he is involved in both cross country and track, he know it is important for him to place academics first. Wess is a student in Mrs. Williams Geometry course. Wess was recommended because he is a low performing student.

Angela

Angela is a 15-year-old female who was chosen for this study because she is a medium performing student. She is involved in a variety of sports at Bridgeport. Angela is a sophomore and was very quiet and reserved during the interviews. She would consider herself to be “okay” in math. She described herself and quiet and reserved, but once she feels comfortable around people she opens up and can be more talkative. Angela commented that she likes school, but mostly because of the extracurricular events
that she is involved in. She is a student in Mrs. Williams flipped mathematics class and was chosen for this study because she is a medium performing student.

**Jenna**

Jenna is a 15-year-old female student who considers herself an A or B student in math class. Her parents are involved in fostering numerous young children and there are often times that Jenna is responsible for watching them. While she enjoys this, she is also involved with cheerleading that takes up a lot of her time. Jenna admits that she does well in all of her classes. She is extremely quiet with students and well as with her teachers. Jenna explained that she enjoys school and because it comes easy to her, she does not mind the homework that is assigned outside of class. Jenna is a student in Mrs. Williams flipped mathematics class and was chosen for this study because she is a high performing student.

**Informed Consent and Permission Procedures**

Both Patton (2002) and Creswell (2013) were reviewed prior to conducting the study in order to understand the procedures in conducting qualitative research, including ethics. Full disclosure to all participants was followed at all times during the study. The researcher adhered to all rules and procedures mandated by Bridgeport High School as well as The University of Toledo. All necessary paperwork will be completed in order to comply with the university’s Institutional Review Board (IRB).

With the approval of both Bridgeport High School and The University of Toledo, the researcher selected student and teacher participants for the study and their permission using appropriate assent and consent forms for each. Participants and parents were given informed consent forms according to Creswell’s (2013) model for gaining consent.
approval. The elements that will be included in this form include: (a) the right of participants to voluntarily withdraw from the study at any time, (b) the central purpose of the study and the procedures to be used in data collection, (c) the protection of the confidentiality of the respondents, (d) the known risks associated with participation in the study, (e) the expected benefits to accrue to the participants in the study, and (f) the signature of the participants as well as the researcher (Creswell, 2013).

**Gaining Access and Entry**

The principal of Bridgeport High School, as well as the Superintendent, were first contacted to obtain permission to conduct a study on caring in the flipped mathematics classroom at Bridgeport High School and its effects on the behavioral, cognitive, and emotional engagement.

**Data Collection Methods**

There were three types of data that were collected throughout this research study. Participant observations of classrooms involving the eight participants took place. Interviews with the two teachers and six students also occurred. Finally, artifacts were collected.

**Interviews**

According to Creswell (2013), a characteristic of a good qualitative case study is that it presents an in-depth understanding of the case. Interviews are guided conversations that are usually one of the most important sources of case study evidence (Yin, 2009). Interviews were conducted one-on-one with the researcher to make certain confidentiality was maintained. In addition, privacy was guaranteed by sustaining the comfort levels of each participant. Keeping the interview “respectful, nonjudgmental,
and nonthreatening” was important in order for the participants to feel comfortable to share their stories (Merriam, 1998, p. 85). This one-to-one format also allowed students and teachers to express their personal views about caring beliefs with the flipped mathematics program. The interviews were conducted in quiet areas and lasted approximately 30 minutes, allowing flexibility for extended time.

Semi-structured interviews were used because they are open-ended and focus on general questions that are guided by main topics. They provide continuity among the interviews for each participant. However, prodding from the researcher may take place to ensure that I cover the correct material. Semi-structured interviews collected detailed information through a somewhat conversational approach. They are used when a researcher wants to investigate deeply into a topic and to understand thoroughly the answers provided (Bogdan & Biklen, 1992).

The experience of an interviewer with regard to technique and subject matter expertise is a key factor in identifying and maximizing the collection of relevant information. It is recommended that interviewers mainly use probe questions, which start with “How…?” and cannot be answered with a “yes” or a “no”. (Perry, 1998). Therefore, it was imperative in the interview process that careful attention was given to the interview questions. Spradley (1979) states, “One key principle in asking descriptive questions is that expanding the length of the question tends to expand the length of the response” (p. 85). Thinking about descriptive questions, I focused on questions that elicited lengthier responses. Giving the interviewee some more detail in a question may draw out more thoughts and ideas from their answers, which may lead to greater, in-depth answers. Spradley (1979) also states that if you expand a descriptive question it “gives
informants time to think” and also is a way of telling the person that you want them to be as specific as possible.

**Observations**

In addition to semi-structured interviews, observations were conducted in order to gain insight to teachers’ and students’ perceptions about caring in the flipped classroom. My involvement with the observation fell somewhere between complete observation, where I was neither seen or noticed, to complete participation, where I was fully engaged with the students or teachers I was observing. My unique role as the researcher also gave me the advantage that I observed students that I have previously taught, as well as teachers that I work very close with on a daily basis. The classroom observations were entirely non-participating with regards to classroom activities.

A major advantage to participant observations is it helps to understand data collected which may lead to further interview questions. A second advantage to participant observations is that you can read body language, which may be imperative to a study regarding students and teachers perceptions regarding care in the flipped mathematics classroom. According to Glesne (2011), “Human beings communicate nonverbally in many ways. So take the field notes that describe not only what people are doing and saying, but also what they are wearing, how they decorate themselves, and how they use and share space with others” (p. 69-70). Myerhoff (1978) even explained, “In working among the elderly – also, I suspect, among the very young – an exceptionally important part of one’s information is derived from nonverbal communication and identification, this because the bodily state is such a large determinant of well-being for the growing and declining organism” (p. 18). While words
may depict what a person is saying, body language and other nonverbal communication can also contribute to important aspects of a qualitative research study.

According to Bogdan and Biklen (1992) it is recommended that observations not last longer than 60 minutes and that the researcher plan to document information directly following observations so one can recall specific memories. According to Sanjek (1990), “It was because of such immediate recording of my field experiences that I was able to recreate the atmosphere in which each conversation or event took place. Even now, as I write, I can vividly feel the presence of the participants” (p. 97). Glesne (2011) adds, “If you wait until the end to write, your work will not be as rich, thorough, and complex as it would have been otherwise” (p. 189). Completing the descriptive fieldnotes in a timely fashion will allow me to remember the details and strive to elaborate on what I viewed regarding students’ and teachers’ perceptions of caring in the flipped classroom.

Spradley (1980) states, “Writing in concrete language is difficult because most people have had years of training to condense, summarize, abbreviate, and generalize” (p. 68). Besides details, I will also focus on making the familiar strange.

Artifacts

Besides the semi-structured interviews and the observations, Creswell (2013) also suggests journals as a source of information to collect. Yin (2009) states, “No matter how the experience is gained, every case study investigator should be well-versed in a variety of data collection techniques so that a case study can use multiple sources of evidence” (p. 118). Stake (1995) suggests when reading artifacts, such as journals, to look for unexpected clues. However, Creswell (2013) describes two drawbacks to collecting artifacts including being able to read participants handwriting and the lack of
comfort experienced by participants using writing to describe their experiences. I believe the journals gave the students and teachers a way to express themselves during the course of my research and allow them to reflect on their thoughts as a rich source of data for this study.

**Explanation of Interview Questions**

The interview protocol consisted of questions created from a variety of related research literature involving students and teachers perceptions of caring as well as related research on cognitive, behavioral, and emotional engagement. According to Glesne (2011), “You can make such questions less vague by asking the respondent to recapture something by imagining it. You want to ask questions that will cause them to recapture time, place, feeling, and meaning of a past event” (p. 108). The types of questions I asked required both the teachers and students to think back to specific moments throughout the year in order to answer the questions. I attempted to ask questions that did not require yes or no answers. Despite some of them being “why” questions, it is my belief that these questions will lead to more in depth questions as the interview progresses.

In terms of the order of questions, Glesne (2011) states, “Which should be kept as far apart as possible because you want to minimize how the answer to one question might affect the answer to another.” (p. 109). I was conscientious about the order of the questions. I placed specific questions at different ends of the interview so that there was a possibility to receive a greater in detail answer. While I interviewed teachers, I also remembered that I was interviewing teenagers who I have previously had as students. I did not want the process to be overwhelming for them or cause the students anxiety.
Finally, Glesne (2011) states, “This assumption guides the researcher in asking interview questions about the ways in which people do things and the kinds of experiences and attitudes people have as well as of the meaning they make of some behavior or perspective” (p. 105). My questions acted as a bridge between my ideas and my participant’s ideas by focusing on the different experiences and attitude regarding the emerging theme of caring in the classroom. Also, to bridge these ideas, I focused on Hypothetical-Interaction Questions. “Hypothetical-interaction questions can be used to generate many native-language utterances. By being placed in a typical situation and having the identities of speaker and listener specified, most informants overcome any tendency to translate and recall many phrases used in ordinary talk” (Spradley, 1979, p. 90). My questions were specific about roles by each person and received detailed answers from my interviewee.

**Teacher interview questions.**

1. Please tell me your beliefs about creating relationships with students in a flipped mathematics classroom.
2. Describe your interactions with students in the flipped mathematics classroom. How do they differ in their quality and focus than in a traditional class that you teach?
3. What do you do to create and maintain relationships with your students in a flipped mathematics classroom?
4. What do you do with the information that you learn about your students in a flipped mathematics classroom?
5. Describe the behavior and affective qualities of students who you would describe as engaged in your flipped mathematics classroom.
6. How is what you learn about your students in the flipped mathematics classroom used to create and maintain teacher-student relationships?

7. How does all of this (your sharing, learning about them, and using what you learn about them in a flipped mathematics class) affect your relationship with your students?

**Student interview questions.**

1. Tell me about yourself as a student in the flipped mathematics classroom.

2. What is it like to be in a flipped mathematics classroom?

3. How do you create and maintain relationships with the teacher and other students in your flipped mathematics class?

4. Describe the teacher behaviors that engage you in your flipped mathematics class.

**A. Cognitive Engagement**

1. How do you know that you understand the lesson when presented in the flipped mathematics course?

2. What do you do if you do not understand the lesson in a flipped mathematics course?

3. How often do you ask questions in the flipped mathematics class or contribute to class discussion?

**B. Behavioral Engagement**

1. When you are working during the flipped mathematics class, how do you make sure you are staying on task?

2. How do you work to your full potential in the flipped mathematics classroom?
C. Emotional Engagement

1. Describe how you get involved when working on material in the flipped classroom.

2. How do you feel about working at your own pace in a flipped mathematics classroom?

Journal prompts for students

A. Emotional Engagement

1. Today, I think learning in the flipped mathematics classroom is . . .

2. Today, I like/dislike being in a flipped mathematics classroom because . . .

3. Today, learning math in a flipped classroom made me feel . . .

B. Cognitive Engagement

1. One of the most memorable or important things I learned today in my flipped mathematics class is . . .

2. I showed I needed help or support in my flipped mathematics class today by . . .

C. Behavioral Engagement

1. When I was in my flipped math class today, I showed I was working by . . .

2. Today, when I was completing my class work in my flipped mathematics classroom I . . .

3. When I did not understand something today in my flipped mathematics class I . . .
Data Collection Procedures

I used participant-observations with field notes, interviewing with transcription, and document collection with analysis. The importance of using multiple data-collections methods is identified as triangulation (Glesne, 2011, p. 49). Triangulation has many benefits including, “increasing confidence in research data, creating innovative ways of understanding a phenomenon, revealing unique findings, challenging or integrating theories, and providing a clearer understanding of the problem” (Thurmond, 2001, p. 254).

Data was initially collected for my study from eight interviews: two from teachers using the flipped classroom approach, and six students who were enrolled in a flipped mathematics course during the winter and spring of 2016. The interviews began with introductions, a brief description of the study, and the purpose of the study. The interviews were guided by the topics from the interview protocol. Interview questions created by the researcher were used to provide internal consistency among the interviews and to collect participants’ perceptions about caring. This allowed the participants to elaborate on their experiences on caring in the flipped mathematics classroom. The following question initiated each interview: what is your understanding of the following terms: caring actions and demonstrations of caring? Each interview was tape recorded and then transcribed for data analysis.

Following the interview, the idea of a reflective journal was discussed. Participants were told that the journals were mandatory. The participants were notified that they could reflect on any thoughts or feelings that occurred to them while journaling, however, the focus should be on specific moments of care that occurred in the flipped
mathematics classroom. These journals asked each teacher and student to submit a reflective, thoughtful written document describing one incident that defined or characterized her personal perspective of care. Also, student participants were asked to focus on moments where they felt or experienced any of the three types of engagement under review: cognitive, emotional, or behavioral. Journals were kept by the teachers and students for approximately three weeks. They were collected prior to the second interview.

Participants were informed about their rights as a participant in the research, including the opportunity to discontinue or take a break at any time. The participants and I discussed the limits of confidentiality and the use of pseudonyms. I took notes during the interviews and a transcript of the interview was produced within 24 hours of the meeting.

Classroom observations occurred during the spring of 2016. The purpose of these observations was to document behaviors and interactions among students and teachers in order to identify concrete acts of caring. Mrs. Williams’ classroom was observed during a Geometry course that lasted approximately 51 minutes. Mrs. Fore’s classroom was observed during an Algebra 1 course and also lasted approximately 51 minutes. During the observation, I took field notes so as not to distract the learner or the teacher. Following the observation, a second interview was completed to discuss the observations and the journals. These interviews were shorter, lasting approximately fifteen minutes. Again, the interviews were conducted in a quiet environment where the participants felt comfortable. The second semi-structured interview was guided from previously collected
data, including interviews, observations, and the journals. Participants were encouraged to clarify and elaborate on their experiences.

**Data analysis strategy**

Qualitative data analysis involves processes such as coding, categorizing, and making sense of the essential meaning of the phenomenon. The data analysis occurred both during and after data collection. I worked with the descriptive data to make sense of common themes as they began to emerge throughout the research. Coding was used to name and categorize the phenomena by closely examining the data. The analysis was viewed from particular to general. After looking through all of the documents and searching for general ideas, I looked for both descriptive and thematic data as suggest by Creswell (2013). As advised by McCracken (1988), I used personal knowledge and experiences as tools to make sense of the material. I based my findings on a narrative analysis centered around the stories of students who have participated in the flipped classroom.

The data analysis occurred both during and after data collection. The data collection for this study occurred over a two month period. Field notes were taken during participant observations of the flipped mathematics courses. Reflective notes were recorded immediately after each interview, and again after the interviews were transcribed. Transcripts of each interview were shared with each participant and a follow up conversation was allowed for any necessary clarification of the data. My participation in the project, and my relationship with the data sources, allowed easy access for follow up data that was needed.
I developed my initial list of codes by using the in vivo coding approach. In vivo coding is utilized by researchers to either code documents with exact words from participants or names the researcher composed that best describes the information (Creswell, 2013). I chose this approach because Saldana (2013) suggested this for beginning qualitative researchers learning how to code data, “and studies that prioritize and honor the participant’s voice” (p. 91). Even further convincing me to use this approach was Saldana’s suggestion of using in vivo coding with youth because, “the child and adolescent voices are often marginalized; and coding with their actual words enhances and deepens an adult’s understanding of their cultures and worldviews” (Saldana, 2013, p. 91).

I also kept the idea of emergent coding when analyzing the data. Emergent coding is based on themes and topics you recognize in your transcript, interviews or field notes. According to Coffey and Atkinson (1996), when you search for patterns in coded data to categorize them, sometimes you may group things together not just because they are exactly alike or very much alike, but because they might also have something in common. Saldana (2013) states, “coding is not a precise science, it is primarily an interpretive act” (p. 4). Saldana (2013) also states “Qualitative inquiry demands meticulous attention to language and deep reflection on the emergent patterns and meaning of human experience” (Saldana, 2013, p. 10). A researcher needs to be sure that his or her own biases are not protruding through emergent codes. An example Saldana (2013) discusses is in regards to a set of field notes about an inner city neighborhood. After a few examples of emergent coding, Saldana asks, “Did you agree with the codes? Did other words or phrases run through your mind as you read the data? It is all right if
your choices differed from mine.” When considering these emerging codes, I will need to look at it from an outside perspective in order to obtain accurate descriptions.

**Trustworthiness features**

In order to maintain trustworthiness throughout the research study, I began by developing a set of thoughtful, targeted, unbiased questions. This ensured that I aligned the questions with my project goals. I needed to remain unbiased and listen to the participants without interjecting my opinion as a proponent of the flipped classroom. A trustworthiness guideline is to share the interview transcripts or a draft of the final report with the research participants to make sure I am correctly representing them. Member checks were utilized throughout the process to ensure the work properly represents the ideas of the participant (Creswell, 2013). The eight procedures discussed under the trustworthiness section in Chapter 2 of Glesne also gave excellent suggestions on how to address credibility. One suggestion from Creswell (as cited in Glesne, 2011) that addresses validity is, “peer review and debriefing –external reflection and input on your work” (p. 49).

**Validity**

I focused on the topic of descriptive validity that was discussed in Maxwell’s *Understanding and Validity in Qualitative Research*. According to Maxwell (1992), “For example, a verbatim interview transcript might be descriptively invalid in omitting features of the informant’s speech, such as stress and pitch, that are essential to the understanding of the interview” (p. 287). Besides stress and pitch, there are other “tones” of a voice that can completely change the meaning of what somebody said. A sarcastic
tone of voice or language someone uses can completely change the interpretation of a statement.

**Rapport**

According to Glesne (2011), “Developing and maintaining rapport and trust with children and adolescents adds extra dimensions to the research process. The role (supervisor, leader, observer, friend) the researchers takes in relationships to children affects the kind of information gathered and the development of rapport and trust” (p. 145). Because I was observing and interviewing prior students and close co-workers, I certainly had a special relationship already developed prior to this research project. This is directly related to Subreendeth and Rhee (2010) where it is stated, “We testify that combining professional responsibilities and personal attachments with the people we conducted our research proved to be a messy endeavor. Traditional frameworks of sanitized data collecting techniques, separation of personal and professional, friend versus research participant, field versus home, researcher and researched collapsed creating permeable boundaries and blurred distinctions” (p. 334-335).

**Subjectivity**

Subjectivity is a difficult concept to conquer when observing and interviewing co-workers and students that may possibly have you as a teacher. Prior knowledge, relationships, and bias can affect a researcher’s observations and interviews. From the very beginning of this research process, I was aware of the subjectivity that could arise in this project. According to Glesne (2011), “Keeping track of your subjective selves and then inquiring into their origins, as Laurie did, can make you aware not only of your own perspectives, but also how those perspectives might lead you to ask certain questions (and
not others) and to make certain interpretations (and not others) of interactions within the research setting” (p. 154). I was cognizant of this possibility and continually kept myself in check regarding subjectivity.

**Summary**

The purpose of my research was to explore how the flipped classroom enables teachers to develop a caring relationship with their student’s and to what extent these experiences shape the cognitive, behavioral, or emotional engagement of students? This case study used a qualitative research method to collect data on the flipped mathematics classroom at Bridgeport High School. This chapter discussed the specific research methodology that will be used in this qualitative case study. Data was collected from participant observations, interviews, and journals. The research design, data collection methods, and data analysis were described in detail.
Chapter Four

Results

The purpose of this study was to use a case study to identify what opportunities for a caring relationship the flipped classroom affords a teacher and his or her students and to determine to what extent these experiences shape the cognitive, behavioral, or emotional engagement of students. This was achieved by exploring the ways in which teachers and students in a flipped mathematics class described and explained these opportunities. The data from this study were collected from field notes, two interviews with two different teachers, two interviews with six students who were selected by the teachers and researcher to represent a cross section of the class, and a document collection consisting of a journal kept by the students. The research questions for this study include:

(1) What opportunities for a caring relationship does the flipped classroom afford a teacher and his or her students?

(2) To what extent do these experiences shape the cognitive, behavioral, or emotional engagement of students?

This study was limited to one secondary school in southeastern Michigan. The two teachers selected are the only two teachers who utilize the flipped classroom at this site, besides the researcher. In addition to the two teachers, six students were also interviewed, observed, and wrote in a journal addressing how the flipped classroom shaped their cognitive, behavioral, or emotional engagement. The findings in this chapter
explored the descriptions, responses, and classroom observations of both teachers and the six students.

Five categories emerged from the data that contain the results of this study: (a) teachers’ perceptions of creating a relationship in a flipped mathematics classroom, (b) teachers creating and maintaining relationships in a flipped mathematics classroom, (c) students’ view of the teacher-student relationship in a flipped mathematics classroom, (d) teachers’ view of cognitive, emotional, and behavioral engagement in a flipped mathematics classroom, (e) students’ view of cognitive, emotional, and behavioral engagement in a flipped mathematics classroom.

When discussing the data in this chapter, the teachers are referred to by the pseudonyms Mrs. Fore and Mrs. Williams. While the students addressed Mrs. Fore and Mrs. Williams in their responses using their titles and last name, the text in this chapter uses only their pseudonyms. Each teacher’s interviews and classroom observations will be analyzed and described, as well as each student’s. Cross case analysis of the two teachers’ interviews and six students’ interviews revealed five recurrent categories. Each category was identified as follows:

**Teacher’s Perceptions of Creating a Relationship in a Flipped Mathematics Classroom**

**Mrs. Fore**

As described in Chapter 3, Mrs. Fore is an Algebra I teacher at Bridgeport Schools. She has been a teacher for nineteen years and has taken the role of a special education teacher as well as a mathematics teacher. Some years, she has divided her time between both positions. This is the case for this year. A majority of her day is spent as a
special education teacher where she assists ninth grade students in all subject areas.

During this time of her day, students are located in her classroom and receiving one-on-one help. The other two hours of a day she is a co-teacher in a Geometry class and the main teacher in an Algebra I class. The Algebra I class utilizes the flipped classroom format. As described earlier, students are expected to watch the lesson either at home or during their study hall. Class time is spent working as a whole group to discuss the lesson, as time for Mrs. Fore to help students individually work on practice problems, or to assist with an activity that is relevant to the lesson. Mrs. Fore provided three areas that she believed were important when creating relationships with students in a flipped mathematics classroom. Those three areas included making personal connections with students, having clear expectations, and creating an environment that is positive.

**Making Personal Connections**

In the initial interview with Mrs. Fore, she was asked about her beliefs regarding creating relationships with students in a flipped mathematics classroom. It was apparent she needed more time to think for a moment before she responded.

“You have to meet them where they are and you have to learn a little something about them personally before they will connect with you mathematically, otherwise everything you say is going to sound like Charlie Brown’s teacher. They kind of tune you out, so I think if you can recognize something about sports, for example, like how they did at that track meet, you have a chance to connect with them at their level. You have to set that up first before you can reach them. I believe a flipped classroom gives you more opportunity to do that.”

Mrs. Fore’s response was evident when I observed her classroom. The first thing that I noticed about her trying to connect with her students was her location before the class began. Mrs. Fore stood outside of her door and greeted students as they entered. During this time she was not just saying “hello” or nodding to greet them, she specifically
talked to three students about the previous night. In my follow up interview with Mrs. Fore, she explained that she had conversations with these three students during the week and she knew they were excited about the specific events that discussed with them at the door. Mrs. Fore asked one student about her personal best at the track meet. It was clear that the student’s face lit up and as the student was getting to her seat, she was still smiling. Mrs. Fore discussed with the second student if he was able to get to work on time. It was during the second interview that Mrs. Fore explained that this particular student has to help his family pay some of the household bills, but was worried that he wasn’t going to be able to get to work on time because of the condition of their family car.

Mrs. Fore explained to me many times while the students are working in groups during class, she is able to have side conversations. Specifically with this student, she was able to see how his home life is and how his job was going. The third interaction was with a student that is also one of the six students that I interviewed for this study. Mrs. Fore asked this student if she was able to get her art project completed that she started in class last week. The individual attention that Mrs. Fore gives her students goes beyond greeting them at the door. She is adamant about connecting with each student around an area that is important to them. It was very evident that while the class had not even started, Mrs. Fore had already had three positive interactions with students before the bell even rang! In the follow up interview, Mrs. Fore discussed these interactions.

“I really try to make an effort to greet my students at the door. It’s only because of the flipped classroom model that I even have this knowledge about the students. When I taught a traditional math class, I am ashamed to say that sometimes when I forgot to take attendance. I couldn’t remember whether or not a student was actually in my class! In this model, I talk to everyone of my students every day. I am so proud of that. I find out little tidbits of information
about them and I store it away. I want them to know that I care about the personally, because if they know I care about them personally, then I know I can get them to have goals and reach them. You have to develop a personal relationship with your students. You learn to recognize the looks on their faces, their mannerisms, if you know that….I think that’s what a lot of other teachers never get the opportunity to key into because they are up at the board and they are focused on their lesson. They are interested in getting through their lesson, you know, I have to teach this, I have to cover that, that they never get to see the looks on their faces, all of those personal things that make us what we are. I think if you can key into that you are going to be able to help kids better and that’s the beauty, the strength of the flipped classroom. You have more time to actually sit down next to a kid. You can sit down next to them a minute or two, get up and hit another kid for a minute or two, whereas that’s totally absent in a traditional classroom.”

**Having Clear Expectations**

The second area Mrs. Fore believed in regarding creating relationships with students in a flipped mathematics classroom is to have clear expectations. While this may also be imperative in a traditional classroom, it has an even greater necessity in a flipped classroom where the class may not always be teacher led. Students need to understand the expectations regarding classroom work time and working in groups.

“It’s so important to set clear guidelines with students. They will test your limits at every chance. That’s what they are supposed to do. They’re teenagers! I think, you know, with the dress code policy that I was a part of, if they know the rules and know the bar that you set, then they will meet you there. Most kids, if they know that you are sincere and believe in them, will meet you where you are at. Sure, they will push your buttons, but that’s where you just have to remain positive with them. Tell them they are special, even if you don’t really mean it. Treat them and say things to them that you would want them to say to you. In the beginning of the year, we had to discuss what it means to be in our pods. When you have three to four people working together, or at least sitting together, you have to set up guidelines and expectations, otherwise no work will ever get done. My expectations from day one are very clear. In the flipped style, students may be all of over the place. When I say that to some math teachers, I can see their faces just cringe. But, that’s the beauty of the flipped style. I am meeting the kids where they are at. Because of this, I have to be clear so that they do not get lost along the way.”
I observed Mrs. Fore multiple times conveying her expectations to her students. In one observation there were several students who were not getting much accomplished during a work day in their groups. Mrs. Fore reminded them of her expectations. “Make sure we are getting our work done. When Friday comes, I don’t want you to be upset with yourself or me that you wasted time today.” At the beginning of one class she reminded the students to look at the back board to see the schedule for the week. This particular week was a little different due to the end of the year awards assembly. The assembly affected her Algebra I class that was taught in the afternoon. Students needed to be reminded that they would have a shortened hour on Thursday. “Remember class, because of the assembly on Friday, our class is going to be cut short by about twenty minutes. You need to make sure you are prepared for the two assessments on Friday. I expect you to be ready to go on Thursday so that I can review as a whole group with you during that time. It will not be your time.”

In my follow up interview, I asked Mrs. Fore about this specific situation. I reminded her about the assembly and how it changed the schedule for the week.

“While my class has the typical things that we do during the week, there are also many times where our schedule is disrupted by snow days, fog days, assemblies, or field trips. Sometimes I just have to go with it. I have to be clear with the kids. They need to know what makes up their time and what is our time. I don’t want them slacking and I want them to use every minute wisely. If they make their plan and it consists of them coming into class to watch a video or work on homework and I want to go over something with them as a whole group or work on some type of project or foldable, I have to let them know this so they do not get frustrated. They have to know my plans so they can set goals for themselves.”

Creating an Environment that is Positive

The third area Mrs. Fore believed in regards to creating relationships with students in a flipped mathematics classroom is to create an environment that is positive.
Mrs. Fore believes that without a positive environment, a true caring relationship cannot exist. It is evident in Mrs. Fore’s classroom that she creates a positive atmosphere for her students. During one observation I noticed there were at least eight students who were really struggling with a lesson and were getting very frustrated that they “just weren’t learning it from the video”. Instead of getting angry or impatient with her students, Mrs. Fore was extremely positive with feedback to them, stating “I know you can do it”, “Let’s work on this together and see where we are at”, “See, I knew if you kept trying, you could make this happen”, “I bet all of you feel much more comfortable with this material now”, “Ask me another question if you don’t understand something, I know this material can be quite difficult.”

I addressed Mrs. Fore’s feedback with her students during the follow up interview.

“The reason I stay positive and try not to get frustrated with them is because I had a teacher in school that made everyone feel special. You could never tell if she was angry with a student, but you always knew when she was proud of you. I remember how she made me feel. She had three sayings that she drilled into our heads: Make good choices, do more than is expected, and always keep your promises. I will never, ever forget those. I guarantee if you saw any one of her students today they could tell you those three things. Oh yeah, and “A little DAB will do ya”, dream, act, believe. Anyways, kids loved to be in her room and I wanted them to feel the same way about my room. The difference is, these kids are different these days. You have to keep them, I don’t want to say entertained, but you have to keep them interested. Because the flipped classroom is so different from any traditional one that they are in, it would be very easy for kids to fly under the radar. I refuse to let that happen. I want them to feel welcome and feel comfortable. That my room is a safe, fun place. It’s not Disneyland by any means, but it certainly can be a fun place to be.”

Creating a positive environment was also important to Mrs. Fore because of all of the opportunities for students themselves to become teachers. “The flipped classroom must be a positive learning environment because of how close the students work with
each other.” This was evident during classroom observations. As I was sitting near one group of students, it was evident that they cannot always rely on Mrs. Fore for help. Two students who were sitting at the same pod were able to rely on each other for help.

Student A: “I don’t know how to do this problem. I’m never gonna get the help I need.”

Student B: “What are you working on?”

Student A: “I don’t even know. My problem is I don’t know how to put it in the graphing calculator. I have no idea how she’s getting all those points to graph.”

Student B: “You mean using the t-table?”

Student A: “Yeah.”

Student B: “It’s easy. I’ll show you real quick.”

I also noticed one particular student who appeared to be farther along than most students and was more of an assistant to Mrs. Fore than a student! When Mrs. Fore was busy working with students in one pod, this student was more than willing to help others. He mingled between pods and it was very interesting to watch how he interacted with different groups and different students. They were all very welcoming of him helping them. He seemed to articulate the math very well and there were times he even asked the student a question instead of just explaining how to complete the problem. There were a few times when the students were frustrated because they did not understand his explanation. This was also interesting. Instead of insisting on going to Mrs. Fore, or even sitting there with their hand up in the air, they turned to a student in the next pod over and asked them for help. Mrs. Fore commented that the relationship that is
developed between student to student is one that can foster and grow between them and sometimes can be even more valuable than the relationship between teacher and student.

**Mrs. Williams**

As described in Chapter 3, Mrs. Williams is a Geometry teacher at Bridgeport Schools. She also has a minor in communication and teaches an elective course Speech. The high school mathematics courses that Mrs. Williams teaches utilizes the flipped approach, but she also teaches a seventh grade advanced Pre-Algebra class that is taught using the traditional format. Mrs. Williams has been a teacher for four years. Her position at Bridgeport is her first teaching experience. The Geometry class that was used for this research utilizes the flipped classroom format. As described earlier, students are expected to watch the lesson either at home or during their study hall. Class time is spent working as a whole group to discuss the lesson, as time for Mrs. Williams to help students individually work on practice problems, or to assist with an activity that is relevant to the lesson. Mrs. Williams provided three areas that she believed important regarding creating relationships with students in a flipped mathematics classroom. Those three areas include relating to students individually, modified/positive expectations, and dynamic of the classroom.

The initial interview with Mrs. Williams began with her background because she is relatively new to teaching. She included her view on her experience with student teaching and the flipped classroom approach to teaching.

“When I went to college, different types of teaching styles were really never talked about. I had heard of the flipped classroom, but thought it was for more classes like maybe English or Science. You never heard about it in any of my math methods classes. When I was interviewing for this position I was nervous because I knew they used the flipped approach and I had never used it as a student and not as a teacher. So, now that I have used it, I don’t know if I would go back
to the traditional way. I can see how it is beneficial to the older kids, but I really can say I’m not sure how the younger students like my Pre-Algebra kids would adjust to it. I really like how I get to get the students involved more and how some of them become teachers themselves.”

Relating to Students Individually

This first area Mrs. Williams addressed regarding creating relationships with students in her flipped Geometry course is by relating to students individually. She is able to talk with all of her students on a daily basis in her flipped class and believes that she needs to learn about them independently as well as meet their academic needs individually.

“I believe teaching in the flipped mathematics classroom allows you to relate to students on a more individualized basis. As the teacher, I have more time to check in with students one-on-one since we do not lecture in class. Students are more comfortable asking me questions and get my full attention. I believe teachers can create a safer and warmer environment in the flipped classroom because from the beginning students know they are valued and if they are willing to put in effort, they will thrive. I think students feel more comfortable in the flipped classroom because the learning happens at the speed that works for them. Teachers are not just in front of the class spoon-feeding information to them. The students can make learning their own and that quickly helps teachers get to know their students.”

During the classroom observation, the individual attention Mrs. Williams was able to give her students was noticed. She related to the students personally on an individual basis as well as academically. This is one conversation I heard while observing.

Mrs. Williams: “What are we working on here today?”

Wess: “I have to finish my homework before I can get started on the project.”

Mrs. Williams: “Okay, do you need my help with anything right now?”

Wess: “Ummmmm, I don’t think so.”
(As Mrs. Williams is walking away) Mrs. Williams: “I noticed you didn’t come to our peer to peer meeting last night after school. Did something come up?”

Wess: “Yeah, I forgot I had to go to play practice. We only have three practices left until the show this Friday and Mrs. Dennis (pseudonym) would kill me if I didn’t make it to practice.”

Mrs. Williams: “Oh, I didn’t realize you had such a big role.”

Wess: “Yeah, I’m playing one of the guys in the traveling band.”

Mrs. Williams: “What’s the name of the play this year?”

Wess: “Rock of Ages. It should be pretty cool because we get to dance to a bunch of 80s songs.”

Mrs. Williams: “Ahhhh, my favorite decade of music. Mr. Lakes’s too. (referring to the physical education teacher. Pseudonym also used). I hear you guys working out to it all of the time in Advanced PE.”

It was evident from the classroom observation that students had individualized plans in terms of homework assignments and projects that they were working on. I was able to observe two different groups of students working on their power point presentation and asked to see the rubric for their project. Upon further questioning of these two groups, I was able to see that not only were the group’s projects differentiated, but the individual expectations for each student were also different.

“At our school we do not have advanced placement courses or classes that are specialized to the students who need a lot of extra attention. I have students who are the best and brightest all the way to your most struggling math student. I love that in the flipped style I can meet the kids where they are. Some really struggle and others are gifted. I have the freedom to do what I think is best for everyone. In my Pre-Algebra class, this is not as easy to do. Even though it’s advanced, I still have some in there that struggle. But, I teach the material and move on. If you get it, great. If not, we’re gonna keep moving. I always let my kids choose
their project. They can figure out for themselves if they have to ability to do what I am expecting of them. Some of them like to draw, some like to tell stories and some don’t like to do either. That’s when we talk and try to figure out what works for them.” She also added, “Learning about students- their likes and dislikes- helps. If trying to explain something to them, you can compare it to something they like- or understand- really well. If you know a student hates math, you can say, “I know math isn’t your thing, BUT, right now, your job is to be a student, and you need to do things you don’t necessarily like so that you can do what you love later.” Students often appreciate transparency and acknowledging that you know they don’t like something. It shows that you know something about him or her and that you’re not saying they have to love it, but they at least need to “suck it up” and get it done. Learning about students also helps you to connect. If you and a student love Michigan football, it gives you something to talk to him/her about. This makes you REAL to them, adding to approachability and a desire to perform well for you.”

**Modified/Positive Expectations**

Mrs. Williams believes that in order to create a relationship with her students, she needs to be clear on her expectations, but also be willing to modify them because every one of her students have different needs and are at differing abilities. In addition, these expectations need to be positive in nature.

“I use the information that I learn about my students to help them in the best way I know possible. I make sure I am in tune with my students’ personalities and learning styles. I have modified expectations for each individual student. One example is that there are students that need extra assistance. Because of the flipped classroom atmosphere and the freedom they have, not all students are capable or motivated enough to stay organized and accountable for their learning. These students need to be identified early on in the year because it is so easy for them to fall through the cracks and get behind the class. I make sure it is clear that I can’t do the work for them and I expect them to try their best. I also try to be understanding that math doesn’t come easy for every student and they have a lot of external factors that affect their performance in school. I often find myself trying to relate to the problem students in any way possible so that I can try to gain their respect and interest early on. The flipped classroom gives me more time to do this.”

During a classroom observation, it was evident how Mrs. Williams expectations were clear, yet modified for each student. Even though her expectations were modified, she still expected students to be held accountable and had high expectations for her
students. Mrs. Williams believed her students knew that she had high expectations because she did not accept work that was nothing but high quality. She demanded that her students show all of their work and pushed them to put forth their best effort, even if they did not want to retry or retake an assessment. This was evident in a classroom observation when she told a student “You always show your work in Algebra I. It’s the end of the year, I know you’ve heard me say that a thousand times this year. And, pencils are better in math class. They make you smarter.” She also said to another student “You know I accept nothing but the best, and I know you are better than that.”

During the follow up interview, Mrs. Williams commented:

“I like to challenge my kids. I know they are all at different places, but they all can be pushed. But pushed in a positive way that they know I want them to persevere and do the best they can. This skill is so important to life. They can develop a work ethic in the flipped classroom that is so beneficial to them later in life. I encourage them to finish a task so that they are happy with what they do. Some kids rush through just to get done. I want them to know that I know what they are capable of.”

**Dynamic of the Classroom**

The final reason Mrs. Williams felt that the flipped approach creates an opportunity for a caring relationship to exist between her and her students in due to the structure in the classroom. No longer is Mrs. Williams in front of the classroom for a lengthy period of time. In her opinion, her role as a teacher is much more valuable than ever before. She is able to walk around the classroom as more of a facilitator than the disseminator of the knowledge. Mrs. Williams carries a clipboard around with her as she is traveling from pod to pod answering questions and helping students. She does this to ensure that she speaks to every one of her students daily. She stated that it is very easy to get distracted on work days when students are working at their own pace and being held
responsible for their own learning. She keeps tally marks for how many times she has spoken with each student. Mrs. Williams does this because she believes that it lets every student know that they are a part of the classroom and she has found that students stay on task more when they know that she is keeping them held accountable.

“I just started keeping tally marks last year. There are some days where I feel like I ran a marathon at the end of the hour. Mostly because I felt like kids were always trying to get out of doing their work and I was more of a watch dog. I needed to come up with something that let them know what I expect and that I wasn’t going to let the hour go by without them having at least one conversation with me. They all joke around about the clipboard, but at the end of an hour I have a visual that lets me know I’ve checked in with each and every one of my kids.”

Mrs. Williams also spoke about how she has learned through the flipped classroom progression how students can become such a huge asset to each other. In the beginning of the switch from the traditional to the flipped approach, the students were not utilized as much as they currently are to help each other.

“I love to be able to walk around and help all of the kids. It’s very interesting hearing how they talk to one another. The way they interpret the information. Sometimes kids understand the material better when another student shows them how to do it. They might understand their language better! Sometimes I even learn a better way to explain it. Too often as teachers we can’t put ourselves in our student’s shoes and think about it from their point of view. Here’s a perfect example. A student the other day was saying how he was always confused about who makes up a junior varsity team. He thought because the word junior was in the name, then it had to have juniors on it. He was so confused by this. To him, it didn’t make sense that a junior varsity team would have freshmen and sophomores on it. Think about that for a second. To us, that seems so ridiculous because we just know the order of a ninth grader through twelfth grader and who’s on which team. But what he was saying made so much sense to me. So just that one misconception got me thinking about how much we just assume these kids know. Hearing how to do something from another student is the best thing for these kids. And even better for the kids who are explaining it to them!”

Mrs. Williams continued by talking about how the flipped classroom creates this type of environment where students work closely with one another and how important it
is for students to understand the boundaries of working with each other students. She stresses the importance of how to talk to each other, how to be a helper, how everyone does not work at the same pace, and how to rely on each other.

“In my opinion, the best thing about the flipped classroom is how students get to work with one another and how these kids develop relationships with each other just because of the simple make up of the room. They work together in small groups and have so many one-on-one interactions. Now, I’m not gullible! I know that not all of the conversation that is happening in my room is about math. But that’s okay. More kids are involved and working. They are relying on each other. Working through some tough material. I’m okay with the side conversations as long as work is getting accomplished. I can’t expect these kids to be sitting one foot from another and not have a conversation about something other than math.”

Mrs. Williams also commented on how it is important to set up guidelines about the group work at the beginning of the school year. She understands that without the proper direction from her, the student to student interaction may not be a positive one and perhaps make students feel badly about themselves. She models and practices dialogue between students so they understand what is acceptable and what is unacceptable. “I encourage students to think about why certain words and actions can be hurtful. I let them establish the standards and then hold each other accountable to these standards.”

**Teachers’ Creating and Maintaining Relationships in a Flipped Mathematics Classroom**

**Mrs. Fore**

Mrs. Fore believed as she has become more of a veteran teacher, she realizes just how important it is to create and also maintain relationships with students. This is one reason why she changed her teaching to the flipped model.

“Over the years I have had many, many students. I remember about five years ago teaching an Algebra I class, I could even tell you what hour it was and the
names of the students in that class. I sat there thinking how bored some of those kids were. They had no idea what was going on and really didn’t care. One boy was only here part of the year. His family would transfer him back and forth between Texas and Michigan so that he could work in the fields in Texas and earn money for his family. I wanted, I needed to change something because I could see on these kids faces what I was doing wasn’t working for them. This same student I remember doing a bucket list project for English class. He was really good at origami. His entire bucket list project was created with origami foldings. It really was the coolest thing. And here he sat in my math class, so bored, so unengaged, almost so lifeless. I wanted to do cool things in my class too. I wanted fun projects like this. I wanted the time to talk to my kids. And that’s one of the main reasons I switched from what I was doing to the flipped format.”

In order to maintain the relationships that she had developed with her students, Mrs. Fore explained that she is just “real” with her students and “treats them with respect”. Her efforts to maintain relationships include the following components: (a) letting learners choose; (b) being consistent; (c) being flexible; and (d) seeing her as a real person.

**Letting Learners Choose**

Mrs. Fore described the flipped classroom as one where she no longer is teaching every student the same lesson at the same time. Students in her class are not working on the same assignments. During the classroom observations this was quite evident. When students entered the classroom, they knew what they were working on for the day. There appeared to be groups of students who were completing the same task. For example, a few students were inquiring about previous test scores, a small group circled up and began working on a homework assignment, some gathered around the round table in front of the room to check their homework assignment, and two students went directly to Mrs. Fore’s desk to ask a question. Each student knew his or her role and was able to begin his or her work without direction from Mrs. Fore. Mrs. Fore believed this opportunity for choice allowed students to create guidelines and goals that work for them.
“At our school, we do not have classes for the honor student and we do not have a class for students who struggle. We have in our classes, especially the math classes, the student who struggles, has never felt good about math, and who generally just despises the subject. On the other end of the spectrum, there are the kids who have always excelled in math, enjoy the challenge of a difficult problem, and overall, just really like doing math problems. When I taught in a traditional classroom, it was almost impossible for me to meet the needs of all of these students. I was forcing everyone to learn the same material at the same time. I began to look at my own learning as an adult and tried to put myself in my students’ shoes. I know nothing about cars. I can’t change a tire, can’t change the oil, and could never take an engine apart and put it back together! Nor do I want to! I have no interest in it. I understand that some of these kids have no interest in math, but if I can begin to let them make their own choices about their learning, how they learn it, when they learn it, and let them choose how to show me that they understand it, the maybe, just maybe I can get them to like the subject a little better and show them that it’s not that bad.”

Mrs. Fore believed that the flipped classroom allows students to make choices about their learning that not only affects their grade in Algebra I, but allows them to develop skills that will go even further than the mathematics they have learned. She identified that a flipped classroom teaches students in regards to life skills that are more difficult to acquire in a traditional classroom. Students are making decisions about when and how the material gets completed. With the lessons on videos, students do not necessarily have to be on track with the rest of the class. Secondly, with the opportunities for retakes on assessments, students learn to fail and try again. She believes this is a major advantage of the flipped room:

“One of the best things, especially for kids who have never known failure, is to fail and try again. If you have always done everything right then you really haven’t learned one how to deal with failing, but two what your plan is to be successful. You always remember the stuff that was hard, difficult. When it’s easy, it’s easy to forget!”

**Being Consistent**

Having a special education background, Mrs. Fore knows how important it is to have consistency in her classroom. In the flipped mathematics classroom, it is evident
through the classroom observations that she is consistent with her lessons and schedule. I was already seated in the back of the room when students began to enter the classroom. Because I also teach at this school, the students needed to be told why I was in the classroom prior to the observations, so as not to cause a disruption. Mrs. Fore did not want any disruptions in her class. She was very adamant about maintaining structure and consistency in her classroom. To have consistency in her classroom in terms of academics, Mrs. Fore places a schedule on the board so students understand what is expected of them during the hour. Because the flipped classroom can be such a flexible environment, students need to be aware of the plan for the day or week. She understands that this may be the only consistency that some students have in their lives.

“Many of my students come from homes where they have to work after school to help support their families. They help pay the bills. They help watch their younger brothers and sisters. They drive them to their practices. Basically they are the parents in the family. They are the one’s responsible. The only form of consistency I can offer them is to be there for them every day and make my classroom consistent for them. They need to know what is expected of them and they need to know what to do in order to get the job done. If I cannot provide them with consistency, then I am letting them down.”

In addition, Mrs. Fore also keeps consistency in mind when she disciplines her students. With group work happening on a regular basis, Mrs. Fore explained that it may be difficult for her to always know what every student is doing in the room.

“It’s just consistency and consistently doing the same thing with them so that they feel safe. They need to feel that somebody cares about them. If a student knows that I asked about their track meet last night then they know that I am sincere when I ask how it is going with their math. They are more willing to open up, they are more relaxed. They let their teenage guard down a bit and they see you as a person when you see them as a person.”
Being Flexible

Mrs. Fore believed the flipped classroom affords her the opportunity to be flexible. She understands that every day is going to be something different. Some students may need help on an area more than others. Some days the entire group is having difficulty with a concept. Perhaps what she has planned for the day may not happen because she is checking in with all of her students to talk to them about their plan. While consistency is important, being flexible is also imperative. This was not always possible in the traditional classroom.

“Years ago when I taught the same lesson to every student every day, I felt under pressure to get through the lesson. I was always watching the clock, making sure I was able to get through what I had planned for the day. This made me anxious and nervous. There were years when I taught three sections of Algebra I and depending on how many questions students asked, I found myself rushing through some lessons and other times when I just couldn’t get through everything. The students knew I was rushing and knew if I couldn’t get through the lesson then they wouldn’t have as much homework. With the flipped classroom, all of the students are working at their own pace so I have to be flexible. With flexibility comes fairness and when you are fair with the students, they know that you respect them and understand that you care about them.”

Flexibility was evident during the classroom observations. Once students were settled into their seats, some students collected a chrome book and started watching a video, others gathered at a round table in front of the room to begin checking their homework, a few were gathering papers in the back of the room, and there were two students who were not doing any of these tasks. As students were completing each one of these assignments, Mrs. Fore was circling the room checking in with each student. She was very comfortable with the atmosphere that I would describe as a little chaotic. While Mrs. Fore was asking where they stood mathematically with what they were
working on, she also took the opportunity to have a few personal conversations with students that talked about their goals and their plan for the week.

“I think my role is to monitor what the kids are doing and I try to catch kids, I watch their faces. If I can see kids looking around, looking at each other and they appear to not understand the material, my role is to catch that and directly help them or work another one of those problems in front of the room because the kids would like to see that again. I have to be flexible throughout an entire class. If I get upset because some students are getting chromebooks and watching the video in class when I suggested they not waste class time doing this, I will not win with them. By winning, I mean once I get upset with the choices they are making given the flipped style of learning, I will not get them to buy into what I am trying to sell. I want them to know that I genuinely care about them as students, the goals they set for themselves, and how they make this plan happen. This starts with being flexible with them. One of the major freedoms of the flipped classroom is that a student gets to choose how, when, and where. If I am not flexible in their decision making, some will be defiant and purposely sabotage their own learning.”

Seeing her as a Real Person

Mrs. Fore explained during the initial interview that one of the best things about creating and maintaining relationships with her students in the flipped mathematics classroom is that she now has the time that allows her students to see her as more than just a teacher. During one classroom observation, Mrs. Fore shared details about what she likes to do on the weekends. She was helping with a student learn how to solve a rational equation. This particular student was having a very difficult time with finding the common denominator and then understanding why you could simply eliminate the dominator in order to solve for the variable. Mrs. Fore explained to the student how she likes to take her three nieces and nephew to the local ice cream shop on the weekends to spoil them.

“It’s sort of like this. Once a month I get to spoil my three nieces and nephews. But, even though I am not a mom, I know that what one gets they all should get. Otherwise, all I have are three kids that want what everyone else has. One time they each got a different flavor and they all wanted everyone else’s. So, I’ve
learned to just tell them the flavor of the day! If it’s an ice cream day, we will all go in and get hot fudge sundaes. If it’s a slush day, we all go in and get blue raspberry slushies. Think about each part of this rational equation as being one of my nieces and nephews. They all have to get the same thing in order to keep everyone happy and balanced. What you do for one, you have to do for all. So once you get the common denominator, you multiply each part (my niece or nephew) by this common denominator. Watch what happens. All of the sudden my denominators are all gone and look at this nice and pretty problem I now have to solve. Looks a lot better doesn’t it?”

One student commented during their interviews on how Mrs. Fore shares information about herself to the class.

“I talk with Mrs. Fore a lot. Since it’s not a group discussion there is always time for one on one help which leads to conversation about other stuff. When you’re one on one you talk more, you have a more friendly relationship. It helps that we are in groups and there’s always room for her to sit next to a student and help them or talk to them. When you’re in a group with the teacher in front, a student isn’t likely to raise their hand and have a personal conversation with the teacher. When you’re one on one you talk more. There’s been lots of times where she will tell me a story about her. It’s gotten to a point where when a Monday comes I’ll ask her what she did this weekend. I like hearing about her life. She’s not just a teacher, she’s like a real person.”

Mrs. Williams

Mrs. Williams believed that it is also important to create and maintain relationships with students in a flipped mathematics classroom. She talked about relationships that she had with her high school teachers and the types of professors she had in college. This is one of the main reasons she became a teacher.

“I was lucky enough to have teachers at my high school who showed interest in me. They knew my family, knew what sports I was involved in, and even after my sister graduated, would still ask how she was doing. I loved that about my high school. Relationships were created naturally because of the size of the school. That doesn’t always happen. I’ve heard stories from other kids where they could say there were 13 other math teachers and they might know two people in their class. I think being in a small school is just one way to make those relationships. But, even in some small schools kids get lost, fall through the cracks, don’t make it because they do not want to be noticed. I want to make a difference. That’s why I’m not only a teacher, but also a coach and an advisor.
Kids need adults in their lives to let them know we do care and they are not just another student in our rooms.”

Mrs. Williams believed creating relationships with students is just as important as the content she is teaching them. She stated in the initial interview that if she takes the time to have meaningful relationships with her students, other things will fall into place. She believes a strong foundation for any successful relationship includes trust.

“One way to start building trust is by having “check-ins” where students are given an index card and asked to let me know how life is going. This might look like a numerical value, it might be something like “Using weather terms, describe how you’re feeling about life.” Doing this doesn’t force kids to talk, but it lets them know the option is there. I love this because they hand the cards in, and the rest of class goes on its way. I’m able to follow up with them at a later time. Having some sort of check in is productive for multiple reasons. It lets the kids know you care and you’re available if they need something. If a kid feels cared for, it typically makes them want to work for you, and it offers oversight, which plays a role in classroom management. If you know a kid is having a bad day, you’re likely to cut him/her some slack.”

Mrs. Williams efforts to maintain relationships include the following components: (a) learning about students; (b) encouraging student to student relationships; and (c) flexibility and approachability.

**Learning About Students**

Mrs. Williams believed that it was important to learn about her students. She believed learning about her students’ individual learning styles, as well as their interests, were essential components of a teacher-student relationship in the flipped mathematics classroom.

“To create and maintain relationships with my students, I make sure I get to truly know my students first and foremost. I need to know what helps them learn and how they can be successful in math, especially when they haven’t been in the past. I try to have a laid back personality and approach to teaching, yet still hold high expectations and push my students to be their best. I strongly feel that when students get to know you and respect you, you
have almost everything you need to help them learn. It is so important that they know you care first, because then they are more likely to care.” She added, “I use what I know to individualize the instruction that certain students or groups may get. I also try to find ways to make the math appeal to them. I have a lot of male students that are interested in trucks so I try my best to connect the problems I am working on to something that may relate to trucks. The flipped classroom allows me to easily catch when a student is having an off day. Depending on that student, I know if I need to just give them space or if they would be better off venting to me for a couple minutes and then returning to their work. I love that I can be more than just the sage on the stage. It truly opens up opportunities for me to help my students in life, not only mathematics.”

Relating to her students interests was evident during the classroom observation. While Mrs. Williams was sitting in a pod with a group of students, Jenna was having difficulty finding the volume of a figure that was a cone on the bottom and half of a sphere on top. Mrs. Williams stopped talking about the math problem and began talking about ice cream. She was explaining to Jenna how she was really just trying to determine how much ice cream Jenna would be eating if the cone appeared like it did on the paper. The conversation went from Jenna’s favorite ice cream flavor to her possibly applying for a job at the local ice cream shop. Mrs. Williams dissected the problem by drawing two separate figures and talking with Jenna about what part of the formula she would need in order to determine the amount of ice cream. Mrs. Williams provided some humor by coloring the “ice cream” pink because Jenna’s favorite ice cream is strawberry.

“My interactions with students in the flipped classroom are very specific on the individual. Teachers know their students and what methods of interaction is best to help them learn. I know some students greatly benefit from me checking in with them on a daily basis because they need the motivation and accountability. The flipped classroom allows me to reach this type of student because of the extra time I have. On the other hand, I have some students that are better without my interference and they are successful on their own. These students can fly through the material and have extra time to focus on preparing for quizzes and tests. Since the flipped classroom gives me more
flexibility, I don’t need to have each and every student on the same page at the same time, every single moment.”

In addition to learning about her students, Mrs. Williams used this information to have clear expectations.

“Once you have attempted to make connections and get to know your students learning abilities and styles, you need to be consistent in expectations. My students don’t wonder what a typical week will look like because it has been the same kind of set up since day one. I have time devoted to checking in with them, individual practice, assessments and re-teaching.”

**Encourage Student to Student Relationships**

Mrs. Williams believed a major proponent of creating and maintaining relationships in a flipped classroom can be among students. The flipped classroom is an environment that allows more opportunities for this relationship to occur as compared to the traditional classroom.

“In my Pre Algebra class that is not flipped, students do not have much opportunity to collaborate or work together because so much of the time I am up in front lecturing and it’s only at the end of the hour they are able to work on homework or ask questions. Typically they are in rows and asking me questions not to each other.

In the classroom observation, it was evident that students worked well together in teams and showed respect and support one another. Although students were at a different pace and working on different material, they were supportive of one another. There was no evidence of students being condescending to one another or disrespectful to one another. This environment was created by Mrs. Williams during the first few weeks of school.

“It’s very important to me and one of my personal goals is to create an environment where the students could discuss and share their ideas as they progress through their modules. I wanted them to encourage their peers to accomplish their goals.”
The following are statements made between students in Mrs. Williams flipped classroom that show evidence of respect and support between students. “I did that last night at home, so I can help you with this”, “Oh yeah, that’s easy, let me show you”, “Say that again, I didn’t get it”, “Thanks for helping me out”, “Can anyone help me on section 10.2? It’s super hard. I can’t get it”, and “I feel so much better.”

**Flexibility and Approachability**

Mrs. Williams explained during the initial interview that there are two things that are very important in getting students comfortable: flexibility and approachability. She believed that students should know that they can approach her with any type of problem, whether it be academically or personally. She identified a variety of ways that she makes herself approachable to her students: providing the mentality that there are no silly questions, not making fun of a student, making him/her feel at ease, and smiling and using body language to let them know she is approachable.

“Approachability is huge. Flexibility is huge. Things will come up, they did for us when we were students, and they do for us now as adults. Too often, we are stuck on “holding kids accountable” which is important, but we also need to remember that sometimes things happen that are beyond our control. If a student had to miss school for a funeral or severe illness, is making up a 5-minute warm-up really necessary? Or is it just going give them one more thing they need to do and add stress? If you aren’t approachable, students aren’t going to “let you into their world. For me, it is sitting in front of the class and walking around as often as possible. Standing in front of a classroom lecturing (the opposite of a flipped classroom) is a huge barrier for approachability. Let students into your world a bit. Tell them stories about your kids, a mistake you made, even just a, “Hey guys, I’m having a really bad day today. Sorry if I don’t seem like myself.” Students often appreciate seeing their teacher vulnerable. It reminds them that you’re just like they are, and chances are, they’ll be on their best behavior that day since they know you’re already having a hard day. Another important thing is letting them know if you made a mistake. For me, if I overreacted about something, it took a dose of humility to say, “hey, I’m sorry that I yelled before. I overreacted and it was unnecessary.” Not only are you helping build trust, you’re modeling for them
how important it is to take ownership of our actions, and how necessary it is to have grace for others- and ourselves.”

Noticing Mrs. William’s flexibility and approachability was a very simple task when completing the classroom observations. She greeted her students at the door with a smile, engaged in conversation with them as they entered the room, and had a sense of humor with the students. Mrs. Williams also showed approachability by appearing to be down to earth. In one conversation between Mrs. Williams and another student, she was talking about her daughter’s one year old birthday party. Mrs. Williams was telling the student that the theme was ladybugs and her daughter was “hilarious when she didn’t even know what to do with this big ole cake in front of her.”

During one observation, Mrs. Williams was completing an activity around a standard involving lateral area. She displayed exceptional enthusiasm throughout this lesson. Mrs. Williams maintained students’ attention with laughter, telling anecdotes, and asking the students about their feelings toward the material.

Besides approachability, Mrs. Williams displayed flexibility. One student was entering the room before class began and was explaining to Mrs. Williams that she forgot her notes in the library, but could not afford to take another tardy because she already had two for the semester. Mrs. Williams addressed the situation with kindness. During the follow up interview she addressed this:

“Because relationships are important, the way I discipline absolutely goes hand in hand. I believe in giving students the benefit of the doubt. Instead of coming to a situation angry, accusing, and yelling, I like to ask questions first. It allows students to explain/own up to their mistake, and allows me to assess the situation. When we go into a situation pointing fingers or shouting, it puts everyone on the defense. Kids feel attacked, and any progress that was made building trust and rapport is quickly lost. Get to the bottom of the issue, and discipline accordingly. If you’ve built a relationship with students, they’ll feel bad disappointing you.”
Students’ View of the Teacher-Student Relationship in a Flipped Mathematics Classroom

The students in Mrs. Fore’s and Mrs. Williams classrooms were asked interview questions about their relationships in their flipped mathematics class. The students offered different views in their interviews and provided examples in their classroom observations. The students’ views were categorized into the following areas: Students Feel Connected to Teacher in a Flipped Mathematics Classroom, Students Feel Recognized in a Flipped Mathematics Classroom, Teacher Shared Personal Information in a Flipped Mathematics Classroom, Teacher Respects Students Feelings in a Flipped Mathematics Classroom, Students Feel a Sense of Belonging in the Flipped Mathematics Classroom, Students Feel Supported by the Teacher in a Flipped Mathematics Classroom, and Students Overall Experience in a Flipped Mathematics Classroom.

Students Feel Connected to Teacher in a Flipped Mathematics Classroom

Mrs. Fore

Michael, Brock, and Sara felt they had a positive relationship with Mrs. Fore and felt connected to her. Michael suggested that he and Mrs. Fore are closer than his math teacher from last year that was in a traditional classroom. He stated,

“Mrs. Jones could not tell you one fun fact about me, but Mrs. Fore could. She would say I’m a nice guy and she knows that I’m on the track team. We talk about that sometimes. In Mrs. Jones class since it was whole group, there wasn’t a lot of conversation, but in Mrs. Fore’s class there’s more time for one on one talk.” Brock said that Mrs. Fore was his favorite teacher and that he hopes he has her again next year in Geometry. “Yeah, I feel connected to Mrs. Fore. I like that she is always there at the door greeting us and walking around the room to see if we need help.” Sara was more vocal about her relationship with Mrs. Fore: “With Mrs. Jones it was more a class discussion when you had questions she would explain it to the class and not directly to you. If you didn’t understand she wouldn’t clarify because the entire class was waiting for her attention and waiting for her to move on. With Mrs. Fore she is with you like a student and she will
answer your question while she sits right next to you. Mrs. Fore could tell you personal things about me. She could tell you if I liked track or something that is my favorite. I don’t think that Mrs. Jones even remembers my name. I talk with Mrs. Fore a lot. Since it’s not a group discussion there is always time for one on one help which leads to conversation about other stuff. When you’re one on one you talk more, you have a more friendly relationship. It helps that we are in groups and there’s always room for her to sit next to a student and help them or talk to them. When you’re in a group with the teacher in front, a student isn’t likely to raise their hand and have a personal conversation with the teacher. When you’re one on one you talk more.”

While all three students felt they had a positive relationship with Mrs. Fore and felt connected to her, Michael specifically suggested that he and Mrs. Fore were closer than his math teacher from the previous year. Unlike Mrs. Fore’s students, two out of the three interviewed felt connected to Mrs. Williams.

Mrs. Williams

Only two of the three students interviewed felt connected to Mrs. Williams. Both Wess and Angela had positive comments regarding their relationship with Mrs. Williams. However, Jenna did not feel like she made a personal connection with Mrs. Williams in the flipped mathematics classroom.

Wess: “I have more conversation with Mrs. Williams than I do other teachers. Especially on work days. Depending on the section that I’m on.”

Angela: “I get to talk to Mrs. Williams more because we have work days a lot and it’s quiet and I can just go up to her whenever. Yeah, I know I have a connection with her. We talk about softball and stuff and she’s just a really nice person. I look forward to her class. Maybe not so much the math, but I like to see Mrs. Williams.”

Jenna: “I don’t think she could tell you one thing about me or that I’m even in cheer. She might though. There are a lot of days where I really don’t even talk to Mrs. Williams. I don’t talk to a lot of my teachers. I do talk to students.”

While only two of the three students interviewed felt connected to Mrs. Williams, it was not evident that this connection was made with Jenna from the interviews and observations. The next category that was students’ views were grouped into was Students Feel Recognized in a Flipped Mathematics Classroom.
Students Feel Recognized in a Flipped Mathematics Classroom

Mrs. Fore

Michael, Brock, and Sara felt Mrs. Fore knew aspects about their life that other teachers may not have known simply because of the conversations that occur during class time. Mrs. Fore made ample efforts to learn about the students. The following are statements made by each student in the follow up interview that are evidence that Mrs. Fore makes her students feel known.

Michael: “She calls my mom a lot at home and knows my family really well. She actually had my dad in school so she is always asking me questions about how he is doing.”

Brock: “Mrs. Fore comes to my football games on Wednesday nights. I know that because she talks to me about it the next day.”

Sara: “Mrs. Fore and I both like to run so we talk about that.”

It was evident during the interviews that all three students felt that Mrs. Fore made them feel recognized. Comments made by all three students supported this claim. Additionally, Mrs. William’s students also felt recognized by her.

Mrs. Williams

All three students, Wess, Angela, and Jenna felt that Mrs. Williams goes out of her way to make sure that she learns something about them that is not related to mathematics. Getting to know her students is something that Mrs. Williams works on from the very first day of school. Often times, she stated that she will play quick, fun games with them to get them to know each other and get to know her better. The following statements were made by the students when asked how the teacher knows them well or how she takes a personal interest in them at school.

Wess: “She asked me about how I did at my basketball game.”
Angela: “She knows I work at Subway and sometimes she’ll come in when I’m working and she’ll tease me and say that she hopes I did my homework.”

Jenna: “I told her I was going to see a movie and she asked me if I liked it the next week.”

Through the interviews and observations, Wess, Angela, and Jenna confirmed that Mrs. Williams made an effort to get to know her students and made them feel recognized. Mrs. Williams took a personal interest in Wess, Angela, and Jenna in order to facilitate this. The next category regarding student’s view of the teacher-students relationship in a flipped mathematics classroom is the how the teacher shared personal information about themselves.

**Teacher Shared Personal Information in a Flipped Mathematics Classroom**

Students in both Mrs. Fore’s and Mrs. Williams’ class indicated through interviews and journals they enjoy when their teacher shares personal information about themselves with them. Some felt it makes them feel like the teacher cares more about them than other teachers, while others indicated they like to get to know their teacher on a personal basis because they feel like the teacher understands them better as students.

**Mrs. Fore**

Michael: “She told the class about her math school days and how she wasn’t really good at math. It makes me feel better when she talks about this because then I know she knows where I am coming from and how I struggle too.”

Brock: “I love to hear about Mrs. Fore’s bike trips that she goes on. Her and another teacher do these bike trips throughout the year and she’ll always show us pictures. It’s neat because we get to see stuff from lots of different places in Michigan and Ohio.”

Sara: “Yeah, Mrs. Fore is fun like that. She loves to go off on tangents and tell us stuff about her, but it’s fun. It makes me want to do better in class.”
Mrs. Williams

Wess: “Mrs. Williams talked about her vacation to Florida and how much fun it was.”

Angela: “She talked about playing softball in high school. I play softball too so it’s cool to hear her talk about how their school did and the positions she played. I know that she always wants to know if we won or lost after a game. I hope she can make it to one of my games this year.”

Jenna: “She said she like my new outfit and told me she had the same scarf, but in a different color.”

Whether the student felt that the teacher cared more about them than other teachers or that they like to get to know their teacher on a personal basis because they felt that the teacher understood them better, all six students in Mrs. Fore’s and Mrs. Williams’ class indicated through interviews and journals that they enjoyed when their teacher shared personal information about themselves with them. Comments made by all six students during interviews as well as journal supported this.

Teacher Respects Students Feelings in a Flipped Mathematics Classroom

During the second interview students were asked to specifically discuss if they think their teacher in the flipped mathematics classroom considers their feelings. Five out of the six students agreed that the teacher, either Mrs. Fore or Mrs. Williams, respected their feelings. Only one student, Brock, stated that it was hard for him to answer that question because he doesn’t show a lot of emotion.

Mrs. Fore

Michael: “There are lots of days where I do not feel like working or doing stuff and Mrs. Fore will usually ask me about the night before. She knows that I help take care of my younger brother and that my mom works late at night. If she knows that I was up late trying to get my work done then she’ll not get on me so much.”
Brock: “I am not really a kid who talks about my feeling with teachers. I’m just pretty good at math and don’t really have any problems so I don’t really talk to her like that.”

Sara: “She treats me the same as everyone else even though some days I know I ask her a ton of questions and sometimes I feel like it bugs her. I just feel bad because I want to get it and move on and she knows I’m trying to earn the A.”

Mrs. Williams

Wess: “She knew I was feeling sick and that I didn’t want to miss class. She said I could come in the next day to make up my stuff. She just made me feel that it was okay to go home.”

Angela: “Mrs. Williams was really nice to me today because she knew that my mom was in the hospital with my grandma who isn’t doing good.”

Jenna: “She said it was okay for me to miss class today because I was going over to ACES at the elementary school. I felt better because I knew I could make up the work.”

While only one student, Broc, stated that it was hard for him to answer a question regarding a teacher considering student’s feeling, the other five made supporting statements that indicated students agreed that the teacher, either Mrs. Fore or Mrs. Williams, respected their feelings. Broc simply stated he does not exhibit a lot of emotion and this may be the reason for his remarks and feelings.

Students Feel a Sense of Belonging in the Flipped Mathematics Classroom

While some students mentioned that their teacher in a flipped mathematics classroom helped to build their self-esteem, others stated how they felt included because of the teacher’s nonverbal communication. Both teachers expect the students to take ownership of their learning, which is innately a part of the flipped classroom. This ownership creates a sense of belonging for students. Because the teacher is not identifying specific goals and deadlines for students, self-pacing is required, which allow students to have control over their own learning.
Mrs. Fore

Michael: “She always makes me feel like I belong in class because she tells me good job a lot. She’s always smiling and saying positive things. I like how she doesn’t get on me for every single thing and let’s me pick and choose what I’m working on and getting done.”

Brock: “She makes me feel included when working out a problem in a group with my friends. When I am helping other students, she sometimes is watching and nods her head at me letting me know that I’m doing a good job.”

Sara: “Her smile encourages me and I feel good about my work.”

Mrs. Williams

Wess: “She does say everyone is working and thanks us for that. She pushes me to get my stuff ready for the quizzes Friday. She’ll always say stuff like ‘you’ll be disappointed in yourself if you’re not ready to go on Friday.’”

Angela: “She is always nice to me and helps me when I don’t understand my homework.”

Jenna: “I likes that she makes me feel like I fit in with the other students. She knows I’m really quiet and like to sit by myself so sometimes she encourages me to help others just so that I can get involved more. But, she lets me make that decision.”

Several students revealed that their teacher assisted to develop their self esteem, while others stated how they felt integrated because of the teacher’s nonverbal communication. As part of the flipped classroom, both teachers expected the students to take ownership of their learning. A major component of this is the self pacing that is required of a student. This self pacing allowed students to have control over their own learning, which made them feel a sense of belonging.

Students Feel Supported by the Teacher in a Flipped Mathematics Classroom

All six students felt supported by their teacher in the flipped mathematics classroom through a variety of different ways. Evidence ranged within whole group
discussion, the arrangement of the classroom, and the opportunities to work together in groups.

**Mrs. Fore**

Michael: “Mrs. Fore helps me on my homework all of the time. Usually she’ll take me to the back board and works with me one on one. I like that because I feel like other kids won’t make fun of me then. We’re not all at the same place, so sometimes kids will make fun of us who are behind. But, Mrs. Fore is real good about always saying everyone’s different and we all learn stuff differently.”

Brock: “I don’t really need help from Mrs. Fore because most of the stuff I can get through on my own. I mean I guess I shouldn’t say I don’t feel supported because she encourages me in other ways. She knows I like to get perfect papers and it really bothers me when I don’t. She reminds me that it’s okay not to be perfect all of the time and that I’ll learn more by making mistakes than doing everything right the first time.”

Sara: “She listens to me when I ask questions, and I ask a lot of them. But I do ask questions in my group too. I like sitting next to the other kids so I can help them and they can help me.”

**Mrs. Williams**

Wess: “When we work together in our pods on workdays sometimes I ask kids for help, but if I need Mrs. Williams to answer a question, I know that she will.”

Angela: “I mean for some of the kids who fall way behind she gets into a table and helps them. But I haven’t fallen behind. She walks around to see if we have questions. We do whole group stuff. If we have a problem that I want to see she would do it on the board and see if we understand it that way. She tries to simplify it that way.”

Jenna: “We watch the videos online, but Mrs. Williams always goes over the stuff in front of the board. I like it that she does this because if I haven’t watched the video yet, I know she won’t get mad at me. She’ll just encourage me to do it now. Some kids will complain that they hate the videos, but it’s not like that’s the only way we see the stuff. There are times I don’t even watch the video and I can get it by what she does in front of the board.”

It was evident that all six students felt supported by their teacher in the flipped mathematics classroom through a range of methods. Whole group discussion, the
arrangement of the classroom, and the opportunities to work together in groups were three areas that confirmed this.

**Students Overall Experience in a Flipped Mathematics Classroom**

As a final question, students were asked to give an overall view of the flipped mathematics classroom. Five out of the six students liked the format of the flipped style, however one students preferred the tradition classroom as a way of learning.

**Mrs. Fore**

Michael: “I like it because last year I felt like I had to keep up with everyone else and that was hard for me. I also like that I can get help all of the time from Mrs. Fore. She’s one of my favorite teachers.”

Brock: “I like it because I can go at my own pace and I can get through more material that helps me when I get to Algebra 2.”

Sara: “I felt like I could move ahead at my own pace. I can choose to do stuff at home, during study hall, or during class. The only thing I don’t like is that some days I wish I had more time to take quizzes. I sometimes feel rushed when I have to do this. But, I really like Mrs. Fore’s room. There’s not a lot of kids in here so it’s easy to get your questions answered. She’s always walking around saying ‘Ask me a question’. I like that because I know I ask a lot of questions and I feel like I’m bugging her, but this lets me know that she just wants me to do my best.”

**Mrs. Williams**

Wess: “I think I would learn better in the traditional classroom. I feel like she doesn’t really teach us, she just lets us go. Sometimes she’ll just go over the practice quizzes or the most important stuff, but for the most part she just lets us work together in our groups.”

Angela: “I liked it because I got to go on my own pace without feeling rushed.”

Jenna: “I do like it. I feel like Mrs. Williams is a good teacher and she just doesn’t rely on the videos to do the teaching. You can tell she really cares and wants us to do good because she’ll go over and go over and go over stuff that she expects us to know. For some kids it drives them nuts, but for me it’s good.”
Teacher Participants Definition of Engagement

While I asked Mrs. Fore and Mrs. Williams to describe the behavior and affective qualities of students who they would described as engaged in their flipped mathematics class,

I thought it was important to take a step back to understand the teacher participants’ definition of engagement and specifically their understanding of cognitive, emotional, and behavioral engagement. During the second interview, Mrs. Fore and Mrs. Williams explained an engaged student looks like in their flipped mathematics classroom. Mrs. Fore defined engagement as students who are “working on the appropriate material during class work time, actively working together with students in their pods if necessary, asking questions when necessary, and participating in whole group and pod activities.” Mrs. Williams’ definition of student engagement in a flipped mathematics classroom consisted of students paying attention, asking questions, being involved in the group discussion, being interested in the material, and getting the required amount of material completed.

Teachers’ View of Cognitive, Emotional, and Behavioral Engagement in a Flipped Mathematics Classroom

Because I focused on researching cognitive, emotional and behavioral engagement during the interviews, observations, and journal writing, I shared the definition of each of these terms with the teacher participants. I then asked each teacher to give me an example of how they engage their students in a flipped mathematics classroom through their teaching practices or instructional strategies. Mrs. Fore explains,

“I try to engage my students all the time. While keeping the weekly time frame consistent, I try to mix it up with whole group discussion and small little projects.
It’s definitely not easy in my one class where I know I have a lot of students who do not like school in general and especially do not like math. I try to engage them through smartboard activities and through a game called challenges. I guess cognitively it’s very easy to tell whether or not they are engaged by asking them questions and seeing if they understand. Emotionally, that’s a little tougher. I try to make my class fun by using humor and telling stories, and getting them to laugh. But, sometimes that’s hard to do depending on the type of student. Behaviorally, they just need to understand what is expected of them so that they are able to be successful.”

Mrs. Williams also stated that cognitively she tries to get students involved through smart board activities like Jeopardy or having students come up to the board and explain a problem. She also uses the students in the room as mini teachers to help her. She believed that when students start to communicate mathematically, they really begin to understand the concept. Behaviorally, she makes sure all students understand their roles in the pods and weekly routine and expectations. Finally, emotionally she also tries to use humor “at my expense” and tries to build relationships with her students by talking about their hobbies and interests with them.

Both teacher participants’ commented during the second interview how cognitive engagement is definitely the easiest to implement. Mrs. Fore explained that encouraging cognitive engagement can be easy or difficult depending on the material she is teaching.

“I can always ask questions to see if a student understands the material, but I also like to use some type of hands on activity through group work. Not all students get it through videos or even with me up at the board. They need a visual to help them or need to recreate like a poster or game for them to understand. I know one of the hardest concepts is factoring and why they have to learn how to do it. Seriously, if I had a quarter for every time a student asked me why is factoring so important! If they can make the connection between the graph and visually seeing the x-intercept then it’s not so abstract to them and they begin to understand what solving for x means. It’s not like they are just solving for numbers. They really start to see how everything is connected.”

Mrs. Williams also stated that cognitive engagement is the easiest to control. During the classroom observation, she showed three graphs that identified the roots of a
quadratic. Mrs. Williams displayed three graphs and three types of solution on the smartboard. She then asked the class to match the solution with the correct graph.

“Take a look at the three graphs that are up here on the board. I also have three solution, or root, or zeros. We’ve talked about these words quite a bit now and how they all mean the same thing. There is another word that means the same thing. Think about that word and see if you can match the correct graph with its solutions.”

“Are you able to match them correctly?”

A majority of the students raised their hand. Some were excited they had already learned this from the video, while others weren’t sure. Some of these students were watching other students, watching the teacher, looking through their notes, or just staring down at their desks. Mrs. Williams explained in the post observation interview how it’s extremely important to use visuals as much as possible in mathematics.

“I really don’t like standing up in front of the class for a lengthy period of time. That’s just one of the purposes of the flipped classroom. I like the opportunity to work one on one with students. But, sometimes with difficult concepts like parabolas and quadratics, it’s important to bring everyone back together and make sure I’ve gone over it several times. Visually looking at graphs and relating this to the factoring quadratics is really good for the kids. Not everything in math can be done like this. So, whenever I get a change to visually represent a concept, I do. And sometimes it works out better if they hear it from a student. When kids work together in our pods, the dynamic of that can be more beneficial than me up in front of the room. The environment is so comfortable that kids will jump from pod to pod getting help.”

One instructional method that both teachers mentioned during the second interview that they thought were excellent to engage students cognitively, behaviorally, and emotionally is the use of a game called “Challenges.” I was able to observe this game during Mrs. Williams’ classroom observation and asked her to explain the game and why she incorporates this into her flipped curriculum.
“Challenges is a game where I think hits all of these types of engagement that you have been talking about. I use it at least twice a week. It’s competitive for students and they can relate to it emotionally. So let me think how I want to explain this. I start by rearranging the classroom from the pods (groups of four) to rows. This is great because when the kids walk into my room and see the rows they get excited because they know it’s game time! The goal of Challenges is to end up in the two middle rows. I put a problem up on the smart board and have all of the kids do the problem. I go down the two middle rows and if they get it right they get to stay. If they get it wrong, I go outside the rows and see who had gotten it right and then kids trade seats based on this. I really like to do this prior to going over a lesson as a whole group because it lets me know who is watching the video outside of class and who is not. When I teach the seventh grade pre-algebra class it’s really tough for me to fit this in because so much of the class is made up of me in front of the room. I never feel like I have enough time for these or even other projects or activities. I always feel rushed and rushed to get through everything.”

When asked to describe the behaviors and affective qualities of the students in her classroom, Mrs. Fore responded,”

“Because when I ask when I walk around the classroom and I ask for specific questions, some haven’t even done the material. I hear excuses, that’s how I know the ones’ are really not engaged. So it’s my job to try to help pull them along. My expectations need to be clear and concise. But, I think there is a balance. And this is where I struggle because I can’t spend a ton of time that are just not willing to do anything. They are not going to do it no matter what method you use. I can’t get stuck on those few because maybe they didn’t do part of the homework because they just didn’t understand something. Those are the ones I really have to be on the lookout for. If I get lost in the other ones’ I think a good teacher has to recognize that. We as teachers are natural born helpers. We want to help people. And we can’t save one at the expense of many others.”

Mrs. Williams was also asked to describe the behavior and affective qualities students who she would describe as engaged in her flipped mathematics classroom. She explained that students who are organized are engaged because they need to make sure that they have the materials and “stay up-to-date” on their grades. Engaged students are motivated because they want to learn on their own time and are not waiting for the teacher to direct them as to what to achieve. Mrs. Williams
described behaviorally engaged students as focused and goal-driven. Her students know what is expected of them and truly want to step up and be held accountable. Finally, Mrs. Williams explained, “My engaged student is also driven since the teacher is the guide on the side, students need to be ready to put in effort and realize they can be successful. Even if math is not always easy for them, they can still be one of the engaged students in the flipped classroom if they want it.”

**Students’ View of Cognitive, Emotional, and Behavioral Engagement in a Flipped Mathematics Classroom**

Evidence from initial interviews, classroom observations of students, follow up interviews, and their reflection in a journal provided rich evidence of students’ engagement in each of the areas of focus for this study: cognitive, emotional, and behavioral engagement. All of the student participants shared their thoughts and beliefs about how the extent of the experiences in a flipped classroom shaped their cognitive, behavioral, or emotional engagement.

**Michael**

Michael is a 15-year-old male who is a special education student. He was chosen for this project because he is a low achieving student. He is a student in Mrs. Fore’s Algebra I class. Michael considers himself to be a poor math student. Michael stated that he likes the flipped classroom better than the traditional way Pre-Algebra is taught in junior high. He feels less anxious, better prepared to make his own decisions, enjoys being able to work with fellow classmates on homework and projects, and likes getting one on one help from Mrs. Fore when he needs it. In the initial interview he talked about
himself as a math student and in particular a student in the flipped mathematics classroom.

“I definitely would say I am not good at math. Never have been. I don’t really like it at all. It’s such a struggle. I just do what I need to do to get by. I try to get a decent grade so that it doesn’t affect me playing sports. In the flipped class you can work at your own pace and you don’t have to go with everybody else. That’s what I like about it. Last year I had a hard time staying with everyone else, but this way is a lot better for me. I like that I can check my answers at the round table and I like that I can work towards that grade that I want. I feel like I might have done better if I were in a different hour because a lot of the kids don’t work in my room. I am one of the better ones and I am getting a D! My brother is in there though and he pushes me to do better too. He’s getting a B right now and it’s easier for him, so I try push myself like he does.”

Michael was the most difficult student to interview. At the beginning of the initial interview he was answering everything with very short answers. I had to really persevere and get him to answer the questions with a bit more length. Michael is also a reserved student. He has a dry sense of humor, does not talk to a lot of other students, and as noted in the observations, was very short with his answers. He appeared to be almost emotionless in the interviews and in the observations.

Cognitive and behavioral engagement were observed and noted, but it was extremely difficult to recognize emotional engagement. Because Michael is very quiet, he did not raise his hand during whole group instruction to answer a question asked by Mrs. Fore. I asked him about this during our second interview:

“I don’t like everyone to look at me in class. I just like to do my work. I mean, I’ll answer a question if Mrs. Fore calls on me. I don’t want her to think it’s her because it’s not. I like Mrs. Fore. She’s about the only teacher who gets me. She doesn’t get on me all the time like others do. She also gives me a lot more slack. She knows I’m going to try my best, but doesn’t get all over me if I’m getting a D because she knows that I am trying.”

However, Michael did display cognitive and behavioral engagement in other ways. Even though Michael was earning a low grade in the Algebra I class, many
students asked him questions during the classroom observation. Sometimes he was not able to answer, but on at least three separate occasions he was able to help another student with the material. One was in regards to manipulating the calculator and the other two were about previous material that the class had been working on. This interview was towards the end of the year, therefore some of the observations were during a review period for the final exam. When asked how he knows that he understands a lesson when presented in the flipped mathematics course, he stated he does more than just the homework and takes a practice quiz. He felt that these prepared him for the assessment better than the homework. Michael usually asks questions daily, but this also depends on the material. One section that was difficult for him was abandoned for awhile. He rewatched the notes several times, but this did not seem to help him. Michael was considering giving up and going on to something else.

“That section 10.2 was the worst. I just couldn’t do it. I know Mrs. Fore really thinks that I can, but I’ve tried to watch the notes so many times and just can’t get it. When she’s standing up at the board and going over where kids are at and what they want to get through and she gets to me I know she’s going to give me that look. That look that makes me feel guilty that I know I should do it. First semester I had no trouble getting a B, but this one is a lot harder. All these quadratics and parabola and factoring and stuff is just hard and I’m having a hard time with all of it. Plus it’s getting close to the end of the year which doesn’t make it any easier.”

Michael displayed positive behavioral engagement despite times when he seemed to be daydreaming and staring out the window. When I asked him about this, he stated that the track team was in the state meet the next weekend and he was having a difficult time concentrating on his classes. He assured me that it had nothing to do with the material or with Mrs. Fore. This is one thing that Michael said that he dislikes about the flipped classroom:
“The best thing about the flipped classroom is that I can work at my own pace. If I want to get a D, then I can get a D and I don’t have to worry about the other kids that want to go faster than me or slower. But, what I don’t like is that when Mrs. Fore pulls us all back together and she’s at the front of the room going over stuff that I already know how to do or haven’t even gotten to yet. I know that I just tune out and don’t pay attention. Yeah, my mind starts to wander. I think she can almost tell though sometimes because she always seems to call on me when I have no idea what she’s doing at the board. I mean, I know she just wants me to pay attention but sometimes it makes me nervous. I just get frustrated when that happens.”

It was difficult to observe evidence of emotional engagement with Michael because of his mild manner, his quietness, and because he does not like to draw attention to himself. However, during group work, it was noticed that when he was helping another student with the calculator options, he was proud that he was able to answer the student’s question. There were several occasions when students asked Michael a question and several times when he asked questions of other students. Mrs. Fore was asked about Michael’s performance in the course as well as how he relates to her and other students:

“He has been a difficult read since the beginning of the year. He was super quiet and shy at the beginning of the year and if he wasn’t in such a small class you would just think he was a jerk. But I’ve gotten to know him so much better. He uses that shyness as a defense mechanism. I think he thinks the quieter he is the less attention he will draw to himself. He’s really got a fun personality. I mean some people may not find his sense of humor very funny, but he really is extremely witty. You have to really pay attention when he talks because you might miss the pun he was getting at.”

**Brock**

Brock is a 14-year-old student in Mrs. Fore’s Algebra I class. He is a freshman at Bridgeport and is involved in many sports and activities including basketball, football, baseball, and student government. Brock was chosen for this study because he is a high performing student. Brock enjoys how the flipped mathematics classroom is set up. Up
until this year, the math classes that Brock has taken have been ran the traditional way.

He explained in his first interview that he had heard about the flipped classroom while in junior high and was very excited to be a part of it as a freshman. Brock also explained that he has heard positive and negative things about the flipped mathematics classroom, but in his opinion, the positive far outweigh the negative. Out of all of the participants, Brock was the student who was the most vocal. It appeared that he was the least nervous.

When asked to talk about himself as a student in the flipped mathematics classroom, he responded:

“So, I like going at your own pace. You don’t have to stay at the exact same spot with everyone else. It’s a lot better for me because it challenges me, but let’s others go at their own pace too. Last year when I was in Pre-Algebra, I would get frustrated because even though you want to go ahead you can’t because everyone has to go at the teachers pace and I got bored a lot. Also, I had to sit through when others didn’t understand something as good and I did, so I had to just sit there and wait until I could start my homework. The flipped classroom let’s me learn more material than the standard pace. I know this will really help me when I get to Algebra II.”

In the initial interview, Brock was also able to identify how Mrs. Fore engaged him in the flipped mathematics classroom:

“As an athlete I compete to be the best and in the flipped room I also have the drive to want to be the best for me and for Mrs. Fore. I mean, I don’t want to disappoint her and she is always telling me to be my best and do my best. I feel like if I don’t try as hard as other students, then I’m letting her down and she’ll think less of me.”

It was evident through both observations and the interviews with Brock that he is cognitively engaged in the flipped mathematics classroom. He is a student that is asked a lot of questions from other students. Immediately when entering the classroom, Brock went directly to the round table to correct a homework assignment and then back to his
desk where he looked at his notes to determine what he did wrong. After this, several students in the room asked him questions. In his journal he commented:

“Some important things I learned from the flipped classroom is that no matter how far you get, you can always go back and help the students that are struggling especially in a class of thirty plus.” In addition he stated, “When I need help or support in my flipped classroom, I usually go to the teacher or another student. Once I find out how to do that problem, I can help everyone else if they have the same problems.”

Brock also showed that he was cognitively engaged by consistently raising his hand during group discussion led by Mrs. Fore. Several times during this observation, a student sitting behind Brock tapped Brock on the shoulder and asked him a question. Although I was sitting too far away to hear what they were saying to each other, it was evident by their body language that Brock was able to answer the student’s question. Immediately after this, Brock quickly turned around to continue in the group discussion. Also during this observation, Mrs. Fore and Brock discussed Brock’s goals because it was getting towards the end of the school year. She was letting Brock know the time frame and how much time he had remaining in order to get through the required amount of material.

Mrs. Fore: “I just want to make sure that you understand how much time is left and what days you are able to quiz on so that you are able to meet your goals. I know sometimes you need time to retake in order to earn a 3 or a 4, so just make sure that you have enough time.”

Brock: “Yeah, I think I do. With Channel One, I think I can get it done without having to use the exam days.”

Mrs. Fore: “How many sections are you trying to get through by Friday?”
Brock: “I am trying to finish 11.3 and 11.4 this week and then using next week to get through 11.6.”

Mrs. Fore: “Remember on Friday we have the awards assembly, so you don’t have my class on that day.”

Brock: “I know, that still gives me enough time.”

Mrs. Fore: “I don’t know! There’s been a lot of kids asking you questions as you guys have ventured into chapter 11. I’m really proud of how far you’ve gone and what you’ve done this year. It will pay off. Good job.”

Brock was asked about this conversation during the second interview:

“Having Mrs. Fore give me such a nice compliment, even if it’s just good job, makes me want to do even better. I want to make her proud and show her what I can do. I’m always going above and beyond as Mrs. Fore would say. I mean, I know that she really appreciates me helping other kids out in the room when they are having trouble. It makes me feel good that I am helping them and that I am helping her. Sometimes kids are just lined up to see her, or sometimes she is just moving from pod to pod answering questions. Sometimes I wish kids would just go back and look at their notes before asking because I know it’s in there. But that’s okay. I think a lot of kids just like her and knows that she loves answering their questions so they just ask her.”

Brock was also behaviorally engaged by always being on task, answering questions during the group discussion, and volunteering to help other students. During the initial interview with Mrs. Fore when asked about student to student relationships, she specifically mentioned Brock as being of those students who is always willing to help others.

“I can definitely see how the flipped room lends itself for students to come into contact more academically than ever before. Way more than in the traditional classroom. When I taught years ago. The kids would have a few minutes at the end of class to get help with homework. And by that time they were so spent from the lesson that only those who were my really good students used the time to get started on homework. Otherwise, I feel like it was a wasted 10 minutes. More like I was just hounding them to get busy. Now, with the flipped room, they are
so used to being in pods working that they lean on each other so much more. My students are becoming my helpers. Like, mini me’s! Some jump right in and take on that role. And as the year goes on, you hear some of them talk like me and ask questions like me. It’s great. My principal will come in and tease me about this. Especially since I have his daughter this year. She’s one of those that loves loves to help. Brock in my 7th hour is another one. Kids just flock to him. And I love listening to how he responds and how he helps. It’s interesting to watch the different relationships that develop between different types of kids.”

Emotional engagement was also evident in Brock. During the observations, Brock appeared to be happy and even at times excited. It was evident that he really enjoyed helping other students be successful and also pleased with himself when he earned a perfect paper. He explained during one of the interviews that he is a very competitive person. He likes to be the first one to watch the lesson on the video and show that he completed the notes to Mrs. Fore. He also strives to always earn a perfect paper. He explained that he will go over a quiz two, even three times before he hands it in. Also, when he can, he always checks his work to make sure he has the correct answer. In a follow up interview he was asked about retaking quizzes.

“That’s one of the best things about the flipped room. We have the time to do retakes. I can’t do that in other classes because we are always moving onto the next stuff. I like to get a perfect paper. If I get 34 of them I earn Algebra I honors credit. I usually get them, but not always. Kids tease me when that happens, but I know they are just joking. They just think I will get a perfect paper. Being able to retake too makes me less anxious when I’m taking the quiz.”

In his journal, Brock added:

“Math in a flipped classroom makes me feel positive and not stressed out knowing that you can go on your own level and if you fall behind it can be easy to catch up.”

Sara

Sara is a 15-year-old female who enjoys school. She considers herself to be a motivated and “decent” math student. She likes the flipped classroom because of being able to make her own decisions about when and how to complete the material.
“I like it a lot better because you can go at your own pace and the people who don’t do as much as others don’t hold the whole class back. This lets me focus better. Otherwise I just start to daydream when I already know how to do the stuff and I’m just waiting to start homework like the traditional classroom where everyone has to stay with it and everyone has to keep up. In the flipped classroom you have to stay on top of things and you’re busy a lot. I think it’s easier cause sometimes in a traditional classroom you don’t know what you are going to do. I think in the flipped classroom you are able to plan more and you see from the assignment sheet what is expected of you. In a traditional classroom the teacher gives you the homework assignment each night and you don’t have to think about a plan. The teacher makes the plan for you.”

In her journal, Sara wrote about working at her own pace in the flipped classroom:
“I like it because if I have a track meet I’m not going to want to do a whole bunch of homework. I can do the homework ahead of time. It’s not like this in other classes. I like it a lot better. I feel less pressure because I can plan ahead.”

During my observations there was apparent proof of cognitive engagement by Sara. During one observation, she continually raised her hand when Mrs. Fore was asking questions of the class regarding parabolas. I also observed other students asking Sara for help who did not understand the material on multiple occasions. Some students were in Sara’s group and others were even in separate pods and made a choice to leave their pod and specifically go to Sara to ask for help. One day when Mrs. Fore was going over a quiz with students at the round table in front of the room, Mrs. Fore asked, “Bailey needs some help. Bailey, what do you have a question about?” When the student responded how to factor a trinomial with a leading coefficient other than one, Sara raised her hand and offered her help to Bailey. “Mrs. Fore, I am really good at that and I’ve already quizzed over that material. I can help her.” It was clear that Sara enjoyed helping other students. She was eagerly available to help Bailey and when any student asked for her help when she was working, Sara was always willing to help. She was never frustrated that she had her own work to complete, but was willing and very sweet about helping other students.
Evidence also existed in the area of cognitive engagement for Sara because of the questions she asked, the comments she made to other students in her group, and the number of times she did not get a problem right, but persevered and continue to try. In the initial interview with Sara I asked her how she knew if she understood the material or not.

“I know if I am doing it correctly because if you get your answers correct on the homework. You can always go back and check it and if you get it wrong you can go back and fix your mistakes rather than have the teacher grade it and you have to wait awhile until you know what you missed and how to fix it. Being able to grade my homework as I am working on it is so much better. For me, I take advantage of being able to check my answers. I love this about the flipped style. It takes some time to do this, but it really helps in the end. For me, I am a type of person that if I don’t understand something I want to get better at. I’ll look at the answer and I’ll go back to see how they got that answer. When you grade it in a traditional classroom it’s just taken for a grade and you really don’t have the chance to go back and see what you did wrong. If I missed a couple and I didn’t have to redo it… I wouldn’t. It just takes longer.

In her journal, Sara wrote:
When I was in my flipped math class today, I showed I was working by working on my 11.4 homework and reviewing my notes if I didn’t understand something. I also asked Sam for help on his because I know he understands it. I am going to get an A if I finish 11.4. I did not do well on the first try for homework, so today I was fixing what I got wrong.

During the classroom observations, Sara not only asked question of other students, but during one 51 minute class period, she asked Mrs. Fore seven questions pertaining to material on quadratics. In one instant, Sara approached Mrs. Fore to ask her a question and after Mrs. Fore explained it, she shook her head in agreement that she understood. Sara started to walk away back towards her desk and quickly turned back around to make sure that she understood. “So, do you mean that I should take EACH part and set them equal to zero”. Mrs. Fore nods her head. Sara continues,

Sara: “But then what do I do with the number in front?”

Mrs. Fore: “What do you mean the number in front?”
Sara: “The number that I took out at the very beginning.”

Mrs. Fore: “Does that number have a variable next to it?”

Sara: “No.”

Mrs. Fore: “Ok, then I want you to take that number and set it equal to zero.”

Sara: “You mean 5 equals 0?”

Mrs. Fore: “Yes, 5 equals 0. Now tell me does that make sense to you?”

Sara: “No” (shaking her head)

Mrs. Fore: “Ok, then what would make sense to you to solve that?”

Sara: “If it had an x by it.”

Mrs. Fore: “Bingo, you’ve got it!”

Behavioral engagement was also evident because of Sara’s focus and attention.

Upon entering the classroom on a work day, Sara knew that Mrs. Fore was not going to be doing whole class instruction, so she immediately sat down at her desk and starting working. After finishing a few homework problems, Sara checked her solutions. Throughout the observations, Sara continually asked questions for explanation from Mrs. Fore and from another student. Sara was slightly distracted by one boy in the room, but Mrs. Fore addressed this quickly at the beginning of class and Sara did not go to the back of the room to visit with him again. While in her group or while Mrs. Fore was instructing the whole group, Sara was not distracted by other students. In addition, Sara was able to begin her work without direction from Mrs. Fore. Sara commented during the interview in order to work to her full potential she needs to complete work outside of the classroom.

“To work to my full potential I watch the notes on Monday and review and complete homework through Thursday. If I have a question, I like to ask Mrs.
Sometimes I get my homework done at home, this helps me in order to plan for the week. A lot of students don’t think they need to work on stuff at home, but you really do in order to stay on task and do your best.”

In her journal regarding behavioral engagement, Sara wrote:

“Today, when I was completing my class work in my flipped mathematics classroom I got a lot accomplished because I knew I needed to get two sections done and I did get them done. I have a work ethic that I can get stuff done in time whether its last minute or a week before.”

Emotional engagement was difficult to observe in most of the students in this research. However, Sara was one of the few students, who when received help from Mrs. Fore, usually left with a smile on her face or some type of laughter. She did show a bit of enthusiasm when she received a score on one of her assessments. When Mrs. Fore announced that Sara received a passing grade on one of the toughest sections, Sara put her hand ups in the air and said “YES”. She didn’t shout it out, but it was obvious that she was very proud and excited that she had passes this section. Positive emotional engagement was not revealed. In her journal, Sara wrote:

“Today, learning math in a flipped classroom made me feel stressed because in order to get an A I have to finish four more quizzes. The A work is a lot of harder than a lot of other stuff that we had to do. It takes more time, but it makes me smarter than more than half the class so that motivates me a lot.”

**Wess**

As described in Chapter 3, Wess is a 15-year-old male who does not consider himself to be a good student. During the initial interview with Wess, he appeared extremely nervous and I had to pause the recorder to remind him that none of his answers would reflect on his grade and that he was specifically recommended by Mrs. Williams. I also reminded him that just because he was not an outstanding math student, and in fact that he struggles with the material, I wanted him to answer the questions honestly and not
respond to a question because he thinks that is what I wanted to hear. This seemed to relax him, however it was clear throughout the initial interview that he was not comfortable answering questions.

My initial questions in the first interview will all of the students was to explain what is it is like to be in a flipped mathematics class and to tell me about being a student in the flipped mathematics classroom. Wess explained that he does not work ahead, but instead focuses on the required material for the week. He does not prepare anything over the weekend or even watch a video, but rather he waits until that specific week to start any new material. Wess explained that it is difficult for him to be a student in a flipped mathematics classroom.

“It’s very difficult for me because I’m used to a teacher up in front of the class teaching, but for the most part you watch the notes. You’re more involved. I feel like I’m going for help like once or twice from the teacher, but most of the time I’m getting help from other students more than I think from her.”

When asked about he creates and maintains a relationship with Mrs. Williams or other students in the flipped mathematics class, he focused more on the other students instead of the teacher.

“There’s definitely more conversation in my math class than in any other class that I am in. And most of the time that conversation is not about math. Especially on workdays where we are allowed to be in our groups. Depending on how hard the section is that we are working on, there may be more conversation than work. Most of the time I’ll sit down with a friend or two and get side tracked. It’s more difficult to maintain focus. Most days I don’t want to do this. Sometimes when there is like 15 or 20 minutes left in class I just shut down. Mrs. Williams will encourage me to keep working, but sometimes I just make it look like I am doing something. Especially when it’s Wednesday or Thursday and I need to get something done, but I just don’t feel like it.”

During my observations, there was clear evidence that Wess was easily distracted, had a difficult time getting started, and an even harder time staying on task. At least...
three times Mrs. Williams addressed his procrastination or lack of concentration. Mrs. Williams addressed Wess multiple times by saying, “Wess, what are you working on?”, “C’mon, let’s go, get started,” Wess, I hear you talking, but I’m pretty sure it’s not about math,” and “You’re going to be upset with yourself when Friday rolls around and you’re not ready.”

As Wess sat in his group with two other students, he waited almost 10 minutes before getting any material out on his desk to work on. During this time, Mrs. Williams was taking attendance and helping other students with questions, so it appeared that she did not notice he had not started working. Also during my classroom observation, it was not evident whether or not Wess was cognitively engaged. While it appeared as though he was working on his practice problems during one observation, he was not taking advantage of going up to the table where solutions are provided to see whether or not he was completing the work correctly.

In the initial interview, Wess stated that if he doesn’t understand something he will rewatch the video, maybe even a third time. “Sometimes I’ll go to Mrs. Williams and have her explain it slowly, but most of the time I just rewatch the video. This was evident during the classroom observation as Wess was watching a video during the class. I noticed that he already had the notes completed on his desk and this time he was just listening, but not writing. During the follow up interview I asked Wess about this particular day and whether or not he always watches the notes again instead of asking for help.

“Yeah, I usually just watch the notes again, but obviously that is not working for me. It’s just easier to sit back and watch the notes. Sometimes I listen to music while watching the notes. I know I’m not supposed to, but I do think watching the notes for a second or third time does help me learn the material.”
In the journal that Wess reflected in after the initial interview and during the classroom observations, he stated two items concerning cognitive engagement. (1) One of the most memorable or important things I learned today in the flipped mathematics class is to ask for help when I need it instead of waiting. I learned this because I struggled a bit on some problems, but didn’t ask for help when I should have, (2) I showed that I needed help by asking the students around me for help. If I still didn’t understand the material, then I asked the teacher and watched notes on this section again. This information conveys to me that Wess was not cognitively engaged. He was certainly not cognitively engaged during my classroom observation.

Like his cognitive engagement, Wess’s behavioral engagement was not evident through my observations. He was not paying attention to the tasks he needed to be working on, he was not focused, and he did not participate in any group discussion about the material. While other students in his group were discussing the material and asking for clarifications, Wess sat slouched in his desk and did not attempt to enter the conversation. Throughout the observation, he was easily distracted by others. One student walked by his desk and tapped his pencil on Wess’ desk which caused quite an interruption for Wess. Wess was unable to motivate himself in order to get any material completed.

It was difficult throughout this study to find observable evidence of emotional engagement. It was clear however, with Wess, he was also not emotionally engaged in his Geometry flipped classroom. During the initial interview Wess explained he likes the flexibility of working at his own pace, because he doesn’t like everything thrown at him
like his other classes do. “I like knowing what is due at the beginning of the week and I like working at my own pace.”

When completing the emotional engagement portion of his journal reflection, he reflected (1) I think that learning in the flipped classroom today is very self-driven. It is self-driven because there was little on the board work done requiring you do push and motivate yourself, (2) I liked being in a flipped mathematics classroom because I was able to work at my own pace and ask for help when I needed it. Also, it was a very stress free workday making it easier to focus and work, (3) Learning in the flipped classroom today made me feel a bit more confident in my abilities. I feel as of now I am more prepared and more confident for future tests and exams.

**Angela**

Angela is a 15-year-old female who was chosen for this study because she is a medium performing student. She is involved in a variety of sports at Bridgeport. Angela is a sophomore and was very quiet and reserved during the interviews. She would consider herself to be “okay” in math. She commented during her initial interview:

“I wouldn’t say I’m bad at it, but I’m not that good at it either. It’s not like I don’t have to study because I do. I should study more than I do because I would probably do a lot better. Math has never really been my strong subject. I’m a lot better in social studies or current events. I like them better too. You get to talk more about what’s going on in the world so it’s more relevant to me. But, I do like the flipped classroom. I mean, I like how I get to go at my own pace an make my own choices. Well, sometimes that’s good and sometimes bad. I like watching the videos in geometry because I can look back whenever I wanted to. Sometimes I don’t understand something and I can look back in the notes to see it again.

During the classroom observations, Angela showed that she was cognitively engaged several times. Not only was she asking questions within her group, but she also asked Mrs. Williams questions several times. Angela did not wait for Mrs. Williams to
come to her pod to see if she needed assistance. This was interesting because at the time of the observations Angela was wearing a boot on one of her legs because she had a broken bone from playing softball. Angela did not use this as an excuse, but still made every effort to get help from Mrs. Williams. I asked her about this in the second interview.

“I know that if I don’t understand something I have to speak up and ask her (Mrs. Williams). If I go home or go to study hall and don’t understand then I just sit there staring at my paper and I know I get easily distracted. Like in study hall, it’s so super easy to not do your work. I have to get focused and get my work done. We’re allowed to have our phones out and it’s way more fun to be on that. So, I have to make sure I ask questions to Mrs. Williams when I can. Plus, I’m in a really small class too so it’s really easy to get all of my questions answered. I know some of my friends are in bigger classes and it’s tougher for them.”

Cognitive engagement was also evident when Angela was struggling with finding the slant height of a cone. I was sitting close enough to her group, so I was able to hear the conversation between Angela and another student:

Angela: “I don’t even get this. I just can’t see where it’s at to even find it.”

Student: “Look, I’ll draw if for you. It’s right here.”

Angela: “Yeah, but when you start at the top why aren’t you going to this point right here?”

Student: “Because the slant height goes to the middle right here.”

Angela: “Ughhhh – it’s so hard for me to see it!”

Student: “Go get the model up there.” (Angela gets the three dimensional cone and comes back to the group.)

Angela: “Okay, here it is.”
Student: “Okay, so look. You start right here (pointing to the vertex), and you go to here points to the middle of the side towards the bottom and draws a 90 degree angels on the cone.)

Angela: “Oh, okay. I get it there, but it’s still really hard to see it on the paper.”

Cognitive engagement was also apparent when Angela applied something previously learned to a new situation. She was working on finding the lateral area of a regular pyramid and knew she had to use the Pythagorean theorem to find the lateral edge. She needed guidance from Mrs. Williams.

Mrs. Williams: “Look here. Are you able to show me what you are trying to find?”

Angela: “Yeah, it’s this line right here.”

Mrs. Williams: “You got it. Now let me take this triangle and pull it out so you can see what we’re looking at.”

Angela: “Oh okay, now I see what you’re doing.”

Mrs. Williams: “Now, tell me how you are going to find this line?”

Angela: (interrupting Mrs. Williams) “Oh yeah, oh yeah (snapping her fingers in the air). That’s pythags (referring to Pythagorean theorem).

Similar to her cognitive engagement, Angela’s behavioral engagement was evident throughout my observations. While Mrs. Williams was going over part of the review for the exam, Angela was one of the first students to raise her hand and volunteered to walk in front of the class to participate on the smart board. Angela explained during the second interview:

“I like to go to the smart board to either do a problem or sometimes when we have competitions I like to volunteer for that. My class is really small so I don’t mind
doing that. Mrs. Williams makes you feel comfortable with doing that too. She
doesn’t embarrass anyone. She helps you too if you don’t understand something
when you’re there.”

Angela also exhibited behavioral engagement by almost always being involved in
the work in some way. Whether the class was participating in a whole group discussion
or lesson, or students were working individually in their pods, Angela was always sitting
up and paying attention to either Mrs. Williams or members in her group. During the
follow up interview, Angela commented:

“Me and my friends sit at the same table every day. We all do our own thing and
listen to music because we are allowed to so that helps a lot because we are not
really in conversation. Most of the time we get our practice quizzes at the same
time and when we have a question Mrs. Williams will come help us.”

It was obvious during the observations and during the interviews that Angela felt
more comfortable getting help from Mrs. Williams than from other students. Even with
part of her leg broken and the amount of effort it took Angela to go up to Mrs. Williams
desk, she made attempt after attempt to ask questions to Mrs. Williams.

“Most of the time I just go up to her, sometimes there’s a line though. I will
sometimes go to a student, but it depends who the student is, but most of the time
I just ask Mrs. Williams. I normally don’t go to students, I normally just go to
Mrs. Williams.

Upon further questioning and probing why she chooses Mrs. Williams over
students to get her questions answered, Angela responded:

“I just really like how Mrs. Williams treats me. She’s just really nice. She never
makes me feel stupid, or like I don’t understand something. She’s super easy to
get along with. I don’t know. I think it’s because I never really did good in math
and now this year I am. I get to work at my own pace and I love that. I don’t get
stressed or pressured. I’ve had her for two years now and I think she really tries
to be a good teacher and let us know that she respects us and wants school to be
fun for all of us. My other teachers aren’t like that, except for Mrs. Stuewy
(pseudonym). They just do most of the talking about the class stuff and we don’t
really get to know them. Like when Mrs. Williams, when I’m gone and come
back the next day she’ll tell me that everyone missed me. No other teacher does
that and it makes me feel good. Sometimes she’ll ask me about my home life. Sometimes she’ll even give me a hug.”

Emotional engagement was also apparent. Angela always appeared to be happy during the observations. When she received one of her quizzes back from the week, Angela put her hands up in the air. While she did not say anything, it was evident from her facial expression and her body language that she was very happy, yet also relieved that she had earned a passing grade.

During the second interview Angela explain what would increase her engagement in the flipped mathematics class:

“I think I learn better when I work in the pods instead of in the whole group. I mean I like it when Mrs. Williams is in front of the class, but sometimes I think I day dream a little when this happens. I think it’s better when I can work at my own pace. I like being able to make my own choices and I like not having a rigid structure. I’m very organized and like to focus on one thing at a time.”

Jenna

Jenna is a 15-year-old female student who considers herself an A or B student in math class. Her parents are involved in fostering numerous young children and there are often times that Jenna is responsible for watching them. While she enjoys this, she is also involved with cheerleading that takes up a lot of her time. Jenna admits that she does well in all of her classes. She simply shrugged her shoulders when asked whether or not she likes math. Jenna responded with, “I’ve always been pretty good at it. I really don’t have to work very hard at it.” In the initial interview she explained that she really doesn’t feel like she is engaged in her flipped classroom. She explained that she is a very shy and quiet student who usually keeps to herself during work days. Many students will ask her for help because she is more advanced with the material than others. This was evident in the classroom observations. Jenna was extremely quiet and almost introverted. Even
when she did speak, it was difficult to understand what she was saying. Several times Mrs. Williams had to ask her to speak more loudly because she could not understand her questions.

However, during one observation it was clear that Jenna was getting frustrated when reviewing for the exam. She was having a difficult time recalling material from early in the semester. When Mrs. Williams was in front of the whole class, Jenna did raise her hand to ask a question. I was quite surprised by this, because when observing her she seemed like the type of student who would ask at a different time rather than be noticed in front of the other students. However, this was important to her as she stated in her journal:

“One of the most memorable or important things I learned today in my flipped mathematics class is that I should pay more attention because we went over our review packets and I only got about seventy percent right. This was important because I usually get about ninety percent correct.”

In the follow up interview I asked Jenna about this specific day because it seemed unusual to me that she was not focused and on task. She commented to me that she was very distracted this specific day because her nephew had just been born and he was premature. Jenna was very worried about this as we talked about it during the second interview.

During my classroom observation, Jenna behaved much like Sara in that when the bell rang she immediately sat in her group and began getting the material out to work on. She did not need any direction from Mrs. Williams during any classroom observation. This shows that Jenna was cognitively engaged with the material. She also attempted to ask a friend for help with one of the problems. In her journal, Jenna reflected:
“I showed I needed help or support in my flipped mathematics class today by asking my friend if she knew how to do a problem that I didn’t know. Then, because she didn’t know how to do it, I went to the teacher. Once she showed me how, I went and showed it to my friend.”

Another way that Jenna showed that she was cognitively engaged is by completing part of the homework and then checking it at the solutions table. I observed her working on practice problems for about 10 minutes. Before she finished the entire assignment, Jenna checked to make sure that what she had completed so far was correct. Also during this time, if she did not understand any of the material, she asked another student. Seldom did she ask for Mrs. Williams help during the classroom observations.

“For me I do a problem by myself. I would check my homework and see if I got it right. If not I would rewatch the video. I would rewatch the video before I would ask Mrs. Williams a question. I would go to video first and see if it will help me, then friends, then Mrs. Williams. I ask questions rarely. A whole week could go by and I may have not spoken to Mrs. Williams. Depending on how hard it is determines whether or not I ask questions. I don’t think she could tell you one thing about me or that I’m even in cheer. She might though. There are a lot of days where I really don’t even talk to Mrs. Williams. I don’t talk to a lot of my teachers.”

In the follow up interview I asked for more information regarding Jenna’s relationship with Mrs. Williams because I was concerned that repeatedly she was asking other students for help before turning to Mrs. Williams. Jenna did share that she enjoys the side conversations that they share with each other in the class. These conversations might be from student to student or between Jenna and Mrs. Williams. When I asked her about her comment regarding rarely asking questions and possibly an entire week going by without even speaking to Mrs. Williams, Jenna explained:

“Well, I don’t really mean a whole week. I just think if the material is easy for me, I may not talk to her a whole lot about the stuff we are working on. That doesn’t mean that I don’t get involved in all of the other stuff. Like when one day she was talking about her little girl being sick and this was around the same time when my nephew was born five weeks early. I was telling her about this. It’s
almost like we share or talk more about stuff other than math. But, if I the material was harder for me I think I would. My parents pay me $100 for getting all A’s. So if I am really close to getting an A I for sure would talk to her about understanding the stuff more.”

It was difficult determining Jenna’s level of behavioral engagement. Although I believe Jenna exhibited behavioral engagement in class, it was almost impossible to observe. She was paying attention and focused, but she rarely participated in classroom discussions. I believe this is due to how extremely quiet she is. She did not initiate a conversation or question with students or Mrs. Williams. She stated in her interview that she would ask Mrs. Williams for help if she needed it, but this was not entirely evident during the classroom observations. In her journal, Jenna reflected:

“When I was completing my work I wasn’t talking to friends or messing around out of my seat. I also had a lot of things to do at the end of the semester.”

In addition in her second interview Jenna commented:

Me: “When Mrs. Williams is up in front of the room do you raise your hand to answers questions?
Jenna: “No I fly under the radar.”
Me: “Do you sometimes know the answer but you just don’t raise your hand?”
Jenna: “Yeah”
Me: “Why?”
Jenna: “Because I don’t really like talking in front of other people.”

When asked about her emotional engagement in the class, Jenna commented in her journal:

“Today I dislike being in a flipped mathematics classroom because I had to take my exam. As soon as I got my exam I couldn’t remember half the things I learned. Also, I did the wrong number of the exam, so I had don’t an extra problem than I was supposed to. Today, learning in a flipped mathematics classroom made me feel happy because I saw my grade was close to an A in this class. I figured out what I had done working while taking the exam.”

When asked about the flipped classroom, Jenna responded:
“I get to go at my own pace. When I had to keep up with the others in a traditional classroom it wasn’t as easy for me. I like going at my own pace then I don’t have to worry about where anyone else is at and it’s just easier for me. Jenna also stated that she likes to help other students. Me: Do you like to help other kids? Jenna: Yeah I do. I think it really helps me understand the material better when I help other kids because I’m actually doing it with them using words that we both understand.

In the follow-up interview, I asked Jenna if there were any other types of activities that would increase her cognitive, emotional, or behavioral engagement. She responded:

“Think it would be better if we played some games or did some more group projects. Sometime, well a lot of the times, it gets really boring just doing the same thing over and over. I mean it’s really nice knowing the plan for the week, but I like working with others. I know I am really quiet, but I have two friends in this class that I could work with and I think that would be fun. I don’t know. Maybe I wouldn’t choose to work with anyone, but I might. I remember one time in Pre-Algebra we did some sort of PEMDAS (please excuse my dear aunt sally) project and it was really fun. I don’t know if I knew the material any better, but it was fun making a poster about it. It might make others too get out of the routine and work with other kids.”
Chapter Five

Discussion and Conclusion

Researching the role of the flipped classroom and how it can provide an avenue for caring relationships to develop is significant in that it can be an alternative to the traditional mathematics classroom, thus allowing for caring relationships to develop and allowing for student engagement. The purpose of this research was to explore how the flipped classroom enables teachers to develop a caring relationship with their students in order to foster students’ cognitive, emotional and behavioral engagement. Research suggests if students are going to achieve their academic goals, then schools must play a major role in raising healthy, competent, and happy children by providing caring and continuity for students (Noddings, 2005). While analyzing the literature concerning caring in the classroom and engagement in schools, I developed a theoretical framework based on Noddings’ theory of care to support my findings. I used this framework to gather and analyze the data during my research study.

Noddings describes the means of nurturing and ethical ideal through four components: modeling, dialogue, practice, and confirmation. Noddings (1988) stresses when teachers model caring they continue to be concerned with their students’ academic achievement, but also encourage self-affirmation. Students are treated with respect by teachers and are encouraged during the modeling piece to treat each other with respect as well. Dialogue is the most fundamental element of the care model because it is through this component that teachers and students consider each other’s perspectives, which leads to building trustworthy relationships. By having dialogue, we learn more about each other, which is needed to act effectively as carers and to contribute to growth of the
cared-fors (Noddings, 2012b). Opportunities for practice can occur through peer interaction. Noddings also suggests using cooperative learning to promote competence in caring as well. While the aim of cooperative work in schools is usually for academic learning, it can also be used to support practice of care (Noddings, 1995a).

Finally, through the confirmation component, we are able to identify a better self by assisting students in the construction of their ethical ideal. As adults, educators have the experience to value ethical strengths and to encourage those that are appropriate (Noddings, 1988).

Two specific questions guided this study:

(1) What opportunities for a caring relationship does the flipped classroom afford a teacher and his or her students?

(2) To what extent do these experiences shape the cognitive, behavioral, or emotional engagement of students?

Data collection for this study took place at one secondary school in Southeastern Michigan in the spring of 2016. Three types of data were collected for this study including interviews with two teachers and six students, classroom observations, and journal. The purpose of this final chapter is to discuss the findings of my research and to make recommendations for further research regarding caring in the flipped classroom. I will begin by summarizing teachers’ perceptions of creating a relationship in a flipped mathematics classroom and teachers creating and maintaining relationships in a flipped mathematics classroom. Following this, I will discuss the four themes that emerged from the data to answer the research question: What opportunities for a caring relationship does the flipped classroom afford a teacher and his or her students? Finally, I will identify
to what extent these experiences shape the cognitive, behavioral, or emotional engagement of students.

**Summary of Teacher Perceptions and Creating and Maintaining Relationships in a Flipped Mathematics Classroom**

**Teacher’s Experiences of Creating a Relationship in a Flipped Mathematics Classroom**

The teachers in this study discussed their experiences of creating a relationship in a flipped mathematics classroom. Some of their beliefs were consistent with Noddings’ theory of caring. The flipped classroom allowed both Mrs. Fore and Mrs. Williams opportunities to create an environment that allowed them to demonstrate caring behaviors and caring attitudes, while still being able to deliver the mathematical content effectively. Mrs. Fore believed it was important to make personal connections with students, have clear expectations, and create an environment that is positive. To make personal connections with the students, Mrs. Fore stated she must learn something personally about them. It was important to her to do this in order to reach them mathematically.

Mrs. Fore was able to create this personalization by greeting her students at the door on a daily basis as well as by having small side conversations with them while they were working in groups. She stated she “finds little tidbits of information about them” and stores this away. She credits the flipped classroom with being able to make these personal connections. “You are going to be able to help kids better and that’s the beauty, the strength of the flipped classroom.” Mrs. Fore’s second insight was having clear expectations. She believed it was necessary to set clear guidelines with sincerity and
belief in the students that they can achieve these expectations. Her expectations were clear and concise including expectations on students working together. Finally, Mrs. Fore believed that it was necessary to create an environment that is positive, otherwise a true caring relationship cannot exist. She created this with her comments to the students and by modeling positive behavior. This was important to Mrs. Fore because of how the students work so closely together and help one another.

Mrs. Williams believed relating to students individually, having modified and positive expectations, and the dynamic of the classroom were important regarding creating relationships with students in a flipped mathematics classroom. Relating to students individually was evident in classroom observations and through the safe and warm environment she created. Relating to students individually was also evident in the way she valued each student by differentiating instruction for each student by learning about their likes and dislikes. Mrs. Williams also believed that in order to create a relationship with her students she needs to have modified and positive expectations. She took into account students’ personalities and learning styles in order to keep students motivated and accountable for their learning. She stated, “I also try to be understanding that math doesn’t come easy for every student and they have a lot of external factors that affect their performance in school.” She believed the flipped classroom is an environment that allows her to push kids who excel in math, but also allows her the flexibility to modify expectations for others.

Finally, Mrs. Williams believed the dynamic of the flipped classroom has a profound effect on creating opportunities for a caring relationship to exist between her and her students. Because the flipped classroom is a much more flexible environment, it
is necessary for her to set standards to make sure students are held accountable. The students need to understand the boundaries in order to work with other students.

**Teachers’ Creating and Maintaining Relationships in a Flipped Mathematics Classroom**

The teachers in this study also discussed how they created and maintained relationships in a flipped mathematics classroom. Mrs. Fore categorized her beliefs into four areas: letting learners choose, being consistent, being flexible, and seeing her as a real person. In the flipped classroom, Mrs. Fore is no longer teaching every student the same lesson at the same time. Therefore it was important for her to allow the students choose how they were going to be successful in a flipped mathematics course. She believed this opportunity for choice allows students to create guidelines and goals that work for them. The flipped classroom allows students to make choices about their learning as well as choices that will allow them to develop life-long skills.

Being consistent and being flexible were also important to Mrs. Fore in order to create and maintain relationships with her students. Mrs. Fore was consistent with her classroom structure and well as with the classroom discipline. She stated, “It’s just consistency and consistently doing the same thing with them so that they feel safe. They need to feel that somebody cares about them.” While consistency is important, being flexible is also imperative. Flexibility was evident through classroom observations as it may have appeared to be very unlike a traditional classroom that is very quiet, Mrs. Fore’s classroom was chaotic structure. Each student knew his or her role and Mrs. Fore multitasked easily to meet the demands of each student.
Finally, Mrs. Fore sought to have her students see her as a real person in order to create and maintain relationships with her students. The flipped classroom afforded her the time to allow her students to see her more than just a teacher. She shared personal details about herself. One of the most interesting details of the classroom observations is how Mrs. Fore was able to talk about her personal life while also teaching math.

Mrs. Williams believed that it is also important to create and maintain relationships with students in a flipped mathematics classroom. The three categories she felt were important were learning about her students, encouraging student to student relationships, and flexibility and approachability. She believed learning about her students’ individual learning styles, as well as their interests, were essential components of a teacher-student relationship in the flipped mathematics classroom. She stated, “I strongly feel that when students get to know you and respect you, you have almost everything you need to help them learn. It is so important that they know you care first, because then they are more likely to care.”

While caring relationships can occur between a teacher and their student, it is also important to encourage student to student relationships. Mrs. Williams focused on this relationship because the flipped classroom lends itself to developing this connection more than in a traditional classroom. In the classroom observation, it was evident that students worked well together in teams and showed respect and support for one another.

Finally, flexibility and approachability were key factors for Mrs. Williams in order to create and maintain relationships with her students. Letting students know that they can approach her with academic or personal problems was important to Mrs. Williams. She commented, “Standing in front of a classroom lecturing (the opposite of a
flipped classroom) is a huge barrier for approachability. Let students into your world a bit. Not only are you helping build trust, you’re modeling for them how important it is to take ownership of your action.

**Discussion of Findings**

This study contributes to the understanding of how relationships with caring teachers took place in a flipped mathematics classroom. Very little is known about the beliefs and practices of teachers and students in a flipped classroom. The teachers and students that participated in this study disclosed their thoughts regarding relationships with each other. The purpose of this qualitative case study was to increase the understanding of what is known about caring relationships in a flipped mathematics classroom and how it affects the cognitive, behavioral, and emotional engagement of students. This chapter will address the four themes that arose from the cross-case analysis and the relevant literature. Following will be suggestions for further research and limitations. The chapter will conclude with the implications of this research.

To answer the first research question, what opportunities for a caring relationship does the flipped classroom afford a teacher and his or her students, four themes emerged. The first theme is based around the role of the relationship between the teacher-student relationship as well as the student-student relationship.

**Theme one: The Role of the Relationship**

The flipped classroom is a much different environment than the traditional one where a teacher is lecturing in front of the room for a majority of the class. Each of the teachers and students spoke of ways in which they felt the flipped environment affords them the time to build a relationship between teacher and student and student to student.
Mrs. Fore and Mrs. Williams explained that unlike the traditional classroom, the flipped classroom gives them the opportunity to make personal connections with students by relating to them individually. Being able to sit with students one-on-one in groups or pods of students afforded them the chance to get to know their students more than a traditional classroom could.

They identified that building relationships with students was obtained by allowing the students to get to know them as more than a teacher, but rather as a real person. For Mrs. Fore, this was done through talking about her personal life with students. Mrs. Fore explained to me many times while the students were working in groups during class, she was able to have side conversations in the flipped model that allowed her to make a connection with her students. “You have to meet them where they are and you have to learn a little something about them personally before they will connect with you mathematically, otherwise everything you say is going to sound like Charlie Brown’s teacher.” It was important to Mrs. Fore that she learned about her students personally, because, “if they know I care about them personally, then I know I can get them to have goals and reach them.”

Like Mrs. Fore, Mrs. Williams was also passionate about making connections with her students. During the classroom observation, the individual attention Mrs. Williams was able to give her students was noticed. She related to the students personally on an individual basis as well as academically. “I believe teaching in the flipped mathematics classroom allows you to relate to students on a more individualized basis. As the teacher, I have more time to check in with students one-on-one since we do not lecture in class. Students are more comfortable asking me questions and get my full
attention. I believe teachers can create a safer and warmer environment in the flipped
classroom because from the beginning students know they are valued and if they are
willing to put in effort, they will thrive.” She believed in this format she was able to
learn about students likes and dislikes, unlike in a traditional classroom where a majority
of the time is devoted to lecturing.

Not only was the role of the relationship between teacher and student identified,
but the student to student relationship was also imperative because of what can be
learned. Mrs. Williams declared that one of her favorite advantages to the flipped
classroom was how the students were able to work with one another and how they began
to develop relationships between themselves because of the makeup of the room. She
attributed this to the small groups that they work together in and the one-on-one
interactions they had with each other. She stated, “Sometimes kids understand the
material better when another student shows them how to do it. They might understand
their language better! Sometimes I even learn a better way to explain it. Too often as
teachers we can’t put ourselves in our students’ shoes and think about it from their point
of view.”

The role of the relationship between teacher and student or between student to
student was created within a classroom because of the caring beliefs and practices of
teachers. When a teacher takes the time to develop relationships with students and help
them achieve their personal or academic goals, a teacher is exhibiting caring in education.
Both Mrs. Fore and Mrs. Williams beliefs from the present study verified Noddings’
definition of what caring should look like in schools. Noddings stated that caring in
schools happens when teachers make every effort to establish and maintain caring
relations between teachers and students. Noddings also defined caring as a natural, affective response between humans (Noddings, 2005). Specifically, the modeling component of the theory states that actions must be genuinely demonstrated. Mrs. Fore and Mrs. Williams showed that they cared for their students by modeling caring behavior between teacher and student as well as between student to student. During the modeling component, students are treated with respect by teachers and are encouraged to treat each other with respect as well. This was evident during this theme of the role of the relationship.

Five out of the six students felt they had a positive relationship and connected to their teacher. Comments made regarding this connection include, “Yeah, I feel connected to Mrs. Fore. I like that she is always there at the door greeting us and walking around the room to see if we need help;” “Since it’s not a group discussion there is always time for one on one help which leads to conversation about other stuff. When you’re one on one you talk more, you have a more friendly relationship;” and “I get to talk to Mrs. Williams more because we have work days a lot and it’s quiet and I can just go up to her whenever. Yeah, I know I have a connection with her. We talk about softball and stuff and she’s just a really nice person.” There was only one student, Jenna, who felt like she did not have a personal connection with her teacher. However, she attributed this to being extremely quiet and not talking to a lot of her teachers. Jenna stated, “There are a lot of days where I really don’t even talk to Mrs. Williams. I don’t talk to a lot of my teachers.”
Sara agreed with the teachers in regards to the amount of time the flipped classroom affords a teacher and his or students to be able to have personal conversations with each other.

“When you’re in a group with the teacher in front, a student isn’t likely to raise their hand and have a personal conversation with the teacher. When you’re one on one you talk more. There’s been lots of times where she will tell me a story about her. It’s gotten to a point where when a Monday comes I’ll ask her what she did this weekend. I like hearing about her life. She’s not just a teacher, she’s like a real person.”

Both Mrs. Fore and Mrs. Williams felt it was important in a teacher-student relationship to include information about themselves and to be very open with them. Students in both Mrs. Fore’s and Mrs. Williams class felt that the teachers shared personal information about themselves in the flipped mathematics classroom. The students indicated, “It makes me feel better when she talks about this because then I know she knows where I am coming from and how I struggle too;” “Yeah, Mrs. Fore is fun like that. She loves to go off on tangents and tell us stuff about her, but it’s fun. It makes me want to do better in class;” “She talked about playing softball in high school. I play softball too so it’s cool to hear her talk about how their school did and the positions she played.”

Classroom teacher-student relationship literature encourages the idea that students should learn about their teacher. Mrs. Fore’s and Mrs. Williams’ beliefs about creating relationships with students seem to be closely aligned with teacher-student relationships proposed in Noddings’ theory of care in that, by sharing, they attempted to show their affection and trust for students and to create collaborative and trusting relationship with them (Noddings, 2005). The notion of care is not just about expressing concern for students, but developing a relationship with them.
Theme Two: Flexibility

For each teacher, flexibility was a part of how they created and maintained relationships with their students. Their flexibility was evident in their interactions with students in the classroom observations as well and in the curriculum and assessment of the students. Both teachers demonstrated flexibility by allowing each student to work at their own pace and make decisions about the students learning process. Mrs. Fore and Mrs. Williams were able to be open to the needs of their students by being flexible. In classroom observations, both teachers were constantly moving from pod to pod talking with students about their plans and goals for the week. In addition, there was evidence that both teachers were flexible with the decisions that students were making about their learning. Mrs. Fore stated, “I want them to know that I genuinely care about them as students, the goals they set for themselves, and how they make this plan happen. This starts with being flexible with them. One of the major freedoms of the flipped classroom is that a student gets to choose how, when, and where. If I am not flexible in their decision making, some will be defiant and purposely sabotage their own learning.” In addition, she stated, “I understand that some of these kids have no interest in math, but if I can begin to let them make their own choices about their learning, how they learn it, when they learn it, and let them choose how to show me that they understand it, the maybe, just maybe I can get them to like the subject a little better and show them that it’s not that bad.”

Being flexible is necessary so that a teacher can maneuver easily around a classroom and work within these pods, or conference with a student away from noise. In a flipped classroom, it is expected that students are not quiet, but are working with one
another, asking questions, and the environment noisy (Hamden, McKnight, McKnight, & Arfstrom, 2013). Teachers are not only flexible with their environments in terms of logistics, but also flexible with student performance. “Educators who flip their classes are flexible in their expectations of student timelines for learning and how students are assessed” (Flipped Learning Network, 2014, p. 5).

The theme flexibility appeared from teachers’ descriptions that they were able to accommodate students’ learning styles and were receptive to students needs. The teachers also discussed wanting to design opportunities for learners at different ability levels within their classroom. This also involved accommodating students working at different paces as well as students working on different material. Mrs. Fore declared, “In the flipped style, students may be all of over the place. When I say that to some math teachers, I can see their faces just cringe. But, that’s the beauty of the flipped style. I am meeting the kids where they are at.”

For Mrs. Williams, her flexibility was evident not only in the curriculum, but also in her approach to personal issues and discipline with students. She stated, “When we go into a situation pointing fingers or shouting, it puts everyone on the defense. Kids feel attacked, and any progress that was made building trust and rapport is quickly lost. Get to the bottom of the issue, and discipline accordingly. If you’ve built a relationship with students, they’ll feel bad disappointing you.”

Like Mrs. Fore, Mrs. Williams discussed with students their plans and goals so that she is able to meet them where they are. She talked with them to determine if the expectations that she and the student had set for themselves was attainable. Mrs. Williams believed that flexibility also meant that she talked with them to determine their
life outside of school, and used this information to remain flexible with them in the classroom. She believed that being flexible with them individually benefited everyone in the end because the student will be more responsive to her given this empathy. She stated, “Approachability is huge. Flexibility is huge. Things will come up, they did for us when we were students, and they do for us now as adults. Too often, we are stuck on “holding kids accountable” which is important, but we also need to remember that sometimes things happen that are beyond our control. If you aren’t approachable, students aren’t going to “let you into their world. For me, it is sitting in front of the class and walking around as often as possible. Standing in front of a classroom lecturing (the opposite of a flipped classroom) is a huge barrier for approachability.”

In an effort to improve student engagement, Mrs. Williams specifically created different opportunities to make sense of the material. She supplemented the original curriculum in a way that often made the lesson more likable. For example, during one interview she explained how in one class she has quite a few boys who love to talk about their trucks. She took advantage of any chance she had to relate the mathematics to their trucks. This is just one example of a strategy that Mrs. Williams used to help her students become successful. She commented, “I use what I know to individualize the instruction that certain students or groups may get. I also try to find ways to make the math appeal to them.”

All six students had positive things to say regarding how Mrs. Fore and Mrs. Williams make them feel a sense of belonging. Many of their comments included the flexibility displayed by each teacher. “She always makes me feel like I belong in class because she tells me good job a lot. She’s always smiling and saying positive things. I
like how she doesn’t get on me for every single thing and let’s me pick and choose what I’m working on and getting done;” “She does say everyone is working and thanks us for that. She pushes me to get my stuff ready for the quizzes Friday;” “She knows I’m really quiet and like to sit by myself so sometimes she encourages me to help others just so that I can get involved more. But, she lets me make that decision.”

Each of the students also described how their teacher makes them feel supported in the flipped mathematics classroom. Again, flexibility was a part of how this support was created. All six students felt supported by their teacher in the flipped mathematics classroom. Students’ comments include, “Usually she’ll take me to the back board and works with me one on one. I like that because I feel like other kids won’t make fun of me then. We’re not all at the same place, so sometimes kids will make fun of us who are behind. But, Mrs. Fore is real good about always saying everyone’s different and we all learn stuff differently;” “She reminds me that it’s okay not to be perfect all of the time and that I’ll learn more by making mistakes than doing everything right the first time;” “She listens to me when I ask questions, and I ask a lot of them;” “If we have a problem that I want to see she would do it on the board and see if we understand it that way. She tries to simplify it that way;” “We watch the videos online, but Mrs. Williams always goes over the stuff in front of the board. I like it that she does this because if I haven’t watched the video yet, I know she won’t get mad at me. She’ll just encourage me to do it now.” Mrs. Williams was not only helping build trust with her students, but she was modeling for them how important it is to take ownership of their actions, and how necessary it was to have kindness for others.
This is in alignment with Noddings’ theory of care component of modeling. She stressed how important it is for educators to show what it means to care through their own behavior. It is not enough to tell students how to care. The action must be genuinely demonstrated (Noddings, 2012a). The teacher models worthy examples of intellectual activity, but also desirable ways of interacting with people. Students are treated with respect by teachers and are encouraged during the modeling stage to treat each other with respect as well (Lockwood, 1999). The flexibility and support that was felt by students correlates to Noddings’ theory of care not only through modeling, but also through the dialogue component. Again, it is important for educators to show what it means to care through their own behavior. In addition, the dialogue that occurred between teacher and student, as well as student to student, was open and respectful that led to the creation of a caring environment.

**Theme Three: Creates a Positive Classroom Environment Where Students Feel Recognized**

Each teacher described and displayed ways in which they created a positive classroom environment. Mrs. Fore explained that the flipped classroom is one that can seem chaotic to those who are not comfortable with that type of environment. It is the teacher’s responsibility to create an environment where students feel safe. She does this by not only having verbal conversations with students, but by also through the students non-verbal communication. Mrs. Fore stated, “You learn to recognize the looks on their faces, their mannerisms, if you know that….I think that’s what a lot of other teachers
never get the opportunity to key into because they are up at the board and they are focused on their lesson.”

In addition, Mrs. Fore maintains a calm demeanor with the flipped classroom. Instead of getting angry or impatient with her students, Mrs. Fore was extremely positive with feedback to them, stating “I know you can do it,” “Let’s work on this together and see where we are at,” “See, I knew if you kept trying, you could make this happen,” “I bet all of you feel much more comfortable with this material now.” Because the flipped classroom is very different from any traditional one that they are in, it would be very easy for Mrs. Fore to allow students to not be recognized, or as she stated, for “kids to fly under the radar.” In response to this, she stated, “I refuse to let that happen. I want them to feel welcome and feel comfortable. That my room is a safe, fun place. It’s just consistency and consistently doing the same thing with them so that they feel safe. They need to feel that somebody cares about them. If a student knows that I asked about their track meet last night then they know that I am sincere when I ask how it is going with their math.”

Mrs. Fore also stated it is imperative to create a positive environment because of the relationship that exists between students in a flipped mathematics class. There is greater opportunity for students to be helpers to each other. Creating the environment that is safe and allows students to feel comfortable to seek help from others besides Mrs. Fore, is a valuable component of the flipped classroom. Likewise, Mrs. Williams agreed that the pods in the flipped classroom and the time that is spent working together lend itself to the students turning to one another to get help. Mrs. Williams stated, “It’s very important to me and one of my personal goals is to create an environment where the
students could discuss and share their ideas as they progress through their modules. I wanted them to encourage their peers to accomplish their goals."

Mrs. Williams also discussed how the simple make up of the classroom due to the flipped approach created opportunities for a caring relationship to exist between her and her students. Mrs. Williams does not lecture in front of the classroom for a lengthy period of time. She believed her role as a teacher is much more valuable than ever before. She was able to walk around the classroom as more of a facilitator for the students than the lead instructor in the class. She assisted students not only academically, but also helped them transition between activities as well as helped them to set goals for themselves and determine a plan to make that plan happen. As a result, students did feel recognized and respected in the flipped mathematics classroom.

In the category students feel recognized, all six students believed that they felt like Mrs. Fore and Mrs. Williams made them feel accepted. The students believed that the teachers go out of their way to get to know them. “Mrs. Fore comes to my football games on Wednesday nights. I know that because she talks to me about it the next day;” “She calls my mom a lot at home and knows my family really well;” “She knows I work at Subway and sometimes she’ll come in when I’m working and she’ll tease me and say that she hopes I did my homework;” “I told her I was going to see a movie and she asked me if I liked it the next week” were all comments made by students during the follow up interview. Whether the teacher made a point to talk about a student’s home life with them, the sport they were playing in, a call home to a parent, or simply playing a short
game to find out more about each other, students felt that the teacher went out of their way to know their students better in the flipped mathematics classroom.

Five out of the six students agreed that they felt that their teacher respected their feelings in the flipped mathematics classroom. Only one student, Brock, felt that he does not really talk about his feeling with teachers, so it was difficult for him to answer the question. However, the other five students agree their feelings were respected by stating, “She treats me the same as everyone else even though some days I know I ask her a ton of questions and sometimes I feel like it bugs her. She just made me feel that it was okay to go home.” “She said it was okay for me to miss class today because I was going over to ACES at the elementary school. I felt better because I knew I could make up the work.”

The findings from the teachers in the present study of treating students with respect and being flexible with students, were consistent with research by Noddings regarding how caring ways are modeled or demonstrated in their classrooms. When teachers expect their students to respect them and when students feel respected from their teacher, students begin to feel recognized. Noddings’ emphasis on modeling and practice defined respect as a way to show positive regard for student’s basic human rights as a person (1984). Respect is a necessary behavior for teachers who demonstrate caring behaviors towards students in their classroom (Bongo, 2011).

Some of these characteristics the teachers demonstrated and spoke about were consistent with the dialogue component of Noddings’ theory of care where expectations are discussed between the student and teacher through open and respectful dialogue in order to create a caring environment. Effective dialogue will contribute to critical
thinking skills by allowing different points of view and questioning these different perspectives (Lockwood, 1999). Engaging in open and respectful dialogue and critical thinking are all vital in building a caring classroom.

**Theme Four: Expectations**

Both Mrs. Fore’s and Mrs. Williams’ responses about their expectations for their students included evidence that they push their students to work hard and held learners responsible for their own learning and their quality of work. Mrs. Williams stated, “I like to challenge my kids. I know they are all at different places, but they all can be pushed. But pushed in a positive way that they know I want them to persevere and do the best they can. This skill is so important to life. They can develop a work ethic in the flipped classroom that is so beneficial to them later in life.” Mrs. Fore added, “While my class has the typical things that we do during the week, there are also many times where our schedule is disrupted by snow days, fog days, assemblies, or field trips. Sometimes I just have to go with it. I have to be clear with the kids. They need to know what makes up their time and what is our time. I don’t want them slacking and I want them to use every minute wisely.”

In order for each student to have the opportunity to be successful, each of the teachers described a desire to individualize expectations. Because students are working at different paces, each learner was able to build from his or her current level of knowledge and be successful. Mrs. Williams commented, “I think students feel more comfortable in the flipped classroom because the learning happens at the speed that works for them. Teachers are not just in front of the class spoon-feeding information to them. The students can make learning their own and that quickly helps teachers get to
know their students.” She added, “Once you have attempted to make connections and get to know your students learning abilities and styles, you need to be consistent in expectations. My students don’t wonder what a typical week will look like because it has been the same kind of set up since day one. I have time devoted to checking in with them, individual practice, assessments and re-teaching.”

Students confirmed that being able to work at their own pace was something they enjoyed. Five of the six students said they would choose the flipped format over the traditional one because, “I like it because last year I felt like I had to keep up with everyone else and that was hard for me;” “I like it because I can go at my own pace I felt like I could move ahead at my own pace;” “I do like it. I feel like Mrs. Williams is a good teacher and she just doesn’t rely on the videos to do the teaching. You can tell she really cares and wants us to do good because she’ll go over and go over and go over stuff that she expects us to know.”

In Mrs. Williams’ classroom, it was evident from the classroom observation that students had individualized plans in terms of homework assignments and projects that they were working on. I was able to observe two different groups of students working on their power point presentation and asked to see the rubric for their project. Upon further questioning of these two groups, I was able to see that not only were the groups’ projects differentiated, but the individual expectations for each student were also different. She understands that not all students are capable or motivated enough to stay organized and accountable for their learning. She identifies these students early in the year so they do not fall behind. Mrs. Williams stated, “I love that in the flipped style I can meet the kids where they are. Some really struggle and others are gifted. I have the freedom to do
what I think is best for everyone. I always let my kids choose their project. They can figure out for themselves if they have to ability to do what I am expecting of them. That’s when we talk and try to figure out what works for them.”

Each teacher also provided students with opportunities to reflect on what it meant to be a caring and responsible member of the classroom. Guidelines about working in pods and what was expected of this group work was laid out in the beginning of the year. Mrs. Fore stated, “Treat them and say things to them that you would want them to say to you. In the beginning of the year we had to discuss what it means to be in our pods. When you have three to four people working together, or at least sitting together, you have to set up guidelines and expectations, otherwise no work will ever get done.” Both teachers felt it was imperative to discuss how negative comments can make others feel badly about themselves. Instead of taking this path, Mrs. Fore and Mrs. Williams encouraged, established, and expected their students to discuss specific standards for caring and respectful behavior. They also discussed guidelines for unacceptable language and conduct. Mrs. Williams stated, “I encourage students to think about why certain words and actions can be hurtful. I let them establish the standards and then hold each other accountable to these standards.”

While modeling and dialogue are important components of Noddings’ theory of care, opportunities for practice can also occur through peer interaction. “In a classroom dedicated to caring, students are encouraged to support each other; opportunities for peer interaction are provided, and the quality of that interaction is as important (to both teacher and students) as the academic outcomes” (Noddings, 1988, p. 223). Noddings also suggests using cooperative learning to promote competence in caring as well. While
the aim of cooperative work in schools is usually for academic learning, it can also be used to support practice of care (Noddings, 1995a).

Teachers who take the time to encourage and are positive with their students align with Noddings’ theory of care which emphasizes a component called confirmation. Through the confirmation stage, we are able to identify a better self by assisting students in the construction of their ethical ideal. Noddings suggest students will rise to teachers expectations (confirmation) if they feel the teacher cares about them and has a connection with them (Noddings, 1984).

In summary, to answer the first research question, what opportunities for a caring relationship does the flipped classroom afford a teacher and his or her students, four themes emerged. The first theme is based around the role of the relationship between the teacher-student relationship as well as the student-student relationship. Each of the teachers and students spoke of ways in which they felt the flipped environment affords them the time to build a relationship between teacher and student and student to student. Mrs. Fore and Mrs. Williams described that unlike the traditional classroom, the flipped classroom gives them the chance to make personal connections with students by relating to them individually. They recognized that constructing relationships with students was gained by permitting the students to get to know them as more than a teacher, but rather as a real person. They also felt it was important in a teacher-student relationship to include information about themselves and to be very open with them. Students in both Mrs. Fore’s and Mrs. Williams’ class felt that the teachers shared personal information about themselves in the flipped mathematics classroom. Taking the time to develop relationships with students in order to help them achieve their personal or academic goals
is aligned with Noddings’ theory of care. Specifically, the modeling component of the theory states that actions must be genuinely demonstrated. Mrs. Fore and Mrs. Williams showed that they cared for their students by modeling caring behavior between teacher and student as well as between student to student. During the modeling stage, students are treated with respect by teachers and are encouraged to treat each other with respect as well. This was evident during this theme of the role of the relationship.

The second theme, flexibility, was a part of how the teachers created and maintained relationships with their students. Their flexibility was evident in their interactions with students in the classroom observations as well and in the curriculum and assessment of the students. Both teachers demonstrated flexibility by allowing each student to work at their own pace and make decisions about the students learning process. The theme flexibility appeared from teachers’ descriptions that they were able to accommodate students’ learning styles and were receptive to students needs. The teachers also discussed wanting to design opportunities for learners at different ability levels within their classroom. All six students had positive things to say regarding how Mrs. Fore and Mrs. Williams make them feel a sense of belonging. Many of their comments included the flexibility displayed by each teacher. Each of the students also described how their teacher makes them feel supported in the flipped mathematics classroom. Again, flexibility was a part of how this support was created. All six students felt supported by their teacher in the flipped mathematics classroom. The flexibility and support that was felt by students correlates to Noddings’ theory of care consisting of the components modeling and dialogue. Again, it is important for educators to show what it means to care through their own behavior. In addition, the dialogue that occurred
between teacher and student, as well as student to student, was open and respectful that led to the creation of a caring environment.

The third theme consisted of how each teacher created a positive classroom environment. Mrs. Fore explained that it is the teacher’s responsibility to create an environment where students feel safe. It is imperative to create a positive environment because of the relationship that exists between students in a flipped mathematics class. Creating the environment that is safe and allows students to feel comfortable to seek help from others besides the teacher, is an important component of the flipped classroom. It was stated how the structure of the classroom due to the flipped approach created opportunities for a caring relationship to exist between a teacher and his or her students. As a result, students did feel recognized and respected in the flipped mathematics classroom. In the category students feel recognized, all six students believed that they felt like Mrs. Fore and Mrs. Williams made them feel accepted. The students believed that the teachers go out of their way to get to know them. Five out of the six students agreed that they felt that their teacher respected their feelings in the flipped mathematics classroom. When teachers expect their students to respect them and when students feel respected from their teacher, students begin to feel recognized. Noddings’ emphasis on modeling and practice defined respect as a way to show positive regard for student’s basic human rights as a person (1984). Some of these characteristics the teachers demonstrated and spoke about were consistent with the dialogue component of Noddings’ theory of care where expectations are discussed between the student and teacher through open and respectful dialogue in order to create a caring environment.
The fourth theme, expectations, showed that both Mrs. Fore’s and Mrs. Williams’ responses about their expectations for their students included evidence that they urge their students to work hard and held learners accountable for their own learning and their quality of work. Each of the teachers also described a desire to individualize expectations. Because students are working at different paces, each learner was able to build from his or her current level of knowledge and be successful. Students confirmed that being able to work at their own pace was something they enjoyed. Five of the six students said they would choose the flipped format over the traditional one. Each teacher also provided students with opportunities to reflect on what it meant to be a caring and responsible member of the classroom. Teachers who take the time to encourage and are positive with their students align with Noddings’ theory of care which includes the component confirmation. Through this component, we are able to identify a better self by assisting students in the construction of their ethical ideal. Noddings suggest students will rise to teachers expectations (confirmation) if they believe the teacher cares about them and has a connection with them (Noddings, 1984).

**Student’s View of Cognitive, Emotional, and Behavioral Engagement in a Flipped Mathematics Classroom.**

Before I addressed the cognitive, behavioral, and emotional engagement of students in a flipped mathematics classroom, I began my research with determining what opportunities for a caring relationship a flipped classroom affords a teacher and his or her students because according to Noddings’ (1995b), a caring relationship precedes any engagement with subject matter. Research has shown that teachers’ caring behaviors
significantly influence students’ behavior, education, motivation, education, and engagement. All of the student participants shared their thoughts and beliefs about how the extent of the experiences in a flipped classroom shaped their cognitive, behavioral, or emotional engagement.

In the previous discussion, I answered the research question: What opportunities for a caring relationship does the flipped classroom afford a teacher and his or her students? In this discussion I will answer: To what extent do these experiences shape the cognitive, behavioral, or emotional engagement of students? Data from this study showed interesting results. The findings show that the flipped mathematics classroom opportunities affected both the cognitive and behavioral engagement of students, but it was not evident that it affected the emotional engagement of students. This may have been due to how some of the students in the study were more reserved than others. In addition, emotional engagement was difficult to observe possibly due to the specific days that the classroom observations took place. I did discuss in the results section how three out of the six students were emotionally engaged, but I do not feel like I can contribute that specifically to the opportunities that a flipped classroom affords a teacher and his or her students.

Based on my observations, the interviews, and the journals, two themes were evident concerning the cognitive and behavioral engagement of the students in a flipped mathematics classroom. I identified those themes as follows: (a) The role of relationships and a positive classroom environment shaped students cognitive engagement in a flipped mathematics classroom, (b) How flexibility in a flipped mathematics classroom shaped students behavioral engagement.
When a teacher is no longer in front of the room for a substantial amount of time, the dynamic of a classroom changes. A greater amount of accountability is now placed on the learner. The teacher can get to know their students better than ever before, both personally and academically. They can determine the best way for students to learn, can accommodate students individually, and get to know them more as individuals. Mrs. Fore and Mrs. Williams explained that unlike the traditional classroom, the flipped classroom gives them the opportunity to make personal connections with students by relating to them individually. Being able to sit with students one-on-one in groups or pods of students afforded them the chance to get to know their students more than a traditional classroom could. Both teachers stated it was vital to create a positive environment because of the relationship that exists between students in a flipped mathematics class. There is greater opportunity for students to collaborate with each other. Constructing an environment that is secure and allows students to feel comfortable to seek help from others besides the teacher is a valuable component of the flipped classroom.

Both Mrs. Fore and Mrs. Williams identified using the student to student relationship as one of the instructional practices to ensure cognitive engagement. They learned that in order to cognitively engage students, it was necessary for students to ask for help within pods and even maneuver from pod to pod for help. Martin and Downson (2009) stated teachers who enjoyed teaching in their content area, respected students, involved students in decision making, and cared about students, raised the engagement levels of students.
All of the students in the study cited seeking help from other students was one of the ways they felt cognitively engaged. Wess was one student who appeared to be the most disconnected with learning mathematics in a flipped classroom. He stated that if given the choice, he would choose the more traditional format over a flipped classroom. However, even Wess stated in his journal, “I showed that I needed help by asking the students around me for help,” which shows that he does use the flipped format to cognitively engage. Showing that she offered her help to a student, Sara stated, “Mrs. Fore, I am really good at that and I’ve already quizzed over that material. I can help her.” Sara also stated in her journal, “I also asked Sam for help on his because I know he understands it.” Another comment made by a student showing they were cognitively engaged in their pods included, “I showed I needed help or support in my flipped mathematics class today by asking my friend if she knew how to do a problem that I didn’t know. Then, because she didn’t know how to do it, I went to the teacher. Once she showed me how, I went and showed it to my friend.” In addition, Angela, Michael, and Brock all disclosed that they showed that they were cognitively engaged by asking students in their pods for assistance.

The second theme identified was how flexibility in a flipped mathematics classroom shaped students’ behavioral engagement. When behavioral engagement was addressed with both Mrs. Fore and Mrs. Williams, each spoke about how expectations promoted behavioral engagement. Mrs. Fore stated, “Behaviorally, they just need to understand what is expected of them so that they are able to be successful,” and Mrs. Williams stated that behaviorally she makes sure all students understand their roles in the pods and weekly routines and expectations. Behaviorally, students showed engagement
by stating that they understood these expectations, and identified that they were able to stay focused and pay attention because they were able to work at their own pace. All six students commented either in an interview or journal entry that they enjoy being able to work at their own pace and that allows them to stay on task. Sara stated, “I like it a lot better because you can go at your own pace and the people who don’t do as much as others don’t hold the whole class back. This lets me focus better. Otherwise, I just start to daydream when I already know how to do the stuff and I’m just waiting to start homework like the traditional classroom where everyone has to stay with it and everyone has to keep up.” Other comments made were, “I get to work at my own pace and I love that. I don’t get stressed or pressured,” and “In the flipped class you can work at your own pace and you don’t have to go with everybody else. That’s what I like about it. Last year I had a hard time staying with everyone else, but this way is a lot better for me.”

**Suggestions for Further Research**

This study focused on teacher and student perceptions, beliefs, and experiences of caring in a flipped mathematics classroom and how this affected students cognitive, behavioral, and emotional engagement. I would suggest five directions of research that are needed to pursue caring in a flipped mathematics classroom.

1. The study presented here investigating caring in the flipped classroom needs to be repeated because the majority of information regarding a flipped mathematics classroom is in regards to academic success. The caring relationship between a student and a teacher in a flipped classroom is a new concept that requires exploration in multiple classrooms as well as different content areas.
2. Suggestions for further research include researching a flipped mathematics classroom during the same semester to a traditional classroom taught by the same instructor. Because so much research of the flipped classroom has been focused on academic achievement, it is necessary to explore the caring aspect to investigate how this avenue can play into student success.

3. Long-term studies are needed that follow students through multiple flipped classrooms, not just mathematics courses, to examine the caring aspect of a teacher student relationship. It would be important in this long term study to investigate both high achieving students as well as low achieving students.

4. Besides investigating engagement, examining student motivation as a result of caring in a flipped classroom could be very useful.

5. Research is needed that would investigate students with different learning styles and how these students would respond to the flipped classroom format, specifically studying how caring plays a role in their academic and/or social success.

6. Research focusing on students that have never felt a personal relationship with a teacher in any type of classroom format would be very interesting to examine. Assessing these types of students may give even more answers to if and how a flipped classroom allows opportunities for caring to exist between a teacher and his or her students.

**Limitations of the Study**

There were several limitations with this study. The first limitation was due to the small school atmosphere that exists at Bridgeport High School, the site where the
research was conducted. Some of the students have had the participant teacher for more than one year. This may lead to the development of a caring relationship forming between the student and teacher, not because of the flipped classroom, but because of the extended time that the student and teacher have shared with each other.

A second limitation of this study was in the ability to generalize the findings. According to Marshall and Rossman (2011), “A discussion of the study’s limitations demonstrates that the researcher understands this reality – that he will make no overwhelming claims about generalizability or conclusiveness about what he has learned” (p. 76). I conducted in-depth interviews and participant observations in order to focus on students’ perceptions and teachers’ perceptions of caring within the flipped classroom. While the research was from two different perspectives, the small number of participants was a limitation. Due to the small number of students and teachers, findings cannot be generalized to all teachers or all students. According to Creswell (2013), “To best generalize, however, the inquirer needs to select representative cases for inclusion” (p. 74). Because of this suggestion, a convenience sampling technique was utilized to ensure a sampling of students from three different levels of growth in achievement. There was no collection of objective methods such as grades or standardized test scores to validate the caring relationship developing between teachers and their students and if this relationship affects student engagement.

A third limitation of this study was at specific moments, the participants might have been recalling information from previous months or even years. At times, student participants were asked to recall information about caring in the classroom from their middle school years. The flipped mathematics program was required during their
freshman year in Algebra I or Geometry. It is possible that details would have been
forgotten.

A final limitation stems from the fact that I have been working in the school
district and personally work with the two teachers and the six students in which the study
was focused upon. Not only have I worked closely with these two teachers in the
development of the flipped mathematics program, but it is known that I am a strong
proponent of this style of teaching and its benefits in terms of providing an avenue for a
caring relationship for a student and teacher to develop. A small degree of bias may be
suggested with regard to the reporting and interpretation of the study’s results and
finding. My involvement and relationships with these teachers and students are discussed
in more detail in the “Role of Researcher” section of this study (Chapter III).

**Delimitations**

This study confined itself to Bridgeport High School. The school is located in
Petersburg, Michigan and is part of Monroe County. The participants included six ninth
grade students who represent varying genders, as well as high, middle, and low achievers
within the school. In addition, two, ninth grade content area teachers who teach in
similar content areas participated. Therefore, generalizability to other situations may be
limited. Again, due to the study using a qualitative design, empirical evidence was not an
analytical focus.

**Implications**

Up until this point, research on the flipped mathematics classroom has always
involved academic success. There has been very little research on the affective domain
of a flipped classroom. Understanding how teachers create and maintain a caring
relationship with students in a flipped classroom is vital to understanding the learning that occurs in this setting. It was also imperative to understand a student’s perspective to validate whether or not a caring relationship exists. It is just as important for students to learn about their teachers as it is for teachers to learn about their students.

This study has established initial groundwork concerning opportunities for a caring relationship that the flipped classroom affords a teacher and his or her students and to what extent these experiences shape the cognitive, behavioral, or emotional engagement of students. It enhances important insight to the limited research on the flipped classroom. This research not only viewed information from a teacher’s perspective, but also through the eyes of a student. Too often in education, a student’s views, thoughts, and beliefs are overlooked. Understanding teachers’ and students’ perceptions of caring in a flipped mathematics classroom has the potential to impact students’ engagement. This knowledge can have a profound effect on a student’s classroom experience. Classroom teachers can use the flipped model to make connections with students that may not be possible in a traditional format. Because the data from this study indicated that engagement can be affected, more students may benefit if a greater number of teachers implement the flipped model into their instruction.

**Conclusion**

In this research study, I attempted to discover what opportunities for a caring relationship the flipped mathematics classroom affords a teacher and his or her students as well as to what extent these experiences shape the cognitive, behavioral, or emotional engagement of students. I used qualitative methods including interviews, participant observations, and journals to uncover opportunities the flipped mathematics classroom
affords a teacher and his or her students. The data were further saturated by having participants discuss the themes that emerged from the initial interview. Perceptions and experiences of caring in the flipped mathematics classroom were gathered from both teachers and students.

I discovered an abundance of information regarding how two secondary school teachers in a flipped mathematics classroom created and maintained relationships with students in this format. They identified that building relationships with students was obtained by allowing the students to get to know them as more than a teacher. These teachers believed it was important to make personal connections with students on an individual basis, have clear expectations that may need to be positive and modified, create an environment that is positive, be consistent yet flexible, allow students to see them as real people, and encourage student to student relationships. Furthermore, I also learned how students feel these actions affect their cognitive, emotional, and behavioral engagement.

It is evident to me that the students who participated in this study, while ranging from low performing to high performing, as well as having different levels of motivation, overall felt they had a positive relationship and connected to their teacher. In addition, all six students had positive things to say regarding how Mrs. Fore and Mrs. Williams make them feel a sense of belonging and many of their comments included the flexibility displayed by each teacher. Furthermore, all six students believed that they felt like Mrs. Fore and Mrs. Williams made them feel accepted and believed that the teachers go out of their way to get to know them. Finally, based on my observations, the interviews, and the journals, two themes that were evident concerning the cognitive and behavioral
engagement of the students in a flipped mathematics classroom included how the role of relationships and a positive classroom environment shaped students’ cognitive engagement in a flipped mathematics classroom and how flexibility in a flipped mathematics classroom shaped students’ behavioral engagement.

It was evident to me that the teachers provided a caring environment to their students in these flipped mathematics classrooms. Overall, the students enjoyed this type of environment that is very different from a traditional format. Students benefited from learning about their teachers and appreciated being able to make their own choices about learning. In today’s world where students may see a huge divide between themselves and adults, the flipped mathematics classroom may be an avenue to be further explored by other educators to allow opportunities for caring to exist within a classroom and may ultimately affect the engagement of students.
References


Jennings, J. (2012). *Reflections on a Half-Century of School Reform: Why Have We Fallen Short and Where Do We Go From Here?* Center on Education Policy.


Reschly, & C. Wylie (Eds.), Handbook of research on student engagement (pp. 365–386). New York, NY: Springer Science.


Appendix A

ADULT RESEARCH SUBJECT – TEACHER INFORMED CONSENT FORM

Caring in a Flipped Classroom

Principal Investigators: Dr. Leigh Chiarelott, Ph.D., (419) 530-5213
Kendra Dafoe, Student Researcher, (734) 693-0202

Purpose: You are invited to participate in the research project entitled, Caring in a Flipped Classroom, which is being conducted at the University of Toledo under the direction of Dr. Leigh Chiarelott. The purpose of this study is to gain information about how the flipped classroom enables teachers to develop a caring relationship with their students in order to foster students’ cognitive, emotional and behavioral engagement.

Description of Procedures: This research study will take place in your classroom as part of regular instruction as well as during your preparation period. Data collected will take place weekly across an estimated 5 -6 weeks. If you consent, understand that the following data may be collected from you as part of the research associated with this research project:

- Observing you in your flipped mathematics classroom.
- A journal reflecting your thoughts and feelings regarding caring in a flipped classroom.
- Interviewing you twice for approximately 30 minutes regarding caring in a flipped classroom.

Permission to observe: Will you permit the researcher to observe you during this research procedure?

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Permission to collect journals: Will you permit the researcher to collect a journal from you regarding caring in the flipped classroom during this research?

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Permission to interview: Will you permit the researcher to interview you regarding caring in the flipped classroom during this research?

YES ☐ NO ☐ Initial Here ☐

Potential Risks/Alternatives: There are minimal risks to participation in this study, including loss of confidentiality. If being observed during regular class instruction, allowing the researcher to interview you, or asking you to keep a journal causes you to feel upset or anxious, you may stop at any time. You have the right to not answer any specific questions or to stop your participation at any time.

Potential Benefits: One potential benefit if you allow yourself to participate in this research may be that you will learn about how research studies are run. Future teachers and students will benefit from the data collected. Information on caring in any classroom is important to understand.

Confidentiality: The researchers will make every effort to prevent anyone who is not on the research team from knowing that you provided this information, or what that information is. The consent forms with signatures will be kept separate from responses. Responses will not include names and will be presented to others only when combined with other responses.

Although we will make every effort to protect your confidentiality, there is a low risk that this might be breached. Also, you should know that there are some limits to confidentiality. Cases where reported information indicates that you or another person is judged to be in imminent danger and cases of suspected child abuse or neglect must be reported to the appropriate authorities.

Voluntary Participation: Your refusal to participate in this study will involve no penalty or loss of benefits to which you are otherwise entitled and will not affect your relationship with The University of Toledo. In addition, you may discontinue participation at any time without any penalty or loss of benefits.

Contact Information: Before you decide to accept this invitation to take part in this study, you may ask any questions that you might have. If you have any questions at any time before, during or after your participation or if you experience any psychological distress as a result of this research you should contact a member of the research team (Dr. Leigh Chiarelott, 419-530-5213)
If you have questions beyond those answered by the research team or your rights as a research subject or research-related injuries, the Chairperson of the SBE Institutional Review Board may be contacted through the Office of Research on the main campus at (419) 530-2844.

Before you sign this form, please ask any questions on any aspect of this study that is unclear to you. You may take as much time as necessary to think it over.

**SIGNATURE SECTION – Please read carefully**

You are making a decision whether or not you will participate in this research study. Your signature indicates that you have read the information provided above, you have had all your questions answered, and you have decided to take part in this research.

The date you sign this document to enroll in this study, that is, today's date must fall between the dates indicated at the bottom of the page.

_________________________  __________________  ______________
Name of Subject (please print)  Signature  Date

_________________________  __________________  ______________
Name of Person Obtaining Consent (please print)  Signature  Date

This Adult Research Informed Consent document has been reviewed and approved by the University of Toledo Social, Behavioral and Educational IRB for the period of time specified in the box below.

Approved Number of Subjects: ________________
Appendix B

CHILD RESEARCH SUBJECT ASSENT FORM
Caring in a Flipped Classroom

Principal Investigators: Dr. Leigh Chiarelott, Ph.D., (419) 530-5213
Kendra Dafoe, Student Researcher, (734) 693-0202

- You are being asked to be in a study that researches how the flipped classroom enables teachers to develop a caring relationship with their students in order to foster students’ cognitive, emotional and behavioral engagement.

- You should ask any questions you have before making up your mind. You can think about it and discuss it with your family or friends before you decide.

- It is okay to say “No” if you don’t want to be in the study. If you choose not to participate in this study, this will not affect your grade in your math class in any way. If you say “Yes” you can change your mind and then quit the study at any time without getting in trouble.

We are doing a research study about caring in a flipped classroom. A research study is a way to learn more about people. If you decide that you want to be part of this study, you will be asked to do what you normally do in math class and to let us observe you in class while your teacher teaches during a flipped mathematics classroom. We will also ask you to keep a journal regarding any thoughts or feelings regarding caring in a flipped mathematics classroom. You will be given prompts to begin your writing. In addition, we are asking to interview you on two separate occasions: one before the classroom observation and one afterwards. We will not share your interview or journal with anyone else. If you do not feel comfortable being observed, interviewed, or sharing your journal, that is okay. If you change your mind we will not use any information that you have provided. If you change your mind, please let us know. Everything you say will be confidential. This means that only people working on this project will know what you say.

You might feel uncomfortable answering some of the questions we ask you about caring in the flipped classroom. If you do not want to answer a question, you do not have to, but we would like you to try your best. You may also stop at any time. No one will be upset with you.

Not everyone who takes part in this study will benefit. A benefit means that something good happens to you. We think the benefits might be that what we learn will help teachers develop caring relationships with students in order to foster students’ cognitive, emotional and behavioral engagement.

When we are finished with this study we will write a report about what was learned. This report will not include your name or say that you were in the study.

If you have any questions about the study, you can ask them at any time. You can also call Dr. Leigh Chiarelott at 419.530.5213 if you have a question later.
If you decide to be in this study, please print and sign your name below.

I, ____________________________, want to be in this research study.

(Print your name here)

Sign your Name: ____________________________  Date: ____________________________
MINOR CHILD RESEARCH SUBJECT - PARENT/GUARDIAN INFORMED CONSENT FORM

Caring in a Flipped Classroom

Principal Investigators:  Dr. Leigh Chiarelott, Ph.D., (419) 530-5213
Kendra Dafoe, Student Researcher, (734) 693-0202

Purpose: Your child is invited to participate in the research project entitled Caring in a Flipped Classroom, which is being conducted at the University of Toledo under the direction of Dr. Leigh Chiarelott. While there is no single model of the flipped classroom, the flipped classroom model is implemented by rotating on a fixed schedule between face-to-face teacher guided practice during the standard school day and online delivery of content from an outside location. It combines two essential components of education including the lecture and active learning. The purpose of this study is to gain information about how the flipped classroom enables teachers to develop a caring relationship with their students in order to foster students’ cognitive, emotional and behavioral engagement. There are three ways your child is being asked to participate.

First, as part of your child’s math teacher’s participation in this project, we would like to observe your child in their mathematics class.

Second, as part of the research we would like to collect a journal from your child. Your child could reflect on any thoughts or feelings that occurred to them while journaling, however, the focus should be on specific moments of care that occurred in the flipped mathematics classroom. The written document will be used by the research team. It will not be shared publically.

Third, as part of the research we would like to interview your child. Interviews will last approximately 30 minutes and will not affect their classroom instruction time. There will be two interviews: one prior to observation and journal writing and one following the classroom observation and journal writing.

Description of Procedures: This research study will take place in your child’s classroom as part of regular instruction as well as during their study hall. Data collected will take place weekly across an estimated 5 -6 weeks. If you consent, understand that the following data may be collected from your child as part of the research associated with this research project:

- Observing your child in their mathematics classroom.
• A journal reflecting your child’s thought and feelings regarding caring in a flipped classroom.
• Interviewing your child twice for approximately 30 minutes regarding caring in a flipped classroom.

Permission to observe: Will you permit the researcher to observe your child during this research procedure?

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Permission to collect journals: Will you permit the researcher to collect a journal from your child regarding caring in the flipped classroom during this research?

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Permission to interview: Will you permit the researcher to interview your child regarding caring in the flipped classroom during this research?

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Potential Risks/Alternatives: There are minimal risks to participation in this study, including loss of confidentiality. If being observed during regular class instruction, allowing the researcher to interview your child, or asking your child to keep a journal causes your child to feel upset or anxious, you may stop at any time. Your child has the right to not answer any specific questions or to stop their participation at any time.
**Potential Benefits:** One potential benefit if you allow your child to participate in this research may be that you will learn about how research studies are run. Future teachers and students will benefit from the data collected. Information on caring in any classroom is important to understand.

**Confidentiality:** The researchers will make every effort to prevent anyone who is not on the research team from knowing that your child provided this information, or what that information is. The consent forms with signatures will be kept separate from responses. Responses will not include names and will be presented to others only when combined with other responses. Although we will make every effort to protect your child’s confidentiality, there is a low risk that this might be breached. Also, you should know that there are some limits to confidentiality. Cases where reported information indicates that you or another person is judged to be in imminent danger and cases of suspected child abuse or neglect must be reported to the appropriate authorities.

**Voluntary Participation:** Your refusal to allow your child to participate in this study will involve no penalty or loss of benefits to which you are otherwise entitled and will not affect your relationship with The University of Toledo or your child’s school or your child’s teacher. In addition, your child may discontinue participation at any time without any penalty or loss of benefits.

**Contact Information:** Before you decide to accept this invitation for your child to take part in this study, you may ask any questions that you might have. If you have any questions at any time before, during or after your participation or if you experience any psychological distress as a result of this research you should contact a member of the research team (Dr. Leigh Chiarelott, 419-530-5213)

If you have questions beyond those answered by the research team or your rights as a research subject or research-related injuries, the Chairperson of the SBE Institutional Review Board may be contacted through the Office of Research on the main campus at (419) 530-2844.

Before you sign this form, please ask any questions on any aspect of this study that is unclear to you. You may take as much time as necessary to think it over.

**SIGNATURE SECTION – Please read carefully**

You are making a decision whether or not your child will participate in this research study. Your signature indicates that you have read the information provided above, you have had all your questions answered, and you have decided to allow your child to take part in this research.

The date you sign this document to enroll your child in this study, that is, today’s date must fall between the dates indicated at the bottom of the page.
This Adult Research Informed Consent document has been reviewed and approved by the University of Toledo Social, Behavioral and Educational IRB for the period of time specified in the box below.

Approved Number of Subjects: ____________________
Appendix D

Teacher Interview Questions.

1. Please tell me your beliefs about creating relationships with students in a flipped mathematics classroom.

2. Describe your interactions with students in the flipped mathematics classroom. How do they differ in their quality and focus than in a traditional class that you teach?

3. What do you do to create and maintain relationships with your students in a flipped mathematics classroom?

4. What do you do with the information that you learn about your students in a flipped mathematics classroom?

5. Describe the behavior and affective qualities of students who you would describe as engaged in your flipped mathematics classroom.

6. How is what you learn about your students in the flipped mathematics classroom used to create and maintain teacher-student relationships?

7. How does all of this (your sharing, learning about them, and using what you learn about them in a flipped mathematics class) affect your relationship with your students?
Appendix E

Student Interview Questions

1. Tell me about yourself as a student in the flipped mathematics classroom.
2. What is it like to be in a flipped mathematics classroom?
3. How do you create and maintain relationships with the teacher and other students in your flipped mathematics class?
4. Describe the teacher behaviors that engage you in your flipped mathematics class.

D. Cognitive Engagement
   How do you know that you understand the lesson when presented in the flipped mathematics course?
   What do you do if you do not understand the lesson in a flipped mathematics course?
   How often do you ask questions in the flipped mathematics class or contribute to class discussion?

E. Behavioral Engagement
   When you are working during the flipped mathematics class, how do you make sure you are staying on task?
   How do you work to your full potential in the flipped mathematics classroom?

F. Emotional Engagement
   Describe how you get involved when working on material in the flipped classroom.
   How do you feel about working at your own pace in a flipped mathematics classroom?
Appendix F

Journal Prompts for Students

Emotional Engagement

Today, I think learning in the flipped mathematics classroom is . . .

Today, I like/dislike being in a flipped mathematics classroom because . . .

Today, learning math in a flipped classroom made me feel . . .

Cognitive Engagement

One of the most memorable or important things I learned today in my flipped mathematics class is . . .

I showed I needed help or support in my flipped mathematics class today by .

Behavioral Engagement

When I was in my flipped math class today, I showed I was working by . . .

Today, when I was completing my class work in my flipped mathematics classroom I . . .

When I did not understand something today in my flipped mathematics class I . . .