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An Exploratory Study of Mathematics Engagement of Secondary Students

Tracy Thomas Brown

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ACCEPTANCE

This dissertation, AN EXPLORATORY STUDY OF MATHEMATICS ENGAGEMENT OF SECONDARY STUDENTS, by TRACY THOMAS BROWN, was prepared under the direction of the candidate's Dissertation Advisory Committee. It is accepted by the committee members in partial fulfillment of the requirements for the degree Doctor of Philosophy in the College of Education, Georgia State University.

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ABSTRACT

AN EXPLORATORY STUDY OF MATHEMATICS ENGAGEMENT OF SECONDARY STUDENTS

by
Tracy Thomas Brown

A large proportion of American students are not psychologically connected or engaged to what is occurring in their classes; in addition, they fail to take school seriously, have lost interest in school, and do not value or seek out success (Steinberg, Brown, & Dornbusch, 1996). In addition, the relationship in a mathematics classroom between schooling and engagement from the student's perspective is not well known (Cothran & Ennis, 2000).

The purpose of this study was to investigate engagement in order to describe students' constructs of student engagement, their beliefs, attitudes, and values as they relate to engagement in secondary mathematics. Three broad questions guided this investigation: (a) What are students' practices and beliefs concerning student engagement in the secondary mathematics classroom? (b) What are the patterns of engagement in the secondary mathematics classroom? (c) What are the interactions between the student in the secondary mathematics classroom and primary contexts that affect student engagement?

Data were collected through behavioral observations, interviews, recent events, journals, and observer's perceptions in this interpretive case study. Participants in this

study were eleventh- and twelfth-grade high school students who were recruited from a high school in a rural community in the southeast United States. Data from the transcriptions of observations, interviews, researcher's journal, and students' journals were analyzed using a constant comparative and pattern-matching method using a tentative codebook. The codebook included: (a) themes derived from the affective, behavioral, and cognitive dimensions of student engagement; (b) contexts that affect student engagement; (c) properties of attribution theory; (d) the processes and sources of self-efficacy; and (e) factors that researchers have found that affect student engagement.

Themes for each participant emerged from the data. A cross-case analysis was conducted. The cross-case themes were (a) moods, feelings, and/or physical conditions; (b) effort; (c) behavioral engagement, including attentiveness and help-seeking skills; and (d) approach to instruction. Findings from this study show that there are specific student practices, behaviors, and patterns that affect engagement. This study provides specific descriptions of these practices, behaviors, and patterns with respect to the influences on student engagement.

AN EXPLORATORY STUDY OF MATHEMATICS ENGAGEMENT
OF SECONDARY STUDENTS

by
Tracy Thomas Brown

A Dissertation

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Doctor of Philosophy
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in
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CHAPTER 1

INTRODUCTION

This study centered on student engagement in secondary mathematics. Students' practices and beliefs were investigated and patterns of engagement were explored. This chapter is organized into five sections. First, the problem that motivated the investigation is introduced. In the second section, the issue of engagement is described, including the progression from general engagement, through the idea that engagement affects achievement and graduation rates, to the issue of mathematics as a gatekeeper and then finally engagement in mathematics. The third section includes an operational definition of student engagement and the purpose of the study. The fourth and last sections include the research questions and the theoretical framework.

Problem

Researchers recognize that students are not engaged in school (Sedlak, Wheeler, Pullin, & Cusick, 1986; Steinberg, Brown, & Dornbusch, 1996). Studies have shown that engagement is an area of interest and one in need of further investigation (Finn, 1993; Fredricks, Blumenfeld, & Paris, 2004; Klem & Connell, 2004; Lamborn, Brown, Mounts, & Steinberg, 1992). Although many aspects of engagement have been researched quantitatively using student surveys and self-report scales, there is a need to provide an in-depth description of engagement behaviors as well as a description of how interactions

between students and their respective settings produce engagement (Fredricks et al., 2004; Lewis, 2002; Sullivan, Tobias, & McDonough, 2006).

More than two decades ago, approximately two-thirds of high school students were persistently disengaged (Sedlak et al., 1986). Based on qualitative and ethnographic evidence that varied in scope and sophistication, researchers stated students from all social classes were “uniformly uninvolved in the acquisition of challenging academic knowledge” (p. 3).

Ten years later, adolescents were still “largely disengaged from the serious business of education” and 40 percent were only going through the motions of school (Steinberg et al., 1996, p. 18). In Steinberg et al.’s (1996) longitudinal study of 20,000 students at nine different high schools over a period of 10 years, results showed that many students were not engaged, did not take school seriously, and were not interested in school. Thirty to 40 percent of the students surveyed admitted to not trying in school and not paying attention in class. Thirty percent of the students surveyed reported they had lost interest in their schooling and were not learning much in the classes they were taking.

Described as “physically present but psychologically absent”, students were harder to motivate and it was more difficult to hold their attention than in the past. Steinberg et al. (1996) argued that nearly half of the students had “checked out” and that this lack of student engagement was a persistent problem and potentially more harmful to the future well-being of American society than other social problems involving youth. Their main finding was that many students did not value or seek out success in school. The authors agree that little research was conducted before their study on student

engagement and it was important to listen to what students describe as motivators to engage in school.

Engaged students attend school, earn better grades, score higher on standardized tests of achievement, and are more personally adjusted than students that do not engage in school (Skinner, Wellborn, & Connell, 1990). Educationally engaged students are goal-directed, focused, persistent, and interested (Connell & Wellborn, 1991; Furrer & Skinner, 2003). “Qualitative methods can illustrate the process whereby students construct the meaning and purpose of education...qualitative methods can shed light on how the various types of engagement develop and interact as well as on why some students begin to disengage from school...observational, and ethnographic studies would contribute to this effort” (Fredricks et al., 2004, p. 87).

Engagement affects student achievement. “Understanding the constellation of factors that maintain students’ emotional and behavioral engagement in school remains of critical importance” (Finn, 1993, p. 266) because “student engagement in school and class activities is an important, an essential antecedent of successful achievement outcomes” (p. 265). In a study of 6,000 eighth-grade students nationwide, Finn (1992) found that high levels of engagement led to academic achievement. In a longitudinal study of 449 high school students, engagement in school was found to be “a critical predictor of mathematics achievement for high school students” (Akey, 2006, p. 31).

School achievement is a concern to educators, scholars, and policy makers. Cathy Seeley (2004), past President of the National Council of Teachers of Mathematics, stated that student engagement influences achievement and that engagement could have the

greatest impact on equity in the mathematics classroom. She goes on to argue, “Student engagement leads to learning for more students than we have ever reached before.”

While engagement affects student achievement, a look at graduation rates suggests student achievement is a predictor of graduation. The Editorial Projects in Education Research Center released their Graduation Project 2007, *Diplomas Count* (Diplomas, 2007) listing graduation rates for the 2003-2004 school year. The graduation rate nationwide was 69.9%, up 0.3% from the previous year’s report (Diplomas, 2006). The report also gives estimates for the number of students that are not promoted from one grade to another. Thirty-five percent of ninth grade students nationwide do not make the transition from ninth to tenth grade.

Students do not graduate, in part due to not being able to pass mathematics courses. Mathematics is a gatekeeper, keeping students from higher level, rigorous mathematics classes, diploma tracks, and the job market (Stinson, 2004; U. S. Department of Education, 1997). In May of 2007, at the National Summit on America’s Silent Epidemic, U. S. Secretary of Education Margaret Spellings stated, “Solving our dropout crisis is not just a moral imperative, it’s an economic necessity. The United States has the most severe income gap between high school graduates and dropouts in the world...a high school diploma is the bare minimum for success” (U. S. Department of Education, 2007). Furthermore, for No Child Left Behind accountability, the graduation rate is the secondary academic indicator, which poses a strong motivator for states to increase graduation rates.

As mathematics is the gatekeeper course, this study centered on student engagement in secondary mathematics. In an experiment testing whether student attitudes

and behavior contribute to mathematics and reading achievement among high school students, Akey (2006) found that prior successful levels of student engagement in mathematics positively influences academic performance in mathematics in later years. She also found that levels of exhibited successful behaviors affected students' mathematics achievement and engaged students perceived themselves as academically competent. Based on a longitudinal study spanning three school years at three high schools participating in the First Things First school reform initiative, Akey says, "Engagement in school was a critical predictor of mathematics achievement for high school students" (p. 31).

Since engagement is important as a precursor to achievement, "there is...a need for more research that explores constructs such as student motivation, socialization, identity, and agency with respect to mathematics" (Hart, 2003, p. 45). In order to explore these constructs, it is "informative to observe...students in their mathematics classes and seek to identify any relationships between their self perceptions of effort and their behavior in class" (Sullivan et al., 2006, p. 97).

Critical elements in student engagement involve more than solely the student (NCTM, 2000). Sustained student engagement revolves around the affective, behavioral, and cognitive dimensions as they relate to the student, the academic performance, classroom behavior and extracurricular involvement of the student, the teacher, the learning environment, the learning process, the interpersonal relationships, the school community, and the curriculum. However, for the learning experience to be successful, students must combine commitment to the task with engagement. Feelings, thoughts, and behaviors should be aligned in such a way as to support the learning process of the

student. However, what has not been the focus in research are studies that analyze engagement as a multidimensional construct or describe it from the student's perspective (McMahon & Portelli, 2004). Student engagement is a multidimensional construct that would benefit from further qualitative analysis (Fredricks et al., 2004).

Definition of Engagement

The term engagement is elusive within the body of relevant literature. The word engagement has referred to student engagement, academic engagement, and school engagement. Its application is both inconsistent and loose. Definitions of student engagement are multidimensional (Appleton, Christenson, Kim, & Reschly, 2006; Akey, 2006; Blumenfeld et al., 2005; Finn, 1993; Newmann, Wehlage, & Lamborn, 1992; Schlechty, 2001; Skinner & Belmont, 1993) and include cognitive, behavioral, and affective dimensions. The affective, behavioral, and cognitive dimensions do not work in isolation but work together in a synergetic manner. There is not a definition of engagement that strictly refers to mathematical engagement. The definition below given by Jimerson, Campos, and Greif (2003), is used, in the absence of a definition for mathematical engagement. Jimerson et al. incorporated multiple dimensions into the following definition:

School engagement is a multifaceted construct that includes affective, behavioral, and cognitive dimensions. Furthermore, in measuring this multifaceted construct the primary contexts include: a) academic performance, b) classroom behavior, c) extracurricular involvement, d) interpersonal relationships, and e) school community. (p. 11-12)

The first dimension of school engagement is affective or emotional, which includes feelings, values, emotions, reactions to the learning tasks, reactions to teachers, choices of easy or hard tasks, the desire to know more, and a sense of self. This

dimension also involves feelings of belonging and whether or not learning is valued (Blumenfeld et al., 2005).

The second dimension in the definition is behavioral or conative. Conation refers to mental processes and behaviors and the effort a student puts forth to act or change. Behavioral engagement includes natural skills, actions, performance, participation, task completion, grades, effort, persistence, help-seeking skills, scores, and response levels. Blumenfeld et al. (2005) calls this dimension the participation dimension.

The third dimension of school engagement mentioned in the definition is the cognitive dimension. Cognitive engagement can include intelligence, attentiveness, communication, mental effort, task persistence, information, language, thoughts, experiences, perceptions, and beliefs. Blumenfeld et al. (2005) calls this the investment dimension because it includes what effort and willingness students are able to exert in order to understand the content and master the skills. Certain aspects of cognitive engagement are observable in classroom situations (Helme & Clarke, 2001). Verbalizing thinking, self-monitoring, concentration, questioning, exchanging ideas, explaining, asking, and answering questions were all observable in Helme and Clarke's (2001) qualitative study of Year 8 mathematics students.

The definition reported by Jimerson et al. (2003) was used as the basis of this investigation as the affective, behavioral, and cognitive dimensions were explored within the context of a secondary mathematics classroom.

Purpose

The purpose of this study was to investigate students' constructs of student engagement, their beliefs, attitudes, and values as they relate to student engagement in

secondary mathematics. This investigation was to allow for a better understanding of how contexts inside and outside of the mathematics classroom affect the engagement of students in secondary mathematics.

Research Questions

To describe student engagement in mathematics as constructed by students, my research addressed the following questions:

1. What are students' practices and beliefs concerning student engagement in the secondary mathematics classroom?
2. What are the patterns of engagement in the secondary mathematics classroom?
3. What are the interactions between the student in the secondary mathematics classroom and primary contexts (academic performance, classroom behavior, extracurricular involvement, interpersonal relationships, and school community) that affect student engagement?

Significance

There is a scarcity of investigations that seek to find the impact of interventions on the dimensions of engagement and how interactions between students and their respective settings produce engagement (Fredricks et al., 2004; Sullivan et al., 2006). In *Principles and Standards*, the National Council of Teachers of Mathematics' vision for school mathematics states:

Imagine a classroom, a school, or a school district where all students have access to high-quality, engaging mathematics instruction. There are ambitious expectations for all...curriculum is mathematically rich, offering students opportunities to learn important mathematical concepts and procedures with understanding...Students confidently engage in complex mathematical tasks...draw on knowledge from a wide variety of mathematical topics, sometimes approaching the same problem from different mathematical perspectives or representing the mathematics in

different ways until they find methods that enable them to make progress...are flexible and resourceful problem solvers...they work productively and reflectively...students communicate their ideas and results effectively...value mathematics and engage actively in learning it. (NCTM, 2000, p. 2)

In the first line of NCTM's vision, the word imagine is used. This vision was a mental image conceived by NCTM. They realized that this type of engagement is not persistently occurring and in fact would be "highly ambitious" (p. 3). NCTM claims that research indicates that students are "not learning the mathematics they need or are expected to learn." NCTM contributes this deficiency to a curriculum that does not engage the students. This vision refers to mathematical engagement and incorporates all three dimensions from the definition given by Jimerson et al. (2003).

School achievement is a concern to educators, scholars, and policy makers. Cathy Seeley (2004), a President of the National Council of Teachers of Mathematics, stated that student engagement influences achievement and that engagement could have the greatest impact on equity in the mathematics classroom. She goes on to argue, "Student engagement leads to learning for more students than we have ever reached before." Learning what engages students and making certain they are engaged can reach those students that are just simply going through the motions of school.

Engagement is a predictor of student achievement. Finn (1993) argues, "Understanding the constellation of factors that maintain students' emotional and behavioral engagement in school remains of critical importance" (p. 266) because "student engagement in school and class activities is an important, indeed, an essential antecedent of successful achievement outcomes" (p. 265). In a previous study of 6,000 eighth-grade students nationwide, Finn (1992) found that high levels of engagement lead

to academic achievement. In a longitudinal study of 449 high school students, Akey (2006) found that “engagement in school was a critical predictor of mathematics achievement for high school students” (p. 31).

This investigation into students’ practices and beliefs in secondary mathematics will contribute to the knowledge base in mathematics education and will be useful to practitioners and policy makers. Dewey (1933) said, “Teaching may be compared to selling commodities. No one can sell unless someone buys” (p. 35). Teachers may try every trick and strategy in the book, but unless the student buys in, the new curriculum, strategy, or theory implementation is ineffective. Investigating engagement from the student’s perspective is important. Csíkszentmihályi (1990) said, “If intrigued by the opportunities of the domain, most students will make sure to develop the skills they need to operate within it” (p. 126). Moreover, if the students are engaged, substantively and behaviorally, acquiring those skills, research has shown that student achievement gains follow (Akey, 2006; Finn, 1993; Marks, 1995; Newmann, 1992).

Theoretical Framework

This section develops a theoretical framework that aided in understanding student engagement in the mathematics classroom. The phenomenon, student engagement, was analyzed by applying Weiner’s (1985) attributional theory of motivation and emotion and Bandura’s (1994) theory of self-efficacy. These theories focused the study because they addressed aspects of student engagement, the choices students made prior to and following engaged behaviors. The theories helped to explain the relationships found as students’ engagement practices and beliefs were investigated. As students were observed and interviewed and their practices and beliefs concerning student engagement were

realized, the guiding principles that make up attribution theory and the theory of self-efficacy were used to explain those practices and beliefs about engagement in the secondary mathematics classroom. Given that attribution theory allows researchers to study the reasons people make the choices they make in their lives, the reasons students use to explain why they did or did not engage affectively, behaviorally and cognitively were explored. Since the theory of self-efficacy helps explain individual rationales behind behavior based on perceived capabilities, students' mindsets prior to engagement behaviors were investigated.

Attribution Theory

Attribution theory was developed based on the theories of social psychologists, Heider (1958), Jones and Davis (1965), and Kelley (1967). Attribution theory deals with the why questions, how people make explanations for events in their lives and then analyzes how they contend with the emotional and behavioral results of these explanations. Since "attributional patterns seem to predict individuals' performance over time" (Pintrich & Zusho, 2002, p. 89), I used the principles of attributional theory as a tool to study the student's mathematical engagement practices and beliefs.

There are different attribution theories; however, the one that I believe best supported my study of student engagement in mathematics classrooms is a model presented by Bernard Weiner, a cognitive psychologist. Weiner (1985) developed attribution theory further and called it an attributional theory of motivation and emotion. From the perspective of the attributional theory of motivation and emotion, achievement endeavors are the theoretical focus. Understanding the reasons students engage in the mathematics classroom and understanding the behavioral and environmental factors that

students attribute their engagement to was essential in this investigation. Weiner (1985) finds three properties that are drawn on to explain behaviors and actions. He names these three properties of perceived causality: locus, stability, and controllability.

The locus, the first property of perceived causality, is the source of the attribution and can be either internal or external in nature. If the reason attributed to an action is internal, then the why question is answered by factors that are internal to the person, i.e. aptitude, temporary exertion and perhaps even mood (Weiner, 1985). If the locus is external, then the why question is answered by factors that are external to the person, i.e. objective task characteristics and chance.

Cognitive engagement includes the amount of effort and willingness students are able to exert in order to understand the content and master the skills (Blumenfeld et al., 2005). Cognitive engagement can be observable in classroom situations (Helme & Clarke, 2001). As I analyzed the data, I ascertained students' practices and beliefs relating to student engagement in the mathematics classroom and whether or not these practices and beliefs were based on reasons that are external or internal.

Stability, the second property of perceived causality, is based on the research of Weiner et al. (1971). Conclusions of Weiner et al.'s research suggest that the external and internal loci of causal factors can either be stable, relatively constant, and likely to be present in the future, while others are unstable, fluctuating, and changing from moment to moment. For example, students may see ability as a constant, stable capacity and see effort as unstable, in that it fluctuates for reasons known only to the student. I collected data on the engagement practices and beliefs of students and coded it according to whether or not engagement was based on stable or unstable factors.

Suppose that an observation shows that a student engages persistently throughout a lesson. Is this engagement attributed to the student's belief that their ability is constant and stable or do they attribute their engagement to haphazard understanding, one day they understand and the next day they do not? The behavioral dimension of student engagement includes natural skills, actions, performance, participation, task completion, grades, effort, persistence, help-seeking skills, scores, and response levels. Blumenfeld et al. (2005) call this dimension the participation dimension. This study investigated the stability or instability of these types of participation behaviors.

The third property of perceived causality is controllability (Rosenbaum, 1972; Weiner, 1979). Some factors of attribution are controllable by the person. For example, a person could control the amount of effort that is exerted in order to complete a task. However, the student can see mood or the onset of fatigue as uncontrollable (Weiner, 1985). Again, this category was utilized in my collection of data. Did students believe that there are aspects in their practices and beliefs that are controllable? Were their behaviors, emotions and even their cognitive choices controllable or uncontrollable?

I used Weiner's (1985) causal properties in his attributional theory of motivation and emotion to support my analysis of data. Weiner (1985) concludes that individual positions on the properties of attribution could explain behaviors. The stability property is directly applicable to the mathematics classroom. He says that if an event is thought to be stable, then the event will be expected to occur again. However, if the event is thought to be unstable, then the event will be different when it occurs again. Since stability of a cause can determine students' expectancies, I used stability as a way to frame my research, i.e. if a student performed poorly and believed that their ability was a stable

property, then they should have been more apt to remain a poor performing student because they do not believe that ability, theirs in particular, can fluctuate based on different circumstances.

Since attribution theory deals with people's explanations for events in their lives and student's reasons on how they contend with the emotional and behavioral results of their explanations, I was able to draw on this theory to understand students' practices and beliefs as they engaged in the mathematics classroom. Furthermore, I was able to see patterns in the students' academic performance, classroom behavior, extracurricular involvement, interpersonal relationships, and school community.

Self-Efficacy

Attribution theory is about the "why" questions, how people make explanations for events in their lives and then analyzes how they contend with the emotional and behavioral results of their explanations. Self-efficacy theory deals with the "can I" questions, actions preceding the above-mentioned explanations. Attribution theory deals with justifications made after an event, while self-efficacy deals with justifications that a person makes to decide whether to instigate the event. Attribution theory and self-efficacy complement each other in an explanation of engagement behaviors. Self-efficacy beliefs influence our cognitive, behavioral, and affective beliefs about the world around us, are important for successful learning, and affect motivation and achievement (Greene, Miller, Crowson, Duke, & Akey, 2004; Schunk & Pajares, 2002). Therefore, I believed that self-efficacy was a theory that could frame the phenomenon of student engagement.

Bandura and Cervone (1986) define self-efficacy as "People's judgments of their capabilities to organize and execute courses of action required to attain designated types

of performances. It is concerned not with the skills one has but with the judgments of what one can do with whatever skills one possesses" (p. 391). Self-efficacy, then, is an individual's belief that he or she can perform a particular task or behavior. Self-efficacy (Bandura, 1977, 1993) is a person's beliefs about their own abilities to control her/his level of performance and events that influence his/her life. Students with strong self-efficacy are harder workers, engage more frequently, have greater persistence in tasks and persevere in face of difficulties more often than students with low self-efficacy (Bandura, 1977).

Self-efficacy beliefs produce feelings, thoughts, motivations, and behaviors through four processes: the cognitive process, the motivational process, the affective process, and the selection process (Bandura, 1992). I used the theory of self-efficacy in framing my study on student engagement in the mathematics classroom. This theory guided my data analysis of students' practices and beliefs concerning cognitive, behavioral, and emotional dimensions of student engagement. Linnenbrink and Pintrich (2003) show the relationship between student engagement and self-efficacy:

Self-efficacy beliefs are positively related to students' behavioral engagement. Students that feel efficacious about their capabilities to do the task are much more likely to try hard, persist, and seek help in an adaptive manner...students who believed that they were capable of doing the task or their schoolwork were much more likely to be cognitively engaged than those who had lower self-efficacy. (p. 129-130)

First, self-efficacy beliefs can be produced and enhanced through the cognitive process. Did students think they could accomplish tasks? Research has shown that cognitive performance can be enhanced by possessing self-efficacy beliefs (Bouffard-Bouchard, 1990; Bouffard-Bouchard, Parent, & Larivée, 1991; Collins, 1982). Cognitive

performance can be influenced by three factors: how people understand ability, one's ability versus the ability of others, and performance feedback.

Students view ability either as an acquirable skill or as an inherent amount. It has been shown that those students who believe that they can acquire skills and build their abilities have a high sense of personal efficacy and those that believe they are born with only a certain amount of ability have very low efficacy (Wood & Bandura, 1989).

Through this investigation, one of the areas under exploration was how students perceive the relationship between their beliefs about their abilities and their engagement in the mathematics classroom, i.e. beliefs versus actual beliefs in practice.

People also perceive their own ability based on the performance of others (Bandura & Jourden, 1991). Students' efficacy beliefs were weakened when they saw others scoring higher and performing better; however, personal efficacy was strengthened when students realized they were progressively gaining advancement. Performance feedback can also affect feelings of efficacy. Efficacy is enhanced when feedback is positive and is centered around what is achieved versus negative attention put on what has been done incorrectly (Jourden, 1992).

The second process, motivation, can be enhanced and sustained by clear and challenging goals (Bandura & Cervone, 1986). Students will remain engaged if the work that they are completing is within or just beyond their abilities. Motivation is enhanced by self-efficacy beliefs (Bandura, 1994). Self-efficacy beliefs determine the goals students set for themselves, the persistence of students to complete tasks, and the student's ability to overcome a sense of failure and continue to persevere, even through disappointment.

The third process is the affective process and it is the emotional center of self-efficacy. Did the student feel that she could handle the emotional consequences of first contemplating and then attempting a task? Perceived coping self-efficacy and thought control efficacy can work together to help students reduce their levels of stress and withdrawal behaviors (Ozer & Bandura, 1990).

Lastly, selection or choice related processes are shaped by beliefs of personal efficacy. The types of activities students choose to participate in, the environments students place themselves in, even the career options they choose to investigate are influenced by self-efficacy (Bandura, 1994).

Not only is self-efficacy made up of four processes that control how students function; the cognitive process, the motivational process, the affective process, and the selection process, self-efficacy can also be explained by what causes efficacy beliefs (Bandura, 1994, Usher & Pajares, 2006). There are four sources of self-efficacy (Bandura, 1986, 1994). First, efficacy beliefs develop from mastery experiences, experiences that have been met with either success or failure. While experiences of success foster healthy personal efficacy, experiences of failure only weaken a student's sense of personal efficacy. It is interesting to note though, that frequent, small successes over time do not build a resilient sense of efficacy, but that personal efficacy is built up over a prolonged period of time.

The second source of efficacy beliefs is through vicarious experiences (Bandura, 1994). It has been found that if students see others, especially students who they deem to be their equals, succeeding, then they will feel they are able to accomplish similar tasks.

However, if students were to see another student put forth a large amount of effort and fail, they would not feel they were capable of the same task.

Not only does being successful and seeing others succeed build efficacy, verbal persuasion, the third source of self-efficacy, can aid in building efficacy beliefs (Bandura, 1994). Students can be persuaded that they have the abilities to accomplish a task. Achievement is improved through verbal encouragement (Schunk, 1985). It is not an easy endeavor, especially if the persuasion is followed quickly by an experience of failure. “Attempts to artificially raise self-efficacy beliefs through undeserved praise and manipulative messages run the risk of undermining confidence” (Usher & Pajares, 2006, p. 138).

The fourth source of efficacy beliefs is the physiological states of the students. Students’ moods, physical conditions, and stresses they feel are indicators for efficacy beliefs (Bandura, 1994). Given this statement, did teachers provide a classroom environment that was stress-free? Did students feel that teachers affected their engagement in the mathematics classroom by setting the “mood”?

Utilizing the processes and sources of self-efficacy (Bandura, 1994) helped support my analysis of the data and were an aid in understanding the construct of student engagement in the mathematics classroom. Self-efficacy includes a cognitive process, a motivational process, an affective process, and a selection process (Bandura, 1992) that were used as an aid in explaining students’ practices and beliefs concerning student engagement in the mathematics classroom. “Student engagement is...in terms of behavioral engagement, cognitive engagement, and motivational engagement...self-

efficacy can lead to more engagement, and subsequently, to more learning and better achievement” (Linnenbrink & Pintrich, 2003, p.122).

Summary

In summary, the problem that led to this investigation was that students are not engaged in their mathematics classes. Students are “largely disengaged”, harder to motivate, and do not value or seek out success in school. Students that are engaged exhibit positive characteristics. They attend school regularly, they earn better grades, and they score higher on standardized tests of achievement. Engagement in school predicts levels of mathematical achievement in high school for students. Serious issues surround our nation’s need to enroll students in higher-level mathematics classes, in reducing the dropout rate, and in increasing the graduation rate. Since engagement is a precursor to student achievement, which in turn affects students in multiple ways academically, engagement needed to be investigated.

Due to this disengagement and a lack of rich characterizations that depicts engagement from the student’s perspective, the purpose of this study was to investigate students’ constructs of engagement, their beliefs, attitudes, and values as they relate to student engagement in secondary mathematics. The theoretical frame that was used in this investigation of student engagement in mathematics classrooms included the definition of engagement given by Jimerson et al. (2003), Weiner’s (1985) attributional theory of motivation and emotion, and Bandura’s (1994) theory of self-efficacy.

CHAPTER 2

REVIEW OF THE LITERATURE

This study investigates the problem of why many students are not engaged in secondary mathematics classes. Approximately two-thirds of high school students are reported to be persistently disengaged (Sedlak et al., 1986; Steinberg et al., 1996). There is a shortage of investigations that seek to find the impact of interventions on the dimensions of engagement and how interactions between students and their respective settings produce engagement (Fredricks et al., 2004; Sullivan et al., 2006). The purpose of this study was to investigate student engagement in the mathematics classroom. This study answered the following questions:

1. What are students' practices and beliefs concerning student engagement in the secondary mathematics classroom?
2. What are the patterns of engagement in the secondary mathematics classroom?
3. What are the interactions between the student in the secondary mathematics classroom and primary contexts (academic performance, classroom behavior, extracurricular involvement, interpersonal relationships, and school community) that affect student engagement?

This chapter presents a review of prior literature on student engagement. While some of the literature deals directly with mathematics, the majority of the literature on student engagement deals with engagement as a general phenomenon. The review is

divided into nine sub-sections. Each subsection will be described using the researchers' findings.

Overview of Research on Engagement

Skinner et al. (1990) found that students successfully engaged in school earn better grades, score higher on standardized tests of achievement, and are more personally adjusted. Interest on student engagement has flourished in recent years due to its impact on both learning and student achievement (Newmann, 1992; Steinberg et al., 1996). However, very little literature exists on student engagement in the high school mathematics classroom. In a systematic review of 44 articles that span 22 years, Fredricks et al. (2004) found only four articles that dealt with engagement in a mathematics classroom, and only one of the four dealt with engagement in a secondary mathematics classroom.

Jimerson et al. (2003) characterized engagement as “a multifaceted construct that includes affective, behavioral, and cognitive dimensions” (p. 11). They argued that student engagement occurs in a student's academic performance, classroom behavior, extracurricular involvement, interpersonal relationships, and school community. Their definition encompasses the whole child, including emotional, behavioral, and cognitive processes, and the many diverse contexts that affect and are in turn affected by engagement in the mathematics classroom. This investigation on student engagement in the mathematics classroom was based on the definition proposed by Jimerson et al. Therefore, a search was made to identify significant theories that relate to students' emotional, behavioral, and cognitive abilities. However, a dearth of information exists within that body of literature for research pertaining to the combination of behavioral,

emotional, and cognitive factors that make up student engagement. Research spans multiple grades levels and content areas and includes theoretical articles. Most of the prior research is based on the engagement of students in elementary schools or on students that are considered at-risk. The prior research summarized in this chapter will be used in Chapter 5. It is compared and contrasted to the findings in this investigation of student engagement in the secondary mathematics classroom.

Multiple factors affect student engagement. Nine of these factors that affect student engagement that are considered the most relevant to this study will be explained in detail. The factors include: (a) competence or perceived ability; (b) teacher support; (c) sense of community, school participation and attitude toward school; (d) quality of instruction and authentic work including challenging tasks and higher-order thinking activities; (e) peer connections; (f) classroom structure and environment; (g) perceived control; (h) parental involvement; and (i) prior levels of student engagement and academic performance.

The next section contains a review of the literature surrounding student engagement. In this section, three goals will be accomplished. First, the literature will be synthesized into the above-mentioned nine factors, (a) – (i). Each factor will be described using researchers' findings. Second, the findings and conclusions will be related to student engagement. Lastly, there will be a description of how the findings are important in this study.

Competence and Perceived Ability

The literature suggests that student engagement can be a direct result of competence or perceived ability (Akey, 2006; Connell, Spencer, & Aber, 1994; Miller,

Greene, Montalvo, Ravindran, & Nichols, 1996; Newmann et al., 1992; Patrick, Skinner, & Connell, 1993; Skinner et al., 1990; Valeski & Stipek, 2001). The researcher's agree that the need to express competence is real in every person's life. In addition, when one experiences that feeling of success that accompanies competency in something, it tends to cause that person to try again and try even harder so that they continue to feel accomplishment (Newmann et al., 1992).

Findings in Valeski and Stipek's (2001) longitudinal study of 225 kindergartners and 127 first graders indicated that perceptions of competence lead to positive attitudes, which in turn lead to greater engagement. The students in their quantitative study attended one of 233 classes in 138 schools. Stipek and Valeski analyzed data from direct assessments, teacher questionnaires, and classroom observations. While their elementary grade study showed that perceptions of competence and level of ability were connected to student engagement, what remains to be explored is how competence and perceived ability affects student engagement in the secondary mathematics classroom.

Not only has research shown that feelings of competence affects elementary aged children, research in middle schools and high schools on the effects of perceived ability has also been informative. Akey (2006) carried out an exploratory analysis of school context, student attitudes, and behavior, and academic achievement of 449 tenth and eleventh graders over a three-year period. One of her four research questions dealt with the effects of engagement in school and perceived academic performance on student achievement in reading and mathematics. One of her conclusions indicated that perceived academic competence produced a positive effect on math achievement. Her results suggest that students who believe they are competent in the content area would be more

academically engaged over a period of time. Akey's study specifically deals with engagement of high school mathematics students; however, the results are based on administrative records and student surveys of a First Things First school reform initiative evaluated by MDRC, a nonprofit, nonpartisan social policy research organization. The study does not include a rich description of student engagement based on time spent in the field interviewing and observing the students themselves.

Newmann et al. (1992) helped to define engagement as well as make a case on the importance of student engagement in educational reform. They claim that the need for competence is "one of the most powerful bases for human action and motivation" (p. 19). Based on the research, competence and perceived ability can be investigated in order to see if student engagement is affected when students feel competent and able to perform.

Teacher Support

Prior research indicates that teacher support, closeness, and encouragement have been associated with student's behavioral, emotional, and academic engagement (Akey, 2006; Birch & Ladd, 1997; Connell & Wellborn, 1991; Cothran & Ennis, 2000; Furrer & Skinner, 2003; Marks, 1995; Newmann et al., 1992; Ryan & Patrick, 2001). In their research on motivation in students enrolled in 3rd to 6th grade, Furrer and Skinner (2003) found that students who felt valued by their teachers were more involved in activities in the classroom and viewed these activities as interesting and fun. However, students that did not feel valued felt boredom, unhappiness, and anger during classroom activities. Furrer and Skinner conducted this longitudinal study of children's motivation and coping over a two-year period. Data was collected from a subset of 641 children in the form of self-report questionnaires, teacher reports, and academic records. While their results were

analyzed quantitatively, they suggest that there is still a need for an examination of a “wider range of academic outcomes, distinguishing, for example, performance in specific subject areas, [mathematics] and including other markers of school success, such as attendance or participation in extracurricular activities” (Furrer & Skinner, 2003, p. 159).

While Furrer and Skinner (2003) found that teacher encouragement increased student involvement, other research indicates that teacher dependency can have negative effects. Birch and Ladd (1997) found in a study of 206 kindergarten students that the students that had an unhealthy dependency on their teachers were less likely to be engaged in the classroom.

Other researchers have found similar correlations between teacher support and student engagement. Connell and Wellborn’s (1991) research findings indicate that students who feel they have a positive relationship with teachers even though they are having effort issues in the classroom are more apt to continue engaging in achievement-related behaviors. Connell and Wellborn proposed a theoretical model of self-system processes based on three needs: competence, autonomy, and relatedness. Path analysis results within their Relatedness Path Model indicate that positive relatedness with peers and teachers predict academic engagement and school performance. Similarly, Akey (2006), in her exploratory analysis of school context, student attitudes and behavior, and academic achievement of 449 tenth and eleventh graders over a three year period, found that students who experienced teacher support indicated that they had higher levels of engagement in school.

Teacher support plays an extremely important role in promoting student engagement in the classroom (Newmann et al., 1992; Ryan and Patrick, 2001). In their

large-scale longitudinal study of 7th and 8th grade students in 30 mathematics classes, Ryan and Patrick found that teacher care and support promoted positive student/teacher communication, self-regulated learning, and less off-task behavior in mathematics classes. Teachers that created and maintained environments within their mathematics classrooms where mutual respect was valued, student ideas were respected, and student efforts were appreciated were more likely to have students that applied themselves more on cognitive tasks.

Cothran and Ennis (2000) called teachers the bridge builders to student engagement. They found that student engagement levels were positively affected by their beliefs that the teacher was willing to communicate with them, i.e., to talk with and listen to them, inside and outside of class and about things other than the content area. In their research in physical education classes, students who felt they were not involved in the decision-making in the classroom were less likely to be engaged. Care also was a factor in student engagement. Students that felt the teachers cared enough to work with them and that their personal life and wellbeing mattered were more engaged.

Research shows that teacher support is a factor that contributes to student engagement. Since research findings indicate a strong relationship between teacher support and student engagement, teacher support was examined in this investigation through interviews with students to determine and draw a picture of how this support helped student engagement.

Sense of Community and School Participation

Articles in this research suggest that a sense of community or belonging to the school built by school participation both in class, out of class, and during extra-curricular

activities is a predictor of student engagement (Battistich, Solomon, Watson, & Schaps, 1997; Finn, 1993; Newmann, 1981; Newmann et al., 1992; Voelkl, 1997).

In their research on elementary through high school aged children, Battistich et al. (1997) found that academic engagement was positively affected by students' sense of community. Battistich and his colleagues found that the warmth and supportiveness of the teacher and the classroom, an emphasis on prosocial values, an encouragement of cooperation, and a drawing out of student thinking and expression of ideas advanced their sense of community. Data was collected yearly over a 15-year period and included questionnaires and observations from more than 550 classes and involved more than 4000 students.

Finn (1993) investigated engagement in school as it related to student achievement. His first study included data from 15,737 eighth-grade students that had been surveyed in the U. S. Department of Education's National Educational Longitudinal Survey of 1988. His second study pulled data from a subgroup of this sample of 5945 eighth-grade students. In this study, Finn found that student's achievement scores rose as a direct result of participation. Participation factors that he measured included attendance, behavior, and participation outside the regular academic program.

The results of Voelkl's (1997) longitudinal research of 1335 eighth-grade students indicated a correlation between feelings of identification with school and academic achievement and classroom participation. Although the predictive power of this investigation was weak, she notes that a continued history of behavior and achievement patterns suggests the cycle will continue throughout the high school years. Her investigation centered on students that had been participating in a longitudinal research

project that observed students through their elementary and middle school years. Data was collected through student questionnaires, past achievement tests, and teacher questionnaires. The students' eighth-grade mathematics and English teachers filled out the teacher questionnaires.

Decreasing student alienation in schools is necessary. Since student engagement in the classroom is a necessity for learning (Newmann, 1981), developing a sense of membership, or bonding, is essential in order to promote student engagement (Newmann et al., 1992). Students are inclined to engage themselves in academic work if they experienced bonding, or a sense of membership, in their school. Developing a sense of membership requires certain factors from a school: clarity of purpose, fair treatment, personal support, opportunity to experience success, and a climate of caring (Newmann et al., 1992; Newmann, 1989).

Bonding could be promoted if students' voices were not silenced and their opinions were valued. In their study on instructional discourse, Gamoran and Nystrand (1992) went into 54 ninth-grade English classes. They found that instructional discourse should revolve more around the students in the classroom. The development of in-depth understanding would occur if discourse veered away from recitation to substantive discourse, which includes authentic questions, back and forth sharing of information and a serious interest in the thoughts of the students.

A sense of community and school participation, according to the research, fosters engagement. Students' practices and beliefs were explored in this investigation of student engagement to see how these areas affected levels of engagement.

Quality of Instruction, Authentic Work, Challenging Tasks, and Higher-Order Thinking Activities

The literature on quality of instruction, task challenge including the use of high order thinking skills, and the use of authentic work suggests that these factors are predictors of student engagement (Akey, 2006; Blumenfeld & Meece, 1988; Fredricks, Blumenfeld, Friedel, & Paris, 2003; Marks, 1995; Marks, 2000; Newmann, 1992; Newmann et al., 1992; Shernoff, Csikszentmihalyi, Schneider, & Shernoff, 2003; Stipek, 2002). In a longitudinal investigation of high school students in the United States, Shernoff and his colleagues (2003) found that academically meaningful activities aided in engaging students in the classroom. Higher expectations and challenges that were afforded to the students led to higher engagement. They argue teachers should think of their students as learners and should appropriately adjust instructional activities in the classroom to meet the needs, developmental stages, and interests of the students. Although their data was from a longitudinal study, the Sloan Study of Youth and Social Development, which collected data from elementary, middle, and high schools, Shernoff and his colleagues, sampled a subgroup of 526 students in the tenth and twelfth grades.

Newmann et al. (1992) cite three factors that affect student engagement. One of those factors is authentic work students perform in the classroom, work that “entails extrinsic rewards, meets intrinsic interests, offers students a sense of ownership, is connected to the “real world” (i.e., the world beyond school), and involves some fun is more authentic and more likely to engage students” (p. 23).

Marks (1995, 2000) called authentic instructional work that is both “cognitively challenging and connected to the world beyond the classroom” (p. 169). Marks collected

data from over 3660 surveys of fifth-, eighth-, and tenth-grade students in mathematics and social studies classrooms of restructuring schools. Her study included data from both student questionnaires and teacher questionnaires that indicated that authentic work contributed to the engagement of students in elementary, middle and high school. In the research findings of Marks, it was interesting to note that students in mathematics classes were more engaged than students in the social studies classrooms. They attributed this to the uniqueness of the mathematics classroom where more attention had to be paid in order to grasp the material.

Newmann's (1992) findings, in his study of 16 high school social studies departments, suggested that when students were urged to think, they tried more, concentrated more, and were more interested in their studies. The students were more engaged in a "thoughtful" class. Based on 500 lesson observations, in-depth interviews with teachers, department chairs and principals and student interviews and self-report surveys, results indicated that higher order thinking led to higher engagement. Even though Newmann's investigation was conducted in social studies classrooms, the same search for relationships between higher order thinking and engagement can be explored in mathematics classrooms and was in this study of engagement in mathematics classrooms.

Peer Connections

Studies have shown that peer groups can put down students who are striving for academic success and who are academically engaged (Ogbu, 2003; Steinberg et al., 1996). In an intensive longitudinal study of more than 20,000 students in nine high schools over ten years in northern California and Wisconsin, Steinberg et al. (1996) noted

that peers “are the chief determinants of how intensely they are invested in school and how much effort they devote to their education” (p. 138).

Other researchers are finding that peer connections do not seem to affect student engagement at all (Furrer & Skinner, 2003). However, one dissenting researcher found that highly engaged students seemed to find other engaged students to work with in the classroom (Kindermann, 1993). Additional studies into how peer connections can affect student engagement are needed since there seems to be contradictions in the findings resulting from similar investigations.

Classroom Structure and Environment

The organization of the classroom structure and the classroom environment has also been shown to be a predictor of student engagement. Students experience increased engagement when they feel that the classroom environment is under their control (Shernoff et al., 2003). Marks (1995, 2000) found when students felt they were valued as a part of the classroom environment that supported learning, they reported much higher levels of classroom engagement. An environment that is respectful, fair, safe, and elicits positive communication is favorable to students, which in turn enhances their engagement. If students perceive that the conduct rules are clear and fair, they are more likely to be engaged in the classroom (Akey, 2006).

Perceived Control

Research has shown that if students believe they have control over their learning and their learning environments, then they are more likely to be engaged. On the other hand, students who feel they have little control over their learning and their learning

environments will show signs of disengagement (Skinner, Zimmer-Gembeck, & Connell, 1998; Shernoff et al., 2003; Skinner et al., 1990).

Skinner et al. (1990) write about exercising control over success in the classroom. They believe that perceived control “is situated within a process model of motivation which holds that perceived control contributes to school performance by promoting or undermining children’s engagement in learning activities and that the social context...can have an important impact on children’s perceptions of control” (p. 22).

Parental Involvement

Family involvement in the learning process has an impact on student engagement in the classroom (Connell & Wellborn, 1991; Furrer & Skinner, 2003; Marks, 2000).

Furrer and Skinner (2003) researched students’ sense of relatedness as a factor in academic engagement. They found that relatedness to parents was a high predictor of student engagement in the classroom. Students who entered the classroom with a high level of parental relatedness were more apt to be willing to follow the classroom agenda.

Connell and Wellborn (1991) found that student/parent relationships influence school engagement. Student engagement is affected because the quality of the at-home relationship is carried over to the relationships between the student and teachers and other students in the classroom.

Prior Levels of Student Engagement and Academic Performance

Very little research exists on how prior levels of student engagement affect current engagement. However, student engagement tends to be a cyclic construct. Student engagement from one year, if supported and sustained, and not undermined will continue to exist in subsequent years (Akey, 2006; Marks, 1995). Student engagement is an

indicator of student achievement (Finn, 1993). Akey (2006) found that students who are engaged early in the school year or even in their school careers will become more secure in their abilities to be successful in the content areas and that engaged behavior promotes mathematics achievement. Researchers (Hancock & Betts, 2002; Willms, 2002) have shown that when students are actively engaged they are attentive and remember the new things they have learned.

In summary, this chapter has described the factors that have been shown to have an effect on student engagement. Figure 1 lists these factors.

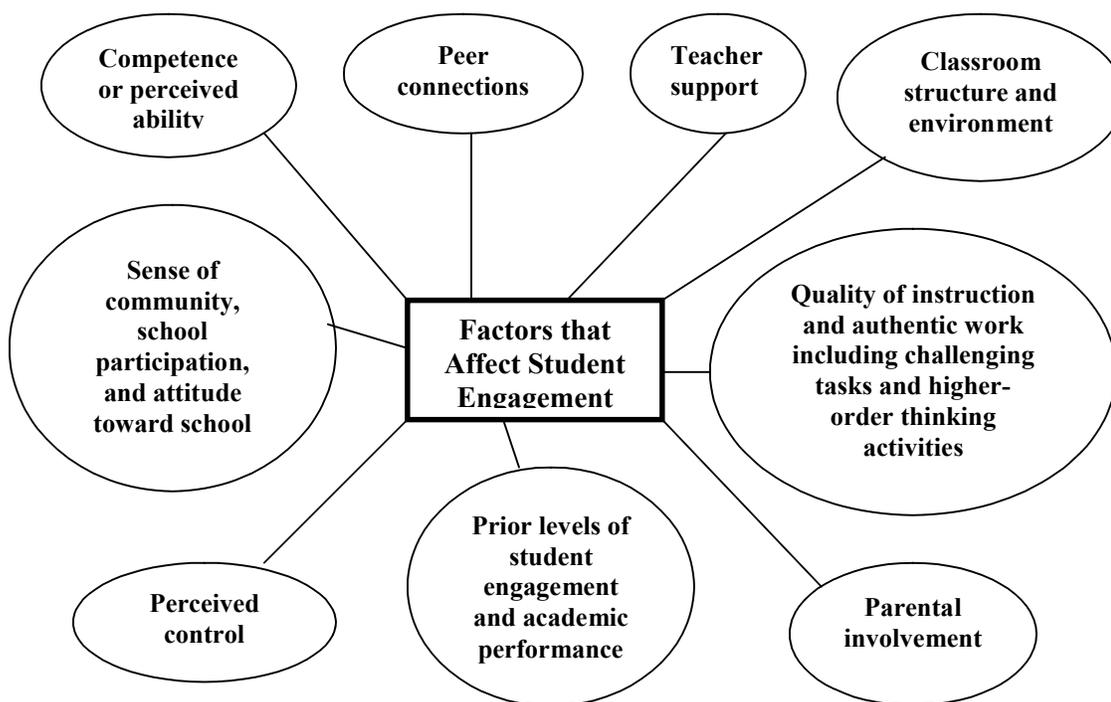


Figure 1. Factors That Affect Student Engagement.

CHAPTER 3

METHODOLOGY

Many students are not engaged, do not take school seriously, are disinterested in school and do not value or seek out success in school (Steinberg et al., 1996). In addition, the relationship in a mathematics classroom between schooling and engagement from the student's perspective is not well known (Cothran & Ennis, 2000). The purpose of this study was to investigate engagement in order to describe student's construct of student engagement, their beliefs, attitudes, and values as they relate to engagement in secondary mathematics. In order to do this, the following questions were answered:

1. What are students' practices and beliefs concerning student engagement in the secondary mathematics classroom?
2. What are the patterns of engagement in the secondary mathematics classroom?
3. What are the interactions between the student in the secondary mathematics classroom and primary contexts (academic performance, classroom behavior, extracurricular involvement, interpersonal relationships, and school community) that affect student engagement?

While a universal agreement to a working definition of engagement does not seem to exist, Jimerson et al. (2003) supplied a definition that I used for my research:

School engagement is a multifaceted construct that includes affective, behavioral, and cognitive dimensions. Furthermore, in measuring this

multifaceted construct the primary contexts include: a) academic performance, b) classroom behavior, c) extracurricular involvement, d) interpersonal relationships, and e) school community. (p. 11-12)

This chapter includes nine sections on methodology. In the first section, the researcher's methodological orientation including the data sources, instrumentation, and method will be explained. In the second section, the research setting will be described as well as how entrée was negotiated and the role of the researcher. The next three sections include the data collection plan, the data management plan, and data analysis. The subsequent two sections include confidentiality and ethical issues related to the project and a section dealing with trustworthiness of results. The eighth section will describe the guidelines that were used to interpret findings and the final, ninth section, will explain how the results will be disseminated.

Methodological Orientation

My ontological, epistemological, and methodological beliefs influence my methodological orientation. It has been difficult to claim belief in a single paradigm; therefore, I have drawn on multiple theories, models, ideas, and paradigms through the years to understand the interactions within a subject or issue.

Since ontology deals with what exists, what is there, or what is the nature of reality, I had to decide if my belief of reality was external to the individual or internal. I also had to ask myself whether I believe that reality is discovered or created. Do I believe that all truths are already out there, just waiting to be discovered or do I believe that we create truth based on our own experiences? I believe that parts of reality and truth are discovered and some are created. I do not think it is important to argue over whether truths are discovered or created because regardless of where truth comes from, for the

individual, their truth is an interpretation of what has been offered to them, through their personal experiences, prior understandings, social interactions, assumptions, observations and beliefs. Individuals live in a reality that has been socially constructed, as they live day to day in their world. My belief in multiple constructed beliefs or realities lends itself to an interpretive constructivist paradigm. While each person can be in the same room, looking at the same art, or working on the same problem, they have all constructed their own beliefs of what the art says to them or how to work the problem. They have constructed their beliefs based on their own experiences and their own cultural capital. Social constructivism or interpretivism stems from the works of Mannheim (1986), Berger and Luckmann (1967) and Lincoln and Guba (1985).

I agree with what interpretive theorists believe

- (i) the belief that any event or action is explicable in terms of multiple interacting factors, events and processes, and that 'causes' and 'effects' are mutually interdependent;
- (ii) an acceptance of the extreme difficulty in attaining complete objectivity, especially in observing human subjects who construe, or make sense of, events based on their individual systems of meaning;
- (iii) the view that the aim of inquiry is to develop an understanding of individual cases, rather than universal laws or generalisations;
- (iv) the assumption that the world is made up of tangible and intangible multifaceted realities, and that these are best studied as a unified whole, rather than being fragmented into dependent and independent variables (in other words, context makes a difference);
- (v) a recognition that inquiry is always value-laden, and that such values inevitably influence the framing, bounding and focusing of research problems. (Candy, 1989, p. 4)

As epistemology deals with the issue of how we know, what we know, and what counts as knowledge, I had to make sure I could justify my beliefs on how reality is understood and how this knowledge is transmitted to others. I believe that we come to

know through our personal experiences, social interactions, observations, and beliefs.

Since I believe that individuals live in a reality that has been socially constructed, as they live day to day in their world, my epistemological beliefs are constructivist and interpretivist in nature. The knower and the known create understandings together.

Since methodology deals with the practices used to go about acquiring knowledge and understandings, as a researcher, I needed to understand how I believed knowledge is validated. As I believe that most of reality is constructed, I needed to create instrumentation that would allow me to observe how students construct, interpret, and create knowledge. While engagement can be investigated through many different methodologies, there is a shortage of rich characterizations of individuals, purposive seeking for the source of engagement, finding the impact of interventions on the dimensions of engagement, and how interactions between student and setting produce engagement (Fredricks et al., 2004). I investigated student engagement in its natural environment, the classroom.

Qualitative research that leads to an understanding of the phenomenology of engagement is needed. “Qualitative methods can illustrate the process whereby students construct the meaning and purpose of education... qualitative methods can shed light on how the various types of engagement develop and interact as well as on why some students begin to disengage from school... observational, and ethnographic studies would contribute to this effort” (Fredricks et al., 2004, p. 87). I attempted to fulfill the purpose, enhancing the understanding of students’ beliefs and practices concerning engagement in the mathematics classroom, by choosing instrumentation that best fits this study. Since “qualitative research is a situated activity that locates the observer in the world” (Denzin

& Lincoln, 2000, p. 3), I was in the mathematics classroom – the natural world of the mathematics student.

Data sources included four students and the researcher. I chose four students since this number would generate data that is manageable for a single researcher. For the students, data instrumentation included behavioral observations, self-reports, interviews, recent events, journals, and observer perceptions. I kept a journal on all personal observations.

Since student engagement has been studied using mostly quantitative methodologies, student engagement needs to be researched qualitatively so that “thick descriptions of classroom contexts [will]...enhance our understanding of how and why they work” (Fredricks et al., 2004, p. 86). Qualitative methods are needed so that the construction of meaning and purpose by students can be portrayed. I wanted to focus on the meaning of engagement as the students experienced the phenomenon. Finn (1993) recommends that research be carried out that focuses on “the engagement or disengagement of *individual students* in contrast to larger groups” (p. 78).

I was interested in understanding the experience and discovering characteristics of student engagement; therefore, according to Merriam (1998), I went into my research with an interpretive or qualitative perspective. Merriam (2002) states that “learning how individuals experience and interact with their social world, the meaning it has for them, is considered an interpretive qualitative approach” (p. 4). Terre Blanche and Kelly (1999) argue that we should use “methods that try to describe and interpret people’s feelings and experiences in human terms rather than through quantification and measurement” (p. 123). I took an interpretive stance because I believe that knowledge is socially

constructed and consists of multiple truths that are influenced by our culture, history, and personal identity. People construct reality in an ongoing process.

“It is an understanding of lived experience derived from participants themselves that is important to interpretive studies. This carries its own theoretical schemata based on assumptions about the subject-person, the life-world and the validity of making sense of lived experience through participants’ stories” (Garrick, 1999, pp. 147-148). Readers of this study will have an enhanced understanding of the construct of student engagement since “we practice inquiries that make sense to the public and those we study” (Preissle, 2006, p. 690).

I used case study methodology in my study so that I could solicit the individual perspectives and constructions of reality from the students. Case study research can “explore student experiences...they seek to answer focused questions by producing in-depth descriptions and interpretations” (Hays, 2004, p. 218). I realized that “case study is an evolving process” (p. 227) and I had to be open to the possibility that my questions would change and new ones would evolve. The questions did change and evolve; however, the focus of my study remained the same. This study focused on different students’ experiences of student engagement in the mathematics classroom; therefore, there were multiple cases. I gathered data from students in an attempt to understand and describe students’ engagement practices and beliefs in a secondary mathematics classroom.

Denzin and Lincoln (2000) state that “qualitative research involves the studied use and collection of a variety of empirical materials...that describe routine and problematic moments and meanings in individuals’ lives” (p. 3). I conducted an

interpretive case study in order to “understand complex social phenomena” (Yin, 2003, p. 2) of student engagement in a secondary mathematics classroom. I interviewed students, observed students, collected documents and artifacts, and asked students to keep an engagement journal. Schramm (1971) noted that the aim of case study “is that it tries to illuminate a decision or set of decisions: why they were taken, how they were implemented, and with what result” (p. 25). My case was the student, and I had multiple cases in my study. The student was the case so that data could be collected and each individual student’s practices and beliefs intensively described and analyzed. Each student had his or her own unique perspective and experience in the mathematics classroom. I wanted to investigate each student as an individual. The number of cases was limited so that the data collection and analysis was manageable.

This study focused on a chosen number of students’ experiences of student engagement; therefore, there were a fixed number of cases. Data were gathered from students to understand the factors that affect student engagement in a secondary mathematics classroom. Students were used as separate cases so that their individuality could be thickly described. By looking at each student as a separate case, the students retained their “voice”, and their perspective was not lost in the crowd.

The study is an interpretive investigation. The aim of an interpretive case study is to “develop conceptual categories or to illustrate, support or challenge theoretical assumptions held prior to data gathering” (Merriam, 1998, p. 27-28). This interpretive case study has the three features of case studies as put forward by Merriam. It is particularistic, descriptive, and heuristic (Merriam, 1998). The study is particularistic because it focuses on a particular phenomenon, a student’s perspective of student

engagement. The study is descriptive because the product includes a “thick”, detailed depiction of students’ experiences of engagement. According to Merriam (1998), “Heuristic means that case studies illuminate the reader’s understanding of the phenomenon under study. They can bring about the discovery of new meaning, extend the reader’s experience, or confirm what is known” (p. 30). My study has this heuristic quality as the reader will have a fuller understanding of student engagement in the mathematics classroom.

Research Setting

The research was conducted at a public secondary school situated in a rural community in southeast United States. Smithfield High School is located in a county that has grown 49.7% in the past five years. The county, as of 2004, was 86.1% White, 11.7% African American and 2.2% other ethnicity. The county’s school district has grown 44% during that same five years. For purposes of confidentiality, the school is referred to as Smithfield High School, a pseudonym.

During the 2005-2006 school year, Smithfield High School had an enrollment of about 2160 students. Sixty-nine percent of the enrollment was White, 26% of the enrollment was African American, and 5% of the enrollment was other ethnicities. The retention rate for the school was 69.4%. Twenty-five percent of the student population was economically disadvantaged. Smithfield High School did not meet Adequate Yearly Progress (AYP) for the 2005-2006 school year. The school’s graduation rate for the class of 2006 was 73.8%. The dropout rate for the same year was 4.7%.

The teachers make up a crucial part of the school culture. The high school employs 122 teachers, nine support personnel, and six administrators. Forty-three percent

of the faculty is male and 57% is female. Eighty-two percent of the faculty is white, 16% is African -American, 1.6% is Hispanic and 0.4% is Asian. The statistics for years experience breaks down as: less than 1 year, 7.4%; 1 to 10 years, 55.7%; 11 to 20 years, 23.8%; 21 to 30 years, 12.3%; more than 30 years, 0.8%. This averages to 9.89 years experience per teacher.

Participants

Four participants were chosen by executing a purposive typical case sampling method. “Purposeful sampling is based on the assumption that the investigator wants to discover, understand, and gain insight and therefore must select a sample from which the most can be learned” (Merriam, 1998, p. 61). Random sampling was not beneficial in this study since students were needed that would portray different levels of engagement. Selected participants needed to be information-rich students so that student engagement was described in depth.

The students, male and female, came from two mathematics classes at Smithfield High School. Participants were chosen from Algebra II and Advanced Algebra and Trigonometry classes. I observed classes and obtained achievement records for students I was interested in asking to be participants. I purposefully chose students from different races, gender and achievement levels from examining student transcripts.

Negotiating Entrée

Bogdan and Biklen (2003) state that the first step in negotiating entrée into a school is to become aware of the hierarchy and the rules of the school system. I did not foresee any difficulty in negotiating entrée into the research site because it was the school where I teach. I have not had any problems in the past gaining permission from the

county or my principal to conduct research. I have conducted two other projects at the same high school and the participants were open and honest and enjoyed participating. I gained the trust of participants at Smithfield High School by making sure that I was forthright from the beginning and by including them in the other aspects of the research, including data analysis.

My colleagues at Smithfield High School were supportive. They were already aware of the study that I wished to conduct and seemed to have no problem with allowing me to enter their classrooms for observations. However, I went through a formal interview with them at the beginning of the school year, during pre-planning, where I obtained their renewed permission to enter their classrooms.

At the beginning of the school year, I visited the two classes and observed the students. After I explained my study to all of the students in the classes, I passed out a simple survey asking for their definition of engagement in the mathematics classroom and whether or not they would like to participate in my study. In this fashion, students did not have to volunteer out loud. Other students as well as teachers did not know who was participating, unless the participant gave out that information. I purposefully sampled from the list of volunteers.

Researcher Role

Angen (2000) argues that “we cannot separate ourselves from what we know, our subjectivity is an integral part of our understanding of ourselves, of others, and of the world around us” (p. 385); therefore, my values were always present from the beginning to the end of my study (Creswell, 1998). First, let me note that even though I went into my study with certain preconceptions about the engagement of students within my own

classroom, I did not start this study with a pre-conceived answer to the research questions of this study. If this were so, I would have already known the practices and beliefs of the participants and would have implemented strategies that would increase student engagement in my classroom.

I am first a teacher and then a researcher. This belief influences my research choices. I chose to investigate students rather than teachers, a particular curriculum, or the effects of the implementation of a new policy. I search daily for ways to serve them so that they are able to successfully meet their goals in their futures. I have taught for 15 years in many diverse settings. I have taught in public schools and at a private school, in middle schools and in psychiatric hospitals. I have taught in large schools and in small schools. However, all of the schools have been located in southeast United States and none of them have been inner city schools. My research site is the type of school that I have taught in for many years.

My own life experiences have shaped who I am today. I grew up in a very rural area. We were very poor; however, I did not realize this until much later in life. Even though, I had very little social capital to pull from for use in the classroom, I did have a mom who was there for me. Always encouraging, she supported me in my goal to become a mathematics teacher. Armed with scholarships and Pell grants, I went on to school to become one.

I am somewhat restrained in having a free hand to interpret data as I chose to look for how data fits into the definition and theoretical framework of this study. It has helped that there is not a large amount of research on student engagement that has been

qualitative, so I did not have a fixed frame of mind of what I would see as I collected the data.

I was personally vested in my research, as any researcher would be. I have always been interested in student voice and in increasing student engagement in my classroom. Through the years, I have been in many faculty lounges, listening to teachers talking about students, their engagement or lack of engagement, their behaviors in the classroom that seem to affect their ability to learn the material. However, seldom have I heard teachers say that they have sat with and talked to students about their beliefs. It is interesting to me that we tend to think we know how and why others behave without even considering their perspectives.

I was a researcher-as-instrument so I had to assume many roles. As an interpretive bricoleur, I produced a “bricolage—that is, a pieced together set of representations that are fitted to the specifics of a complex situation” (Denzin & Lincoln, 2000, p. 4). As I currently teach at what was my research setting, I performed “backyard” research that could possibly restrict the data collection by creating ethical problems (Glesne & Peshkin, 1992, p. 22-23). I was very careful to make sure that I remained ethical. There were times during interviews with my participants that they disclosed things about their teachers that were criticisms or were negative thoughts and comments. At other times, I could tell that participants did not fully disclose information and I respected their choice.

It was difficult for me to assume the role of full-fledged participant observer in my research. I had to make sure that I did not influence their beliefs about student engagement. I knew what the teachers were doing in the classrooms and I knew the teachers. Researchers that engage in participant observation “watch what people do,

listen to what people say, and interact with participants” to “elicit from people their definitions of reality and the organizing constructs of their worlds” (Goetz & LeCompte, 1984, p. 110, 112).

While students do tend to open up to me in discourse, I was not the same age, gender, or ethnicity as my participants. My role as researcher was to be the primary party responsible for collecting data and analyzing the data. At first, I was concerned about my role in the investigation and how it would affect the students; however, I came to realize that it was legitimate for me to participate in their classes, to observe them while they worked and to ask them questions and invite them to participate in a discussion of student engagement. I entered my study with certain biases that could affect my understanding and interpretation of the data that I would be collecting. I was not an unbiased bystander indifferent to the outcomes of my study; therefore, I kept a self-reflective journal.

Preissle (2006) argues that:

Most scholars no longer pretend some state of neutrality; we have learned to interrogate objectivity and subjectivity and their relationship to one another, although many of us continue to pursue balance by attempting to represent all the views we can identify in a situation. Accompanying this relinquishment of neutrality is a focus on self-consciousness and self-awareness; we are studying ourselves and others. If we can no longer use detachment, distance and neutrality to achieve objectivity, we can at least document and track how what we study is influenced by who we are. (p. 691)

I obtained permission from IRB, the county where I work, the principal, and the teachers or ‘gatekeepers’ of the classes I entered. I realized I must make sure to reflect on and document my own researcher biases throughout the research process and I did.

However, I used methods of triangulation to ensure that the findings were consistent.

Data Collection Plan

I followed Yin's (2003) list of five major tasks in collecting data. First, the researcher should "gain access to key organizations and interviewees" (p. 73). I obtained entrée to Smithfield High School by first seeking permission from the principal and then by going through the proper county procedures. It was the high school where I was teaching, so gaining entrée was not difficult. The second task is to ensure sufficient resources while in the field. I had available the time necessary and the programs to organize the data that was collected. The third task involves having a plan in place to call for assistance, if needed. I had plans to hire a transcriber if I felt that transcribing in addition to coding became too overwhelming, but it did not, and hiring a transcriber was unnecessary.

While Yin's fourth task is to prepare for unanticipated events, it was difficult to imagine all possible contingencies. What would have happened, for example, if for some reason one of my participants moved away from Smithfield High School? If this had happened far enough into the data collection, it could have posed a problem. I obtained permission to conduct phone interviews if there was only a small time left to spend in the field. I also had a list of alternate participants, with proper consent forms, that I could use if a participant moved or pulled out early in the project. If some unforeseen events did happen, I would have completed data collection the following semester or even the following year.

The majority of the data from the students came from different sources. This ensured triangulation of the data. Data were collected through behavioral observations, journals, self-reports (interviews), recent events, and observer perceptions.

Initially, the participants completed a self-test that described their initial beliefs about student engagement (see Appendix C). They also participated in an entry interview. This self-test and entry interview included items that dealt with (a) general background, (b) beliefs and feelings about mathematics including their beliefs about their competence and perceived ability, (c) goal orientation and effort in mathematics, (d) school and out-of-school influences on motivation in mathematics including peer connections, (e) self-confidence and self-efficacy in mathematics including perceived control, (f) natural ability and prior levels of academic performance in mathematics, (g) study habits in mathematics including parental involvement and support, (h) experiences and beliefs with activities and assessments in mathematics, and (i) beliefs and feelings about the classroom including teacher and environment support. The self-test was in the form of a Likert scale and the entry interview began the process of delving into responses on the self-test. There were one or two interviews per month depending on the time of the observation for a total of eight individual interviews with each participant. The interviews were in-depth and open-ended and lasted up to an hour each. Students were asked about their perceptions, opinions, practices, feelings, and knowledge concerning student engagement in their mathematics' classes. The interviews were audio taped and transcribed.

The interviews started with a list of questions but other questions emerged from previous interviews and observations. The questions were asked with the definition of student engagement by Jimerson et al. (2003) in mind. Questions were asked that allowed the four participants to address the affective, behavioral, and cognitive dimensions of student engagement, as well as the contexts that affect student engagement. Questions

were worded in order to analyze the data using Weiner's (1985) attributional theory of motivation and emotion and Bandura's (1994) theory of self-efficacy. Questions addressed the properties of attribution theory that explain behaviors and actions and addressed the cognitive process, motivational process, affective process, and selection process of self-efficacy.

Participants were observed six times. The eight interviews include an entry interview, an interview after each of the six observations, and an exit interview. The researcher conducted the observations and data was collected to detect and describe activities, behaviors, actions, conversations, interpersonal interactions, and processes as they relate to engagement in the classroom. My plan was to audio or video record days of observation for transcription later; however, due to IRB limitations and the fact that I could not obtain permission from every student within each of the two classrooms, I did not video tape the observations. The observational field notes and my own reflections of what I interpreted during the observation were gathered and coded by hand.

The four participants were asked to keep a journal, noting how they felt about the class period and about their engagement in the mathematics class. Journal prompts were used to focus the participants' answers to those that deal with their engagement in the classroom. The participants were asked to write in their journals at least twice a week. Participants did not write regularly and the amount that they wrote dwindled considerably toward the end of the semester. Every other week, I asked for their journals. Sometimes they had them and sometimes they did not. I wrote comments, asked questions, and took notes from what they wrote and then I gave it back to them. I thought that this interaction between them writing in their journals and having me write back to them would

encourage them to keep writing and answering the journaling questions. It did so for the first half of the semester and they were regular in keeping the journals current. The journals were important because they helped to triangulate data. Participants were asked about their entries and how they agreed or disagreed with what was observed in the classroom. These member checks helped ensure the validity of the study. I was sure that the four participants were honest in their journals because their comments describing what they believed about themselves were evident across the classroom observations.

The field notes, as well as interview transcripts, were analyzed for patterns and themes. At the end of the study, an exit interview with each student took place. A tentative codebook had been constructed that allowed the researcher to analyze the data. The codebook included (a) the dimensions of engagement according to the definition: cognitive, behavioral, and emotional, (b) the contexts of engagement according to the definition, (c) the three properties of attribution theory: locus, stability, and controllability, (d) the four processes of self-efficacy: cognitive, motivational, affective, and selection, (e) the four sources of self-efficacy: mastery experiences, vicarious experiences, verbal persuasion, and psychological states, and (f) the areas from the literature review that have been shown to affect student engagement. The codebook was tentative and was changed often the data were analyzed.

Data Management Plan

A qualitative study lends itself to a very large amount of data. A single interview that lasts an hour could become 25 pages of transcriptions that will be coded and recoded. I transcribed and analyzed data throughout the study. I used a digital recorder to record the interviews and transcribed them using Dragon Naturally Speaking software. Once the

interviews, observations notes, etc. were in Word documents, I found matching patterns and created codes and categories.

Data Analysis

How students make sense of the phenomenon of engagement can be described through a rich contextual description. This thick description must give readers a view of the participants' emotions, thoughts, and perceptions as well as their intentions, as the researchers investigate underlying meanings (Holloway, 1997, p. 154). Ponterotto (2006) gives a working definition of thick description:

Thick description accurately describes observed social actions and assigns purpose and intentionality to these actions, by way of the researcher's understanding and clear description of the context under which the social actions took place. Thick description captures the thoughts and feelings of participants as well as the often-complex web of relationships among them. Thick description leads to thick interpretation, which in turn leads to thick meaning of the research findings for the researchers and participants themselves, and for the report's intended readership. Thick meaning of findings leads readers to a sense of verisimilitude, wherein they can cognitively and emotively 'place' themselves within the research context. (p. 543)

Bogdan and Biklen (2003) state that "interpretation refers to developing ideas about your findings and relating them to the literature and to broader concerns and concepts.....analysis involves working with the data, organizing them, breaking them into manageable units, coding them, synthesizing them, and searching for patterns" (p. 147). I represented the data by intertwining the stories of the participants. Each participant had a different story, with different concerns in their mathematics classroom. However, there were similarities.

Beginning from the first interview, I used the analytic technique of pattern matching as I looked for recurring patterns that could be matched to my existing start list;

however, I also looked for recurring patterns that allowed me to construct categories within each case. I did have a set of codes prior to my fieldwork, as “it forces the analyst to tie research questions or conceptual interests directly to the data” (Miles & Huberman, 1984, p. 64). The code list consisted of codes based on the research questions, the definition of student engagement, and the theoretical framework. “Devising categories is largely an intuitive process, but it is also systematic and informed by the study’s purpose, the investigator’s orientation and knowledge, and the meanings made explicit by the participants themselves” (Merriam, 1998, p. 179); however, “unexpected and unintended results need to be addressed in the analysis of data” (Hays, 2004, p. 232).

After completing the literature review regarding engagement, the data collected fit into some categories that were similar and some that were distinctive to each student as students by their nature are multiplicitous. They have unique and individual perceptions about what matters to them and about the choices that they make. Fleener (2004) states:

Understanding students as multiplicitous is important when we try to make sense of their differences in understandings, interests, and performances. Once we recognize the multiplicity, we need to avoid reification. Thus, while we may recognize the multiplicitous nature of our students, we should never assume we’ve “figured them out” or grasped the essence of whom they are, for the nexus of their being is continual renewal and reinvention. (p. 210)

As the interviews and observations continued, I constantly compared one interview to the next in order to expand, contract, delete, or add codes and categories. I was prepared to “bend the codes when they look inapplicable, overbuilt, empirically ill-fitting, or overly abstract” (Miles & Huberman, 1984, p. 64). The codes that I used included descriptive codes, interpretive codes and explanatory codes (Miles & Huberman, 1984). I examined the data for emerging core categories, categories that

seemed to unfold with regularity. Throughout the coding procedure, I wrote summaries of interviews and observations.

Throughout the data analysis, I coded data by looking for reoccurring themes and how these themes related to Weiner's (1985) attributional theory of motivation and emotion and Bandura's (1994) theory of self-efficacy as well as the findings from the literature review and the definition of student engagement. These theories focused my study because they addressed certain aspects of student engagement. I looked for emerging patterns and themes within each case. As each interview and observation was transcribed and analyzed, I confirmed existing themes and disconfirmed themes that were not evident. The constructed categories "reflect[ed] the purpose of my research" (Merriam, 1998, p. 183) so as to determine students' practices and beliefs concerning student engagement in the secondary mathematics classroom and to look for patterns of engagement that were behavioral, cognitive and emotional. I recoded the data. This double coding helped in assuring reliability of the study.

After the coding, I used narratives, long quotes, and vignettes to communicate a thick description of my findings to the reader. In addition, by using narratives and actual pieces of the interviews and observations, I am allowing the reader to make their own interpretations of what occurred in the natural setting and what were the beliefs and practices of the students. In addition to the narrative pieces, I interspersed descriptions and my own interpretations and findings throughout the narratives. I wrote case studies for each case and only then did I look for cross-case themes. I wanted to make sure I did justice to the uniqueness of each case, of each student. My qualitative analysis involved both inductive and deductive analysis. I first looked at the data for emerging themes and

patterns. Once I established these themes and patterns, I matched the discovered themes with the nine factors in my conceptual framework.

To ensure rigor and creditability of my data analysis, I discussed my findings with the participants themselves to make sure I had interpreted the findings correctly. I used methods of triangulation to make sure that the findings in this study were consistent.

Limitations

The major limitation of this study centered around the sample size. The sample size was small and while purposefully selecting participants did increase the diversity of the findings, the findings are not generalizable to all secondary mathematics students. Another limitation was the analysis or interpretation of the results. Even though techniques of triangulation were incorporated, alternative interpretations by other readers could occur.

Confidentiality and Ethics

Interviewing and observing participants in a research study carry risks to each of the participants. In order to make sure that my study remained ethical, I obtained permission from the International Review Board (IRB) at the university that I attend. A rigorous IRB process that ensures them of their rights protects the participant. Each participant was aware that participation in the study was not forced. The IRB process included informing the participants of what the study entailed from start to finish.

Participants were assured of their anonymity. “Researchers also need to anticipate the possibility of harmful information being disclosed during the data collection process....the ethical code for researchers is to protect the privacy of the participants and to convey this protection to all individuals involved in the study” (Creswell, 2003, p. 65).

Records were not labeled with participants' true names, instead pseudonyms were used. Data was kept confidential in a safe location.

Since there was debriefing or member checking between the researcher and the participants throughout the study, the participants, to the best of my knowledge, accurately represented their beliefs and practices. It was not my intent to misconstrue any of the participants' contributions to this project.

Since the participants attended the same school and may have the same teachers, I believed that it was important to keep comments made by each of the participants confidential. I did not discuss what the participants said with the other participants, nor did I discuss the data with other teachers at the school. Using pseudonyms as described above ensured the confidentiality of participants' contributions to the study. The students were more open in the interviews because they knew that what was said in the interviews would remain private.

Trustworthiness

“Being able to trust research results is especially important to professionals in applied fields, such as education, where practitioners intervene in people’s lives...research results...are trustworthy to the extent that there has been some accounting for their validity and reliability” (Merriam, 1998, p. 198). In this section, I will explain the steps I took to ensure the trustworthiness of my research findings as I sought to increase the internal validity, external validity, and reliability of my study.

Validity

Qualitative researchers can incorporate various strategies in order to ensure the validity of a study (Creswell, 2003; Merriam, 1998). I will use Merriam’s list to explain

how I ensured the internal validity of my study. Her strategies include (a) triangulation, (b) member checks, (c) long-term observation, (d) peer examination, (e) participatory modes of research, and (f) researcher bias. I will describe how I incorporated five of these six strategies into my study so that I could be assured that my findings actually captured what was really exposed by the data.

Merriam's (2002) first strategy is triangulation. According to Yin (2003), "The use of multiple sources of evidence in case studies allows an investigator to address a broader range of historical, attitudinal, and behavioral issues" (p. 98). I used data triangulation in my study. I collected data through behavioral observations, self-reports (interviews), recent events, and observer perceptions so that "the events or facts of the case study [will be]...supported by more than a single source of evidence [and so that the]...multiple sources of evidence essentially provide multiple measures of the same phenomenon" (p. 99).

The second strategy is the use of member checks. I used member checking in my study in order to ensure validity. I took my notes from the observations and transcriptions and interpretations from the interviews back to the participants and determined whether they felt that the results were an accurate representation of their beliefs and practices.

The third strategy is long-term observation. Data collection lasted approximately 12 weeks. This time in the field helped to "develop an in-depth understanding of the phenomenon under study" so that I could use a "rich, thick description to convey the findings" (Creswell, 2003, p. 196). I interviewed each participant multiple times, which helped to ensure internal validity.

Peer examination is Merriam's (1998) fourth strategy. I have peers that were interested in student engagement. I asked one of them to review and comment on the research findings and ask questions about my study.

I did not incorporate the fifth strategy, participatory modes of research, as the specific participants were not been involved from the conception of my study and were not be involved at the end, when the final cross case analysis was written. However, the students did have a huge voice in their respective cases and did have an opportunity to "check" my findings.

The last strategy deals with researcher bias. Biases brought into the study were described from the beginning so that the readers would know my perspectives. Incorporating the above strategies ensured internal validity.

In addition to ensuring the internal validity of my study, I wanted to also make certain of the external validity. While my results are not generalizable to other settings or students in the population, I do think that there is reader or user generalizability. Merriam (1998) argues, "Reader or user generalizability involves leaving the extent to which a study's findings apply to other situations up to the people in those situations" (p. 211). "It is the reader who has to ask, what is there in this study that I can apply to my own situation, and what clearly does not apply" (Walker, 1980, p. 34).

I used three strategies (Merriam, 1998) to enhance reader or user generalizability and therefore, the external validity of my study. I provide the reader with a rich, thick description so they can look at the situations they are in and see whether my data findings are relevant to them. I describe in detail the participants in my study so that the reader can make comparisons with their own students and situations. I chose participants that have

different practices and beliefs of student engagement in the mathematics. Perhaps the reader will have a possibility of seeing comparisons to their own situations. While ensuring internal and external validity are important to my study, I also wanted to ensure that my study is reliable.

Reliability

Even though Yin (2003) argues that “the objective is to be sure if a later investigator followed the same procedures as described by an earlier investigator and conducted the same case study all over again, the later investigator should arrive at the same findings and conclusions” (p. 37), reliability is not a likely outcome in a qualitative study “because what is being studied in education is assumed to be in flux, multifaceted, and highly contextual, because information gathered is a function of who gives it and how skilled the researcher is at getting it” (Merriam, 1998, p. 206). Lincoln and Guba (1985) suggest using the word “dependability” or “consistency” instead of reliability. “Rather than demanding that outsiders get the same results, a researcher wishes outsiders to concur that, given the data collected, the results make sense — they are consistent and dependable” (Merriam, 1998, p. 206). In order for readers to see that the results are consistent with the data that I collected, I utilized three techniques given by Merriam (1998): researcher’s position, triangulation, and establishing an audit trail.

First, I have explained the theory that was used to analyze the data. I have also explained the researcher’s role in the study, the research setting, and the reasons the participants were chosen for the study. Revealing my own position helped to make my study more dependable.

Secondly, I have strengthened the dependability of my study using triangulation. Merriam argues, “Using multiple methods of data collection and analysis, triangulation strengthens reliability as well as internal validity” (1998, p. 207).

The third technique I used to ensure dependable and consistent results was to create an audit trail. I have kept a researcher notebook that describes “in detail how data were collected, how categories were derived, and how decisions were made throughout the inquiry” (Merriam, 1998, p. 207). This log contains thoughts of how I developed my ideas, the process I used to make categories and my reflective thoughts as the study progressed.

CHAPTER 4

RESULTS

As stated in Chapter 1, the purpose of this study was to investigate students' constructs of student engagement, their beliefs, attitudes, and values as they relate to student engagement in secondary mathematics. This investigation allows for a better understanding of how contexts inside and outside of the mathematics classroom affect the engagement of students in secondary mathematics. To describe student engagement in mathematics as constructed by students, my research addressed the following questions:

1. What are students' practices and beliefs concerning student engagement in the secondary mathematics classroom?
2. What are the patterns of engagement in the secondary mathematics classroom?
3. What are the interactions between the student in the secondary mathematics classroom and primary contexts (academic performance, classroom behavior, extracurricular involvement, interpersonal relationships, and school community) that affect student engagement?

The study was conducted during the 2007-2008 school year and included interviews, observations, journals, self-reports, recent events, and observer perceptions. These data from these sources revealed four students' constructs based on their practices and beliefs of student engagement in mathematics.

This chapter is organized first into four case study reports, each a representation of the four participants, Trey, Lynette, Beauty, and Alisha, in the study. Each case study report depicts each participant's practices, beliefs, and patterns of student engagement in a rich description. The findings from Trey, Lynette, Beauty, and Alisha's case studies are encapsulated into four tables, one at the beginning of each case study. These tables contain the categories and relationships that emerged from the voice of each of the participants. The findings evolved based on a constant comparison analysis using the definition of engagement given by Jimerson et al. (2003), Weiner's (1985) attributional theory of motivation and emotion, Bandura's (1994) theory of self-efficacy, and the factors that affect student engagement as indicated by the Chapter 2 literature review. The original code list and subsequent analysis was "systematic and informed by the study's purpose, the investigator's orientation and knowledge, and the meanings made explicit by the participants themselves" (Merriam, 1998, p. 179). The data was examined for inconsistencies and these inconsistencies were brought up in later interviews. As Hays (2004) argues, unexpected and unintended results did occur and were addressed in the analysis.

Beginning from the first interview, I used the analytic technique of pattern matching as I looked for recurring patterns that could be matched to my existing start list; however, I also looked for recurring patterns that allowed me to construct categories within each case. I did have a set of codes prior to my fieldwork, as "it forces the analyst to tie research questions or conceptual interests directly to the data" (Miles & Huberman, 1984, p. 64). Table 1 describes each participant. Then, the themes from each individual case are looked at as a whole for cross-case analysis.

Table 1

Demographic Characteristics of Participants

Participant	Class	Gender	Ethnicity	Grade	Age
Trey	Algebra II	Male	African-American	11	17
Beauty	Advanced Algebra and Trigonometry	Female	African-American	12	17
Alisha	Advanced Algebra and Trigonometry	Female	Caucasian	11	16
Lynette	Algebra II	Female	Hispanic	11	17

Case Study: Trey

If you enter Trey's Algebra II classroom, you would find him sitting quietly in the back, unassuming, quiet, and seemingly attentive to every word the teacher makes as she goes about teaching her class. You are immediately aware that you have entered a very traditional mathematics class. The 30 desks are situated in rows and the teacher's lectern is in the front of the classroom. You would see Trey, a 17-year-old African American junior, peering around the shoulders of the students that sit in front of him and even wadding up his jacket to rest his head upon, as he listens and copies what the teacher is writing on the overhead projector.

Trey chose Algebra II as his mathematics class, having chosen a college preparatory track over a technical preparatory track at the school. Trey could tell you

immediately what his career goals are. In his words, “[I want to] go to college, but I want to be a DJ or a radio host. Radio and TV broadcasting.” He spoke of going to a major university in the state. He continues to say, “[I] like music a lot. I am about to start my own radio station. It’s free. You have to buy your microphone and stuff. I have the music. You have to buy your station and just start broadcasting.” When we talked about whether or not his choice of career and college motivated him to do well in his mathematics class, he said, “No, it doesn’t motivate me because I know I have most of the stuff, the requirements already. Like, I have a whole bunch of credits, so it doesn’t really bother me. I know I am going to college.” Trey’s previous grades include a 91% in Algebra I Plus during his freshman year and a 92% in Geometry during his sophomore year at another school. This is his first year at Smithfield High School..

Trey is not a member of any club or organization at his school, but he does want to join the National Honor Society. He did try out and make the soccer team during second semester, soccer season. When asked what his interests are, he said, “Uhhh, I play with my computer, try to figure it out. I like to take stuff apart and put it back together. My mom hates it though. But it’s fun.”

The interviews, observations, journals, self-report, and observer perceptions led to themes that addressed the research questions. Some of the themes related to a specific research question; however, most of the themes overlapped across two or all three of the research questions. Table 2 lists the themes that will be discussed in Trey’s case study.

Moods, Feelings, and Physical Conditions

Trey, as evidenced through interviews, observations, and journaling, experiences a variety of moods, feelings, and physical conditions. Trey often directly or indirectly

Table 2

Themes: Trey

Research Questions	Themes
What are students' practices and beliefs concerning student engagement in the secondary mathematics classroom?	Moods, Feelings, and Physical Conditions Effort Past Experiences Attentiveness
What are the patterns of engagement in the secondary mathematics classroom?	Participation and Help Seeking Skills Approach to Instruction Working with a Partner
What are the interactions between the student in the secondary mathematics classroom and primary contexts (academic performance, classroom behavior, extracurricular involvement, interpersonal relationships, and school community) that affect student engagement?	

attributes his practices and beliefs to uncontrollable factors such as his mood, his level of fatigue, or even the external physical conditions of his environment. The internal factors, moods and feelings, and the external factor, the physical conditions, would fall under the

locus, a property of perceived causality of attribution theory. In addition, a source of efficacy beliefs, psychological states of the student, is evident throughout. Moods and feelings fall under the affective dimension of engagement.

Trey was asked to write weekly in a journal. There were cued questions that asked him about his day and the time he spent in his mathematics classroom, and the time he spent after school ended. In a series of journal entries, a pattern emerged. Trey said he felt “happy”, he was “having fun”, and we did “a worksheet, the Devil and Daniel Webster. It was easy and fun.” In another entry, he reported he felt “okay, just another day and happy we tied our soccer game and didn’t lose” and the work that day was “semi-easy” because he “got it” and “understood it.” Trey said it was an “okay day, tired and happy we are back in school” and in response to whether or not he enjoyed his math class that day, he said, “it keeps my attention from the cold room.”

One day, he was “hyper, very hyper. It was a good day. Because I had fun all day.” He thought the work that day was “okay and easy to understand. It wasn’t complicated and the examples she went over were like the homework so I had a reference.” On yet another day, he reports it was a “good day because I was having fun, no stress, living life and nothing went wrong today” and said he did not enjoy what he did in math class that day, but it was “informational.” In an entry, Trey said he was “good, energized. It is a good day because everything is going smooth” and that he took the “Chapter 7 Test. I did pretty good, but I think I missed a couple of problems though.” On another day, he was “bored, tired, cold. I hate this classroom. It is a below average day just because.” Trey would say his day was “happy, today is a good day” and that he was on task that day, he “liked it” because it was “not too many problems and easy.”

In other journal articles, he reports that he felt, “tired, sick, cold” and when asked on that day how he did, he said, “I think I did bad because I didn’t understand it.” Once, he was “mad again, the weather, a soccer game got cancelled, but rescheduled...I am a little tired”, and said that what he did that day was “medium”, he did not enjoy what he did in math class that day, and the lesson was “hard, I don’t get logs so it was very hard” and he “gave up.” Trey said “[I am] tired, very tired, hurt and bored. I am sleepy, my ankle still hurts and just bored.” His math class that day “was a little confusing at first but then I got it and it was easy”, but that it was “not fun, it was easy.” One day he said he was “mad because the game we was supposed to have today was cancelled” and the work that day was “a little difficult. I don’t get it.” In another entry, he writes he had a “Bad day, MAD!!!”, and said, “You can’t enjoy math, you just do it.”

One day Trey said, “I was off task because I was tired but I knew how to do it because I was listening and just watching her go over problems and it was so easy I just got it.” Very rarely did he say that he enjoyed what he did in math class. He would either answer “no” or “not really”. On the day of one of his tests, he said the day was “busy, frantic, because I have a lot to do today”, but he did not enjoy it because “I don’t know how I did” and it was “hard, because I didn’t study the night before.”

During observations, on several days, he was leaning his head over on his jacket, using it as a pillow. When questioned about these moments, he said it is usually “because of the cold” and “it makes me really tired. My mom keeps it really cold in her house and it makes me really tired. Kind of like fighting sleep sometimes. And it gets really cold in there.” On a side note, when I went in to make each observation, it was extremely cold.

The teacher had reported the coldness of the room to the proper person, but it was never corrected and she was not allowed to turn off the unit.

Later in the last interviews, when Trey and I were talking about engagement patterns, he said, “No, I didn’t see it then” referring to whether or not he thought that his moods, feelings, and the physical conditions affected his engagement. He said, “Now I see it. But, I didn’t really notice that. Like the cold in the room. I wasn’t thinking about math. It’s like certain conditions you act different.”

Trey’s feelings about his grades also made an impact. The teacher went over each quiz once it was handed back so that the students would know what they did right and/or wrong for testing later. He said he did not like going over the quiz. When asked why, he said, “Cause I failed the quiz and then going over it, ummm, I don’t know, I just didn’t like what we was doing. I failed the quiz and we kept going over it. It just makes me feel more, even stupider since I failed it.” However, concerning assignments that were not graded, he reported benefits, “As long as I see what is wrong, try to figure it out.”

There always seemed to be a connection between Trey’s moods, feelings, and/or the physical conditions and his engagement in the classroom. When Trey reported that he was in a good mood, happy, he was more behaviorally, cognitively, and emotionally engaged. On the other hand, on “bad” days, days he was tired, or days he felt really cold, the engagement decreased. He is indirectly attributing his levels of engagement to uncontrollable factors.

Effort

Trey’s effort was unstable and fluctuated during the time in the field. Effort is controllable and falls under the behavioral dimension of engagement. Interviews and

journal entries give a picture of how Trey perceives his effort. Sometimes the questions were not about effort, but levels of effort could be realized from Trey's words as he talks about his beliefs and practices.

One time, the teacher gave two quizzes over the same material. The first quiz was purely computational, and Trey made a 45%. The second quiz included matching, multiple choice, true and false, and computational problems. Trey made an 80% on this second quiz. The reason for the second quiz over the same material, according to Trey, was that everybody failed the first quiz. When asked which one he preferred, Trey said "I like the first one though because that was just the questions were on this side, you just have to put your answer on the one we did today, you got true and false, multiple choice, and you have to do some problems."

The teacher gave the students several tasks throughout the semester. Some of them were started in class and were to be finished at home so that they could go over them the next day. When asked how he thought he did on one of these tasks, he said, "I don't think I passed it. I did most of it. I did like all of it, but I did not have enough to pass. A 68% or something" and "Yeah, I failed that. I didn't finish it. I did most of it in class, but didn't finish the rest." During observations, when Trey was allowed to work with a partner, he put forth much more of an effort to working on and completing assignments than he did when he worked alone in his spot in the back of the room.

The teacher took up a packet for every chapter they covered for the year. This packet was graded for both accuracy and completion. The packets included homework assignments, tasks, worksheets, reviews, and class work. When asked how he did on them, Trey said "lately I'm starting to like well, at the beginning I did them, in the middle

I didn't do them and now I'm doing them but that one I didn't do much" and "before the homework packet is due I try to finish the rest [of the homework] if I didn't finish it." During one chapter, Trey received a poor grade on his packet but a good grade on the corresponding test. When asked why he thought this occurred, he replied, "I studied and it was easy. I guess it was easy because I studied." Concerning another test, he said, that he felt that he did poorly on it because he chose to read a book the night before instead of studying. He said, "I didn't have experience going in."

Trey's beliefs about his effort on his work were usually attributed to whether he "got it" or not. "Yeah, I try but I just don't get it so I give up", "I tried two or three problems and then gave up", "No, because I didn't understand", and "Yes, not all of it, but most of it. I do the work but if I get to a problem I don't know, I just skip it" were just a few of similar responses to whether or not he finished assignments.

Sometimes he talked about his ability and what happened when he paid attention and studied. He agrees that he has the ability to do well in math. He said, "I think I'm fairly good. Cause I've passed all my Algebra classes. I haven't failed yet." Trey's perception of his ability affected his effort, "Yeah, I try but I just don't get it so I give up", "I tried two or three problems and then gave up", and "No, because I didn't understand". He also said, "I am not the best at math" and "I know how to do simple math." He spoke about paying attention and studying, "studying" helped him understand when he struggled with a particular problem or concept. When it came to chapter assessments, comments included, "I was like, I didn't feel too good but once I saw it, I knew all the stuff", it was "hard because I didn't study the night before", and "I studied and it was easy. I guess it was easy because I studied."

Asked whether he did practice problems, homework, or assignments at home, his replies included “If it’s long not really. But if it’s short I’ll do it”, “probably so, sometimes”, “a little”, “no”, “It’s like half and half. It’s weird coming from a school where they graded every homework assignment. Here certain classes don’t grade homework”, “Yes and studied because I have a quiz tomorrow”, and “No, because I have to study for tests for other classes.” In his journal entries, when asked if he did homework, his responses included “a little b/c I have homework.” On his self-report, Trey answered neither agree nor disagree to the statement that he tried as hard as he could in math class. When asked to explain his choice, he said, “Yeah. I don’t know just sometimes I don’t want to do it.”

Toward the end of the semester, Trey spent almost an entire class period trying to figure out what he would need on his final exam in order to bring up his grade to a B average. During that same class, he came up to the teacher with an astonished look on his face and said to her “I need a 108% on my final in order to bring my grade up to a B?” The teacher nodded. I asked him later how this would affect his future engagement and participation. He said, “I found out I can’t get a B. I’ll just stick with the C.”

Effort to persist with tasks was observed and probing questions were asked during interviews to uncover why he persisted or why he did not persist on certain assignments and tasks. In addition, Trey reported levels of task persistence in his weekly journal entries. On one day the “work was okay because it was odd [problems]. I could look at the answer in the back of the book and keep trying the problem til I got it.” Trey made comments, “I didn’t finish it. I did most of it in class, but didn’t finish the rest”, “not

doing any work because I didn't get it", "if it's short I'll do it", "I didn't do much", and "I try to finish the rest [of the homework] if I didn't finish it."

There was a fluctuation noticed time and time again between effort and grades. During the first semester and the beginning of the second semester, when his grade was a B, his effort was increased, when grade slid to a C his performance, his effort in the class and outside the class was different. One cause for this, as explained by Trey, was:

I'm not used to having class all year. The school I came from, we did block scheduling so I wasn't used to being in all year. Block scheduling is like first semester you have a class, second semester a whole bunch of different classes. Tiredness of being in the same class all year.

Artifacts were examined. Grades fluctuated from the beginning of the school year until the end. The first few chapters included content that had been taught previously in Algebra I. Some homework packet grades and assessment grades are, respectively, 100% and 80%, 85% and 85%, 76% and 81%, 75% and 67%, 40% and 64%, 51% and 84%, and 36% and 85%. An examination was also made of quiz grades and subsequent chapter assessments. Trey was able to use the notes he took in class on his quizzes, but not on the final assessment for each chapter. For one chapter, quiz grades included 78% and 90%, and the final assessment was 85%. For another chapter, quiz grades included 66% and 57% and the final assessment was 64%.

Knowing he could not pull his grade up to B influenced his performance. He said, "I found out I can't get a B. I'll just stick with the C." Toward the end of the research period when his average was a 74, when asked about homework, he said, "Yes" he did it "because I had math hw and I want to pass the class" and "yes, b/c I have to pass the class & that was my only homework." When asked why he did his work, Trey said, "I

don't know. I'm kind of, I guess my parents. I'm afraid of getting in trouble. Cause if I get like a C, they get mad at me."

Students had an opportunity during their winter break to come in and retake tests that had previously done poorly on. However, there was a remediation assignment per test they had to complete in order to get to attend. Originally, Trey signed up to come to this. When I asked him if he had completed the remediation assignments, he said, "No, I changed my mind. After I signed up, I decided not to do it because I brought my grade up. [74 to a 76]. I did good on the chapter 7 quizzes [80 and 85] and the chapter 7 test [84]." Trey also earned a 29 and a 40 on other graded material in chapter 7.

Effort played a huge part of what Trey had to say. While effort is, for Trey, unstable and fluctuating, his temporary exertion was an internal locus. Choices of tasks that were easy and short were doable for Trey, while other assignments that would have required a sustained mental effort were often ignored or skipped over. When asked how he felt when he had all this work and did not feel he could "get it", he said, "Sometimes, I think I'm not right for this math class if I don't get it. I need to be in a different class or something. Something just not this level. Sometimes the problems would be, I wouldn't get it" and "It is stressful. Cause I get to like some problems and work them out three or four times. Just try different equations and not get it at all. It would make me feel mad. I felt stressed out."

Because of his lack of understanding, his self-efficacy was affected. This material became something beyond his zone of proximal development (ZPD) and therefore failed to motivate him to exert himself. Trey's frequent, small successes and his mastery experiences first semester built his self-efficacy, but his unsuccessful mastery

experiences second semester had the opposite effect. Trey said in the exit interview, “I try. My effort was very high. I tried a lot. I just couldn’t get it at all.”

Past Experiences

Many of Trey’s beliefs about himself and mathematics were based on his experiences in mathematics classes. When asked what he meant when he said, “you can’t enjoy math, you just do it”, he replied:

If they did more interactive stuff. She takes up like the whole class period just on notes. If like, we got into a pair to do one of the problems on the board. And, she like helped us to try to figure it out instead of her like up there talking. In my other math class, that’s what happened. We would get a problem and he would say figure it out.

Trey stated:

We did lots of hands on in the other subjects so I was thinking it would just work in math. We had a hands on middle school teacher before I moved. I can’t remember. We were in groups a lot. We had to make things. We had a whole bunch of stuff to do.

Trey said about his Geometry class the previous year that:

Uhhh, the geometry teacher, she was very interactive, she would have all the students, it wasn’t like notes all the time, it was notes for just a little bit and then we would do an activity and it was hands-on, it was like, she would work with you on how to do it or she would do it with you while you were doing it too. We knew she was the teacher, but it was kind of fun having her like our friend and also teaching us at the same time.

However, when asked if he learned what he needed to learn in previous mathematics classes to be successful in his current class, he said, “I still remember some of the stuff, but not really.”

Trey said:

The other school was block scheduling, so it [the class period] was a whole lot longer. There, what we did was, we went over homework, and

we asked questions about anything and then she would do her lesson and we'd get the homework done in class so we'd have nothing to do so I thought that was kinda good. We do the homework activity and then homework and then the rest of class was just like activities she'd have for us.

Reflecting back to elementary and middle school, he strongly agreed that he was a good math student and that he did his math homework.

Trey has had past experiences with hands-on and interactive tasks. He said:

My Geometry class when I was at my other school. It was fun. It was like hands-on. Like, if we had to do something with, like a figure, we'd actually have to make the figure and then do stuff with it.

Concerning one project in Algebra I, he commented, "The Algebra I teacher, he was the baseball coach so he made us make a small rendition of an actual baseball field. We had to get all the measurements right...I like projects but that one was hard."

Trey's past experiences in mathematics classes and even in other classes he had taken shaped what he believed to be the best possible scenario for his engagement in his Algebra II class. The literature review in Chapter 2 indicated that prior levels of student engagement and academic performance affect student engagement.

Attentiveness

During observations, Trey attentiveness fluctuated, depending on his level of focus in the classroom. On many occasions during observations, Trey would be staring off into space, reclining on his jacket, playing games on his calculator, or gazing out the window on the outside door. He was easily distracted. When the teacher asked a question that involved the use of his graphing calculator, he was observed to come back to attention, work the problem, and call out the answer. On many occasions, he was playing

with his calculator and then he put it down. When asked why he would put it down he said, “I probably got bored playing Tetris.”

When asked about these moments, his responses included, “because I got that one, that section, that one was easy” and he was “not doing any work because I didn’t get it.” On other occasions, he was paying attention, copying notes, working problems, and seemingly cognitively engaged. When the teacher gave them time at the end of class to work on the practice problems or to work in groups on task, Trey was usually on-task and working on the assignments.

Probing further about the disconnect between actively engaged, copying notes, and cognitively engaged and understanding the content, Trey said:

Sometimes, I would take the notes and sometimes I was actually thinking. When I was taking notes and thinking, I did better. When I was just taking notes and not thinking, I didn’t know what I was doing after I wrote them down...I’d know how to like, uhhh, do the notes I wrote down. If I wasn’t thinking, I wouldn’t know what to do. I would try to follow what I had in my notes but I would get lost.

In an interview question concerning why he was unfocused, Trey responded that “Yeah. It happens. All of a sudden I’m like off and then it’s like; she’s like two more examples down.” Asked whether or not he thought the times of being “off” affected his grades, he replied, “If it’s during notes that we have to know and it happens, yeah, but it kind of just happens.” In another interview about a moment of inattentiveness, he said, “It was, probably I already knew how to do it, and I was still trying to figure out that thing [grade he needed on the exam to get a B in the class]. I couldn’t figure it out that day but I got it the other day though.” Trey said, “I draw when I’m bored. I still pay attention in class though. I just draw. I can’t draw in math class. It’s too many notes.”

It seems when Trey does combine the three dimensions of engagement, he understands more and is more likely to be engaged in the future. Part of the lack of attentiveness seems to be due to the method of instruction and to the types of assignments offered to the student.

Participation and Help Seeking Skills

Participation, in addition to being a factor of behavioral engagement, is affected by one's sense of self-efficacy, whether it is realized or not. Very rarely did Trey participate verbally in class by asking or answering questions the teacher asked of the class. When asked why, he said, "Because I don't participate out loud. I do it in my head." Trey also stated:

I ask questions on homework if I didn't get a question or figure out how to do it. I don't know, when there's a bunch of people and somebody's talking and I have to say something, I have to wait until they are completely done and then ask. I don't know, I get embarrassed if I'm like talking and there's a whole bunch of people.

Knowing how important a sense of competence and perceived ability is to engagement, probing questions were asked in an attempt to find the barriers to his participation in the form of asking questions and receiving feedback so that he can become more cognitively engaged. It seemed he was unable to control his thought processes with regard to the fear he felt when he asked questions. Later, when asked again about participating by asking questions, Trey said:

I don't know. I do that with every class. I don't like to interrupt people. I like wait until they are completely finished, and then ask them aside...It just makes me feel like, if I have to ask questions, it makes me feel like I'm the retarded one in the class. Like I have to ask a question and everybody else gets it but me.

Realizing that successful mastery experiences where Trey could have participated in a discussion, asked questions and then felt efficacious, I asked him if he felt a sense of belonging in the class that would make him feel less apprehensive about asking for help through questions in class. He said he did not feel a sense of belonging in the classroom and that,

Belonging in a class helps me more...If I belong in a class, felt that way, I would participate more...Cause I knew. If I felt the same way everybody else did, that, like, I had people that could help me with problems and stuff, in a class that I didn't feel I belonged in, it just felt different, weird.

Participation in class remained unstable throughout the research period. At Trey's school, students could remediate and then "redo" any of their graded assignments including tests. When asked if he participated in these recovery opportunities, his replied, "I haven't. Cause her tutoring thing is on Friday morning. My bus doesn't get here."

Participation levels were observed and probing questions were asked.

Opportunities for participation in the form of classroom discussion, working problems on the board, and calling out answers were not observed within the classroom. As stated earlier, Trey rarely participated verbally in class by either asking questions or answering questions the teacher asked the class. When asked if he participated in class, his responses included, "No...just being lectured and taking notes", "No, I usually don't talk. Everybody else just like shouts out their answer. I usually just don't say anything", "yes, I asked questions", "No, because I didn't have to. I understood everything", "yes, answered questions the teacher asked about the problem", and many times "no." During observations, there were occasional moments when he would offer an answer or answer a question. However, on the occasions he was allowed to work with a partner, he did participate. Moments of participation did occur and Trey would answer teacher questions,

“I probably just needed to know how to do it. It was an easy chapter.” I tried to discover how Trey felt about his classes. I usually asked him if he enjoyed math today, his responses included, “not really”, “it was okay”, “no”, and the infrequent, “Yes, it was fun.”

After observing the teacher walking around the room answering questions, I asked Trey if he ever asked any during this time the teacher walked around. He said, “I think I called her once, but she does just walk around to see if people are doing their work.” In many of his daily journal entries, when he responded to the question about asking the teacher a question, he responded “no” because he was “frustrated”, “yes, one before the quiz about the hw”, “no”, “none”, “uh-huh, that day because I didn’t understand it”, and “one, did I do this one right.” The teacher never called on individual students to respond to questions or to work problems or even to call out answers. Therefore, there was no opportunity to delve into response levels when called on.

Regarding soliciting help from his peers, he said, “I’ve never asked my friends for help in math.” In the majority of his journal entries when asked if he asked his peers for help, he responded “no.” He did report that he worked with peers occasionally during Impact. At Smithfield High School, Impact was a 25-minute class period where students could go to their teachers for remediation, tutoring, or recovery. Trey had an opportunity during Impact to go to his Algebra II teacher for extra help and tutoring. When asked if he did this, Trey said, “I usually forget cause my Impact is crazy.” Trey does speak often about getting help from his dad, “I usually just get help from my dad”, “I usually ask my dad because he, my step dad, he was real good at math...he has to do a lot of math”, and

“my dad, I asked him questions.” Asking for help from his dad, in the privacy of his own home, was a less feared activity than asking the teacher in front of his peers.

I asked Trey about times he asks for further assistance in class or outside of class. Regarding soliciting help from his teacher, his comments included, “You have to ask [questions] during class” and that tutoring offered before or after school is “just remediation, if like you fail a quiz, you sign up for remediation, you go on that specific day and she will go over that for a quiz. You can’t just go for tutoring.” He said that he did not attend her tutoring because “my bus don’t get here in time.”

Trey’s view of attendance to tutoring regardless of the time it was offered, might have been linked to an inability to cope with a situation that was beyond his ability to cope. If tutoring consisted of a student asking questions and the teacher answering, Trey would not have felt efficacious enough to cope with asking questions outloud.

Approach to Instruction

Trey’s reactions to the methods of instruction were always evident in what Trey said in interviews and what he wrote in his journal. He explained the usual routine in his math class, “It’s mostly teacher lecture, we don’t do many activities... all we usually do is sit there and listen to the teacher and take notes.” In class:

She would just, she talks, she would go to one problem and then go to another one. She would not do like a couple of problems and show you different ways of doing it. She would just do one problem, show you an example, and go to another problem.

When the teacher lectured, Trey had specific comments based on his perceived level of understanding. He would say either “I gave up b/c she didn’t explain it good and I couldn’t understand it. She goes too fast” or he got it “because I know how to do simple math and the teacher explained it well.” Sometimes the lesson was “hard, I just didn’t get

it and she wouldn't slow down. Everyone doesn't learn at her speed and she doesn't explain it good" and "she was just going through it and it was hard just listening to her and write everything down at the same time." On other days the lesson was "hard because logs are complicated and the teacher was going too fast" or he really understood because "she slowed down and explained the problems better."

It seems as if sometimes listening to a lecture and taking a multitude of notes was not a strategy that works for Trey, "the way she teaches you just can't have fun you just go in there and do it." Trey thought that:

Well, it would have been better if she was more hands-on, had like a student or something work out the problems, like has us show her what we could do, see if she could help us. But it was always her.

But on the other hand, when she explained it well, he said:

Yeah, she [the teacher] uhhh, sometimes would just go over a problem one time and nobody in the class got it and uhhh sometimes she would like do 5 examples and that was better, There were different ways she would do it [when she "explained it better"].

Trey became a different kind of student when tasks were used as a teaching strategy in the classroom. Tasks were sporadically used throughout the year. These tasks were usually authentic tasks applicable to real-life that required higher-order thinking. One such assignment involved salary, commission and exponential growth and decay. Trey thought this was "easy and fun" and said he worked to complete the task. Another task involved receiving money as a gift and then investing it in different accounts with different types of compounding. He thought this was a "good task" and "I wanted to know the answers because it was talking about money and savings." His comments about worksheets the teacher gave included, "I liked it because it was a worksheet. Not too many problems and easy", "worksheets are fun and easy", "I like the tasks. They're uhhh,

more in the problems so you can do more”, “I don’t like bookwork, I like worksheets better”, and “there is not as many problems. And they are funner.” In addition, during observations, Trey was always engaged when the problem, assignment, or task involved using his graphing calculator.

Trey’s reactions to different learning tasks varied. He describes the class as “mostly teacher lecture, we don’t do many activities...all we usually do is sit there and listen to the teacher and take notes.” He felt some tasks were within his ability levels, “some problems were easy and some I could get the right answer.” His feeling one day in math was, “You can’t enjoy math, you just do it.” When asked about some of the tasks, he said, “It’s easier and it takes less time”, “I liked it because it was a worksheet. Not too many problems and easy”, “worksheets are fun and easy”, “it was easy and fun”, “a little confusing at first but then I got it and it was easy”, and “not fun, it was easy.” He reacted positively to some tasks, the ones that were authentic tasks that required higher-order thinking. These tasks involved salary, commission and exponential growth and decay and receiving money as a gift and then investing it. Reactions to these tasks included, “I wanted to know the answers because it was talking about money and savings”, “I liked it because it was a worksheet. Not too many problems and easy”, and “they’re uhhh, more in the problems so you can do more.”

There were very few incidences of communication between Trey and his teacher. I asked once if the teacher ever invited or initiated a conversation about the content she was going over or a problem she was working. Trey said, “No, she does practically the whole thing and expects us to get it.” In an interview question about class preferences, he said that he would like it if “she helped us to try to figure it out instead of her like up

there talking.” Only on one occasion did I observe the teacher directly answer one of Trey’s questions by coming to his desk. There was no guided questioning involving the content on the part of the teacher; she simply told him how to work the problem.

When he spoke of his teacher, her feedback, support, and relationship with him and the class, his comments included that he did not feel his teacher expected his best from him and he did not think his teacher provided positive encouragement, “No, she doesn’t praise anybody’s efforts.”

Working with a Partner

When given an opportunity to work with a partner, Trey always chose to work with one particular student. He said:

Working with somebody if I get stuck on a problem, I could ask them and if they are stuck too, I know I’m not the only one...cause it’s what I’m used to in all my other math classes. We would always work in groups.

When asked the influence this partner has on him, Trey said:

My participation is the same, grades usually go back and forth because sometimes he does better than I do. It’s sort of like a competition between me and them to see who gets the highest grade on like any assignment...I go over there [with this partner] because they help me. They’re a little bit better than me at math.

During several observations, when the students were allowed to work in pairs, Trey and his partner would be discussing the problems or tasks, asking each other questions, and explaining certain concepts to each other. Trey thought that his partner was a little better than him at math because he “will usually get a higher grade than me...He really actually knew what was going on.” Trey thrived in this situation and said, “He [his partner] sat down and actually would like go through a couple of problems.”

Trey attributed some of his understanding of the material to objective an external locus, his selective peer association. His sense of self-efficacy improved when he was able to gain advancement by working with peers that he thought were succeeding. This vicarious experience strengthened Trey's sense of self-efficacy.

Case Study: Lynette

Lynette sits in the front of her Algebra II classroom. If you walk into her class on any given day, she will be there, always present, copying every word, equation, and number that the teacher is writing. She will be asking the teacher questions and is always answering those questions that the teacher asks as she goes through each day's lesson. Lynette is a 17-year-old junior at her school and classifies her ethnicity as Hispanic. Seemingly, always on task, participating, and paying attention, Lynette is "planning on going to college. I want to go to med school and I need that [math] for my future. Either a pediatrician or a LPRN, registered nurse." She says she "is thinking about" joining the Army National Guard, "if I can't get a scholarship." She seems comfortable and confident in class.

Lynette is in a college preparatory track and admits, "This year I'm not doing that well as I normally do." Her previous grades include a 78% in the first semester of Algebra I, a 71% in the second semester of Algebra I, and a 73% in Geometry. When asked what she does just for fun, she said, "I will sit in my room and sing. I write songs or just spend time with the family." Lynette is involved in clubs at school. She participates in "Girlfriends, Chorus, Band [only first semester], one thing I really like about this school is Spanish because at my old school, they only stopped at Spanish 2.

I'm learning the grammar. That's my problem. And another thing I'm in is Diversity Club.”

Interviews, observations, and journal entries, self-report, and observer perceptions pointed at certain themes that address the three research questions of this study. Table 3 lists the themes that will be discussed in Lynette's case study.

Moods, Feelings, and Physical Conditions

Lynette was always in a good mood. The only time she ever was feeling bad was on a day that she suffered one of her migraines. This uncontrollable physical condition did not affect her mood; it affected her ability to pay attention, to participate and to remain alert and engaged during class.

Lynette's journal entries revealed this. On a “good day” she “felt she was on task the whole time”, she “liked it” and “it was easy” because “she understood it”, and she participated by asked and answering questions aloud. The next week, she wrote, “Today it felt like a good day. Because I feel a lot better than last week....when I struggled, I kept going.” On an “excellent day” she felt “energetic” and the work “seemed easy in a way...I enjoyed the lesson...I understood it. When I didn't understand it, I kept asking questions until I got it in a way. Basically I kept trying.” And on yet another “good” day, she did not really enjoy the class, she felt “bored”, but “it was easy, because I understood it. I didn't give up. I kept trying.” She “answer[ed] questions and asked a lot of questions.”

It was a “bad day” when she “had a severe migraine.” She did not enjoy the class because of her headache. The lesson was “in between, some parts I knew what to do.

Table 3

Themes: Lynette

Research Questions	Themes
What are students' practices and beliefs concerning student engagement in the secondary mathematics classroom?	Moods, Feelings, and Physical Conditions Effort Sense of Self Behavioral Engagement
What are the patterns of engagement in the secondary mathematics classroom?	Approach to Instruction Working With a Partner
What are the interactions between the student in the secondary mathematics classroom and primary contexts (academic performance, classroom behavior, extracurricular involvement, interpersonal relationships, and school community) that affect student engagement?	

Some parts I was confused.” She did not participate, she did not ask questions, and she felt she was off-task. On another “bad day”, she had an “extreme headache” and the work “was difficult for me.” She wrote, “I kept going on. When I didn’t understand”, but she

“didn’t get it.” Again, on this day she did not ask any questions and felt she was off task.

As soon as she got home, she said she fell asleep and did not do any homework.

Lynette’s feelings generated by her lack of understanding undermined her self-efficacy and seemed to diminish her on-task behaviors.

Effort

Lynette put forth an effort to complete almost all of her tasks. Her effort seemed to be stable except when she had migraines, an uncontrollable health issue. She admits, “I usually do my homework assignments and from there I understand the class work and from there it makes it easier.” Her grades indicate that she was turning in her graded assignments, which included homework problems, worksheets, tasks, and other assignments. Her grades on turned in assignments included an 80%, 84%, 49%, 86%, 78%, 79%, and 90%. Even though Lynette did well on her homework packets, she did very poorly on the tests for those corresponding chapters.

Lynette never stopped trying. The highest test grade she made all year, one of her few passing test grades, was a 78%. She said:

Actually, I understood like some of the stuff that was on the test. It was like from Chapter 5 somewhere and I was like, it was weird, it was just like a flashback on remembering how to do it, the properties on this part, and then the graph also, and then just knowing about the parabola. I was like okay; it just gives me an idea of how to start and where to stop at. I hung that up on my fridge.

Lynette said that she was not able to arrange to come to teacher provided tutoring. When I asked her if she signed up for Intersession, an opportunity during one of the weeklong breaks to come in and retake tests, she said no, that she “couldn’t get a ride.” I did see her on some afternoons at the school, but she said she had to “go to a different subject for tutoring. Chemistry [she had a 65 in the middle of second semester].” She did

come in at least once to recover a test. On a specific day, she said, “I didn’t go as high like the first time. It gotten lower. I failed it but the first time I took it, I pass it. It was a 74% to a 65%.” Even though she admittedly did not do well in a testing situation, her observed effort never seemed to waver.

Sense of Self

Lynette was a vocal young person about many of the issues we talked about in our interviews and she seemed honest in her comments that she wrote in her journal I asked her to keep. During one interview, when asked about her skills in mathematics, she disagreed that she had any natural skills in mathematics. She often made comments like, “Like I’m not that, like math ain’t one of my strongest points. I have to do the work to get better.”

Lynette was very aware that she was not a good test taker. During an interview, she disclosed, “when it comes to tests and all that like a quiz or a test, I freeze up. I would know it and that I was like uhhh.” When you asked her about either a quiz or a test she had taken, she usually said:

I don’t think I did well on that either. Like there was some stuff, I understood and some I wasn’t too sure...it was the way it was written in the format. I was trying to comprehend and do it, but I wasn’t able to.

Lynette admitted that she did not have any self-confidence in math. She said, “It’s one of those subjects where if you don’t get it, you don’t have enough confidence to make you feel like you got it.” However, she often wrote that she enjoyed math class. I asked her why. She said, “Because I was understanding what I was doing.” She thought the math was easy “because when I started working on it, when I thought to myself, I was thinking okay, I know this is becoming a pattern, so I figured it out.” On the days that she

did not enjoy math, her comments would include, “Because I understood it, but uhhh not too sure side.”

Behavioral Engagement

Lynette seemed to be behaviorally engaged during the six observations. She always came in and immediately got ready for class. She would take out her math binder and her textbook. She was always paying attention. This was purposeful on her part because, as she said, “I usually try to pay attention as much as possible because right now it is one of my weaker subjects” and “it helps me out when it comes to the assignments or tests.” She believed being engaged included copying everything that the teacher would put on the board. She said:

All I do right now, because I want to pass is just take notes and try to get as much as possible. Like if I really don't understand something that, I'm at the confused point, I would ask and then like sometimes she will show me and sometimes she like, you're not paying attention, and I'm like, I think I am because I have it on my paper.

Lynette's body language was always indicative of attentiveness and engagement. She says, “It's like I have to pay attention, it's like my thing.”

The only time that Lynette exhibits a decrease in her level of behavioral engagement in the classroom is when she suffers from one of her migraines. She says, “If I don't wear glasses or contacts, like for, if I feel like I'm stresses or whatever, I'll get migraines and stuff....with the migraine, I don't feel like working. I just feel like putting my head down.” Her doctor gave her a prescription, but because she does not like the side effects, she takes over the counter medications to help with the migraines.

Lynette's in class help seeking skills were evident. During every observation, Lynette asked the teacher questions and she answered questions the teacher asked the

whole class. She says she answers questions “when I know it.” When the teacher went over the previous night’s homework, Lynette asked numerous questions about problems she did not understand. She shared that “Going over homework helps me because I see where I make my mistake at or like what I done wrong.” There were times when the teacher was not willing to answer Lynette’s question during whole group time. I asked her if this happened often. She said, “Yeah, it usually happens often and I am like, oh forget her.” When I asked her how she felt when the teacher brushed her questions aside, she said, “I just think she needs to lay low on her mood swings.”

Approach to Instruction

Lynette’s reactions to the teacher’s approach to instruction and how it affected her engagement were evidenced in remarks she made during interviews. Most of what she had to impart dealt with the experiences that she had in her previous mathematics classes. Lynette had worked on projects and used manipulatives in her previous mathematics classes. She said:

[It] was like something new everyday, from projects we would do, we would do like a little math book and that’ll be a project or just a lot of hands on learning. Like they gave us little things to do...and then our teacher did a way when she was teaching like slope because we had like a chalkboard. That was the way how I learned.

Lynette likes math. She said:

In ways I do, the way how it’s taught, I would like it, like if I understood. If we do group work, I would like it because then I could ask other people about how do they understand it and if they explain it different and I could understand it then. That’s when I begin to like it.

Of her class routine this year, Lynette said that the teacher would “every once in a rare while give us a worksheet to do and other than that we are just taking notes.” This does not seem the best avenue to engage her in class, because she later shared, “I don’t really

like it when she lectures cause I don't really feel like I get much done but like when we interact is I can do it." Her reactions to her math class this year were not usually positive. She does not like it because "we don't do a lot of group work and that's the only way like I really understand. Cause, if somebody understands it differently, the different, like, I probably understand it that way and then I, oh it clicks in."

Lynette shared insights into how she felt about the instructional segments. She stated, "Like one moment I get it and then she moves too fast, she jumps quickly to a different, ummm, segment before it can sink in." During another interview about a different day, she said, "She just starts and goes to the end." However, when the teacher incorporated something non-routine into the classroom, like performance tasks, Lynette thought, "It was fun. I was able to complete it, to finish it up." She did not enjoy one particular performance task, the Bicycling Task because "it was harder."

Lynette has perceived beliefs about her teacher and how their relationship has affected her and her engagement in the classroom. She felt that she did not get along well with her teacher. She did not feel that her teacher helped her when she did not understand. When asked about the teacher answering her questions in class, she said, "sometimes she would, and sometimes she's like I should know it by now from Algebra I." She did not think that her teacher was interested in her as a student and said, "She has that attitude like she don't, it's like her attitude, it seems like she don't care type. I just don't think she has a heart." She felt that, "Sometimes my teacher, she don't, I don't know, she doesn't encourage me to do, like want to retake it [any assessment]. It's usually like if I feel I like if you encourage me to like redo it, I probably would."

Working with a Partner

Lynette thinks that working with a partner is beneficial to her and that:

If we do group work, I would like it because then I could ask other people about how do they understand it and if they explain it different and I could understand it then. That's when I begin to like it.

She works with the same young man in class when they are allowed to work in pairs. She spoke about why she chose him to work with. She stated, "He is the most helpful...there was somebody [else to pair with] but me and the girl wouldn't have been on task." She enjoys this "because if I don't understand something, he gets it and explains it to me like the way how he understands it and I see it from there."

Even though Lynette says "it is very little that we'll [Lynette and her partner] be off task, but we're mainly on task for [the teacher] not to get on to us." Lynette thinks that "peer to peer helping" is the classroom organization that helps her the most. When she worked with her partner, she "felt more confidence." This confidence strengthened her self-efficacy, which in turn allowed her to feel confidence and engage more in the classroom.

Case Study: Beauty Rae

Beauty walks in late almost every day to her Advanced Algebra and Trigonometry class because she must get to the classroom in the front of the building from her previous classroom in a mobile behind the main building in the six minutes allotted between classes. She comes in and sits in the back left corner where she immediately talks for a while to the two people she sits beside. During class, she oscillates between talking to her friends and paying attention. Beauty is a 17-year-old senior and is African-American. Beauty plans on going to college to major in Business Finance and minor in Accounting.

Beauty is in a college preparatory track. Her previous grades include a 92% in Algebra I, a 75% in Geometry, and a 96% in Algebra II. For fun, she likes “to spend time with my mom, of course, because it is just me and her. I talk on the phone. Like it doesn’t take that much to do, like I don’t have to do much to have fun. I can be sitting at home watching TV and that’s like enjoyable.” Beauty is not involved in any sports, clubs, or organizations at school.

Interviews, observations, and journal entries, self-report, and observer perceptions pointed at certain themes that address the three research questions of this study. Table 4 lists the themes that will be discussed in Beauty’s case study.

Moods and Feelings

Beauty’s moods and feelings affect her level of performance, her amount of effort and her self-efficacy. Beauty wrote in her journal about feeling stressed on certain days. When asked to explain, she said, “It was stress because I had so much to do. It was overwhelming. Like when I have so much work to do, it puts me in a bad mood. Not just math, math added on to all the other work combined. What I learned in math that day was kind of simple, but just everything on top of each other, just so much work.”

Beauty said, “When I think negatively I don’t do well, well sometimes, sometimes, but when I’m in a bad mood, I won’t learn as well as I would if I was in a good mood.” There were times when her openness to new content and her quality of performance is affected by her moods. She said:

If I’m in a bad mood it’s gonna like spoil my day and I won’t really be in a mood to do work or do this or do that. If I’m in a good mood, I’ll be open to anything, to trying new things, new problems, this, and that.

Table 4

Themes: Beauty

Research Questions	Themes
What are students' practices and beliefs concerning student engagement in the secondary mathematics classroom?	Moods and Feelings Effort Sense of Self Behavioral Engagement
What are the patterns of engagement in the secondary mathematics classroom?	Teacher Support Approach to Instruction Working With Others/Classroom Behavior
What are the interactions between the student in the secondary mathematics classroom and primary contexts (academic performance, classroom behavior, extracurricular involvement, interpersonal relationships, and school community) that affect student engagement?	

She admitted there were times when her feelings leaned toward a total shutdown. She said, "I just didn't feel like doing it, so I was like whatever, just relax today and I know there will probably be a lot more the next day I'll have to do."

When Beauty reflected back on her day in class, her journal entries demonstrated how her moods and/or feelings would affect her days in class. In one journal entry, Beauty said:

I feel tired. I didn't want to go to school today...it was a little hard because I didn't fully understand it...I tried in class but when I got home and it was time to do my homework I gave up and went to sleep. I didn't do any homework. I was so frustrated with all my work and tired on top of all that...I didn't understand the lesson...in class I just sat back and took notes. Not too much participation was going on...the only question I remember asking her [the teacher] was if we still had the test tomorrow. She never answered my question, which is not surprising...I gave up.

However, in another entry, she wrote:

Today was a great day. I had no problems today. Today we learned about manipulating powers. It was so easy. I really enjoyed it because I understood everything...I called out answers and asked questions. I asked [the teacher] if when you have parentheses so you multiply or add the exponents because I forgot. I felt better because I was able to do the rest of the problems...I was in a good mood and happy about my work...[I was] on task because I was in a good mood and I was interested in the assignment...it was so easy I didn't mind doing it [the homework].

Her moods and feelings also affected the amount of effort she put forth on a daily basis. She differed between what good feelings versus bad feelings led her to put forth more effort or not. She said:

When I have a good feeling about the problem, when I understand it, I want to do more. When I get the problem wrong and I don't really understand it, I'm like uhhh. Sometimes I want to give up. I do keep trying but when I understand it, I just want to do more.

She reiterates this later as she remarks, "When I understand things in math, I'm always in a good mood, and then it just like when I do the work, it just makes me feel a whole lot better when I know what I'm doing." She said she is happy when she can work problems, "cause it made me feel good that I could do it by myself and just know that I have everything down, go home, this will probably be a breeze and do it quick, out of the

way.” There were rare days that her school workload overwhelmed her and her usual coping mechanisms were not enough to avert her feelings of frustration. She said some days she went home and:

 Took a nap. I never take naps at all. I was just so frustrated because I constantly have work, work, work. And like on top of that I really didn't understand some of the stuff in math, so it was just all that frustration, was sleep, just went to sleep, didn't do anything.

Her self-efficacy is strengthened or weakened by her moods and feelings. She says when she is in a “good mood” she participates and does all the work. She says, “I enjoy the days when I understand the work. When I don't understand, it kind of brings me down” and “I get happy when I do well.” During another interview, she said:

 It makes me feel good when I do well. It's like okay, I've accomplished this, I, cause if I don't understand something, it gets frustrating, but if it takes a while sometimes I get frustrated like arugh, okay, I just don't want to do this anymore right now, take a little break something like that, but when I understand it, when I do well, it makes me want to do more. It makes me want to keep going. It just puts me in a good mood.

 She has a feeling of accomplishment when she understands and then pushes her.

She said:

 I like try, but it's harder to concentrate. But I know like sometimes I was in a bad mood and I'll try to do the work and then I might understand. It brings me, it makes me, I go from a bad mood to a good mood of I get something and understand it and I focus more on the work than on my problem.

Successful mastery experiences affect her mood. Beauty said:

 I always enjoy it when I'm able to do the problems correctly or I'm able to ask a question and basically understand after that. You know what I'm able to understand something or take the class that day.

Effort

Beauty controls the amount of effort she puts forth in class and out of class. She purposefully chooses the times that she puts forth the effort to participate and the times that she does not. She said:

My focus, like I can stay focused, somebody's still talking to me, I can still pay attention to what I'm doing. So if they're still trying to talk to me or mess with my hair or whatever, I just block it out. I just need to get my work done. They are not the ones helping me pass the class. At the end, it's going to have to be me by myself.

You can easily tell through observation that Beauty is purposeful in the times she is engaged. When the teacher begins going over a new lesson, she gets very quiet and is attentive. Even though she listens and reacts to the conversation of her friends, she does not actively participate in conversation with them, nor does she get rowdy with them. Then there are times when there was not any conversation around her to grab her attention. One day, the young man beside her became frustrated, put his head down, and went to sleep. Beauty became very focused on what was going on in the classroom, on-task and attentive.

She controls her performance in class. Beauty says completing her homework influences her understanding, so:

Just because she's not taking it up for a grade doesn't mean I'm not going to do it. In the past, I wouldn't have done it, but it's like I have to do it so I can understand the work. I don't want to just like, well, she's not taking this up, I'm not gonna do this. I mean every once in a while, like when I was in a bad mood, I probably just go to sleep or you know, if something came up, but most of the time I did the homework because I needed to understand it. I know the next day she always goes over it and I want to have questions to ask her about the work I didn't understand.

Beauty attributes her effort, her motivation, and her ability to perform to internal or external factors. On one hand she says, "I understand it a little bit more when I keep

trying” or “It was probably just me, just a few of the problems are just I didn’t understand.” Beauty said that she did not have to work for her A’s in Algebra I and in Algebra II. Math is “not hard to me. I can catch on quickly, just depends on how much I apply myself, so I think it’s easy.” She attributes her poor performance to her own lack of effort. On the other hand, she said about a test:

It was tricky. Plus some of the ones that I, there were some, they were like tricky cause she’ll put more difficult problems on the quiz or test whatever and they were just tricky for me. I just didn’t understand how to do them.

She was attributing her performance to external task characteristics. On another day, she said:

I know how to do a majority of the problems. On the test, there are always more advanced problems that I don’t know how to do... We’ll have basic problems but more advanced on the test. They’ll be much harder and I don’t know how to do it.

Beauty admits that this year is a little harder than previous years. She has to try harder this year. “It was like, the Algebra part is so simple to me, but once we get to the Trig and Geometry, that’s much harder.” She talked about her work ethic differences between 9th and 10th and then 11th and 12th grade years. She said:

[In the] 9th and 10th grade I was not very focused. I just, I wasn’t that, it just didn’t hit me yet like, oh this is really going to matter like you know. I don’t know, I wasn’t thinking about college, like I was, I knew I wanted to go, but I wasn’t thinking about, oh they’re going to want to look at this and yada, yada, yada. I was more focused, I say I was more focused my 11th grade year. 11th grade I did really good. I just, I wish I would’ve been a little more focused cause I know I could have done better in my classes, more participation. I would have taken it more seriously. I just wish I would have, you know, taken it more seriously and think about my future.

During another interview, she said:

I try. Sometimes I do and sometimes I don’t. Like okay, I try hard but it might, like it used to be where sometimes in my past sometimes if I’m in a bad mood, I just like, whatever, you know? But this year, I have tried a

little bit harder you know if I'm in a bad mood I just try to stick it out. It's gotten harder and so this year I have to pay more attention because like before math was a breeze like both algebra classes I had an A you know? It was just simple. I knew the stuff.

In several interviews and in her journal entries, Beauty talks about not wanting to fall behind, wanting to stay caught up. She also mentions that she does her work because "I didn't want to forget it." This belief influenced her effort in the classroom. Concerning homework, she said:

We don't get a lot of homework, but when she gives it to us, I complete it...so I'm not behind. I just need to do my homework so I get extra practice so I know what I'm doing, cause I don't want to be, oh I didn't do my homework and here comes a quiz or a test and I'm just lost. So I just do it to be ahead, know what I'm doing.

In another interview, she said:

It is important for me to understand because if I don't understand, I won't do good in the class. I won't understand the work, so I won't get further. I don't want to be stuck behind. So I always ask questions, no matter if I have to ask her five times, I'm like, some people get embarrassed, I don't know that...no, I WILL ask the question, I will ask the question.

Several other times she made remarks that included, "even though it doesn't count for a grade, I still need to do the homework so I won't be behind" and "like I don't want to be, like make a bad grade because of this or that. I want to be on point. I want to pass the class. I want to know what I'm doing."

Beauty puts forth effort in preparing for assessments. When asked how she prepares for particular assessments, she said, "I studied. I did like some math problems. She gave us a page from the book and I did some of those problems, but like I was confused. I think I was absent that day that they learned the material so I tried. I did try but there was still more I needed to learn." Concerning an upcoming quiz, she said:

I feel pretty good about it. The work is easy. I think I'll do pretty well. I'm prepared. I'm going to go home tonight and do more stuff. It's easy but I always feel like I always can use some extra practice like you never know there could be more complicated problems or you could get forget this or forget that so I should always practice before.

She does extra work for “extra help, just so that I can know the work and I can get extra practice even though she didn't assign it, I still did it.”

Effort to complete tasks was sometimes unstable. Sometimes she completed assignments as evidenced by her comments: “It was so easy I didn't mind doing it”, “I finished it”, and “I did the worksheet and studied to prepare myself for the upcoming quiz.” Sometimes she did not complete tasks. On one occurrence, she talked about work the teacher had taken up that she had not completed. She said:

I think she asked for it the next day and I don't think I heard her when she said she was taking it up for a grade. I didn't have it. I didn't have time that night. So the next day she said I'm taking this up and I was like uhhh, don't do that. I did not get a chance to do it.

At other times her comments were, “I didn't understand it and I had so much work to do. I gave up”, “I just gave up. I was mad”, “No, I went out and I didn't have any time”, and “I didn't feel like it.”

Sense of Self

Beauty through analyzing the data seemed to have a strong sense of self. It was all about her learning and she usually internalized factors that affected her performance.

Beauty attributes some of her successes and failures to internal forces and because of this, her self-esteem remains intact. Beauty has had successful mastery experiences in the past, in both Algebra I and in Algebra II. Those experiences have created a strong sense of self-efficacy that supports her even if she has moments of failure. She says, she knows:

Maybe I'll do bad on this test and okay I don't know the material, the next test will be on a different lesson and hopefully the stuff that was on this test won't be on the next one. So I won't really say that [if] I did bad on this test, I'll do bad on the next one.

During another interview, concerning successful mastery experiences, she says:

I think sometimes when I succeed it helps me a little bit and I'm like more determined okay I got this right let me try something else like it builds up my self-esteem so I want to learn something else. I want to try something else.

When asked why it was important to make good grades in her math classes,

Beauty said:

Cause I need to graduate. It is important. I need to learn the stuff and I need to be able to, you know, like it is important to me, like a mental thing. Like I need to be able to pass my classes, understand this, and understand that, so I can, I don't know what the right word is I am looking for, it is just important to me.

Beauty knows that her final grade is ultimately her responsibility. She says that math is "not hard to me. I can catch on quickly, just depends on how much I apply myself, so I think it's easy." When Beauty makes what she considers good grades, an 83% for instance, she feels "good" and cheers herself along the way. She attributes her performance to herself "because I feel like I worked hard and I asked for help, the teacher helped me, and like I pushed myself."

Beauty has her own opinion about mathematical ability. She said,

I think a person is born with it [math ability], but I also do think that you can get better. You can get better because a person, well, a person may or may not be born with it, but either way, you can grow from what you are at first. You can get better. You can learn if you try. I think I acquired it from help in elementary school, teachers, and stuff like that, they helped me to get further, because at first, I wasn't usually good with math at all. So they helped me and I think I'm good now. I acquired it.

She believes that “if you apply yourself, if you try and you can get better. If you try to learn, if you actually care about what you’re doing, I feel that anybody can get better” and “it will just bring my grade down if I give up and that’s not going to affect the teacher cause she has so many other students to worry about.”

Beauty really does self searches for the reasons she sometimes does so poorly.

During two different interviews, she talked about it. During the first instance, she said:

It’s like sometimes frustrating cause I’m like doing all this and I still don’t understand but I don’t beat myself up about it cause I know that I did try so I know what it is I don’t know so I can come in the next day and ask her questions or come to tutoring and ask questions or you know.

The second time, she said:

I think I like rely on my notes too much especially like toward the end of this year. I have like senioritis so bad. I just like been so lazy. Like since Winter Break. I’ve been relying on my notes so it’s like when it’s time for the test, quiz, or whatever I try to think back to my notes but I don’t really remember it.

Behavioral Engagement

Beauty’s behavioral engagement themes came through in her participation and in her help seeking skills. During one interview, she said:

I pay attention, but there’s also, like I talk. I talk, not a lot, I’m not disruptive talking, but like between when she says something, I will probably talk and say, ha ha, this, or that. But I pay attention though; I know it is important for me.

She admitted that there was lots of talking between her and the two students she sat with in the back corner. She said there were positive aspects of sitting there because, “it probably helped me a little. But sometimes I’d have questions and we’d be able to talk about it amongst ourselves, but I think the majority of the time I’d become more talkative.” During the exit interview, for the first time she said, “I didn’t pay attention as

much when I was talking” and that “probably a few times” she missed what the teacher said.

Beauty also talks about talking when the teacher is not in front of the classroom directly teaching the class. She said:

Well, I mean she wasn't talking, like when she talks I pay attention and I do what I have to do, but when she stops talking, and I'll do the problem but when that's over and done with, I'll start talking cause she's not up there.

When asked about her participation, she said, “I was interested in basically what we were doing in class and I need a good grade in that class so I had to pay attention.” She admits that the drive behind her participation is “for me to pass the class, to do what I need to do.”

Even though she participates by asking and answering questions, she does not like to participate by going to the board to work problems. Her reason was, “because I'm like ummm I don't know if [the problem] it's right or wrong. Majority of the time, it's right there, but I don't want to just go up there and put the wrong answer. Just me.” She also shared that:

I don't like doing that. I don't want to get up there and hey class I'm writing this on the board. Every once in a while, like oh I want to do that problem but, I like to be back at my desk.

Part of participation is attendance and Beauty admitted that she “was absent a lot” and tardy to her mathematics class almost every day. When she was absent, there were consequences in her mathematics class. The only times she was observed or admitted to being frustrated in her math classes were times that followed absences from school. She was struggling one day and I asked her why. She said she was somewhat frustrated and:

Most of the things I knew except for the graphing part cause I was absent the day we learned it and I was just behind, kind of frustrating. I didn't know how to do the graphing...if I would have been there, I would have gotten it. The first day [the day she was absent] she went over this means this and this is how you do it and this one [the day she was absent] is slow and easy and you go over each little step. Every day after that, it gets faster and faster pace. Everybody knows how to do it so you can skip this step or whatever cause everybody knows how to do it, but I didn't know how to do it.

When she is absent, she comes back the next day and participates in class. She usually attends tutoring to catch up. Beauty said that:

I paid attention. I copied everything, but it's like I'll try to learn, like while she's doing it, but she goes really fast, so that's why I come to tutoring so a little bit slow down like after school it's slower, but during Impact, there's so many people.

On an assessment, she said she felt she was not prepared. When asked why, she said, "Again, I was absent. And I think that I could have learned more about it, I just needed a little bit extra help on it. And what we went over that day in class it was helpful but I still needed to know a little more about the lesson." Absences affected her participation, which in turn affected her performance. Tardies to class affected her academic performance because "she'd start as soon as the bell rang, so sometimes I missed some stuff."

After a particular observation, I asked Beauty a question about behavioral engagement and cognitive engagement. Throughout the lesson, I had wondered about her level of cognitive engagement even though she was behaviorally engaged. She was copying notes but did not seem to be paying attention to what the teacher was saying. On this day, she neither asked nor answered teacher questions about the content of the lesson. She said:

Well, when I copy the notes I don't think about them. When I'm copying them, I copy them real quick and then I go over what I just wrote. But I like to hurry up and get it in cause she erases it quickly sometimes... She gives time [to think cognitively about a problem or an idea] but I feel that sometimes there's a lot to go over so maybe every once in a while may not be enough time for us because she knows what she's doing so she can go over it faster than us and probably cause she already knows what it is but for us we have to take a little bit more time. Well for me, I have to take a little bit more time and read it and go over it.

Beauty has excellent help seeking skills. She increases her ability to participate in class because she attends tutoring or obtains help from peers. She has no problems asking for help or asking questions during class. She feels that, "I ask a lot of questions. If I don't understand, I ask questions, cause I don't wanna be just sitting there lost, cause I won't benefit from that at all." She elaborated with, "I ask questions so I can learn. I don't want to be left behind."

Having admitted that before this year, "I never went to tutoring before," she talked about seeking help by going to tutoring some days before school, some after school, and during Impact. Her teacher even offered tutoring on several Saturdays the last month of school and Beauty attended those as well. Beauty went to tutoring because:

Tutoring helped, tutoring really did help like when I asked my questions and stuff and I get the answers you know it's just like one-on-one. I feel sometimes still when there's like a lot of people in there, it's like a one-on-one. I get to ask my own personal questions...it did help. Knowing that I could go to tutoring to get extra help, I'll gain something from it.

Attending tutoring was important to Beauty. She said:

I needed the extra help. I needed my questions to be answered. I know I can go to class but we have more time in tutoring. I get to ask more things, you know like in class we'll be going over this or going over that and maybe at the end of class I ask questions. I just want to go ahead and get some more practice and even if we do go over it in class, I still want to be on the same page as everyone else.

Beauty states, “If I don’t understand it, I’ll come to tutoring or ask her the next day.” She attended tutoring in the mornings, afternoons, during Impact, and even on Saturdays at the end of the school year when this particular teacher offered extra help. “I went to tutoring during Impact. I got some help but all my questions weren’t answered because there were so many people in Impact that everybody that ask a question, you’d have to wait until that person is finished.”

Her self-confidence is boosted when she attends tutoring. She said:

The fact that I’m going to get extra help for it [a specific test] and all my questions will most likely be answered so that makes me more confident like okay I know what I need to work on so let me go ahead and learn this and if I learn it feels so much better because I know that I will do well on the final.

In addition to going to tutoring that the teacher offers, she works with her friends on math. She says, “sometimes I’ll call some of my friends or we’ll go over it, math, over the phone or something like that” and “sometimes we’ll do it before school every once in a while when we get here early or we’ll stay after for tutoring.”

Teacher Support

Having the support of the teacher was important to Beauty and it is something that she values. In elementary school, Beauty had some problems in math, but her teacher “helped me and ever since then I have just been better. She helped me a lot.” This teacher helped Beauty to:

Understand math more, everything, she ...worked with me, she took the time to help me understand even though it took longer than others and after that I was just like good with math...she’d come and talk with me and take some time out from the rest of the class.

Beauty’s Advanced Algebra and Trigonometry teacher answered her questions in class and was there to support her through tutoring sessions. Beauty said that this

feedback was “positive cause she was trying to help me” and “she was very helpful.” Beauty’s teacher would come to her desk and help her when she had a question. “Like if I have a question most of the time she does come over there [to her desk] and she’ll come and I’ll ask her this or that and she’ll help me with it.” Beauty’s teacher also supported her by allowing her to come in and finish assessments if she did not finish them before the class ended. This support from the teacher “softened up my mood. I was happy about that.”

Beauty did take advantage of tutoring during Impact. On one such occasion:

There were a lot of people. There are always a lot of people that come to her tutoring, so like you could ask a question, but as soon as she answers the question, she has to go here or go there, like I like to sit down one-on-one, maybe there could be a few other people, but I don’t like for it to be crowded because it’s just like so much talking at one time. She goes back and forth, back and forth. You’ll be sitting there raising your hand forever before you know, get her attention.

Beauty felt:

More confident, a little bit more, but like some of my questions weren’t answered because the bell rang and I had been raising my hand for a long time so I just like got frustrated and I was like whatever.

During one of her journal entries, Beauty wrote about an incident that occurred between her and her teacher. She felt that her teacher had “disrespected” her by “laughing at me.” In spite of this, the teacher continued to support her the same as she had from day one and Beauty continued with her usual engagement and help seeking. She said:

It’s not going to affect how I learn because I need to pass that class regardless. So you know she’s not going to affect my grade. That little incident that happened or whatever, I’m still going to be the same person in class. It’s not going to change...but it changes the way that I see her, but it’s not going to affect my grade at all. I have to pass the class. It’s not going to affect my grade. It might affect the relationship between me and the teacher, but not my grade.

Approach to Instruction

Beauty describes her classroom routine:

We don't do groups. It's like the teacher, she'll give us work, she'll put it on the board, and she does examples. I guess lecture, and after that, we just do our work. Like we get to work in groups if we want to, but she never says, Hey, get in groups. But we just work our problems.

When asked what routine would help her most in a mathematics class, she said:

I think if we had class activities like instead of just lecturing, is she added just a little bit of, like not all the time, but a little bit of fun to it, maybe like a game, cause I know that people learn more when things are fun, when it is amusing to them, when they can actually sit there and pay attention. I think that if she had that it would be better.

During another interview, Beauty said she wished there:

would be like more fun in the classroom, not like oh fun like everybody go crazy, but like add some type of excitement so it would get everybody hyped up so everybody would want to learn. Cause a lot of people don't really pay attention. I didn't pay attention sometimes.

She really liked some of the things a previous math teacher did in his room. According to

Beauty:

His class was fun, enjoyable, like he'd throw out a joke and you know something like that or he'll, he makes up songs for the formulas so like everybody...I still sing it to this day...we did different stuff in the class. He let us work in groups, he did this, he interacted with us. He made us feel comfortable and wanting to learn, willing to learn. Sometimes we'll have like little worksheets. Sometimes, we'd like ummm, we taught the class...I remember one time we had little boxes or something like that.

There were a couple of times throughout the year that the Advanced Algebra and Trigonometry teacher used tasks. On one of those times, Beauty said, "I like the packet [task] because, I like I noticed I showed more interest to the packet just like, I was more into it." However, during another interview, she remarked that, "I do better with the teacher telling me how to do it than doing the problems [on the tasks]."

When asked about the reviews for the assessments, Beauty said,

When we review, it is nothing different. It is just write it on the board or a worksheet. If it was like a review game or if she calls out like random people to call out the answer, it would make everybody do the work, and actually pay attention in class. I would do my problems so I would not look stupid in class.

There was a chapter on probability and a discussion surrounding coins and dice, when Beauty felt the content was applicable to something real for her. Beauty said,

I thought it was interesting.... We have been talking about flipping coins and throwing a die...it was like a visual, something people see every day. I mean like a coin or dice we see all the time. It just seemed interesting to me. More than parabolas and stuff like that. We could actually see it.

She wished there were “a little bit more quizzes...like a quiz on like every two sections or something like that. It’ll help cause it’ll be fresh on your brain and you know what you need to work on instead of just one quiz and a test.”

Working with Others/Classroom Behavior

Beauty was tardy to class on every observation. She walked in after class was already in session. She walked quickly to her seat in the back of the room. She would engage the two peers in conversation before she got her materials out to engage in the class. During the entirety of every observation, Beauty would continually switch her attention from talking with her two peers to participating in class. The classroom as a whole was attentive when the teacher was engaged in direct instruction, but during the times when students were to work on certain problems, work on a worksheet, or any other assignment that is not teacher centered, the students socialized. Beauty admits that she really needs the teacher to facilitate the entire time in order for her to stay focused, “I like it better when she’s up there and talking to us and class participating. When she goes

to her desk, I kind of get off task.” During observations, as soon as the teacher stopped talking she would usually begin talking to the two students that sat next to her.

Beauty is quick to admit that when the teacher is talking, she is usually attentive, but if the teacher has any down time, or time she allows students to try a problem between instructional segments, she is off task and talking. She becomes off task “because like I understand everything so like after we went over everything I was just talking, yada, yada, yada.” She does say however that:

When it’s time for me to stop and pay attention and when I ask a question or whatever, if I need help, I will pay attention and do what I have to do. But you know when she’s done explaining, or when I’m done getting my help I’ll go over to the side and talk to this person or talk to that person. But I do pay attention when I need to.

She is “on-task when my teacher was going over the lesson because I want to learn. I was a little off-task after because the teaching was over and I had time to talk.” Beauty does seem to have the ability to multitask efficiently. However, she has not thought what her performance could be if she was totally focused, nor does she see the consequences to the students she is talking to.

During observations, Beauty constantly oscillates between talking to the young people beside her and paying attention and participating in class. The freedom that the students enjoy within the less restricted environment allows them to feel they can talk between segments of teacher instruction. However, she does reign herself in:

I notice that he [one of the friends that sit next to her] has been really talkative more than usual but I have also noticed that I haven’t paid him any mind. Like I pay him attention, but I notice that more and more lately I just ignore him...I can block him out. You know if I don’t pay him nay mind then he’ll just fade away. I can do that sometimes. I been staying focused on the work like it sometimes last week he kept taking and talking and I wasn’t paying him any mind and I just doing my work copying from the board and I got done with it.

On another day, when I asked her about her class conversations with the young man beside her, she said, “even though he talks, I can listen to him and still know what I’m doing. I can pay attention to what’s going on.”

Beauty has other moments of off-task behavior that involve her cell phone. She says, “When I’m trying to get something done or I’m trying to do the work you know when she’s going over stuff I’ll put my phone down.” Concerning her phone, she believes that “It’s like I use my phone so much, when I text, I don’t even have to look at my phone. I still pay attention, I’m still learning, I started using my phone more toward the end of the school year.” When asked if her phone use in the classroom affected her engagement at all, she replied, “no.”

Case Study: Alisha

Alisha walks in late almost every day to her Advanced Algebra and Trigonometry class early. She sits directly in the middle of the classroom. Loud, boisterous and always laughing and talking, she readily admits, “I can be a distraction and then the teacher will let me know or someone else will let me know I am talking, to calm it down.” During class, she oscillates between talking to students that sit around her, paying attention, and using her cell phone. Alisha is a 16-year-old junior and is Caucasian. She plans on going to a junior college for the first two years after she graduates. She is not sure what she wants to major in, but talked about photography, physical therapy, and nuclear radiology. Alisha is in a college preparatory track. Her previous grades include an 81% in Algebra I in 8th grade, a 76% in Geometry, and an 81% in Algebra II. For fun, she likes to:

Play video games. Ummm, sports, uhhh, if it’s the type of book I like to read, read books, but very rarely. I like to go to the movies. Ummm, just kinda like, not stalkerish type, but you know just sit at the mall and watch

people, just watch people, how they interact, and everything in life. Like you know how you walk by a bench and someone is talking loud as crazy on their phone and you hear every word that is going on.

She plays the saxophone in the school band, is on the tennis team, and is in HOSA, a Health Care Career Club. She has attended HOSA competition in Medical Photography. Interviews, observations, and journal entries, self-report, and observer perceptions pointed at certain themes that address the three research questions of this study. Table 5 lists the themes that will be discussed in Alisha's case study.

Moods, Feelings, and Physical Conditions

Through interviews, observations, and journaling, Alisha's days are described with the following words and phrases: "tired", "so-so", "frustrated", "bad attitude", "good mood", "good day", "okay day", and "felt like bumming." She experienced an assortment of moods, feelings, and physical conditions that affected her engagement in the classroom. Her practices, beliefs, and patterns of engagement were constructed by the uncontrollable factor of mood and fatigue; however, her self-efficacy remained intact. Fatigue, an uncontrollable property of attribution theory, played an important role in Alisha's engagement. Journal entries described her tiredness and its affects. On one day, she reported that it was an:

Okay day but kinda dragging because I woke up late and still a little tired...today in class we were given a worksheet...I needed help but couldn't get any cuz no one else was doing their work but talking instead.

On another day, she "felt like bumming it, since I'm a little tired, but other than that today's been pretty good." During first semester, she participated in marching band and they had rigorous practices after school on most days. During second semester, she was on the tennis team and played both singles and doubles. In addition to tennis, she was

Table 5

Themes: Alisha

Research Questions	Themes
What are students' practices and beliefs concerning student engagement in the secondary mathematics classroom?	Moods, Feelings, and Physical Conditions Effort Attentiveness Approach to Instruction
What are the patterns of engagement in the secondary mathematics classroom?	Sense of Self Behavioral Engagement
What are the interactions between the student in the secondary mathematics classroom and primary contexts (academic performance, classroom behavior, extracurricular involvement, interpersonal relationships, and school community) that affect student engagement?	

in Concert Band. Her extracurricular activities took a lot of her time after school. Tennis takes up much of her emotions and she talks about it in class. One entire day was taken up with talking about an upcoming tennis match. Her comment was “my feelings and

emotions have been up and down between happy and mad” because she was upset with her tennis partner.

Tiredness was tied to mathematical understanding in some of her journal entries and interviews. She reported on a certain day she was “Very slow and tired. Some problems were hard and I didn’t get 'em but I asked for help from the teacher and other students and figured it out.” On another day her comment was, “I was tired and didn’t want to do anything...I just didn’t want to do anything. Didn’t understand it and didn’t want to do it...translation, just don’t do nothing.”

Alisha talked about feelings of hyperactivity in class and the trouble she has with trying to clam down in the classroom. Alisha said, it was a:

Good day...I kinda enjoyed math class today, but it was hard to calm down...the lesson was easyish-hardish since there are still some things that are difficult for me but I’m slowly learning and not giving up on learning it...I didn’t pay attention.

She reported that she did not do any math work that night. Her feelings of excitedness sometimes interfered with her performance in the classroom. She said:

Sometimes I did [the problems]. It just depended on my mood some days. Like if I’m really happy, like super excited, I’ll be too excited to want to work problems; I’ll just want to talk. But if I’m in a really crappy mood, then I don’t want to do anything. I don’t want to talk to anybody. I just want to be mopey all day.

When asked what the culprit of her hyperactivity was, she replied, “I don’t know. It depends on how tired I am. If I’m not tired or sometimes I’m so tired that I just don’t feel it anymore or I’ve had too much sugar. If I’m overly tired, yes I will be hyper.”

On certain instances, issues that occur outside of class determined her mood and it seeps into her mathematics class. One day her teacher called her to her desk after class to

talk with her about her talking in class. When I asked her about them in the interview, she said:

I had a bad attitude that day in class. She [the teacher] said something and I was just like whatever. She like singled... I felt like I had a bunch of personal issues going on like and stuff and a lot of stress on me and like that day she singled me out and said something and I felt like she was making me feel stupid or something and my natural reflex was like to be rude, but she understood. She could see that something was going on. I wasn't just being rude because I'm always hyper and fun in that class...It happens when I get overly stressed...School...and I had some personal issues, I got rid of the personal issues...I moved on from that person. Peace out...if it is something that stresses me out that I don't understand, it will bring out that side of me and I will be on the verge of snapping on somebody, which is what I did to the teacher. I snapped on her. I apologized after class and I told her what was going on. She said all right; just make sure you weren't about to like go all psycho on her.

Alisha described another case in point. She said:

Normally I keep it pretty much on the DL, down low, and just keep it to myself inside, and then sometimes it's just like so much at one time that it just has to explode eventually, whether it be at school or at home in a car. I'll still continue with the lesson, but I'll be in a bad mood for the rest of the day. I just won't be happy that class period.

And during another interview she further explained by saying:

Eah, if something big like that comes up it kinda can distract me from school. Even though to me I know school's more important than all that, but you know, at the time when it's a big competition or something like that or you got a big match coming up, a big rival of something like that, you wanna do well. And if you're just learning new material that day and you not have to worry about a test for a week or two, then it is easy for you to tune it out and just forget about it and worry about things that aren't more important than your education.

Her moods and feelings were also evident when she received grades on certain papers. Concerning a quiz that she did poorly on, she said:

I was more mad when I got it back. Cause I was well, like that sucks. Normally after I take a test, I feel like if I did bad or good and I will go ahead and tell her I will come in [to recover].

Even though she had these feelings after receiving a paper she had performed poorly on, she would always bounce right back and make plans to recover. She talked about her confidence in her mathematics classes:

Like Algebra I, I had confidence in because it was easy then. Geometry and Algebra II, I guess, because I did not have good teachers I did not understand it...if I don't have self-confidence I don't think I'm gonna be able to do anything. If I put myself down all the time, then I won't think I'm good at anything except having no self-confidence.

Concerning her confidence level this year as she took major assessments, she stated, "I don't think I've ever felt confident going into a test unless it was like the first test we take in the year where it's Chapter 1 and it's all review... I've never really had confidence in anything I do, except for Band. Once you win Grand Champions, you kind of have a big head."

On another occasion, she did really well on the review worksheet before a major assessment. On the day of the assessment, she spoke about her feelings of frustration:

I figured I could go in there and make a decent grade, like a 80 or something like I normally do, but then I saw the test, and I was like you can go ahead and give me a zero...I wasn't confident, like I knew from the tests we have already taken all semester that she's going to have some tricky things, she going to try to throw us off and everything, but like the definitions. I wasn't expecting that and I thought I was going to do fairly well on it but [she didn't].

Some days she was not tired, she just felt a total lack of understanding. She said, "I was in a good mood until math class...I didn't get it. And she moved too fast for me...extremely hard. She went fast and I didn't know what she was talking about." She reported that most of her days were often so-so because "just like anything, if you get it, it's good, and if you don't get it, it's bad." In response to whether or not she likes math, she said:

Ummm, I like it when I get it, but until I get it I don't really like it, it frustrates me. But as soon as everything starts clicking, I'm cool with it. As long as I can do it and I think, also the thing is I like to be able to do it and be able to help someone else that doesn't understand it.

Effort

Alisha's effort was observed in the classroom but she admits that she does not put forth an effort at home. Her effort is unstable and fluctuated during the semester. The interviews, the observations, and the journal entries painted a picture of Alisha's effort inside and outside the classroom.

When asked about homework completion, Alisha said it is "very rarely, just like steak. Rarely done." While humorous in tone, she admits:

Ever since Algebra I, I haven't done homework, or much of it. If they tell us it's got to be a grade, I'll do it, but if it's just to give us something to practice, I was like nope, unless it was easy, then that's a different story.

When asked in interviews if she put forth an effort to complete assignments the teacher had given her, remarks included, "didn't do it [laughing]", "don't like it", and "sometimes I do , sometimes I don't. Like if I'm in the video gaming phase of my life, I'm like homework can go somewhere else, I'm playing."

Her experiences in the past with task completion have set the stage for her in high school. She reflected to past years and said:

In Algebra I, it was so easy, but my teacher hated me. I would never do homework, but I would sit there and ace the tests and make 90's and 100's on the tests, but I would never do homework and that's what kept my grade down. And she said I'm not going to pass you unless you start doing your homework, so I started to do my homework. She forced me to do my homework. She pushed me to the point where I would have a good work ethic...It made me get involved more. I mean, she'd call on me during class and I'd say the answer, whatever, and she'd say how'd you get that and I'd be like, I don't know, I just did it in my head and everybody else is like how did you do that so I couldn't really tell them how I did it.

She was more apt to complete assignments when she understood how to do the mathematics. Alisha said, “I did some like portions of it that I actually knew how to do , but when it got to stuff I didn’t know how to do, I’d leave it alone, put it up, wait until I got to class.”

At other times, she would only make the effort to complete tasks if she knew it was going to count for a grade. She remarked, “I would have at least attempted it. Cause sometimes she didn’t do it for accuracy, she’d just do it for completion. But most of them were for accuracy.” During another interview, her comment was “I do class work, if I know it’s going to be a grade, I’ll do it.” She said:

Well it used to be homework could be taken up for a grade and actually count as a grade. Now, not so much, unless it’s a certain, unless the teacher really makes it that way but if it’s not for a grade I really don’t feel like doing it anyway, no point in doing it, especially if you get it. I don’t feel any need to do it. I, even if I don’t get it, it’s probably cause I felt frustrated and I just didn’t want to deal with it.

When asked how not doing her assignments affected her in class, she stated:

Sometimes it could be a downer and make trying to learn the material worse. But then like sometimes it would be good, then if I don’t do it and I go to class the next day, I’ll be like I totally don’t get this and I need to get it. It’ll either push me or just make me not want to do it. One of the two depending on the material or depending on my mood that day.

Alisha was aware of the importance of task completion in a mathematics class and would work during class to finish assignments. When asked why, she said, “Because I knew that I probably wouldn’t do none of it when I got home. So I was like, I might as well get as much done as possible.”

Alisha would get easily aggravated and said, “Sometimes I’ll get frustrated with it, or I’ll get bored doing it.” I have seen her struggle and keep going during certain observations and other days she would struggle and quit. When asked why, she said,

“because this is harder material and I don’t feel like I’ll ever get it. It just didn’t make sense. It was like you speaking French to me.”

She knew toward the end of the second semester that she wanted to pull up her grade. She had missed several days because of band and tennis and missed additional days due to illness. When she came back to school and took a test, she said:

Today in class, we went over our test...I made a 52, but I expected it because I missed most of the material and never caught back up. After tennis slows down, I hope there’s enough time to make things up to pull my grade back up...the math lessons we’ve been learning and took the test on is very difficult for me, but I don’t think it could’ve been too bad if I was there for it. I tried to ask questions and understand, but just wasn’t heard over everybody else.

She knew when she needed to put forth an extra effort for what she wanted. Alisha did put forth effort, even in the face of failure. Her reason was, “because I want to understand it so I can do well and I want to graduate and I can go to college and it will look good and get into a good college.” However, she admits:

I don’t study at home even if the test might be two weeks away I feel like to me even though I studied the 2 weeks up to it feels like a cram session to me and I just get myself more confused and I end up doing worse than I would have if I never studied . Cause sometimes it completely confuses you.

When asked how she could increase her effort, she said:

I think I’m doing pretty much. I mean I could sometimes cut back on the talking and try not to get so distracted but other than that, I try to give it the best I can. I’m not gonna lie. Sometimes I’ll come home from band practice or tennis practice and I’ll just be too tired, or a tennis match and I’m like I’m not doing any homework tonight plain and simple. I won’t do a single bit of homework. I’ll just eat and go to sleep.

Attentiveness

Attentiveness is a factor of cognitive engagement and most of Alisha’s attentiveness was determined by how well she felt she understood the material. She

acknowledged, “When I know it’s something I don’t know, then I’ll pay attention, but if it’s something I understand, then I’ll totally just go off somewhere.” She explained in more detail during another interview. Alisha stated:

I mean like if its material I get, then I just won’t fool with it, get sidetracked and talk to someone else or distract people. Ummm, if I don’t really get it, if I get frustrated enough with it, then I just put it down and not fool with it and then be a distraction. But if I feel like I’m moving, I’m progressing with what I’m doing, then I’ll won’t be a distraction because I’ll be too busy trying to work.

She experienced very sporadic attentiveness and it was usually affected by the amount of distractions that surrounded her in the classroom. She admitted that:

I pick what I want to listen to sometimes. You know how parents will start bickering at you and you’re like okay I’ll listen to this oh and it gets to the part where it’s repetitive she said this a hundred times this week let’s tune it out.

Since this classroom structure was not strict about limiting talking in class, I asked her if she had the ability to pay attention with all the talking going on around her.

She said:

Sometimes, like if it’s something I’m really trying to pay attention, sometimes I can tune them out but sometimes I can’t. The kids that get the most annoying are the ones in the corner ...and all them, cause they just gossip plain and simple and they’re really loud, all they do is laugh and all that stuff back there...if the material is hard I want it as best as possible easy for me to pay attention, I don’t want it so distractive.

When asked about her own talking and distracting behavior in class and how they inhibit her ability to attend to the class, she said on one day that:

There was a lot of talking, but I don't think I talked much that day. I think I was worried about getting everything done. I think the only talking I did was do you know how to do number such and such...I was like [another student] do you want to let me see your work.

Alisha feels more focused and attentive this year. Last year in Algebra II:

He talked in one tone, he taught everything in one way. I just couldn't pay attention. He made you go to sleep and talk with other people in the class. There was just no way to pay attention. There was just one tone. He kept stressing just one way.

When asked if she thought a more stricter environment would help her to be more attentive, her answer was, "I would have been bored more, I wouldn't have wanted to do as much as I did...the more stricter they are the more time I'll spend complaining about them and how annoying they are, yelling all the time."

Approach to Instruction

Alisha's reactions to the methods and the teacher's approach to instruction were evident in the interviews and in her journal entries. She describes this year's mathematics class as:

Most of my math classes are sit down be quiet, listen to the teacher talk, do your homework, come to school, bring it, we're gonna grade it, but with my class and [my teacher], you know, she jokes around with us. She's not like the other teachers I've had in the past where if you don't get it, she sticks with one way. [My teacher], you know goes 20 different ways. And she says choose which one helps you the best. And she interacts with you and makes it fun. She's not always grading every single homework especially when it doesn't count. And she's one of those teachers that's like, okay if you really don't wanna learn in my class, you don't want to do anything, then when you fail it's not my fault because you didn't do anything.

Alisha often talks about the fact that she needs to be shown multiple strategies for a single concept. Her opinion is that is what works best for her to keep her engaged in the classroom. She said:

Well, when I don't get it, to sit there and try different methods if they're possible. Now if there's only one way to a problem, you've got to sit there and show me, you've got to show step by step. Normally if you skip, if you say okay you know to do this so we'll go ahead and skip that step, but then I get lost, I'm gonna have to ask you to go step by step and show me each step. Sometimes that works. Ummm also you know just showing different ways that you can do it, cause certain people not be able to

remember to do it one way but another way they totally can just remember it.

She described in a previous math class that the teacher, “he kept stressing just one way.”

She likes different ways because:

Like the first way might not work for me, but the second way will work for me, so I'll just do the problem that way and when she does problems the first way I will just tune her out. I have selective listening... she just jokes around a lot more and gets on your level but also at a teacher level where as... talking in last year's class was just about random things, this year we talk about random things, but it seems we are always able to bring it back to where we need to be. On last year we talked about anything and everything. They got so loud. There were only two people that paid attention. They were the only ones that could pay attention. It was their style of teaching they liked and the rest of us this is not like how we like to be taught.

And in another interview, she remarked:

If the first way doesn't work there needs to be another way or I'm pretty much screwed. Because if I don't get it the first way and you keep showing me the first way and I'm still not getting it, I mean, there's not another way to do it, then it is a simple plain fact, I've really got to learn this some way or I'm never going to learn this.

Alisha likes to be treated a certain way in class, which increases her engagement.

She said:

What hasn't worked is when they yell at you constantly for not getting it and yet they don't take the time to try to help you get it. What works is when they kinda get on your level and they kinda treat you like an adult or they try to act like a fellow student with you and try to, why don't you try this, or compare it to this and maybe it'll help you get it. Not so much yelling at you, but being able to kinda be a best friend but also have that authority there...my experience, I'm normally, my later classes, my 5th and 6th periods, get stuck with the kids that don't really care, they just want to talk and disrupt the whole period and everything. But what works for me is kind of like in band, you have that discipline then you have that joking around time but you also know where the line is and where you cross it.

She does admit to struggling with attentiveness when the approach to instruction is the same day after day and she doesn't quite grasp the content. Her comment:

We don't really do any activities. Like when she teaches us material out of the book, she'll tell us to partner up with somebody if we can't see a book then after that you can partner up and do homework before the class is done. So, that's about it. We don't do any like scavenger hunts or anything...kind of boring to sit there and you know to make yourself sit down and do math, especially when you don't understand and maybe you can get two steps into the problem, then you don't know what to do from there.

Repeatedly during interviews and in her journal entries Alisha brings up the issue that she feels her teacher's approach to instruction involves putting harder problems on the assessments than the ones they go over in class. She feels this approach is unfair and hinders her performance. She stated:

I think in tests and quizzes some should be easy and some should be difficult but [my teacher] is notorious for this. [My teacher] will teach us one thing and then add a couple of things to make it harder and sit there and we'll sit there for the whole period working on that and then it'd be something we'd never have thought of that only you know, people who've gone past this math class would have thought of.

Alisha blames her performance on external factors. Again she talked about the tests being harder than the work in class. She says this about a test she failed:

Cause she makes it seem like easy and we get it and everything, but it seems like every time we come to a test, she makes it something like we've never seen before. Like she makes the problems harder than what she's already given us. Like we expect it to be something we will understand, and then when she gives us a harder problem than what she's been working with us on, we feel like it's not fair, cause it feels like it is a college problem. And she'll give us hints. but she like won't give us good hints, she'll just like play with us and give us hints and when she finally like gives us real advice, then sometimes it starts to click, but that test did not click. Everybody made a bad grade cause we didn't see those definition questions coming up on there.

However, during the observation before this assessment, the teacher reminded them at least three times to study a certain page with all the definitions and theorems that they needed to know for the test.

Sense of Self

Alisha seemed very sure of herself as a person, seemed aware of her weaknesses and strengths. She talked about her college goals and led a very active extra-curricular life. She thinks it is important to make good grades in math because:

Most people don't think about it. Like I've asked the question before, you know how we gonna use math in real life, but you use it on a day to day basis and like if you don't know how to do it and sometimes even economy ties into some of your math material and if you don't learn it and you don't try and take the time to try to learn it you might get yourself hurt in the end. Like when you're supposed to get a certain amount of something back and you get less or more than you should, you'd know about it. I feel that you need to know it cause there could be something that you need to know that will help you in reality, but you don't know it. You need to be able to do it to go to college. It gets harder.

When asked if she is good at math, she said, "Yes, I'm decent. I can get by."

There were times when she did not get by on assessments and when asked if this affected her, she said, "I'm used to making bad grades in trig. It really didn't have much of an effect." In addition, she was vocal about her opinions about questions I was asking her.

She stated:

Whether I do good or bad, like I said, I stand by what I do, and my opinions and what I say. I'll stand by it. I'm not one to give in to other people or take crap from other people. It's what I believe so right or wrong that's what I believe and I learn from it if it's a mistake.

Behavioral Engagement

Participation is a factor of behavioral engagement. She described her level of engagement in the classroom. She said:

I don't know it's like some days I'm really into it I'd be like I'm gonna get this I'm gonna get this I got this. Then some days it will be like I'll copy the problem and I'll try to work it out but it doesn't mean I'm going to go very far and then once I get to the point where I stop, I'm going to talk so don't get mad at me.

Alisha said she participates in class:

Like she'll throw a problem on the board, like when we first learn something new, she'll throw out a problem; show us how to do it. She'll do a couple of them, then she'll be like okay ya'll work on this one, and then we'll work on it together. And then, when she goes to work on it on the board and asks us what to do, we'll say what we think we should do, and we'll find out if we're right or wrong.

In class, she is observed to be rather loud, constantly needing to be seen or heard by others in the room. She makes noises, taps her desk, talks with her peers, but copies what the teacher puts on the dry erase board. When asked about her off-task behaviors, she says, "some days I'm crazy like that", but her teacher doesn't say much to her except "when she's really annoyed is when she'll tell me to be quiet or calm down." Her behavior includes constant talking and constant commentary on what is going on around her in class. She admitted:

Yeah, we talk to the people around us. In math, we are more lenient. In other classes, I do that, but not as much as I do in math class. Like in math class, all that group, we just sit right there and I hate to say it, but the white kids that sit there together, we all talk to each other.

Alisha's help-seeking skills are evident. Concerning asking questions, she said:

I'm not afraid to ask questions. I'm not afraid to stand by my opinion, in what I think and what I don't get. I used to be the type that would never ask questions and quickly learned that gets you nowhere but further down from where you already are. But when you ask questions, when you are not afraid to ask questions, you get the help you need. They [the teacher] sit there and they get it to where you'll understand it and make you a better person and a better student at the same time.

She was observed on numerous occasions calling out answers to questions that the teacher posed to the class. She will even go to the board and work problems, “if it’s a problem I know how to do and it’s right, I’ll go up there and do it.” One time she did one and it was wrong. She said, “I don’t care. I was like, I’ll at least try it cause no one else was stepping up to the plate. I’m a leader. I’m normally a leader. I hate being a follower.”

Even though help-seeking skills were evident inside the classroom, help-seeking skills were limited before, after school and during Impact. Because of her heavy involvement in her extra-curricular activities, she said, “I just try to get all my questions asked during class...cause normally I don’t have time after school to go to tutoring.” She stated in another interview:

I can’t go to tutoring much because I have so much after school, but like during class I’ll be like I still don’t get it and she’ll either finish a problem if she’s with someone else and then backtrack for me or she’ll just come to me individually and she’ll give everybody work to do and she’ll help me with it.

Alisha’s goal all year was to have at least an 80% in Advanced Algebra and Trigonometry. She admitted in an interview that, “I could use a lot more tutoring. I probably could have could've done better than just an 80.”

Behaviorally, Alisha used her cell phone extensively during class. This was observed and she freely talked about it during the interviews. She would constantly send and receive text messages during class and even answered the phone and had a conversation with someone on the phone. When I asked her about her phone, she said, “I was trying to not make it not so visible. I was using my sweatshirt to hide it from you.” She does not think that using her phone during class affects her performance in the

classroom. She talked more about her phone in an interview and said that it did not really affect her engagement in class:

Not really because even though I'm texting I'm not like one of those kids that once I get to doing something else I don't tune everything out around me I'm still tending to what's going on. It's like when you're looking at something else and the teacher's asking you if you're listening to them it's not one of those things like oh I'm totally not listening I'm totally like tuned in.

Common Themes

The data from the four participants have been presented as individual cases so that the unique contributions of each can be recognized. Next, the data was analyzed and cross case themes were found. The cross case investigation yielded four major areas of commonness. They include: (a) moods, feelings, and/or physical conditions, (b) effort, (c) behavioral engagement including attentiveness and help seeking skills, and (d) approach to instruction.

Moods, Feelings, and/or Physical Conditions

Each of the four participants experienced moods, feelings, and/or physical conditions that affected their patterns of engagement in the secondary mathematics classroom. Their descriptions and explanations of their emotions and feelings rendered a portrayal of their practices and beliefs of how and why their engagement was affected. This portrayal was unique to each individual student: however, there were commonalities. Feelings are part of the emotional (affective) dimension of engagement. Feelings, positive or negative, about the teacher, other students, and/or the curriculum as delivered by the teacher, affects a student's willingness and/or ability to engage in what is going on in the mathematics classroom.

Trey's feelings included joy, happiness, tiredness, boredom, anger, and excitement. Trey's day-to-day emotions and reactions, internal, unstable, and fluctuating, affected his engagement in the classroom. On days when he experienced positive feelings, he was more apt to engage in the classroom, the work was reported as "fun" and "okay and easy to understand." When negative emotions were involved, Trey reported that he had a "below average day", he "didn't understand it", or it was a "little difficult." On many of these days, he reported that he just gave up.

Bandura (1994) reported that a source of self-efficacy was psychological states, the moods, physical conditions, and stresses that students are in. When Trey was experiencing positive feelings, his personal efficacy was strengthened; he was ready to engage and to perform. However, on the days of negative emotions, his self-efficacy was almost non-existent, he did not feel that he could do the work and he did not understand. These feelings and emotions diminished his engagement in the classroom.

Lynette was almost always in a good mood. In her journal, self-reports included comments such as, "good day", "energetic", and "excellent day." The only time that she ever reported anything different was on the days that she suffered one of her migraines. On these days, she was "confused", the work was "difficult", and she "didn't get it." Her reaction to her migraines was internal and uncontrollable. Lynette continued to have a strong sense of efficacy and tried to not let her migraines affect her in class, she "kept going on."

Beauty talked about bad moods, tiredness, stress, and feelings of whether or not she understands the content in the classroom. For her, stress leads to a bad mood, which in turn leads to not learning as well as she would if she was in a good mood. On days that

she was tired and unable to totally engage in the classroom, she struggled, the material was “hard”, and sometimes she would “give up.” On “great” days, she was say the work was “easy” and understandable. Beauty’s sense of self-efficacy always remained strong despite the days she experienced negative emotions.

Alisha has days where she experienced positive and negative emotions. On “tired” days, especially after band practice or after tennis practice, she “didn’t want to do anything.” On “good” days, she enjoyed math class. While hyperactive on all the days of observation, Alisha’s emotions did not diminish her self-efficacy.

Trey, Lynette, Beauty, and Alisha’s emotions and feelings had different causes; however, it seemed as if on days of positive emotions and feelings they were more engaged, cognitively, emotionally, and behaviorally. On days when they were not so positive, they were unable to fully engage in class, even though they might have still been behaviorally engaged by “copying the notes” from the board.

Effort

The findings of this study indicated that effort played a role in the practices and beliefs of students as they engaged in the mathematics classroom. Task completion, homework completion, taking advantage of recovery opportunities, studying for assessments and effort in the face of failure were emerging themes in the cross case analysis. Mental effort is part of cognitive engagement and effort belongs to the behavioral dimension of engagement. Temporary exertion and effort fall under all three properties of attribution theory. Exertion is in internal locus, is unstable and fluctuation and is controllable by the student. Sources of self-efficacy include mastery experiences, successful and unsuccessful, which are obtained because of effort or a lack of effort. In

addition, when a student sees another student putting forth effort but still experiences failure, this vicarious experience could lead to a diminished self-exertion and diminished self-efficacy.

Trey's effort was unstable and fluctuated throughout the months of observation and interviews. His task completion was sporadic as evidenced by the homework packet grades, which included class work and homework. Tasks were more often completed because they were taken up for a grade. For Trey, homework was attempted more often when he "got it" or when the assignment was "short", when he understood the content. He became easily frustrated and would quickly give up, saying, "I am not the best at math" and "Yeah, I try, but I just don't get it so I give up."

Whereas, Trey would give up easily, Beauty would say, "I understand a little bit more when I keep trying" and would usually continue to persist throughout the assignment. However, there were moments that her effort was not as evident, especially if she reported that she was in a "bad mood." She said, "I try. Sometimes I do and sometimes I don't." She also would complete assignments if they were "easy" and if she knew ahead of time, they were to be taken up for a grade. Beauty put forth an effort to complete class and homework assignments even when they were not taken up for a grade. She remarked that, "Just because she's not taking it up for a grade doesn't mean I'm not going to do it."

Lynette completed assignments because she said that completing them led her to understand the class work, which in turn made it "easier." For her it was "mandatory for me to understand the work." Her homework packet grades, which included class and homework assignments were always turned in and were usually strong grades. Lynette is

unable to obtain transportation to come to tutoring before or after school or attend any of the opportunities for recovery. She very rarely made any effort to attend tutoring during Impact. She made comment that her teacher "doesn't encourage me to do, like want to retake it. It's usually like if I feel like if you encourage me to like redo it, I probably would."

Tasks and class work that Alisha knows will be taken up for a grade will be completed, even if sometimes they are copied from one of her peers. Alisha is quick to say that homework is "rarely" done and has not completed much homework since taking Algebra I unless it is "easy, then that's a different story." She puts an extra effort to get assignments completed during the school day because she admits, "I probably wouldn't do none of it when I got home. So I was like I might as well get as much done as possible."

Trey did not regularly attend tutoring, nor did he attend Intersession where he had an opportunity to redo test that he previously did poorly on. He was not encouraged to attend these by his teacher and therefore did not see a need because his class average was not failing. Trey's study habits fluctuated. On certain days, he would study for assessments and would say, "I guess it was easy because I studied", about the assessment. On other occasions, he would purposefully not study, as in one instance when he chose to read a book instead of studying for the assessment. On this day, he said he did poorly because "I didn't have experience going in."

Beauty attended tutoring regularly, but did not attend Intersession because she said her teacher told her she did not need to. Since students could redo any test, even one they had passed say with a B, Beauty could have attended to increase her grade, but

because her teacher said it was unnecessary, she did not go. Beauty would do “some extra practice” as she studied for assessments.

For Trey, a higher grade encouraged him to put forth more effort, while a lowered grade, in the instance when his class grade dropped to a C, his effort diminished. His sense of self-efficacy was weakened because of unsuccessful mastery experiences. He even commented that he thought this class was not the right class for him, according to his ability level. Even though he explained that, he persisted in class because he was “afraid of getting in trouble.”

Beauty’s exertion was more stable throughout the observations and interviews. Whether she experienced successful or unsuccessful mastery experiences, she continued to have a high sense of self-efficacy. Beauty did not have a fear of failure; she had a fear of being left behind in class. She had an inner desire to put forth an effort because she wanted to know what she was doing.

Lynette failed almost every major assignment during the school year. While she admits, “when it comes to tests...I freeze up”, she continued to put forth an extremely large amount of effort in class and continued to persist in the face of failure. In spite of a low sense of self-efficacy, Lynette continued to exert herself.

Alisha does put forth an effort in class, even in the face of failure. She put forth an effort to recover some of her major assignments because she said, “I want to understand it so I can do well and I want to graduate and I can go to college.”

Behavioral Engagement

Common themes surrounding behavioral engagement include attentiveness, participation, and help-seeking skills. Behavioral engagement is a dimension of

engagement and the four participants were all unique in their attentiveness, participation and in their help-seeking skills.

Trey's attentiveness in the classroom wavered from day to day. He did attempt to take notes, to listen to the teacher; however, he was easily distracted by other things that occurred in the classroom and would "check out" from the classroom. He admits, "It kind of just happens." When the class is interesting or there is something outside the normal routine of what occurs, his interest is peaked and he is attentive to what is happening around him.

Trey very rarely participated verbally in class. He usually did not ask questions or respond to the questions that the teacher would ask to the whole class during her instructional time. He felt very uncomfortable and disclosed that he gets "embarrassed" and it makes him feel "retarded" if he has to ask questions. However, Trey would participate with his partner, when the teacher allowed them to work in pairs. He did not feel the same sense of wariness when he could ask questions in a very small group.

It was very difficult to observe Beauty's actual attentiveness due to the talking that occurred between her and her friends that sat in the back corner. Her own beliefs paint her picture. She admits, "I pay attention, but there's also, like I talk." Observations did indicate that she copied the notes that the teacher placed on the board during the instructional time, but during times when she had an opportunity to practice problems, she talked during that time, waiting for the teacher to put the answers on the board.

Although Beauty did not like to participate in class by going to the board to work problems because it made her feel uncomfortable, she was relaxed in class and felt no fear to both ask numerous questions and to answer questions aloud that the teacher would

ask of the whole class. If anything, her participation in class was sometimes hindered by her absences from class. When she returned to school, she was unable to fully participate in discussions because she was busy trying to “catch up” on what she missed.

Beauty has excellent help seeking skills. She, for the first time, attended tutoring regularly. She would ask questions in class about material she did not understand. She constantly wrote in her journal about asking the two students that sat beside her questions if she had them. Beauty’s self-confidence and self-efficacy were strengthened when she attended tutoring. She feels that she gets to ask her own questions in a one on one situation where she can get more practice.

Lynette always entered the classroom ready for class, unless something drastic happened. For instance, one day she entered class and her book bag and her shirt were wet because a bottle of lotion had opened in her book bag. She spent the first part of class cleaning up the mess, going to the bathroom and trying to dry herself before she could participate in class. Lynette always seemed to be paying attention, copying word for word and every problem from the teacher’s notes on the board. She says, “It’s like I have to pay attention, it’s my thing.”

Observations and interviews showed that Lynette was not fearful of asking questions. She does feel that sometimes the teacher is not understanding of the multitude of questions that she does ask and remarked that the teacher said “you’re not paying attention” but Lynette said, “I think I am because I have it on my paper.” Lynette always was observed calling out answers and making comments during the instructional time.

Lynette was unable to obtain transportation to attend tutoring opportunities with the teacher; however, she did work well when allowed to work with a partner in class.

The conversation seemed to be meaningful and she was working on the assignment given by the teacher, with very few off-task behaviors.

Alisha's ability to pay attention in class was somewhat hindered by the talking around her. She said that if she's "really trying to pay attention, sometimes I can tune them out, but sometimes I can't." However, Alisha participates herself in the talking that occurs in the classroom. Very hyperactive, somewhat loud, and easily distracted, she seems to be more engaged during teacher-centered lessons rather than during the time that was student centered. Her attentiveness is also hindered because of her cell phone usage in the classroom. During observations, she constantly sent and read text messages. On one occasion, she even answered a call during the middle of class and held a conversation.

Alisha acknowledges that she is not afraid to ask questions in class. In fact, when she asks questions and feels like her questions are answered in a way that helps her better grasp the material, she feels more confident and her self-efficacy is strengthened. She is quick to volunteer to work problems at the board. Sometimes they were wrong and sometimes they were right. She never hesitates to respond to questions that the teacher asks the whole class. Although Alisha does not "have time after school to go to tutoring", she did attend toward the end of the year in order to recover several tests she did poorly on.

Approach to Instruction

Findings from the study showed that the teacher's approach to instruction highly affected levels of engagement in all three dimensions, cognitive, behavioral, and emotional. Group work, class activities, tasks, and teacher centered instructional time

were emerging themes in the cross case analysis. Most of the themes are affective in nature and if the student attributes success or failure to these external loci, they decrease their self-confidence and self-efficacy.

When his teacher allows him to work with a partner, Trey seems to thrive. He chose someone that created a positive learning environment rather than some of the other students that if had chosen them to work with; he would not have focused on work at all. His comments in interviews, his journal entries, and even his behavior in class becomes more cognitively animated when he can work with someone else. Because Trey did not like to ask questions in class, as soon as he was with his partner, he was discussing the problems or tasks, asking questions, and explaining certain concepts to each other. Trey thought that his partner was a little better than he was at math because he “really actually knew what was going on.” Trey attributed some of his understanding of the material to objective an external locus, his selective peer association. His sense of self-efficacy improved when he was able to gain advancement by working with peers that he thought were succeeding. This vicarious experience strengthened Trey’s sense of self-efficacy.

Because Trey’s daily routine was predictable and included “mostly teacher lecture, we don’t do many activities...all we usually do is sit there and listen to the teacher and take notes”, he seemed so much more engaged when the routine was changed. For instance, worksheets, authentic tasks, graphic organizers all seemed to lead to increased engagement for Trey. He said, “they are funner” and he stated, “it would have been better if she was more hands-on...has us show her what we could do, see if she could help us. But it was always her.”

Lynette, like Trey flourished when she could work with a partner, one that Lynette said was a little bit better than she was in math. Her reasoning was that “I could ask other people about how do they understand and if they explain it different and I could understand it then.” She chose her partner over another girl that she knew she would stay off-task with during class. Since her daily routine in Algebra II is described as “she just starts and goes to the end [of class]”, when the teacher made tasks and other non-routine book work part of her curriculum, Lynette thought it was “fun” and she was able to “complete it.”

When Beauty’s teacher completed her instructional segment, the students never had to ask to work in groups, they were always able to work with the students that sat around them. Because of this constant ability to talk and “discuss” with those around her, she did talk and admitted that some of the talking was off-task. She admitted that if the teacher facilitated more during the group time when they worked on problems, that she would have been more on-task. However, she did work well in her group at times and said, “It probably helped me a little...sometimes I’d have questions and we’d be able to talk about it amongst ourselves.”

Beauty wishes there was “class activities...a little bit of fun to it, maybe like a game” and “add some type of excitement so it would get everybody hyped up so everybody would want to learn.” She would “show more interest” to the tasks, and when the content centered on “visuals”, coins and dice, she was more engaged in the content and could see and understand the mathematics.

Alisha never really talked about working in a group or with a partner. She would often turn around and ask another student a question, but I never observed her during

class having extended conversations with those around her. She says that the usual routine of the teacher teaching the material and then working problems is “kind of boring.”

Alisha was very vocal about her need to have the content explained to her using multiple strategies. She argued, “If the first way doesn’t work, there’s needs to be another way or I’m pretty much screwed.” Alisha talks about her mathematics class this year and her teacher. The teacher’s personality and her approach to instruction sustain her engagement in the classroom. She says her teacher “interacts with you and makes it fun.”

This study began with three research questions. The questions focused on the practices, beliefs, and patterns of student engagement in the secondary mathematics classroom and on interactions between the student and the primary contexts that affect student engagement. This chapter has described each of the four participant’s practices and beliefs in four case studies. Each of the four participants had their own unique story; their own beliefs of what motivated them, of what built their self-efficacy and what engaged and sustained their engagement in learning. The interactions between each participant and their academic performance, classroom behavior, extracurricular involvement, interpersonal relationships, and feelings of school community have been explained.

The next chapter will present a discussion of the relationship of this study to prior research, the factors that affect student engagement as indicated by the Chapter 2 literature review. Then, it presents a discussion of this study to the theoretical framework, Weiner’s (1985) attributional theory of motivation and emotion and Bandura’s (1994) theory of self-efficacy.

CHAPTER 5

DISCUSSION

This chapter presents a summary of the study and important conclusions drawn from the data presented in Chapter 4. It provides a discussion of the implications for action and recommendations for further research. As an aid to the reader, this final chapter of the dissertation restates the research problem and reviews the major methods used in the study. The major sections of this chapter summarize the results and discuss their implication.

Summary of the Study

As stated in Chapter 1, the problem is that a large proportion of American students are not psychologically connected or engaged to what is occurring in their classes; in addition, they fail to take school seriously, have lost interest in school, and do not value or seek out success (Steinberg, Brown, & Dornbusch, 1996). In addition, the relationship in a mathematics classroom between schooling and engagement from the student's perspective is not well known (Cothran & Ennis, 2000). This investigation described how contexts inside and outside of the mathematics classroom affects the engagement of students in secondary mathematics. The three research questions posed in Chapter 1 were:

1. What are students' practices and beliefs concerning student engagement in the secondary mathematics classroom?

2. What are the patterns of engagement in the secondary mathematics classroom?

3. What are the interactions between the student in the secondary mathematics classroom and primary contexts (academic performance, classroom behavior, extracurricular involvement, interpersonal relationships, and school community) that affect student engagement?

As explained in Chapter 3, the study reported here was a multiple case study of the engagement practices, beliefs, and patterns of four students in two different mathematics classes. I sought to solicit individual perspectives and constructions of reality from the students. As a case study, this research used an interpretive qualitative approach, attempting to discern students constructs of engagement in the secondary mathematics classroom. The case study covered the second semester of the school year.

The case study relied on observations, student journals, and interviews. The researcher observed each student 6 times during the semester, in each instance spending fifty-five minutes observing the students in class. There was an entry interview, an exit interview, and each observation was followed by an interview.

This study provides a small snapshot of what engagement feels like, the beliefs and experiences, of four unique, individual students. The researcher did not attempt to intervene or to affect change in the environment. Instead, the goal was to provide an honest, sincere, and unvarnished portrayal of engagement as given by the voices of the students themselves. This study needs to be replicated other areas of the United States and in other schools with a different student populations.

Finn (1993) argues, “Understanding the constellation of factors that maintain students’ emotional and behavioral engagement in school remains of critical importance”

(p. 266) because “student engagement in school and class activities is an important, indeed, an essential antecedent of successful achievement outcomes” (p. 265). Therefore, once a full, robust, and honest description of engagement has been documented, the factors found within the research need to be tested and tried.

The research questions dealt with describing students’ practices, beliefs, and patterns concerning student engagement in the secondary mathematics classroom. The findings included themes from the four participants included: moods, feelings, and/or physical conditions, effort, past experiences, attentiveness, participation, help-seeking skills, working with a partner, approach to instruction, behavioral engagement, sense of self, and teacher support. There were four cross case themes: (a) moods, feelings, and/or physical conditions, (b) effort, (c) behavioral engagement including attentiveness and help seeking skills, and (d) approach to instruction. In addition, the interactions between the student in the secondary mathematics classroom and primary contexts (academic performance, classroom behavior, extracurricular involvement, interpersonal relationships, and school community) that affect student engagement are described in Chapter 4.

Discussion

First, this section contains a discussion of the relationship of this study to the literature and to prior research. Then, it presents a discussion of this study to the theoretical framework.

In the literature review in Chapter 2, I wrote that Skinner et al. (1990) found that students successfully engaged in school earn better grades, score higher on standardized tests of achievement, and are more personally adjusted. I did not find this to be very

accurate for the participants in my study. Lynette was the exception to this finding. While she was “successfully engaged in school”, she did not earn better grades. However, she did earn better grades than she would have if she were not engaged; however, her effort did not always generate corresponding grades for her.

The literature review included multiple factors that affect student engagement. The nine factors that affect student engagement are: (a) competence or perceived ability; (b) teacher support; (c) sense of community, school participation and attitude toward school; (d) quality of instruction and authentic work including challenging tasks and higher-order thinking activities; (e) peer connections; (f) classroom structure and environment; (g) perceived control; (h) parental involvement; and (i) prior levels of student engagement and academic performance.

Competence and Perceived Ability

Previous research had shown that student engagement could be a direct result of competence or perceived ability (Akey, 2006; Connell, Spencer, & Aber, 1994; Miller, Greene, Montalvo, Ravindran, & Nichols, 1996; Newmann et al., 1992; Patrick, Skinner, & Connell, 1993; Skinner et al., 1990; Valeski & Stipek, 2001). The findings for this study coincide with this previous research. Competence, the perceived possession of mathematical ability was tied to each student’s moods, feelings, and/or physical conditions. For example, in Trey’s case when he felt confident, when he “got it”, he was “happy”, he was “having fun” and he was engaged in class. However, when he was confused or when he felt “even stupider” because he did not feel competent, he would often disengage.

For Beauty, when it was “easy”, she felt confident, she called out and answered questions, she was on task because she was interested and when she felt it was easy, she did not mind doing the work, because she knew she could do it. She said, “When I understand it, I want to do more.” On the other hand, when she suffered frustration and “didn’t understand some of the stuff in math”, all she wanted to do was sleep. Alisha experienced the same feelings. She said, “Didn’t understand it and didn’t want to do it”, when she did not feel she had the ability.

Lynette said when she enjoyed lessons, when she felt that she understood, she “kept trying”, but when she was “confused” or “didn’t understand” her behaviors in class indicated that she became slightly disengaged; however, even when Lynette had a failing class average and when she felt that she did not understand, she would continue to put forth effort, to stay engaged, in an attempt to pass the class. For her, it paid off and she passed the class, barely, with a 70%.

Newmann et al. (1992) claimed that the need for competence as it is “one of the most powerful bases for human action and motivation” (p. 19). Since student engagement is affected by competence and perceived ability, how can educators go about creating within a student, the feeling of competence they need to remain engaged in mathematics classes?

Teacher Support

Research has shown that teacher support, closeness, and encouragement have been associated with student’s behavioral, emotional, and academic engagement (Akey, 2006; Birch & Ladd, 1997; Connell & Wellborn, 1991; Cothran & Ennis, 2000; Furrer & Skinner, 2003; Marks, 1995; Newmann et al., 1992; Ryan & Patrick, 2001). Findings in

this study for some of the participants was in accordance with Furrer and Skinner's (2003) research that students who felt valued by their teachers were more involved in activities in the classroom and viewed these activities as interesting and fun. Beauty and Alisha both felt that the support and encouragement they received from their teacher was beneficial. Because of the teacher's helpfulness, the way that she makes it fun, it increased engagement for both of these young ladies, over the engagement levels they experienced in previous mathematics classes. However, both Trey and Lynette felt that their teacher was not as supportive. They talked about not feeling valued, feeling bored, unhappy, and angry during class.

Findings in my study did not agree with Ryan and Patrick's (2001) findings. They found that teacher care and support promoted positive student/teacher communication, self-regulated learning, and less off-task behavior in mathematics classes. Beauty and Alisha did feel that their teacher cared; however, it did not promote less off-task behaviors in class. They were attentive and engaged while the teacher was talking, but were generally off task otherwise.

Sense of Community and School Participation

Battistich et al. (1997) found that the warmth and supportiveness of the teacher and the classroom, an emphasis on prosocial values, an encouragement of cooperation, and a drawing out of student thinking and expression of ideas advanced their sense of community, which in turn positively affected engagement. What this study found, was that a sense of community within the classroom, allows students to feel comfortable enough to be engaged, to ask questions, to answer questions, and to participate verbally in class discussions. Two of the participants, Beauty and Alisha were able to develop a

sense of membership, or bonding, an essential factor in order to promote student engagement (Newmann et al., 1992). Lynette and Trey did not feel this sense of community. In spite of this, Lynette remained engaged: however, Trey felt the lack of closeness in class hindered him from truly participating.

Quality of Instruction, Authentic Work, Challenging Tasks, and Higher-Order Thinking Activities

Shernoff et al. (2003) found that academically meaningful activities would aid in engaging students. Higher expectations and challenges that were afforded to the students led to higher engagement. The findings in this study were in agreement. When tasks, authentic, and non-routine instructional strategies were used in the classroom, Trey, Beauty, Alisha, and Lynette were more engaged and were interested in the content. Newmann et al. (1992) findings, work that “entails extrinsic rewards, meets intrinsic interests, offers students a sense of ownership, is connected to the “real world”...and involves some fun is more authentic and more likely to engage students” (p. 23), was true for the participants in this study.

Peer Connections

Research does not agree on the issue of peer connections and their effect on student engagement. While some studies have shown that peer groups can put down students who are striving for academic success and who are academically engaged (Ogbu, 2003; Steinberg et al., 1996), other studies found that peer connections do not seem to affect student engagement at all (Furrer & Skinner, 2003). For Beauty and Alisha, peer connections within the classroom did interfere with engagement. Talking and texting were common occurrences between peers on a routine basis. However, Alisha

and Trey purposefully collaborated with students that were engaged. This coincided with the results of Kindermann's (1993) study, which found that engaged students seemed to find other engaged students to work with in the classroom.

Classroom Structure and Environment

Marks (1995, 2000) found that an environment that is respectful, fair, safe, and elicits positive communication is favorable to students, which in turn enhances their engagement. The positive communication part of Marks' research was noticed in the study. Beauty and Alisha perceived that communicating within the classroom was safe for them and they reacted accordingly, engaging with the content and with the class. Trey never quite felt safe enough to engage in communication in class. Lynette, regardless of her feelings about the respectful, safe environment remained engaged in the classroom.

Perceived Control

Skinner et al. (1990) research findings centered around exercising control over success in the classroom. They believe that perceived control "is situated within a process model of motivation which holds that perceived control contributes to school performance by promoting or undermining children's engagement in learning activities and that the social context...can have an important impact on children's perceptions of control" (p. 22). This finding was very evident for Beauty. Her possession of strong efficacious behaviors led her to feel that she was in charge of and responsible for her behaviors and engagement within the classroom. Even when she does not do well, she felt a measure of control over herself and her environment, which led her to sustained engagement.

Lynette also felt a measure of control over herself. She knew she had to work extra hard because she was not a good test taker. Her engagement in the form of her attentiveness was a high priority for her. She controlled her attentiveness, felt positive about it, and this maintained her engagement in the classroom.

Parental Involvement

Furrer and Skinner (2003) researched students' sense of relatedness as a factor in academic engagement. They found that relatedness to parents was a high predictor of student engagement in the classroom. Students who entered the classroom with a high level of parental relatedness were more apt to be willing to follow the classroom agenda.

Connell and Wellborn (1991) found that student/parent relationships influence school engagement. Student engagement is affected because the quality of the at-home relationship is carried over to the relationships between the student and teachers and other students in the classroom.

Trey, who lives with his mom and step dad, often talks about his dad helping him with his homework and that his parents have set high expectations for him as far as his grades are concerned. This parental support from home is one of the main reasons for his engaged behavior in the classroom. Lynette talks about the trouble she gets into if she does not have passing grades. She talked about responsibilities she has around the house and that her mom asks her almost every night if she has homework.

Alisha lives with her mom and has shared that she is expected to have a B in her classes. She receives money for certain grades on her report card. She admitted once it was more important to have good grades at the time when progress reports go home and at the end of the grading periods. Beauty lives at home with her mom and she did not talk

about her mom's expectations during the semester. She talked about the positive relationship she had with her on more than one occasion. For these four participants, the quality of their at-home relationships has influenced their engagement at school.

Prior Levels of Student Engagement and Academic Performance

Student engagement tends to be a cyclic construct. Student engagement from one year, if supported and sustained, and not undermined will continue to exist in subsequent years (Akey, 2006; Marks, 1995). Student engagement is an indicator of student achievement (Finn, 1993). Akey (2006) found that students who are engaged early in the school year or even in their school careers will become more secure in their abilities to be successful in the content areas and that engaged behavior promotes mathematics achievement.

Even though research (Hancock & Betts, 2002; Willms, 2002) has shown that when students are actively engaged they are attentive and remember the new things they have learned, I do not think this was found in this research. First, "actively engaged" would need to be defined. If "actively engaged" is the active combination of emotional, behavioral, and cognitive engagement in the classroom, then yes I think the students might remember the new things they have learned. Alisha argued that if you are able to help a peer with a problem, then you understand and remember new things you have learned. However, if "actively engaged" is imply defined as behavioral engagement, then for these four participants, they very seldom remembered new things they had learned as evidenced by their grades and by their questions.

This study had a theoretical framework that was utilized as an aid in understanding student engagement in the mathematics classroom. Weiner's (1985)

attributional theory of motivation and emotion and Bandura's (1994) theory of self-efficacy focused the study because they addressed aspects of student engagement, the choices students make prior to and following engaged behaviors.

Attribution Theory

Using Weiner's (1985) attributional theory of motivation and emotion, this study described the reasons students engage in the mathematics classroom and explained the behavioral and environmental factors that students attribute their engagement to. Weiner (1985) found three properties of perceived causality that explain behaviors and actions: locus, stability, and controllability.

The locus, was both internal and external for the participants in this study. During interviews, probing questions were asked to determine if the participants blamed internal factors or external factors for grades on quizzes and tests, for specific behaviors in and out of the classroom, and for reasons of exerting effort. Very seldom did a participant attribute success or failure on any assessments on their own effort or aptitude, an internal locus. The reasons were usually external to the student; they said the assessments were tricky or harder than what was worked on in class. However, journals and interviews did reveal that the participants attributed their effort to their mood, an internal locus. Journal after journal entry described when students were happy, energetic, or in a good mood, they were more engaged, more interested, and the material seemed to be easier for them to understand.

Weiner et al.'s (1971) research suggest that the external and internal loci of causal factors can either be stable, relatively constant, and likely to be present in the future, or unstable, fluctuating, and changing from moment to moment. Effort was a theme for each

participant in this study. For example, Trey's effort was unstable due to many diverse reasons and he did not sustain effort well. On the other hand, Lynette's effort was more stable and she expected herself to continue to put forth an effort every time she entered the classroom.

The third property of perceived causality is controllability (Rosenbaum, 1972; Weiner, 1979). Each participant did control the amount of effort they put forth on a day-to-day basis, both inside and outside of class. However, each student experienced mood, feelings, and/or physical conditions that were uncontrollable (Weiner, 1985). Journal entries showed that Trey mood, especially tiredness and the cold of the room, affected his engagement. Lynette experienced migraines that interfered with her engagement. Beauty had "bad days" that hindered her engagement, and Alisha hyperactive behaviors were sometimes uncontrollable for her and inhibited her engagement.

Self-Efficacy

Research has shown that self-efficacy beliefs influence our cognitive, behavioral, and affective beliefs about the world around us, are important for successful learning, and affect motivation and achievement (Greene, Miller, Crowson, Duke, & Akey, 2004; Schunk & Pajares, 2002). Bandura and Cervone (1986) define self-efficacy as "People's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances. It is concerned not with the skills one has but with the judgments of what one can do with whatever skills one possesses" (p. 391).

First, self-efficacy beliefs can be produced and enhanced through the cognitive process. Cognitive performance can be influenced by three factors: how people understand ability, one's ability versus the ability of others, and performance feedback.

Even though all four participants believed that mathematical ability is acquirable, that they can work hard to obtain the skills and knowledge to understand the content, some of them did not have a strong enough sense of efficacy to remain engaged in the face of frustration because they did not understand the material even though they perceived they were trying to understand. Because they believed that they could not acquire the skills within their mathematics classroom, either due to the approach to instruction or to their own effort, their efficacy was lessened and their engagement suffered as a result. They would quit, or not do the assignments, or just cease to pay attention. The efficacy beliefs of students in this study were not weakened when they saw others scoring higher or performing better. In fact, three of the participants chose students to work with on a regular basis in class that they considered were better students than themselves and made better grades than they did. Performance feedback can also affect feelings of efficacy. Efficacy beliefs were enhanced for the participants that desired feedback. They wished that they received more feedback, positive feedback that would encourage them to stay engaged in the classroom.

The second process, motivation, can be enhanced and sustained by clear and challenging goals (Bandura & Cervone, 1986). Because students often felt frustrated and that the work was beyond their understanding, they often became disengaged. Their motivation to continue past the stage of frustration was not readily evident. Because they did not feel they had the capability to understand the content, their efficacy was lessened, and their motivation was sometimes non-existent. At other times, students would persist to overcome a sense of failure and continue to persevere, even through disappointment in the case of Lynette.

The third process, the affective process, is the emotional center of self-efficacy. Trey was not able to cope with the emotional consequences of mentally pushing himself to learn the content and he often would shut down during class. He would be copying notes, but his mind was elsewhere. Beauty coped with handling her stress in the classroom by attending tutoring with the teacher to make sure that she got all of her questions asked and answered. If the student possessed perceived coping self-efficacy and thought control efficacy, they were able to overcome levels of stress and disengagement withdrawal behaviors. This coincided with Ozer and Bandura's findings (1990).

It was difficult to ascertain how the fourth process, selection, or choice related processes played out in the classroom. Trey would not place himself in a position in the environment to feel embarrassed. However, he as well as Lynette found partners they felt were the most beneficial to them academically in class. The types of activities students choose to participate in, the environments students place themselves in, even the career options they choose to investigate are influenced by self-efficacy (Bandura, 1994).

The four sources of self-efficacy (Bandura, 1986, 1994) include mastery experiences, vicarious experiences, verbal persuasion, and psychological states. Mastery experiences can be met with either success or failure. For all four students, when they did well on a task, on a worksheet, or on a quiz that led to a major assessment, they were more confident, and at that moment experienced a strong sense efficacy. However, when the experiences were failing experiences, when they felt they did not understand their sense of efficacy was undermined. Very seldom did they persevere through a frustrating unit; they simply waited and hoped the next unit would be better for them.

The second source of efficacy beliefs is through vicarious experiences (Bandura, 1994). Because three of the participants purposefully chose certain students to work with, when they collaborated, and could work together, and see the other person understand, they too felt they were capable as well.

The third source of self-efficacy, verbal persuasion, can aid in building efficacy beliefs (Bandura, 1994). Even though research has shown that achievement is improved through verbal encouragement (Schunk, 1985), very little encouragement was observed within the classroom, and the students did not write about positive encouragement in their journals. Answers to interview questions did not lead to the evidence of verbal persuasion, except in the case of Lynette. She admitted that she would do better, would attend more recovery, and be more engaged if she felt that her teacher encouraged her to do so.

The fourth source of efficacy beliefs, the physiological states of the students, was evident throughout the study. The students' moods, physical conditions, and stresses they felt influenced their efficacy feelings in the classroom.

Implications for Practice

In *Principles and Standards*, the National Council of Teachers of Mathematics' vision for school mathematics states:

Imagine a classroom, a school, or a school district where all students have access to high-quality, engaging mathematics instruction. There are ambitious expectations for all...curriculum is mathematically rich, offering students opportunities to learn important mathematical concepts and procedures with understanding...Students confidently engage in complex mathematical tasks...draw on knowledge from a wide variety of mathematical topics, sometimes approaching the same problem from different mathematical perspectives or representing the mathematics in different ways until they find methods that enable them to make progress...are flexible and resourceful problem solvers...they work

productively and reflectively...students communicate their ideas and results effectively...value mathematics and engage actively in learning it. (NCTM, 2000, p. 2)

NCTM argues that research indicates that students are “not learning the mathematics they need or are expected to learn” and claims that the cause is a curriculum that does not engage the students.

This study offers important implications for educators, scholars, and policy makers. First, this study has shown that engagement can be observed. Students’ practices and beliefs can be investigated. Their engagement patterns can be explored. Teachers can come together and talk about what affects student’s engagement, what factors could possibly encourage self-efficacy and therefore engagement in the secondary mathematics classroom. Engagement can be investigated using theories that look at students’ before and after engagement dispositions.

Second, educators need to take into account that behavioral engagement, attentiveness, participation, and help seeking skills all contribute to active engagement in the classroom. Training needs to be conducted that would guide high school mathematics teachers in how to provide environments that encourages attentiveness. Teachers need to be aware of avenues of providing an environment that supports participation and emphasizes help-seeking skills without feelings of embarrassment.

The third implication of this study is for teachers to analyze their approaches to instruction. As all teachers have their own unique way of presenting material in the classroom, as educators we can all grow and change and develop other strategies that could work to engage our students. What teacher does not want every student to be engaged in all three dimensions in their mathematics classroom? Since engagement

predicts student achievement, Finn (1993) argues, “Understanding the constellation of factors that maintain students’ emotional and behavioral engagement in school remains of critical importance” (p. 266) because “student engagement in school and class activities is an important, indeed, an essential antecedent of successful achievement outcomes” (p. 265).

The fourth implication of this study is that we cannot talk about student engagement without the student present and involved in the discussion. The findings of this study show that each student has a unique perspective and their own distinctive reactions to happenings in and out of class that in turn affects their engagement. Dewey (1933) said, “Teaching may be compared to selling commodities. No one can sell unless someone buys” (p. 35). Teachers need to have a discussion with their students up front about engagement in the classroom. All three dimensions of engagement, emotional, cognitive, and behavioral, need to be discussed. Students, as seen from this student, often believe that if they are behaviorally engaged, they are doing what they need to do in order to understand and to be successful. Informing students about the differences between the three dimensions may help them to realize when they are simply in class versus being “engaged” in class.

Investigating engagement from the student’s perspective is important. Csíkszentmihályi (1990) said “...if intrigued by the opportunities of the domain, most students will make sure to develop the skills they need to operate within it” (p. 126). Even though it was not a goal of this research to affect change, but to observe and report behaviors, interview questions did lead students to think about their engagement behaviors in the classroom. When the findings were discussed with each participant, they

agreed with the results and were surprised to look back at their behaviors and see certain themes themselves. None of the participants realized that their moods and feelings so impacted their engagement in the classroom or that they were sometimes behaviorally engaged, but not cognitively engaged. Participants in the study did talk about the times when they felt they were really cognitively engaged, when they really understood the content versus simply following algorithms. The above suggestions would facilitate creating an environment within the classroom that would encourage students to both think and examine their own levels of engagement and to train teachers to create environments that would support high levels of engagement in the mathematics classroom.

Recommendations for Further Research

This study provides a small snapshot of what engagement feels like, the beliefs and experiences, of four unique, individual students. The researcher did not attempt to intervene or to affect change in the environment. Instead, the goal was to provide an honest, sincere, and unvarnished portrayal of engagement as given by the voices of the students themselves. This study needs to be replicated other areas of the United States and in other schools with a different student populations.

If it is true as Finn (1993) argues, that, “Understanding the constellation of factors that maintain students’ emotional and behavioral engagement in school remains of critical importance” (p. 266) because “student engagement in school and class activities is an important, indeed, an essential antecedent of successful achievement outcomes” (p. 265), then once a full, robust and honest description of engagement has been documented, the factors found within the research need to be tested and tried.

Concluding Remarks

The purpose of the study was to investigate students' constructs of student engagement, their beliefs, attitudes, and values as they relate to student engagement in secondary mathematics. Although the findings from this study may provide a starting point in describing engagement as a multidimensional construct from the student's perspective (McMahon & Portelli, 2004), much more work needs to be done from a qualitative methodological standpoint on student engagement in the secondary mathematics classroom.

Since "engagement in school was a critical predictor of mathematics achievement for high school students" (Akey, 2006, p. 31), it is necessary to further explore and investigate student engagement within high school mathematics classrooms so that themes can be found that when introduced into the classroom to the students will affect change.

References

- Akey, T. A. (2006). *School context, student attitudes and behavior, and academic achievement: An exploratory analysis*. New York: MDRC.
- Angen, M. J. (2000). Evaluating interpretive inquiry: Reviewing the validity debate and opening the dialogue. *Qualitative Health Research, 10*(3), 378-395.
- Appleton, J. J., Christenson, S. L., Kim, D., & Reschly, A. (2006). Measuring cognitive and psychological engagement: Validation of the student engagement instrument. *Journal of School Psychology, 44*(5), 427-445.
- Bandura, A. (1986). *Social foundations of thought and action*. Englewood Cliffs, NJ: Prentice-Hall.
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavior change. *Psychological Review, 84*, 191-215.
- Bandura, A. (1992). Exercise of personal agency through the self-efficacy mechanism. In R. Schwarzer (Ed.), *Self-efficacy: Thought control of action* (pp. 3-38). Washington, DC: Hemisphere.
- Bandura, A. (1993). Perceived self-efficacy in cognitive development and functioning. *Educational Psychologist, 28*(2), 117-148.
- Bandura, A. (1994). Self-efficacy. In V. S. Ramachaudran (Ed.), *Encyclopedia of human behavior* (Vol. 4, pp. 71-81). New York: Academic Press.

- Bandura, A., & Cervone, D. (1986). Differential engagement of self-reactive influences in cognitive motivation. *Organizational Behavior and Human Decision Processes*, 38, 92-113.
- Bandura, A., & Jourden, F. J. (1991). Self-regulatory mechanisms governing the impact of social comparison on complex decision-making. *Journal of Personality and Social Psychology*, 60, 941-951.
- Battistich, V., Solomon, D., Watson, M., & Schaps, E. (1997). Caring school communities. *Educational Psychologist*, 32(3), 137-151.
- Berger, P. L., & Luckmann, T. (1967). *The social construction of reality: A treatise in the sociology of knowledge*. Garden City, NJ: Anchor Books.
- Birch, S. H., & Ladd, G. W. (1997). The teacher-child relationship and children's early school adjustment. *Journal of School Psychology*, 35(1), 61-79.
- Blumenfeld, P. C., & Meece, J. L. (1988). Task factors, teacher behavior and students' involvement and use of learning strategies in science. *Elementary School Journal*, 88, 235-250.
- Blumenfeld, P., Modell, J., Bartko, W. T., Secada, W. G., Fredricks, J. A., Friedel, J., et al. (2005). School engagement of inner-city students during middle childhood. In C. R. Cooper, C. T. Coll, W. T. Bartko, H. M. Davis & C. Chatman (Eds.), *Developmental pathways through middle childhood: Rethinking contexts and diversity as resources* (pp. 145-170). Mahwah, N.J.: Lawrence Erlbaum Associates.
- Bogdan, R. C., & Biklen, S. K. (2003). *Qualitative research in education: An introduction to theory and methods*. New York: Pearson Education Group, Inc.

- Bouffard-Bouchard, T. (1990). Influence of self-efficacy on performance in a cognitive task. *Journal of School Psychology, 130*(3), 353-363.
- Bouffard-Bouchard, T., Parent, S., & Larivée, S. (1991). Influence of self-efficacy on self-regulation and performance among junior and senior high-school age children. *International Journal of Behavioral Development, 14*, 153-164.
- Candy, P. C. (1989). Alternative paradigms in educational research. *Australian Educational Researcher, 16*(3), 1 – 11.
- Collins, J. L. (1982, March). *Self-efficacy and ability in achievement behavior*. Paper presented at the annual meeting of the American Educational Research Association, New York.
- Connell, J. P., Spencer, M. B., & Aber, J. L. (1994). Educational risk and resilience in African-American youth: Context, self, action, and outcomes in school. *Child Development, 65*, 493-506.
- Connell, J. P., & Wellborn, J. G. (1991). Competence, autonomy, and relatedness: A motivational analysis of self-system processes. In M. Gunnar & L. A. Sroufe (Eds.), *Minnesota symposium on child psychology* (Vol. 23, pp. 43-77). Chicago: University of Chicago Press.
- Cothran, D. J., & Ennis, C. D. (2000). Building bridges to student engagement: Communicating respect and care for students in urban high schools. *Journal of Research and Development in Education, 33*(2), 106-117.
- Creswell, J. W. (1998). *Qualitative inquiry and research design: Choosing among five traditions*. Thousand Oaks, CA: Sage Publications.

- Creswell, J. W. (2003). *Research design: Qualitative, quantitative, and mixed methods approaches* (2nd ed.). Thousand Oaks, CA: Sage Publications.
- Csikszentmihályi, M. (1990). Literacy and intrinsic motivation. *Daedalus*, 119, 115-140.
- Denzin, N. K., & Lincoln, Y. S. (2000). *The handbook of qualitative research*. Thousand Oaks, CA: Sage Publications.
- Dewey, J. (1933). *How we think (revised edition)*. New York: D. C. Heath.
- Diplomas Count: An Essential Guide to Graduation Policy and Rates* [Special Issue]. (2006). Education Week.
- Diplomas Count: Ready for What? Preparing Students for College, Careers, and Life after High School* [Special Issue]. (2007, June 12). Education Week.
- Finn, J. D. (1993). *School engagement and students at risk*. Washington, DC: National Center for Education Statistics.
- Finn, J. D. (1992, April). *Participation among eighth-grade students at risk*. Paper presented at a symposium entitled “Students at Risk: Results from National Surveys” (chaired by M. C. Wang) at the annual meeting of American Educational Research Association, San Francisco, CA.
- Fleener, J. M. (2004). Why mathematics? Insights from poststructural topologies. In M. Walshaw (Ed.), *Mathematics education within the postmodern* (pp. 201-218). Greenwich, CT: IAP Information Age.
- Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research*, 74(1), 59-109.

- Fredricks, J. A., Blumenfeld, P., Friedel, J., & Paris, A. (2003, March). *School engagement*. Paper presented at the Indicators of Positive Development Conference, Washington, DC.
- Furrer, C., & Skinner, E. (2003). Sense of relatedness as a factor in children's academic engagement and performance. *Journal of Educational Psychology, 95*(1), 148-162.
- Gamoran, A., & Nystrand, M. (1992). Taking students seriously. In F. M. Newmann (Ed.), *Student Engagement and Achievement in Secondary Schools* (pp. 40-61). New York: Teachers College Press.
- Garrick, J. (1999). Doubting the philosophical assumptions of interpretive research. *Qualitative Studies in Education, 12*(2), 147-156.
- Glesne, C., & Peshkin, A. (1992). *Becoming qualitative researchers*. White Plains, NY: Longman.
- Goetz, J. P., & LeCompte, M. D. (1984). *Ethnography and qualitative design in educational research*. Orlando, FL: Academic Press, Inc.
- Greene, B. A., Miller, R. B., Crowson, M., Duke, B. L., & Akey, K. L. (2004). Predicting high school students' cognitive engagement and achievement: Contributions of classroom and motivation. *Contemporary Educational Psychology, 29*, 462-482.
- Hancock, V., & Betts, F. (2002). Back to the future: Preparing learners for academic success in 2004. *Learning & Leading with Technology, 29*(7), 10-13, 27.
- Hart, L. E. (2003). Some directions for research on equity and justice in mathematics education. In L. Burton (Ed.), *Which way social justice in mathematics education?* (pp. 27-49). Westport, CT: Praeger.

- Hays, P.A. (2004). Case study research. In K. B. DeMarrais & S. D. Lapan (Eds.), *Foundations for research methods of inquiry in education and social sciences* (pp. 217-234). Mahwah, N.J.: L. Erlbaum Associates.
- Heider, F. (1958). *The psychology of interpersonal relations*. New York: Wiley.
- 162.
- Helme, S., & Clarke, D. (2001). Identifying cognitive engagement in the mathematics classroom. *Mathematics Education Research Journal*, 13(2), 133-153.
- Holloway, I. (1997). *Basic concepts for qualitative research*. London: Blackwell Science.
- Jimerson, S. R., Campos, E., & Greif, J. L. (2003). Toward an understanding of definitions and measures of school engagement and related terms. *The California School Psychologist*, 8, 7-27.
- Jones, E. E., & Davis, K. E. (1965). From acts to dispositions: The attribution process in person perception. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 2, pp. 219-266). Orlando, FL: Academic Press.
- Jourden, F. (1992). The influence of feedback framing on the self-regulatory mechanisms governing complex decision-making *Dissertation Abstracts International*, 52(9-B), 5009.
- Kelley, H. H. (1967). Attribution in social psychology. *Nebraska Symposium on Motivation*, 15, 192-238.
- Kindermann, T. A. (1993). Natural peer groups as contexts for individual development: The case of children's motivation in school. *Developmental Psychology*, 29(6), 970-977.

- Klem, A. M., & Connell, J. P. (2004). Relationships matter: Linking teacher support to student engagement and achievement. *Journal of School Health, 74*(7), 262 - 273
- Lamborn, S. D., Brown, B. B., Mounts, N. S., & Steinberg, L. (1992). Putting school in perspective: The influence of family, peers, extracurricular participation, and part-time work on academic engagement. In F. M. Newmann (Ed.), *Student engagement and achievement in American secondary schools* (pp. 153-181). New York: Teachers College Press.
- Lewis, C. (2002). *Colorado learning assessment studies: Studies of student engagement*. Retrieved June 21, 2006, from <http://www.colorado.edu/ptsp/InitiativeEngaged/StudyEngage.html>
- Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Beverly Hills, CA: Sage Publications.
- Linnenbrink, E. A., & Pintrich, P. R. (2003). The role of self-efficacy beliefs in student engagement and learning in the classroom. *Reading & Writing Quarterly, 19*, 119-137.
- McMahon, B., & Portelli, J. P. (2004). Engagement for what? Beyond popular discourses of student engagement. *Leadership and Policy in Schools, 3*(1), 59-76.
- Mannheim, K. (1986). *Conservatism: A contribution to the sociology of knowledge*. London: Routledge & Kegan Paul. (original work published 1925)
- Marks, H. M. (1995). *Student engagement in the classrooms of restructuring schools*. [Washington, DC]: U.S. Dept of Education, Office of Educational Research and Improvement, Educational Resources Information Center.

- Marks, H. M. (2000). Student engagement in instructional activity: Patterns in the elementary, middle, and high school years. *American Educational Research Journal*, 37(1), 153-184.
- Merriam, S. B. (1998). *Qualitative research and case study applications in education*. San Francisco, CA: Jossey-Bass Publishers.
- Merriam, S. (2002). Introduction to qualitative research. In S. Merriam (Ed.), *Qualitative research in practice: Examples for discussion and analysis* (pp. 3 - 17). San Francisco, CA: Jossey-Bass.
- Miles, M. B., & Huberman, A. M. (1984). *Qualitative data analysis: A sourcebook of new methods*. Beverly Hills, CA: Sage Publications, Inc.
- Miller, R. B., Greene, B. A., Montalvo, G. P., Ravindran, B., & Nichols, J. D. (1996). Engagement in academic work: The role of learning goals, future consequences, pleasing others, and perceived ability. *Contemporary Educational Psychology*, 21, 388-422.
- National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics*. Reston, VA: National Council of Teachers of Mathematics.
- National Research Council and the Institute of Medicine. (2004). *Engaging schools: Fostering high school students' motivation to learn*. Committee on Increasing High School Students' Engagement and Motivation to Learn. Board on Children, Youth and Families, Division of Behavioral and Social Sciences and Education. Washington, DC: The National Academies Press.
- Newmann, F. M. (1981). Reducing student alienation in high schools: Implications of theory. *Harvard Educational Review*, 51(4), 546-564.

- Newmann, F. M. (1989). Student engagement and high school reform. *Educational Leadership, 46*(5), 34-36.
- Newmann, F. M. (1992). Introduction. In F. M. Newmann (Ed.), *Student engagement and achievement in American secondary schools* (pp. 1-10). New York: Teachers College Press.
- Newmann, F. M., Wehlage, G. G., & Lamborn, S. D. (1992). The significance and sources of student engagement. In F. M. Newmann (Ed.), *Student engagement and achievement in American secondary schools* (pp. 11-39). New York: Teachers College Press.
- Ogbu, J. U. (2003). *Black American students in an affluent suburb: A study of academic disengagement*. Mahwah, NJ: Lawrence Erlbaum.
- Ozer, E., & Bandura, A. (1990). Mechanisms governing empowerment effects: A self-efficacy analysis. *Journal of Personality and Social Psychology, 58*, 472-486.
- Patrick, B. C., Skinner, E. A., & Connell, J. P. (1993). What motivates children's behavior and emotion? Joint effects of perceived control and autonomy in the academic domain. *Journal of Personality and Social Psychology, 65*(4), 781-791.
- Pintrich, P. R., & Zusho, A. (2002). Student motivation and self-regulated learning in the college classroom. In J. C. Smart & W. G. Tierney. (Eds.), *Higher education: Handbook of theory and research* (Vol. 17, pp. 55-128). New York: Agathon Press.
- Ponterotto, J. G. (2006). Brief note on the origins, evolution, and meaning of the qualitative research concept "thick description". *The Qualitative Report, 11*(3), 538-549.

- Preissle, J. (2006). Envisioning qualitative inquiry: A view across four decades. *International Journal of Qualitative Studies in Education*, 19(6), 685-695.
- Purkey, W. W. (2000). *What students say to themselves: Internal dialogue and school success*. Thousand Oaks, CA: Corwin Press, Inc.
- Rosenbaum, R. M. (1972). A dimensional analysis of the perceived causes of success and failure. Unpublished doctoral dissertation, University of California, Los Angeles.
- Ryan, A. M., & Patrick, H. (2001). The classroom social environment and changes in adolescents' motivation and engagement during middle school. *American Educational Research Journal*, 38(2), 437-460.
- Schlechty, P. (2001). *Shaking up the school house: How to support and sustain educational innovation*. San Francisco: Jossey-Bass.
- Schramm, W. (1971). *Notes on case studies of instructional media projects*. Working paper for the Academy for Educational Development, Washington, DC.
- Schunk, D. H. (1985). Self-efficacy and classroom learning. *Psychology in the Schools*, 22, 208-223.
- Schunk, D. H., & Pajares, F. (2002). The development of academic self-efficacy. In A. Wigfield & J. S. Eccles (Eds.), *Development of achievement motivation* (pp. 15-31). San Diego, CA: Academic Press.
- Sedlak, M. W., Wheeler, C. W., Pullin, D. C., & Cusick, P. A. (1986). *Selling students short: Classroom bargains and academic reform in the American high school*. New York: Teachers College Press.
- Seeley, C. (2004). President's Message: Engagement as a tool for equity. *National Council of Teachers of Mathematics News Bulletin*, 41, 3.

- Shernoff, D. J., Csikszentmihalyi, M., Schneider, B., & Shernoff, E. S. (2003). Student engagement in high school classrooms from the perspective of flow theory. *School Psychology Quarterly, 18*(2), 158-176.
- Skinner, E. A., & Belmont, M. J. (1993). Motivation in the classroom: Reciprocal effects of teacher behavior and student engagement across the school year. *Journal of Educational Psychology, 85*(4), 571-581.
- Skinner, E. A., Wellborn, J. G., & Connell, J. P. (1990). What it takes to do well in school and whether I've got it: The role of perceived control in children's engagement and school achievement. *Journal of Educational Psychology, 82*(1), 22-32.
- Skinner, E. A., Zimmer-Gembeck, M. J., & Connell, J. P. (1998). Individual differences and the development of perceived control. *Monographs of the Society for Research in Child Development, 63*(2-3), 1-220.
- Steinberg, L., Brown, B. B., & Dornbusch, S. M. (1996). *Beyond the classroom: Why school reform has failed and what parents need to do*. New York: Simon & Schuster.
- Stinson, D. W. (2004). Mathematics as "gatekeeper" (?): Three theoretical perspectives that aim toward empowering all children with a key to the gate. *The Mathematics Educator, 14*(1), 8-18.
- Stipek, D. (2002). Good instruction is motivating. In A. Wigfield & J. Eccles (Eds.), *Development of achievement motivation* (pp. 310-334). San Diego, CA: Academic Press.

- Sullivan, P., Tobias, S., & McDonough, A. (2006). Perhaps the decision of some students to engage in learning mathematics in school is deliberate. *Educational Studies in Mathematics*, 62, 81 – 99.
- Terre Blanche, M. & Kelly, K. (1999). Interpretive methods. In M. Terre Blanche & K. Durrheim (Eds.). *Research in practice: Applied methods for the social sciences*. (pp. 123-146). Cape Town: UCT Press.
- U. S. Department of Education. (May, 2007). *U. S. secretary of education Margaret Spellings delivers remarks at national summit on America's silent epidemic*. Retrieved May 14, 2007, from <http://www.ed.gov/news/pressreleases/2007/05/05092007.html>
- U. S. Department of Education. (October, 1997). *Mathematics equals opportunity*. White Paper prepared for U. S. Secretary of Education Richard W. Riley. Retrieved May 14, 2007, from <http://www.ed.gov/pubs/math/mathemat.pdf>
- Usher, E. L., & Pajares, F. (2006). Sources of academic and self-regulatory efficacy beliefs of entering middle school students. *Contemporary Educational Psychology*, 31, 125-141.
- Valeski, T. N., & Stipek, D. J. (2001). Young children's feelings about school. *Child Development*, 72(4), 1198-1213.
- Voelkl, K. E. (1997). Identification with school. *American Journal of Education*, 105, 294-318.
- Walker, R. (1980). The conduct of educational case studies: Ethics, theory and procedures. In W. B. Dockrell & D. Hamilton (Eds.), *Rethinking Educational Research* (pp. 30 – 63). London: Hodder & Stoughton.

- Weiner, B. (1979). A theory of motivation for some classroom experiences. *Journal of Educational Psychology, 71*, 3-25.
- Weiner, B. (1985). An attributional theory of achievement motivation and emotion. *Psychological Review, 92*(4), 548-573.
- Weiner, B., Frieze, I. H., Kukla, A., Reed, L., Rest, S., & Rosenbaum, R. M. (1971). *Perceiving the causes of success and failure*. Morristown, NJ: General Learning Press.
- Weinstein, R. S. (1993). Children's knowledge of differential treatment in school: Implications for motivation. In T. M. Tomlinson (Ed.), *Motivating students to learn: Overcoming barriers to high achievement* (pp. 197-224). Berkeley, CA: McCutchan Publishing Corporation.
- Willms, J. D. (Ed.). (2002). *Vulnerable children*. Edmonton: University of Alberta Press.
- Wood, R., & Bandura, A. (1989). Impact of conceptions of ability on self-regulatory mechanisms and complex decision making. *Journal of Personality and Social Psychology, 56*, 407-415.
- Yin, R. K. (2003). *Case study research: Design and methods* (3rd ed.). Thousand Oaks, CA: Sage Publications, Inc.

APPENDIXES

APPENDIX A

Georgia State University
Department of Middle-Secondary Education and Instructional Technology
Informed Assent

Title: An Exploratory Study of Mathematics Engagement of Secondary Students

Principal Investigator: Dr. Christine Thomas

Student Investigator: Tracy T. Brown

I. Purpose:

You are invited to participate in this study. The purpose of the study is to investigate student engagement. Four participants will be recruited for this study. Participation will require two hours each month for three months.

II. Procedures:

If you decide to participate, you will be observed and videotaped twice a month. You will be interviewed. Interviews will occur at the beginning of the study and after each observation. The interviews will occur before school or after school. Interviews will be audio taped. You will be asked to keep a journal. The journal will be used to record thoughts, feelings, beliefs, and actions.

III. Risks:

In this study, you will not have any more risks than you would in a normal day of life.

IV. Benefits:

You may benefit from participation in this study. You could improve your self-efficacy. You could increase your awareness of your engagement behaviors. Overall, we hope to gain information about student engagement.

V. Voluntary Participation and Withdrawal:

Participation in research is voluntary. You do not have to be in this study. If you decide to be in the study, you can change your mind. You have the right to drop out at any time. You may skip questions. You may stop participating at any time, without penalty. Whatever you decide, you will not lose any benefits.

VI. Confidentiality:

We will keep your records private. We will use a fictitious name on records. Only the student investigator will have access to the information. It will be stored in a locked cabinet. Audio tapes and video tapes will be stored in a locked cabinet. They will be transcribed. Then, they will be destroyed. Your name will not appear when we present this study or publish its results. The findings will be summarized. Findings will be reported in group form. You will not be identified personally.

VII. Contact Persons:

Call Christine Thomas at 404-651-0200 or Tracy Brown at 404-509-9807 if you have questions about this study. You may have questions or concerns about your rights as a participant in this research study. If so, contact Susan Vogtner in the Office of Research Integrity at 404-413-3513 or svogtner1@gsu.edu.

VIII. Copy of Consent Form to Subject:

We will give you a copy of this assent form to keep.

If you are willing to participate as a volunteer for this research and be audio and video recorded, please sign below.

Participant

Date

Student Investigator

Date

APPENDIX B

Georgia State University
Department of Middle-Secondary Education and Instructional Technology
Informed Consent

Title: An Exploratory Study of Mathematics Engagement of Secondary Students

Principal Investigator: Dr. Christine Thomas
Student Investigator: Tracy T. Brown

I. Purpose:

Students in two math classes will be asked to participate in this study. The purpose of the study is to investigate student engagement. Four participants will be recruited for this study. Participation will require two hours each month for three months.

II. Procedures:

If your child decides to participate, they will be observed and videotaped twice a month. Your child will be interviewed by the student investigator. Interviews will occur at the beginning of the study and after each observation. The interviews will occur before school or after school. Interviews will be audio taped. Your child will be asked to keep a journal. The journal will be used to record thoughts, feelings, beliefs, and actions.

III. Risks:

In this study, participants will not have any more risks than they would in a normal day of life.

IV. Benefits:

Participation in this study may benefit your child. Your child could improve their self-efficacy and increase their awareness of engagement behaviors. Overall, we hope to gain information about student engagement.

V. Voluntary Participation and Withdrawal:

Participation in research is voluntary. Your child does not have to be in this study. If your child decides to be in the study, he or she can change their mind. Your child has the right to drop out at any time. Your child may skip questions. Your child may stop participating at any time, without penalty. Whatever your child decides, he or she will not lose any benefits.

VI. Confidentiality:

We will keep your child's records private. We will use a fictitious name on records. Only the student investigator will have access to the information. It will be stored in a locked cabinet. Audio tapes and video tapes will be stored in a locked cabinet. They will be transcribed. Then, they will be destroyed. Your child's name will not appear when we present this study or publish its results. The findings will be summarized. Findings will be reported in group form. Your child will not be identified personally.

VII. Contact Persons:

Call Christine Thomas at 404-651-0200 or Tracy Brown at 404-509-9807 if you or your child has questions about this study. If you or your child has questions or concerns about rights as a participant in this research study, you may contact Susan Vogtner in the Office of Research Integrity at 404-413-3513 or svogtner1@gsu.edu.

VIII. Copy of Consent Form to Subject:

We will give you a copy of this consent form to keep.

If you are willing for your child to participate as a volunteer for this research and be audio and video recorded, please sign below.

Participant's Printed Name

Date

Parent or Guardian

Date

Student Investigator

Date

APPENDIX C

Self-Inventory

1 – Strongly Agree

2 – Agree

3 – Undecided – Neither Agree or Disagree

4 – Disagree

5 – Strongly Disagree

	1	2	3	4	5
A – general background					
I am on time to school.					
I do not miss days of school.					
I have taken challenging math classes in high school.					
I believe it is important to make good grades in math.					
I like math.					
Math is my favorite class.					
B – competence and perceived ability					
I am a good math student.					
I have the ability to do well in math.					
I like to solve new problems.					
I like to dig deeply into understanding new topics.					
I like to apply mathematics to life outside of school.					
C - goal orientation and effort					
I have a goal to make a certain grade in math.					
I try as hard as I can in math class.					

I complete my homework assignments in math.					
I participate in class by asking questions.					
I participate in math class.					
I pay attention in math class.					
I persist in math class even when I do not get it right the first time.					
I only do well in math when I am in the mood to do well.					
I do well in math when the assignments are easy.					
It seems I only do well in math some of the time.					
D - influences on motivation in mathematics including peer connections					
My job affects my achievement in my math class.					
My extracurricular activities affect my achievement in my math class.					
My friends and I work on math together.					
I have too many out of school influences that affect my achievement in mathematics.					
My friends hinder me from being a good math student.					
My priorities hinder me from being a good math student.					
I try harder after moments of success.					
When other students continually do better than I do, I tend to give up.					
E - self-confidence and self-efficacy in mathematics including perceived control					
When given a task to do in math, I feel that I can do it.					
I choose easy problems to do.					
I choose hard math problems to complete.					
I want to know more than my teacher is teaching.					
I have self-confidence in math.					
I feel better and do more when I receive positive feedback.					

When I see my friends learn to do the math, I feel that I can too.					
F - natural ability and prior levels of academic performance in mathematics					
I have natural skills and abilities in mathematics.					
I was a good math student in elementary school.					
I did my math homework in elementary school.					
I believe I was born with only a certain amount of math ability.					
I was a good math student in middle school.					
I did my math homework in middle school.					
I was a good math student last year.					
I did my math homework last year.					
I think that I can do the math.					
I believe I can acquire math skills.					
G - study habits in mathematics including parental involvement and support					
My parents encourage me to do my math homework.					
My parents ask me about how my math class was that day.					
My parents discipline me for not doing well in math.					
My parents attend school events and functions.					
My parents value learning in mathematics.					
H - experiences and beliefs with activities and assessments in mathematics					
I do well when we have activities in class.					
I think that activities are a good way to learn math content.					
I do well on tests.					
I receive feedback on the tests that I take.					
My math class has other assessments than tests.					

I - beliefs and feelings about the classroom including teacher and environment support					
I get along well with my mathematics teacher.					
My math teacher is interested in me.					
My math teacher praises my efforts.					
My math teacher listens to what I have to say.					
I feel safe at school.					
My math teacher expects me to do the best I can all the time.					
My math teacher helps me when I do not understand.					
My classroom behavior in math class is always appropriate.					
I feel I can do the math when someone encourages me verbally.					

APPENDIX D

Sample Interview Questions

What mathematics classes have you taken in the past and what math are you currently taking?

What were your grades then and what is your grade now?

Do you think it is important to make good grades in your math class?

Why is mathematics important?

What kinds of things do you do just for fun?

What do you do at school because you like it?

What do you plan on doing after high school? What kind of job do you want in the future?

Do you like math? Do you like your math class this year? What has been your favorite math class? Why? Are you challenged in your math class?

Are you good at math? Why do you think that is? Do you think you can do the math this year?

What are some things you do in your math class? How do you usually act in your math class? What is your participation level in your math class? Do you complete the homework, the class work? If you do complete the work, why motivates you to complete it?

Do your parents encourage you to do well in math, to do your homework?

If something interferes with being able to do homework, what is it: after school jobs, calling friends, time on the computer, apathy, etc...)

Do you have the kinds of friends that can help you with your math work? Do you ever work with them or talk to them about math?

Do you think math ability is an acquirable skill or something a person is born with?

So do you...

Are the activities in your math class interesting?

Do you ask questions in your math class? Why or why not?

Do you participate in class discussions?

Think about what your teacher regularly does in class: lesson format, projects, assessments, student treatment, classroom environment, prompt feedback, and grading of papers. How does this affect what you do in math class?

Do you take pride in your work in your math class?

What rewards and punishments do you receive when you do well or not so well in math?

What did you do in math class today?

How do you feel today? Is it a good day or a bad day? Do you think your mood today affected how you participated in math class?

Did you enjoy what you did in math class today?

What did you think about the lesson today?

Was the activity or assignment easy or hard? Why?

I noticed that you struggled with the lesson today. You (stopped working or kept trying). Why did you (stop working or keep trying)?

What in the past helped you with the activity?

I noticed that you (did or did not) participate in your group work today?

Why do you think you (did or did not) understand the material today?

You seemed to really understand today's lesson...why do you think that is? Or You seemed to struggle with today's lesson...why do you think that is?

You (did or did not) ask (teacher or peer) for help in today's lesson? Why or why not? What did you think about _____ knowing all the answers to your teacher's questions today?

What did you think when your teacher Negative versus positive feedback...

What were you doing when

The project that your teacher assigned today gave you a choice of how you were to collect and present your information. How did you feel about that?

APPENDIX E

Journal Questions

Journal Questions:

- After your math class, answer these questions in your journal. I will look at them each week and we will talk about them when we meet for our interviews.
1. How do you feel today? Is it a good day or a bad day? Why?
 2. What did you do in math class today? What did you think about what you did today?
 3. Did you enjoy what you did in math class today?
 4. Was the lesson easy or hard? Why?
 5. If you struggled with the lesson today, did you give up or keep trying to get it?
 6. If you really understood the lesson today, why do you think you “got it”?
 7. Did you participate in class and in group today? How? If you did not participate, tell me why.
 8. Did you ask the teacher any questions today? Which ones? How did you feel?
 9. Did you ask any of the other students in class any questions today? Which ones? How did you feel?
 10. Were you on-task or off-task today in your math class? Why?

- Before you go to bed, answer these questions in your journal. I will look at them each week and we will talk about them when we meet for our interviews.

11. What occupied your time from the time you got home until the time you went to bed?

12. Did you do any math homework tonight? Why or why not?

13. Did your parents ask you if you had any math homework tonight?