Attending High School Algebra I: In Search of Well-managed, Engaging, Culturally Relevant, and Caring Classrooms

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ATTENDING HIGH SCHOOL ALGEBRA I:
IN SEARCH OF WELL-MANAGED, ENGAGING, CULTURALLY RELEVANT,
AND CARING CLASSROOMS

A Dissertation
Presented to
The Faculty of the Morgridge College of Education
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In Partial Fulfillment
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Doctor of Philosophy

By
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The inequities in learning between the rich and the poor have become pervasive in United States. This is evidenced by the high school graduation rates, college attendance percentages, and employment statistics. Upon another wave of reform, the Common Core State Standards in mathematics are currently being adopted in hopes of increasing learning for all students, with a focus on college and career readiness. This study is intent on finding ways to remedy the inequities in mathematics between the high income and low income schools by focusing on one of the great glass ceilings to high school graduation and beyond, high school Algebra I. This study gives examples of how successful teachers are providing opportunities for learning Algebra I despite barriers that students, administrators, and policy-makers deliver in low-income schools amidst the latest reform movement.

The researcher provides a portrait of how three different algebra teachers in three different low-income high schools, in the same city in Colorado, teach within the confines of various reform mandates to meet the diverse needs of their students. The research was conducted with a particular focus on the classroom management strategies, student engagement strategies, culturally relevant pedagogy, and caring relationships contributed to the learning in these classrooms. Using observations, teacher interviews, and student interviews, the researcher employs the method of Educational Criticism and
Connoisseurship to answer the research question. The question that guided this study was: What practices do effective algebra teachers employ in high poverty, diverse high school algebra classrooms to implement the curriculum and influence student learning? This question was supported by the sub-questions: (a) What classroom management strategies contribute to student learning?; (b) Which teaching strategies contribute to student engagement?; (c) Which culturally relevant pedagogy practices contribute to students’ opportunity to learn?; (d) How do relationships in the classroom support students’ opportunities to learn?; and (e) How are classroom management strategies, engagement strategies, culturally relevant pedagogy, and caring relationships intertwined in classrooms today?

The findings of this study provide a stark warning to overly prescribed curricula and pedagogy, along with the heightened use of standardized tests tied to teacher evaluation. Answering the primary question using Eisner’s (1998) dimensions of schooling and Uhrmacher’s administrative dimension, paints a bleak picture for low-income schools under the current movement for accountability using student test scores. The negative consequences of a punitive administrative oversight on the teaching and learning of students paints a depressing scene for low-income schools. Conversely, the efforts of teachers to provide classroom management and student engagement supported by culturally relevant practices and caring relationships give a picture of hope if we focus on supporting and keeping in the schools that need them the most.
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I have had many teachers and professors throughout my life who have impacted the kind of teacher that I am today. The most significant impact has been from my dissertation advisors, Nick Cutforth and Bruce Uhrmacher. I have never experienced the cognitive challenges that I did in these two professors’ classes. Paul Michalec’s focus on the aspects of education that come from or impact the heart has guided my teaching and research to which I am grateful. Finally, I appreciate Frédérique Chevillot for agreeing to be my dissertation committee chair. To the teachers in this study who opened their classrooms and their hearts to me and their students, I am forever indebted. In addition, I feel blessed to have so many wonderful people encouraging me along the way.

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Chapter One: Introduction and Overview

In sum, learning environments that are intended to meet the needs of all students must use approaches (e.g., culturally responsive teaching) that acknowledge, respect, and embrace students’ backgrounds and experiences while ensuring that all students have equitable access to mathematics classes and instruction that are designed to engage them and offer them opportunities to learn. (National Council of Teachers of Mathematics, 2007, p. 91)

Watching students who have the true opportunity to learn algebra in a diverse, high poverty, high school is much like observing a scene in a theatrical production. The setting provides a backdrop as to the context of the story, creating expectations of what will unfold. The props allow the actors to convey deeper meaning to a story as they interpret their part in the production from their own lives. The director must coach the actors by creating the mood that supports the roles around them, along with his or her own character. This is much like a classroom setting that sets a student up for success. The teacher must coach the students as to the behavioral expectations for the best learning to occur, he or she must create meaningful connections for students through engaging teaching strategies and associations to their previous experiences, and students need to support each other so they feel safe and can experience the many emotions that can accompany learning math for students who have often struggled and failed with these concepts. The combination of actions and emotions creates scene 1: “high school algebra for the struggling, high-risk student.” What does this look like for current and future
teachers who wish to help their students succeed? This analogy will be expanded upon in
the methods section, tying to the aesthetic qualitative method of educational criticism and
connoisseurship.

One must only listen to the evening news to hear of the distress over the current
economic situation, the mortgage crisis, and the increase in crime to realize the need for
change. Many people point to education to help spur this change. Teaching students how
to contribute positively to our democratic society, while achieving their own hopes and
aspirations, is a desire of most educators. When this is coupled with society’s desire to
remedy many of the crises occurring today through education, a solid verbal and
mathematical foundation for every student becomes essential. Whether the argument is
made that algebra is an imperative requirement for graduation, a necessity to perform in
college, or a need to make better decisions regarding credit, loans, and personal or local
economies, it is difficult to question the need for students to understand algebra.
Unfortunately, many students do not recognize its purpose or use. The push for algebra at
earlier ages has been happening for many years. As a consequence, it is primarily the
underachieving math students enrolled in Algebra I class in high school and these
students are more at risk of failure and dropping out.

Purpose

The purpose of this study is to describe successful practices in high school
Algebra I classrooms in some of Colorado’s poorer schools. I begin by outlining the need
for this focus by discussing the much-advertised gap in learning for students from high
poverty schools compared to neighboring schools attended by their middle- and upper-
class peers. I then highlight the particular need to examine how this gap is exasperated
through mathematics in high schools, Algebra I in particular. I follow this picture of inequity by detailing what research already tells us regarding good teaching in general, followed by an overview of the eternal “math wars” between traditionalist and standards-based advocates. While the purpose of this study is not to highlight one approach as better than another, it is difficult to examine mathematics teaching and pedagogy without recognizing these two dichotomous views. The neutrality that I feel for this debate will be pointed out repeatedly in the literature review within the different themes being evaluated: classroom management, student engagement, culturally relevant pedagogy, and caring relationships.

The themes that will provide a framework for this study are chosen specifically for teaching and learning in diverse, high poverty, secondary schools. This research is based on the belief that good classroom management and engaging learning activities are imperative for low-income students to catch up to higher-income students before graduating, affording equal opportunities in their adult lives. However, my goal is to elucidate the need for classroom management and student engagement to be intertwined with culturally responsive pedagogy and caring relationships (see Figure 1). Consequently, the literature review will provide insight into how these four categories appear in the literature on their own and occasionally in mathematics research. This will provide the lens that will be used in this research to examine how these four categories harmonize to provide the most powerful learning experience and the most equitable opportunities for learning.

While many researchers focusing on equity have been scrutinized for their categorization of certain populations based on race, ethnicity, and socioeconomic status
(SES), it is not my purpose to make generalizations about any groups of people, but rather to analyze the constructs in classrooms that can reduce conflicts and optimize learning. While this literature review highlights some behaviors and attitudes common to many teenagers regardless of race, ethnicity, or SES, some research has highlighted factors that have been found to influence values and behaviors that are common to low or high SES or certain cultural groups. It is not my intention to suggest that any person belongs to only one cultural group or that any assumptions can be made about anyone based on his or her culture, nor to suggest that any cultural group’s values or beliefs are better than another. However, I do suggest that these values or beliefs may differ in ways that may cause conflicts in the diverse classroom between students or between the teacher and student. It is my belief that through a greater understanding of people as individuals and within their given cultural groups a better managed, more engaged, more culturally relevant, and better relationship can exist in the classroom. A diagram of my original assumption regarding how these attributes of a classroom work together to enhance the students’ opportunity to learn follows.

Figure 1: “Supporting the opportunity to learn”
As described in the last chapter, this assumption was incorrect based on my observations, teacher interviews, and student interviews.

**The Role of Socioeconomic Status in Educational Equity**

Recently, the Secretary of Education, Arne Duncan, addressed the National Association for the Advanced of Colored People, NAACP suggesting that: “education is the civil rights issue of our generation” (Duncan, 2010). Additionally, President Barack Obama calls for equity and opportunity for all students by implementing college and career-ready standards (Obama, 2010). At the time of this writing, the Common Core State Standards have been adopted by 46 states and Washington D.C. in order implement college and career standards as called for by the president and his administration (Klein, 2012). Since equity and opportunity are not new ideas, we must ask why we cannot equalize education for so many traditionally underserved students after so many years of research and political mandates. Inequities in education are compounded by sociological
aspects such as poor health care, inadequate nutrition, and exposure to violence and discrimination (Noddings, 2007). Unfortunately, the problem runs deeper. The social class into which a child is born should not determine where a child ends up. However, given the number of failing schools in the nation’s poorer neighborhoods, education is in some ways perpetuating generational poverty and this is also the case in mathematics: “Put in mathematical terms, a student’s access to a high-quality education has historically been a function of the student’s social class” (Kitchen, Depree, Celedon-Pattichis, & Brinkerhoff, 2007, p. 3). Given that 41% of children live in low-income families (Chau, Thampi, & Wight, 2010, p. 1) and the traditional inequity in education for these students, it is reasonable to believe that almost half of America’s students are being under educated. These sobering facts perpetuate and compound the effects of generational poverty, which makes what schools can do to counter the effects of poverty a dire necessity.

The Role of Algebra I in Educational Equity

I believe that this gap can begin to narrow through learning mathematics. Given the “high stakes” and “high status” of mathematics, it “becomes a proxy for academic racism, ethnic inequities in educational opportunities, and a means for perpetuating a class system of “haves” and “have nots” (Gay, 2009, p. 194). In particular, high school Algebra I is a gatekeeper to not only a high school diploma and entry level jobs, but also higher-level mathematics and science courses necessary for college acceptance.

The teacher’s role in creating opportunities to learn.

In order to search for opportunities that increase students’ abilities to learn high school Algebra I particularly in low-income schools, it is natural to focus on the teacher.
Creating opportunities for student learning is predicated on having a skilled teacher. Unfortunately, “A substantial body of research has shown that schools serving high concentrations of poor, nonwhite, and low-achieving students find it difficult to attract and retain skilled teachers” (Duncan and Murnane, 2011, p. 14). Due to low test-scores as compared to other nations and current federal policies, the measurement of effective teaching has become increasingly popular in the last decade (Stumbo, C. & McWalters, P., 2010/2011). States and schools across the nation have been creating value-added methods of evaluating a teacher based on student test scores and classroom observations. Regrettably, “value-added systems aren’t good at showing which differences are important between the most- and least-effective educators, and often totally misunderstand the ‘messy middle’ that most teachers occupy” (Sparks, 2012). This “messy middle” is best described through a qualitative study, educational criticism and connoisseurship. It is my intention in this study to describe, interpret, and evaluate the need for well-managed, engaging, culturally relevant, and caring classrooms in order to provide a true opportunity to learn this necessary and often difficult course, high school Algebra.

**The role of classroom management.**

I was recently talking to a group of teachers from various high schools and across content areas when the subject of unruly classes came up. One teacher mentioned that her 5th period class was particularly challenging this year, while another teacher claimed that 3rd period always seems to pose a problem each year with announcements disrupting the beginning of the class. Anyone who has taught can remember one class as more attentive than another and the exhaustion related to the latter group. As Jones (2007) highlights,
“Most stress of teaching comes from getting students to do things. Managing the behavior of young people is no easy job, as any parent can tell you” (p. 1). Furthermore, the stress of teaching students who lack the learning-related behaviors that facilitate an environment conducive to learning are less frequent in schools that serve the poor (Farkas, 2011). It is, therefore, imperative when looking at opportunities to learning Algebra I in low-income schools that classroom management technique be evaluated.

**The role of student engagement.**

As a mathematics teacher, I am well aware of the pervasive negative feelings towards mathematics in our society. People either tell me about how hard math is or that they are just not good at math, as if it is linked to a genetic code. Parents make excuses for their children’s poor math grades, explaining that they were never that good at math either. It is because of these societal beliefs about mathematics that an engaging algebra curriculum is so important. This study will examine levels of student engagement based on strategies that teachers use including: connections, active engagement, sensory experience, perceptivity, risk-taking, and imagination (Uhrmacher, 2009). The importance of learning Algebra I on future opportunities makes it even more important to keep students engaged and excited about learning.

**The role of culture.**

The three schools in this study all had diverse student populations. It would, therefore, be irresponsible to examine the students’ opportunities to learning without viewing culturally relevant practices. According to Nieto (1999), the research regarding working with students from various cultures shows the benefits of “high expectations, educational environments characterized by caring and respect, positive and close
relationships with their teachers, and interventions and educational strategies that build on rather than demolish their native language and culture” (p. 45). This research will characterize what high expectations and cultural relevant strategies look like in the classroom as well as how these expectations and strategies are received by the students. While the relationships between teachers and students are a part of culturally relevant practices, I deemed them important enough to creating opportunities for learning so that they can be examined separately.

**The role of caring relationships.**

This research acknowledges the significance of positive and nurturing relationships as outlined in the literature review. However, after observing three algebra classrooms in low-income schools and interviewing the teachers and students, it became evident that those caring relationships are imperative at the school wide level. Relationships between students, teachers and students, and teachers and administrators impact student learning significantly. My research will show how these relationships affect student learning and teacher retention in these hard-to-staff classrooms following the theories of Nel Noddings.

**How these roles work together.**

While the literature review will show significant research in the areas of educational equity in teaching Algebra I, the interaction of factors such as classroom management strategies, student engagement, culturally relevant practices, and caring relationships, is deficient. As I will outline in the literature review, the four categories emphasized in this research are all necessary for students’ opportunity to learn; however, to what extent they are necessary remains to be seen. I begin the chapter hypothesizing
that they are equally necessary for the success of a teacher and I will end this dissertation showing that, while they are all integral to student learning, they do not necessarily need to be seen equally distributed among teacher practices.

**Research Question**

This dissertation focuses on the opportunities that teachers provide for students to learn high school Algebra I. The overarching question that guided this research was: What practices do effective teachers employ in high poverty, diverse, high school algebra classrooms to implement the curriculum and influence student learning? In order to answer this question, I used Eisner’s (1998) dimensions of schooling: intentions, structures, curriculum, pedagogy, and evaluation with a dimension added by Uhrmacher (2008), the administrative dimension. This provided a framework in which to organize the data from the three teachers’ classroom observations, interviews, and interviews of their students. Flinders (2005) suggests that this framework brings a broad outlook at all of the aspects of education that affect teaching and learning on a daily basis. The primary question was then focused more specifically on the four categories of classroom management, student engagement, culturally relevant pedagogy, and caring relationships through the following sub questions: (a) What classroom management strategies contribute to student learning?; (b) Which teaching strategies contribute to student engagement?; (c) Which culturally relevant pedagogy practices contribute to students’ opportunity to learn?; (d) How do relationships in the classroom support students’ opportunities to learn?; and (e) How are classroom management strategies, engagement strategies, culturally relevant pedagogy, and caring relationships intertwined in classrooms today? Using the observation and interview data collected during this study, I
was able to show similarities and differences that these teachers employed in order to provide opportunities for learning.

**Significance of the Study**

The literature is replete with descriptions of deeply rooted inequities in education between middle-class schools serving primarily white students and schools serving diverse students from high-poverty neighborhoods. The educational manifestations of these inequities, as highlighted in the literature review, include higher teacher turnover, lower-quality teachers, lower expectations, and higher-discipline rates, among other social affects. These factors, in turn, influence students’ engagement levels and ultimately their opportunity to learn. Without the rich opportunities to learn, these students are not afforded the same pre-requisite skills needed for high school graduation, college attendance, or participation in the workforce. This state of affairs is not only a crisis; it is an embarrassment for the United States. However, while this literature review does not address the issue of how to recruit and retain high-quality teachers, it has emphasized the characteristics of high-quality mathematics teaching and the tools that contribute to effective teaching in diverse, high-poverty high schools.

Thus the literature describes what good teaching in diverse, high-poverty schools might look like. We know that good classroom management promotes student engagement, is fostered by strong relationships, and becomes more equitable through cultural understanding. Strong student engagement is linked to fewer disciplinary issues, as well as teachers knowing their students’ interests and backgrounds and caring enough to engage them in topics of interest and relevance to them. Culturally relevant pedagogy encourages high expectations from both a behavioral and academic perspective and
fosters relationships to engage and understand students better. Finally, the relationships necessary to be a high-quality teacher support the intrinsic motivators that foster positive behavior, content engagement, and culturally relevant pedagogy. While these classroom qualities have been examined separately for over 10 years, how these classroom characteristics work symbiotically has not been the focus of much research. Hiebert and Grouws (2007) state,

> theories that specify the ways in which the key components of teaching fit together to form an interactive, dynamic system for achieving particular learning goals have not been sufficiently developed to guide research efforts that can build over time. (p. 373)

The fact that each of these classroom interactions has been examined separately, makes the research regarding student achievement for diverse, low-income students “limited and fragmented, in part because disciplinary knowledge and student diversity have traditionally constituted separate research agendas” (Kitchen, Depree, Celedon-Pattichis, & Brinkerhoff, 2007, pp. 13-14). At a recent ASCD conference (2010), Gloria Ladson-Billings asked, “What are teachers and students doing?” reflecting her concern about the lack of information on this matter. The purpose of this research is to answer this question specifically in low-income Algebra I high school classrooms by describing classroom management, student engagement, culturally relevant pedagogy, and caring practices in algebra classrooms. While there is dearth of literature addressing this multi-faceted human interaction in the algebra classroom, as outlined in the literature review, the information is isolated by concept, rather than by how they affect each other in providing the best opportunities for learning. With the need for “more evidence on the ways that mathematics may be taught more effectively, in different settings and
circumstances” (Boaler & Staples, 2008, p. 609), this study will document effective practices in three low-SES Algebra classrooms.

**Overview of the Method**

In order to provide a vivid description of the interactions taking place in algebra classrooms in the support of learning, I chose educational criticism and connoisseurship for my research method. Based on demographic data publicized through the Colorado Department of Education, I selected three different districts that met my criteria of low-income, diverse settings. Of these three, two districts agreed to allow my research to take place in their high schools. Ultimately, I conducted my research in two different high schools in one district and one high school in another district. Upon recommendations of administrators and teachers, I selected one teacher from the first high school and two teachers from the other two high schools. Unfortunately, one of the teachers rescinded his willingness to participate before I began observing and the second teacher in the third school showed conflicting data and was therefore eliminated from the study after I conducted observations. I conducted 12-15 hours of observations in the remaining three classrooms in the three different schools. Furthermore, I conducted interviews with each teacher and interviews with four to five of the students from each class. Chapter Three provides more details to my methodology.

**Identifying Needs**

With the many hours that I spent in the classrooms of the three algebra teachers in this study, I gained insight into the daily experiences of teachers and students in three different low-income high schools. The use of description and interpretation provided a portrait of each teacher and their students as they interacted with the material and each
other. The specific events that are portrayed in this section allow access to any teacher in a similar classroom setting to glean ideas to implement in their own classes, as well as, offering them solace in the knowledge that frustrating events happen in even a successful teacher’s class. The evaluation of the events, as they pertain to the research questions can be found in the final chapter. The use of the dimensions of schooling (Eisner, 1998 & Uhrmacher, 2008) as described in answering the primary research question highlighted an unintended significance of this study. The emphasis of standardized test scores and teacher accountability in each of the schools in this study had an impact on every dimension of schooling that should serve as a warning to policy makers and administrators. The effect of accountability on all aspects of schooling offers a graphic consequence that can occur from trying to quantify a teacher’s effectiveness. Contrarily, the evaluation of the five sub-questions that follow offer a silver lining to the negative consequences of student and teacher accountability through the practices in support of classroom management and student engagement uplifted by care and respect.

Ultimately, this dissertation discovers a need for a less prescriptive view of good teaching practices. The practices shown by these three successful teachers varied greatly; however, their intention was to teach in high-risk schools for the benefit of their students’ learning and future endeavors. The heartfelt belief in their students’ abilities shone through the negative implications of accountability as these teachers worked in various ways to meet the diverse needs of their students.

Finally, this dissertation showed a need for more research regarding the social structure of the classroom. Dewey (1916) discusses the classroom as a community of learners. This community can either promote or detract from learning. This study shows
that the same teacher can have a classroom community that fosters learning one period while the next class period will have a community creating interference to learning. This study was able to identify a few students that caused disruptions to learning; however, the challenge is posed to keep these students in class, offering smaller class sizes and balancing the students in a class that provide positive behaviors with those that exhibit negative learning behaviors. The current focus on test scores may tempt administrators and teachers to eliminate these disruptors of learning. I favor supporting teachers and students by balancing the classroom community, making it more manageable. It is the expressed hope of this researcher that we can find a way to increase learning-related behaviors in all students rather than removing the disruptive ones from class.

Chapter Two: Relevant Literature Review

The literature review will provide an overview of the inequity in mathematics education based on race and socioeconomic status (SES). This will be accompanied by the research supporting the need for Algebra I to be learned by the end of grade nine, at the very latest, for the greatest educational opportunities to occur. Before I begin my research regarding engaging students in learning a subject that is often difficult to
understand, or to find value in, it is important to first examine what the literature says about good teaching in general, and in mathematics in particular. Within the context of equity and teaching mathematics, I will then provide an overview of what the literature says about classroom management, student engagement, culturally relevant pedagogy, and caring relationships in classrooms, to provide a foundation for the classroom observations, interviews, and focus groups that I conducted for this study. Given the multiple aspects that I observed and my desire to tell the “story” of what is happening in the classroom, I will use Educational Criticism and Connoisseurship (Eisner, 1985; 1998) as the methodology. After a brief description of my experiences that have led me to this topic of study, the research behind this particular qualitative method will be forthcoming.

**Mathematics in the United States**

The low quality of student preparedness across socioeconomic boundaries for both college and the workforce has been widely documented with newspapers, movies, blogs, and academic researchers decrying the United States’ schools. High schools are under scrutiny as studies of the National Assessment of Educational Progress (NAEP) mathematics test scores show increasing scores for students ages 8 and 13, with no significant changes in scores for 17-year-olds from 1973 to 2008 (U.S. Department of Education). To emphasize the decline of high school mathematics education, the Alliance for Excellent Education (2006) found that the government will spend $1.4 billion per year for remedial education for recent high school graduates. Furthermore, according to the Colorado Commission for Higher Education (2012), 31.8% of high school graduates will need some form of remediation in preparation of college. These statistics, coupled with the disgruntled employers who complain about employees lacking basic skills and
requiring additional training, paints a disturbing picture for both our nation’s economy and educational system. Given these staggering statistics, the strategies that are perpetuating or mediating this problem must be examined for new ideas to be developed and possible solutions found.

The opportunity to achieve an individual’s maximum potential can begin in schools. Students’ opportunity to learn has been shown to be influenced by policy, school, and classroom level factors (Lubienski, Lubienski, & Crane, 2008; National Council of Teachers of Mathematics, 2007). In particular, mathematics and science are more influenced by school quality than family SES (Heyneman, 2004). Therefore, mathematics education can help break the cycle of poverty; however, in order to do so students must be successful in algebra by the end of ninth grade.

As Education Secretary Duncan promotes that education can be a conduit to a more equitable society, Robert Moses and Charles Cobb suggest that Algebra is the gatekeeper (Moses & Cobb, 2001). Unfortunately, Moses’ and Cobb’s vision of Algebra for all middle school students has still not been realized for many struggling first year high school students in low-income high schools. The literature indicates that students should take Algebra I by their first year in high school at the very latest (Paul, 2005). Furthermore, the recent adoption of the common-core state standards by 46 states and the District of Columbia (Rothman, 2012), says that the recommended pathway of Algebra I is either in middle school or first year of high school to ensure college and career readiness (available at www.corestandards.org/the-standards). As students fall short of this goal, the hope that they will be college- or career-ready is greatly diminished. While taking Algebra I in the eighth grade has shown greater outcomes for students, completion
by the end of ninth grade is paramount. One study found that 26% of first-year high
school students and 68% of eighth graders in Algebra I would meet the pre-requisites to
consider a competitive college (Paul, 2005). While this may be a reflection more of
maturity or natural ability, it also highlights the importance of taking (and passing)
Algebra I before the sophomore year. Unlike other subjects, a student’s level of math in
ninth grade is correlated with risks of dropping out, college preparation and admittance,
career readiness, and taking higher-level math classes (Adelman, 1999; Allensworth,
Nomi, Montgomery, & Lee, 2009; Paul, 2005; Riegle-Crumb, 2006). Therefore, as we
begin to examine ways to help counter the failures of the education provided to so many
students, we can begin by looking at Algebra I.

The impact that Algebra has on traditionally underserved students is even more
critical.

The implications of the differential racial-ethnic returns to initial course position
observed here are that white male students who begin high school taking Algebra
I will on average successfully reach a critical course position by the end of school,
while African American and Latino students will not. (Riegle-Crumb, 2006, p. 116)

These statistics highlight the importance of examining which curriculum and instructional
practices are positively influencing the achievement of these struggling students.

While some may argue that we should not require that all students take Algebra I
and above (Noddings, 2007), given the importance that society has placed on higher
mathematics and algebra in particular, as referenced earlier, we need to begin to examine
what teachers are doing to reduce math anxiety and poor academic outcomes for students.
The sad reality is that many of us would be quite familiar with what it is like to be a high
school mathematics student, today, as classroom structure and pedagogy have changed
very little from when we were students (Hiebert & Grouws, 2007; Laughbaum, 2008). If you were observing an algebra class, chances are that you would see students in rows, hurriedly taking notes, as the teacher explains equations involving letters and numbers. You would likely smell the chalk from the board or marker from the overhead as the teacher continues with more examples of the same type of problem that students copy into their notes with little understanding of how they pertain to anything in the real world. As the teacher releases the class to begin the homework of more problems with letters and numbers, you would remember the disdain, discomfort, and sometimes dread that you often felt. And you would not be alone. If you are reading this, you probably “survived” Algebra and went on to higher education. If you are in your late 20s or early 30s with a college education, there is a 39% chance that you are a white adult, while only 21% of your African American and 13% of your Latino peers were as lucky to have the same level of education (Lynch, 2010). Since the time that we were in the classroom, researchers have made great gains in describing what effective teaching looks like. Unfortunately, this research has not been shown to change the face of the high school mathematics class. Before I explore the literature on Algebra I classes in low-income schools, it is important to examine what the research already tells us about teaching that supports the opportunity to learn.

**Great Teaching**

I recently read a letter from a retired teacher of 35 years in response to the Gates Foundation two-year $45 million study of what makes a great teacher (Starkey, 2010). He offers to save Gates the money by recounting teachers of varying teaching styles with captivated audiences commenting that “there are as many classroom approaches as there
are master teachers” and that “great teaching happens by magic” (Starkey, 2010, p. 2). My hope in this study is to describe and interpret some of the “magic” that is occurring in Algebra classrooms containing our traditionally underserved youth. While Mr. Starkey listed ten qualities of a great teacher, I propose to identify what the quality of a “great” classroom might be. I too have visited classrooms that have students in rows and teachers lecturing and everyone is riveted, while other teachers using the same instructional method result in half the class focusing elsewhere. Likewise, another teacher may use hands-on activities as their primary method of instruction in a classroom that is in complete chaos while another teacher uses this pedagogy to provide wonderful learning. So much depends on the teacher and the students, and the classroom culture that has been established. What are the great teachers doing to create the “magic” to which Mr. Starkey refers?

Marzano’s (2003) meta-analysis of effective teaching found that teacher effectiveness boils down to three categories: classroom management, instructional strategies, and curriculum design. Within the category of classroom management, teachers who were explicit about the rules and procedures of the classroom, had both positive and negative reinforcement for behavior, appropriate relationships with students, and a level of “withitness” in the classroom were found to be the most effective (Marzano). Within the category of curriculum design, effective teachers made learning objectives and procedures explicit to students; they provided different modes of access to learning, and exposed students to higher-level learning activities (Marzano). Finally, within the category of instructional strategies teachers who had the highest influence on student learning were characterized by:
identifying similarities and differences, summarizing and note taking, reinforcing effort and providing recognition, homework and practice, nonlinguistic representations, cooperative learning, setting objectives and providing feedback, generating and testing hypotheses, and questions, cues, and advance organizers. (Marzano, p. 80)

While Marzano may have found these to be the “teacher-level factors” for what works in schools, most experienced teachers would agree that different, specific teaching strategies are implemented more effectively by some teachers and received more effectively by different students, depending on their teaching or learning styles. I will expound on this premise in Chapter 5 “Diverse Teacher Effectiveness.”

Unfortunately, there is no consensus about how students learn best and which environments are the most effective. Various curricula are interpreted and conveyed in different ways by teachers, causing students to internalize the information differently. “Studies that are conducted to examine the entire chain – from materials analyses to teacher interpretation to curricular enactment to student learning – would also add considerably to our knowledge base” (Stein, Remillard, & Smith, p. 362). In this study I will highlight processes and materials that teachers use in algebra classrooms to implement the curriculum and influence student learning in engaging and meaningful ways.

Teaching Mathematics

One of the interesting aspects of a high school Algebra I course is that it marks a transition from computation to more abstract reasoning. Kilpatrick (2009) describes it as two colliding plates, one being the collision of elementary learning of mathematics for computing everyday problems and the second being an exercise for the brain in more complex and abstract mathematics of high school. Often this “collision” makes Algebra a
difficult course for young adolescents. Ways to confront these difficulties are often focused on the prerequisite skills and pedagogical practices that are necessary to help students understand these complexities.

The debate continues as to whether or not students with lower computation skills can still reason mathematically about higher-level concepts. As mentioned previously, many of the students entering Algebra I in 9th grade have already struggled with mathematics, which often means that they have low-level arithmetic skills. Thus, one of the challenges is teaching higher-level math concepts to students who have not yet mastered the “basics” (Chazan, 2008, p. 27). How one views this common concern is often dependent on one’s opinion regarding reform versus traditional curriculum and instruction.

One of the prominent ongoing debates in mathematics education concerns pedagogy and curriculum. Historically referred to as “the math wars,” the differences refer to reform-style or standards-based teaching and curriculum versus a more traditional manner of teaching and curriculum. These two dichotomous viewpoints can be considered along a spectrum, where reform teaching is at one end with problem-solving, reasoning, and exploring mathematical concepts being the only method of teaching and learning (NCTM, 1991). On the other end of the spectrum, traditional style teaching and curriculum require more emphasis on learning math facts and procedures (Franco, Sztajn, & Ortigão, 2007). For students in low SES schools, some studies support the use of reform style teaching and curricula to encourage learning (Boaler, 2008); whereas other studies find that this style is detrimental to these students (Lubienski, 2007). Another study supports the use of reform style teaching and curricula for all students, noting that
while good results are found for both low and high SES students, better results are found for high SES students (Franco, Sztajn, & Ortigão, 2007).

Research on high-performing mathematics programs identifies curriculum and pedagogy that contribute to the success of students. Teachers’ practices include: consistent review, sense-making activities, hands-on activities, student created mathematical ideas, use of mathematical vocabulary, mathematical reasoning (answering questions about what is happening and why), making connections, collaborative work, structured lessons, consistent and appropriate pacing, depth of concepts, students liking mathematics, and students’ consistent attendance (Kitchen, Depree, Celedon-Pattichis, & Brinkerhoff, 2007; Lubienski, Lubienski, & Crane, 2008). These practices do not include drilling of math facts and procedures. However, I believe that this study will endorse the view that “it is the adherence to reform ideas – not the rejection of traditional ideas – that relates to improved achievement” (Franco, Sztajn, & Ortigão, 2007, p. 412). Therefore, I would agree with Stein, Remillard, and Smith’s view that a focus on how best to combine reform and traditional curricula and pedagogy for the best well-rounded approach to mathematics education is much needed.

This balance of teaching strategies is possibly even more important in underperforming, low-SES schools. One study of the Principles and Standards for School Mathematics (PSSM) document found that “no recommendations were provided about how to accommodate the unique needs of students who live in poverty” (Kitchen, Depree, Celedon-Pattichis, & Brinkerhoff, 2007, p. 5). The point was made previously that research is inconclusive regarding the best method of teaching students in high-poverty schools. Likewise, the characteristics that comprise a great mathematics teacher
remain elusive. In this study, I will attempt to show that the uses of the traditional and reform-oriented labels are not identifiers of effective vs. ineffective teaching.

**Guiding Exemplary Studies**

**The Algebra Project.**

Robert Moses is the founder of the Algebra Project, a program started for African American middle school students, to ensure their access to college preparatory classes in high school (Moses & Cobb, 2001). Moses was a civil rights activist in the 1960s who became an activist for Algebra in the 1980s after observing a disproportionate number of students of color in lower level math classes (Moses et al.). The theory behind the “Algebra Project” hinges on our current economic reliance on mathematical and science literacy. Moses et al. compare the impact of computers based on mathematical knowledge on labor demands in today’s job market to the introduction of the mechanical cotton picker’s on the labor demands in agriculture during the 1940s and 1950s. As society moves from a more “physical labor” demand to a more “mental labor” demand (p. 94), Moses et al. claim that this makes algebra education the civil rights movement of our time. The difference between the “Algebra Project” and other programs across the nation calling for everyone to take algebra, particularly by 8th grade, are the importance of community involvement and experiential learning (Moses et al.). Through these two aspects of curriculum and pedagogy is found a cultural relevancy and engagement that lead to the classroom management and caring aspects outlined in this proposal.

The Algebra Project’s focus on students of color, African American in particular, grounds this movement in culturally relevant pedagogy. The involvement of students, parents, and educators in encouraging the growth of mathematical literacy encourages
students to have high expectations for themselves and their peers (Davis, West, Greeno, Gresalfi, & Martin, 2007). In addition, the experiential and real-world contexts that frame the curriculum provide a relevant and engaging foundation for learning complex mathematics (Davis et al.).

The curriculum used by teachers in the Algebra Project begins with a trip, either in the neighborhood or around the school (Moses & Cobb). It is from this trip that many of the algebraic concepts are taught throughout the year. This foundation provides a relevant and engaging springboard for the mathematical discussions expected to engage students in connecting what is familiar to them in their lives to algebraic concepts. This program also recommends that students are in smaller classes for 90 minutes daily, with group work incorporated into the lessons (Davis, West, Greeno, Gresalfi, & Martin, 2007). To create even greater support and relationships for students, classes will often stay with the same teacher for more than one year (Moses, West, Davis, 2009). This familiarity with their peers and their teacher helps students feel more comfortable sharing their ideas, as teachers are encouraged to allow students to struggle with problems a little before providing the answers (Davis et al.). While Moses recognizes the difficulties in teaching complex algebraic concepts to students who are lacking basic mathematical skills; through the relevant and engaging practices outlined above, he encourages students to challenge themselves at higher levels.

After working with ninth-grade students who were struggling with classes that are below grade level, Moses “began the current initiative to establish a ‘floor’ of mathematics literacy for the many students around the country who are not succeeding in high school mathematics” (Moses, West, & Davis, 2009, p. 241). Moses and Cobb
recommend encouraging students through highlighting their friends who are succeeding at higher levels, teaching students that they can succeed, teaching them to want to learn, and teaching them to be independent learners. They do admit that this is not easy with many students who have other challenges in their lives outside of school; however, it is essential to their success (Moses et al.). High expectations, a relevant curriculum, and relationships between students, teachers and community members, all contribute to the success of this program.

Like Jaime Escalante in the famed movie *Stand and Deliver* (Musca, 1988), Robert Moses believes in starting students early in learning algebraic skills. While less famous than Escalante, Moses and his colleagues have had equally dramatic results with their students. With intensive training for their teachers and the community support for students’ learning. By building relationships with students and community members and making the curriculum relevant, these students are experiencing success in high school mathematics. In Jackson, Mississippi the enrollment in college-track mathematics classes went from 13% in 1996 to 89% in 2002 for 9th grade students and 32% to 82% for 10th graders using the Algebra Project (Davis, West, Greeno, Gresalfi, & Martin, 2007). Across the United States, Maria Currell, a San Francisco Algebra Project teacher, has had equally great results with a population that has 60-70% of their students receiving free or reduced lunch and 15% that are English Language Learners. Currell’s school only teaches algebra to their 8th graders and they end up in college preparatory high school courses at twice the rate of other students feeding into the same high school (Davis et al.).

While I do not believe that every child must go to college, I do believe that every child should have the opportunity, and an understanding of higher-level mathematics is
definitely a gatekeeper to that opportunity. In Chapter 4, I will describe and interpret how other teachers, on a smaller scale, are working to increase opportunities for students who are traditionally underserved.

**Railside.**

The research findings by Jo Boaler and her colleagues, in particular at “Railside” school in California drives both my teaching and my research. This five-year longitudinal study of 3 high schools originally sought to compare traditional and reform teaching methods, however, they discovered much more. Railside was given its name by researchers to protect its anonymity. It is described as a California school that sits aside railroad tracks and educates approximately 1500 students; 38% of whom are Hispanic, 23% African American, 20% White, 16% Asian/Pacific Islanders, and 3% other ethnicities and 31% of whom are on free or reduced lunch (Boaler, 2008). At Railside, Boaler (2002, 2008) uncovered culturally responsive practices that foster a caring and engaged environment.

Her research features a school in which the teachers collaborate in creating tasks for students in small heterogeneous groups to work together towards learning algebra using problem solving. This involves a very student-centered pedagogy that requires explicit behavioral expectations. Boaler and Staples (2008) found that the students spent approximately 72% of the class time working in groups while the teacher circulated the room and asked questions. Teachers emphasize that students must be given the support in learning the rules and procedures of the classroom as it is often different from what they already know, to fail to do so “is to perpetuate inequality” (Boaler et al.). In conjunction
with making the behavioral expectations explicit, the teachers worked to make the curriculum both engaging and relevant.

Teachers at Railside created their own curriculum based on aspects of the College Preparatory Mathematics Curriculum and the Interactive Mathematics Program, choosing and designing conceptual tasks that would both engage and teach students. Unlike most upper-level math classes, Railside classes were heterogeneous with all ninth graders starting with the same course regardless of ability. In addition, the groups were heterogeneous as well. In order to engage all levels of learners, students “were given a particular role to play, such as facilitator, team captain, recorder/reporter or resource manager” (Boaler & Staples, 2008, p. 632). Furthermore, to engage students with different learning strengths, tasks required multiple forms of representation, using words, graphs, symbols, and tables (Boaler et al.). Finally, Boaler’s (2008) studies combine the second half of my focus, culturally relevant pedagogy and caring relationships into a category she terms “relational equity.”

At Railside, not only did students’ test scores increase but the culture of the classroom was one of inclusion and was unbiased culturally. In keeping with culturally relevant pedagogy, teachers had high expectations for their students, providing “a rigorous and common curriculum for all students” (Boaler & Staples, 2008, p. 614). In addition, the factors of relational equity: “respect for other people’s idea, leading to positive intellectual relations; commitment to the learning of others; and learned methods of communication and support” were found (Boaler, 2008, p. 174). In fact, the equity and inclusion throughout the school was attributed to the norms established by the mathematics department. Seniors interviewed by Boaler (2008), identified the absence of
ethnic cliques that are often found in diverse high schools as a result of the math pedagogy. The group work that fostered student’s caring for their learning and others was also different from other group work scenarios (Boaler). This caring for mutual understanding “made students feel more confident and positive about mathematics” (Boaler & Staples, 2008, p. 630). Furthermore, students at Railside valued students’ different strengths and ideas as was mirrored by the teachers, coined “assigning competence” (Boaler et al.). This is done by calling the class’s attention to something of value that a student has added to the lesson, teaching the students to both value and respect the ideas of others regardless of race, ethnicity, gender, or socioeconomic status.

In addition to a more inclusive atmosphere, test scores showed a narrowing of the achievement gap between ethnic and culture groups. The results of this study that emerged from both qualitative and quantitative analyses contain all of the ingredients being sought by my research. This research shows a connection between “equitable relations” and “equitable classroom conditions” through one mathematics program at one school (Boaler, 2008, p. 190). This study will identify additional examples of this phenomenon. Furthermore, Boaler and Staples state that, “it is critical that researchers gather more evidence on the ways that mathematics may be taught more effectively, in different settings and circumstances” (Boaler & Staples, 2008, p. 609). While it was not possible for me to replicate the vast undertaking of Boaler and her associates, I did look for other teachers and mathematics programs in schools with equal or higher percentages of students in poverty, and found similar outcomes.

Classroom Management and Student Behavior
While researchers debate the merits of different curricula and teaching styles across all demographics, most suggestions make assumptions about students’ understanding of basic behaviors, such as, note-taking, organizational techniques, following directions, and doing homework. While “few studies have been conducted to investigate how teaching mathematics at schools in high poverty areas may differ from teaching in more affluent communities” (Kitchen et al., 2007, p. 6), my experiences lead me to believe that one significant factor is classroom management. Not only do teachers need to discourage distracting behaviors in the classroom, they also need to engage students in focusing on the lesson at hand. A recent study by Farkas (2011) supports the need for classroom management or teaching student-learning behaviors by finding that:

Because economically disadvantaged and ethnic minority groups tend to be geographically concentrated, and since these children tend to have lower achievement and learning-related behaviors than more affluent and white children, the schools attended by these children also tend to have higher-than-average concentrations of achievement and behavior problems. (p. 81)

Therefore, the experiences of teachers in low-income schools concerning student behavior are often different from those in high-income schools.

In high-poverty schools, complaints are often heard from teachers involving student behavior and lack of resources. Many of the complaints are directly related to home factors, such as revolving home residents, single-parent families, more time watching television, and caregivers that are often physically or emotionally absent (Jensen, 2009). These factors have been shown to affect some students’ success in school in comparison to their peers who have a more stable home environment, two-parent families, more time with their caregivers, and more books and educational extra-curricular activities (Jensen, 2009). These lower SES students often exhibit behaviors that
include: “‘Acting-out’ behaviors; impatience and impulsivity; gaps in politeness and social graces; a more limited range of behavioral responses; inappropriate emotional responses; and less empathy for others' misfortunes” (Jensen, 2009, p. 19). These behaviors may be influenced by SES, citizenship, race and ethnicity, demographics, and the teachers’ reactions to these behaviors (Gregory, Skiba, & Noguera, 2010). Therefore, it is important that teachers learn how to work with students, which includes understanding their students’ personal backgrounds and how SES and culture can influence a student’s behavior.

Many of these poor students enter the classroom expecting the teacher or school to let them down as they feel so many others in their lives have (Jensen, 2009). Much research has shown a preponderance of lower quality of teachers’ work in schools in lower SES communities (Jensen, 2009; Darling-Hammond, 2011) along with high teacher turnover, sometimes at mid-semester (Kozol, 2005). However, little research has highlighted the high teacher turnover or mistrust of teachers in these schools as they relate to frequent outbursts and interruptions from other teachers, administrators, and students. How do experienced teachers who know the content and want to teach in these schools create classroom environments in which students feel safe and valued to further their learning? According to one study, along with the characteristics of good teaching discussed earlier “student initiated behavior; and classrooms relatively free of behavioral problems” are equally important factors (Hiebert & Grouws, 2007, pp. 381-82). Therefore, in order to teach effectively, teachers must work with students to establish these behavioral norms in their classrooms and understand where any misbehavior stems from.
Research addressing the social and emotional development of children from lower socio-economic communities has become more prevalent. The commonality of behavioral problems among lower SES students has been found to be both physiological and environmental. The impact of nature versus nurture on behavior has been addressed by both psychologists and child development specialists. According to behavioral geneticists, over half of our behaviors can be attributed to our environment, rather than DNA (Jensen, 2009). While DNA may influence some genetic behaviors, other physiological influences have been found in brain research. According to a study by Cook and Wellman (2004), the prefrontal cortex, an area of the brain that is responsible for making judgments, planning, and regulating impulsivity, may be adversely affected by stress. This would certainly explain many of the outbursts and seemingly inappropriate behaviors in lower SES schools given the daily stress that these students often encounter regarding their basic welfare. Additionally, during the teenage years, the brain is undergoing such changes that make it even more susceptible to the influences of stress (Jensen, 2009). These physiological influences on students’ behavior are accompanied by the environmental factors causing attachment disorders and disruptive behaviors.

Considerable research has emphasized the importance of secure attachment at an early age and its influence on a student’s behavior and relationships (Jensen, 2009; Sroufe, Coffino, & Carlson, 2010). This, in turn, influences the classroom environment and opportunities for learning. Sroufe et al. (2010), in a longitudinal study of infants through their adulthood, found a link between attachment, social behaviors, and school success. In addition to the attachment disorders that many of these students experience,
the stress of their home environment may also inhibit children’s ability to conform to the social norms of the classroom, hurting them academically (Sroufe et al., 2010).

Therefore, in order for students to be successful academically, they must also learn classroom behavioral norms. This success depends both on the teacher’s understanding of the student’s cultural norms and the student’s understanding of the teacher’s expectations.

As teachers look for ways to organize their classes to facilitate successful behavior, they need to keep their students’ culture in mind. This topic is addressed in greater detail in the section titled “culturally responsive pedagogy.”

Many theories about the best approach to classroom management can be found in the educational literature. The one that most aligns with this research study emphasizes “cooperation, engagement, and motivation, and… students’ learning to be part of a dynamic system, rather than on compliance, control, and coercion” (Osher, Bear, Sprague, & Doyle, 2010, p. 49). This definition supports the need for culturally relevant pedagogy, engagement, and caring relationships in the classroom, as well as the importance of classroom management on student learning. While the inequity in educational achievement between different races, genders, and ethnicities has been well documented, how this may relate to student discipline is not clear. The “educational debt” to which Ladson-Billings (2006) refers may be closely aligned with the high amount of instruction missed due to disciplinary actions (Gregory, Skiba, & Noguera, 2010).

Gregory et al. found a discrepancy between the types of office referrals between White and Black students along with discrepancies between genders:

reasons for referring White students tended to be for causes that were more objectively observable (smoking, vandalism, leaving without permission, obscene language), whereas office referrals for Black students were more likely to occur in
response to behaviors (loitering, disrespect, threats, excessive noise) that appear to be more subjective in nature (p. 62).

This study evaluated multiple studies regarding suspension and expulsion rates according to race, gender, and SES and found great inequities that are similar to the inequities in achievement rates.

The achievement gap will not close if students are excluded from classrooms. Students’ misbehavior and teachers’ ignorance or overreaction to certain behaviors may be contributing to this gap. As a result, the use of disciplinary actions that remove students from the classroom, such as having students sit in the hall, sending them to the principal’s office, or suspending them, may significantly contribute to the achievement gap. “This suggests that there is a pressing need for scholarly attention to the racial discipline gap if efforts addressing the achievement gap are to have greater likelihood of success” (Gregory, Skiba, & Noguera, 2010, p. 59). Attendance in the classroom is imperative for student success. Another study evaluating behavior and student test scores found that students’ academic behaviors were eight times more predictive of course failure than academic skills (Allensworth & Easton, 2007). Discipline sanctions resulting in exclusion from school may damage the learning process in many ways. For example students who had been suspended after one year were 3 grade levels behind their peers in reading and 5 grade levels behind after 2 years (Gregory et al., 2010). In addition to falling behind academically, these students also have fewer ties to the school and lack the desire to conform to school and classroom norms, which results in less desire for academic success. Therefore, school and classroom level discipline measures must consider the impact on a student’s academics.
Studies of schools that are narrowing the achievement gap tend to enforce successful school and classroom level behavior management systems consistently. A study of a number of high poverty middle schools found that students were explicitly taught the rules and expectations of the school and that they understand that classroom disruptions and interruptions were unacceptable (Kitchen et al., 2007). Other studies support teaching students the behavioral expectations for the classroom, recognizing that this may be different from what students are used to in their daily lives (Boaler et al., 2008). In addition to explicitly teaching students how to behave, it may also be implicitly imbedded in the curriculum; it is this “overlapping area referred to as classroom management” (Wilen, Bosse, Hutchison, & Kindsvatter, 2004, p. 68).

Classroom instruction can often help with achieving behavioral expectations. Some studies have highlighted the “withitness” of the teacher; in other words, being aware of what is going on in the classroom in all areas and at all times, and using strategies such as moving around the room, calling on students randomly, and using eye contact to bring a student back on task (Powell, McLaughlin, Savage, & Zehm, 2001; Wilen, Bosse, Hutchison, & Kindsvatter, 2004). The need for engaging, well-planned lessons must be intertwined with well-used management strategies (Wilen et al., 2004). This is of even greater importance in diverse high poverty schools. I elaborate on engaging lessons in the next section.

Many teachers and schools have found solutions to behavioral problems. While Hollywood has depicted the successes of some teachers in urban schools, it is suggested that schools go “beyond Dangerous Minds stereotypes…[to] explore what the school is doing, on the whole, to help its own novice and experienced teachers better understand
the needs of students” (Powell et al., 2001, p. 243). Certain factors such as the size of the class, the quality of the lesson, the time in the classroom, the expectations of the students, the motivation of the students and teachers, and the relationship between students and teachers can have a positive or negative impact on classroom management (Osher et al., 2010). Therefore, it is important to keep all of these factors in focus when researching effective management strategies. As Gregory et al. (2010) state: “research is needed, using observational studies of classroom interactions and interviews of teachers and students concerning the process of school discipline” (p. 63). The focus of this research study, in part, is to help answer the question posed by Gregory et al.: “Will interventions aimed at reducing the achievement gaps, such as access to rigorous curriculum and caring teacher-students relationships, be accompanied by a narrowed discipline gap?” (p. 65). This requires a focus on the marriage of classroom management and instructional strategies that engage students in wanting to learn, which is crucial for an ideal classroom environment. After examining what is meant by classroom management I now turn to what is meant by instructional strategies that optimize student engagement.

**Student Engagement**

The conflicts previously outlined in the literature regarding mathematics pedagogy and curriculum, between the belief systems of reform-based versus traditional values, along with the classroom management issues related to teaching students from poverty, leads me to focus my study on student engagement in high school Algebra. My assumption is that students who have fewer discipline problems will internalize and make connections to more of what is being taught, and in turn, experience higher achievement.
on class, district, and state assessments. Unfortunately, it is too common to find “instructional techniques that suck the lifeblood out of student engagement and leave even the most willing students squirming in their seats, waiting for the bell to end math class” (Kitchen et al., 2007). Jensen (2009) points out that students raised in poverty are not always taught the social skills at home which may increase their level of engagement and that when this is coupled with the fact that many classes are not very engaging, the results can be disastrous. Thus, an enriched environment is necessary for teaching algebra in an engaging and meaningful way by “teaching multiple methods for doing algebra with a variety of teaching tools, and using a variety of teaching methods” (Laughbaum, 2008, p. 593). This study will use the six themes that foster student engagement as outlined by Uhrmacher (2009) including: connections, active engagement, sensory experience, perceptivity, risk-taking, and imagination with the addition of social engagement (Uhrmacher, 2012) to inform this research. A connection between many of these themes can also be made to the National Council for Teachers of Mathematics (NCTM) (2000) process standards: Problem-Solving, Reasoning and Proof, Communication, Connections, and Representations.

Connections.

Meaning must be made through connections. The NCTM recognizes connections as one of its five Process Standards, with an emphasis on students realizing how mathematics works within other content areas and how a new math concept often uses mathematical information used previously (NCTM, 2000). Types of connections include “emotional, intellectual, communicative, and sensorial” (Uhrmacher, 2009, p. 622).
The emotional aspect of “connections” is supported by the notion “that emotions encode information—detailed, context dependent, rapidly changing information essential to the doing of mathematics (as well as other human activities, of course)” (Goldin, 2002, p. 188). This notion can also be seen in students who have had previously positive experiences mathematically and are open to new opportunities. Conversely, those students who have had negative experiences may suffer anxiety whenever confronted by a mathematical problem. Willis (2009) refers to this as “math negativity” and encourages teachers to provide “lessons and homework that maximize interest and attention and reverse math negativity” (p. 20). In addition, students attributed their attitudes about math more to their teachers than classmates, seating arrangements, or classroom environment (Allen, 2009).

The “math negativity” that many students experience may have been influenced by the intellectual connection. As students are challenged with difficult concepts, they need to have problems that are achievable yet challenging. Many times they are discouraged by problems that are either too basic and seemingly unnecessary or too difficult, and simply give up. As every classroom will have varying degrees of ability that will often change according to the concept, it is important to offer a variety of problems that vary in levels of difficulty.

Communication is another aspect of connections recognized by Uhrmacher (2009) and NCTM (2000) recognizes communication as one of its five Process Standards. Within this standard students are asked to justify their reasoning and speak using the content vocabulary. Noddings (2007) references the importance of communication when outlining the use of overt thinking in mathematics teaching, where
the teacher presents a problem to be calculated and encourages the student to think and explain his or her reasoning. The communicative connection was also important in the “Railside” research conducted by Boaler et al. (2008), in which students were constantly asked to explain their mathematical reasoning. This approach not only increased mathematical conception but also basic skills.

Further connections can be made by using the background and interests of the students to provide meaning and context from which to understand and remember the material (Laughbaum, 2008; Simon, 2009). These connections may also be referred to as providing multiple representations. This strategy for teaching algebra helps students of various learning styles to learn concepts and skills in ways that make sense to them (Simon, 2009). The importance of the connection was apparent at Railside where “students were frequently asked to represent their ideas in different ways, using math tools such as words, graphs, tables and symbols” (Boaler et al., 2008, p. 626) along with emphasizing the connection of the content to real life applications.

Making connections to mathematical concepts is one engagement theme that relates to conceptual development and is widely used in a reform or standards-based curricula. However, it may also support the strengthening of basic skills purported by a traditional curriculum. In support of this belief, Hiebert et al. (2007) outlined several studies that “suggest that instruction emphasizing conceptual development facilitated skill learning as well as conceptual understanding” (p. 387). This, in turn, supports the next theme, active engagement, which also helps improve conceptual and skill-based knowledge.

**Active engagement.**
Active engagement is defined as being “engaged with some kind of object focus” (Uhrmacher, 2009, p. 622). I believe that for students to be actively engaged in the mathematical concepts so too must be the teachers. For example, several studies of successful mathematics programs have found that teachers worked collaboratively and did not follow a certain textbook page after page, but rather thought about how and what to best teach their students (Kitchen et al., 2007; Boaler et al., 2008). The Algebra Project is another example of how students are actively engaged in learning stemming from a field trip focusing on travel and how that relates to algebra (Moses et al., 2001). These processes all support the notion that “we need to enhance learning by creating linked (associated) neural networks so that we increase the likelihood of the brain recalling what we teach” (Laughbaum, 2008, p. 587).

Being actively engaged in learning algebra goes beyond the manner in which many of us were taught. Watching the teacher do examples and then repeating the procedures independently does not foster attributes of engagement. An example of an engaged classroom may look more like those described by Boaler et al. (2008) who quantify students facilitating and being actively involved in their learning by calculating that teachers in these engaged classrooms spent only 4% of the time lecturing, 9% questioning students in a large group setting, 72% of the time with students working in small groups and teachers questioning individuals and small groups, with the remainder of the class period spent on small group presentations and procedural matters. As this scenario conveys, ultimately for students to learn they need to be doing the work. They need to struggle with the problems and reason for the solutions. This leads to another of NCTM’s five Process Standards, “Reasoning and Proof,” in which students investigate
and use conjecture about the use of mathematics in different contexts (NCTM, 2000). These contexts may include real-world examples or the use of hands-on manipulatives, providing a sensory experience for students’ learning.

**Sensory experience.**

Many mathematics teachers have encouraged their students to become engaged in learning mathematics through sensory experience. While this is most commonly used through “hands-on” activities, it may be classified as the use of any of the senses. Hands-on activities used to engage students include algebra blocks, algebra tiles, and hands-on equations (Kitchen et al., 2007). Allen (2009) found that students not only liked using hands-on manipulatives but also “enjoyed math when their teachers used anecdotal stories, acronyms, and songs to teach the material” (p. 3).

Providing sensory experiences is also supported in the NCTM Process Standard, “Representations.” This process standard encourages teachers to use various representations to help students better understand mathematical concepts (NCTM, 2000). This may include drawing pictures or graphs, demonstrating concepts physically, or making songs and rhymes to help the memory. Through different representations, teachers can help students experience the mathematical concepts through various sensorial experiences. However, another major component to learning is for students to interpret this experience in a manner that makes sense to them.

**Perceptivity.**

The sensory experience leads to students’ perceptivity (Uhrmacher, 2009). The problem-solving tools that are so important for mathematical skills to transfer to the “real-world” are reliant on the perceptivity theme of engagement. Once again, those that
believe in a traditional pedagogy would promote the use of basic skills; however, while basic skills are necessary, they are needed to support problem-solving and conceptually oriented activities (Kitchen et al., 2007). Ultimately, students are being prepared for college or the work force and therefore need to be able to transfer and apply the knowledge learned in school to the real world. If students do not have a perceptual understanding of the mathematical concepts, they cannot make this transfer. This can be very intimidating for students who often just want the answer and to move on, not wanting to risk error.

**Risk-taking.**

Many mathematics teachers have discussed the need for students to do the math in order to learn it but students learn at an early age that often in math there is just one right answer. Therefore, it may be intimidating to risk making a mistake and getting the wrong answer. To help students in learning to take risks they need to learn to struggle with mathematics together, knowing that the teacher will offer hints and suggestions when necessary. Students must learn to work together towards a common goal and the teacher must use different strategies to facilitate learning, being patient with students when they get frustrated, and allowing them to struggle for the answers (Huetinck & Munshin, 2000, p. 150). In the successful Railside program students were encouraged to spend more time struggling with a problem and given more probing and conceptual problems than in traditional math classes. Boaler et al. (2008) state, “Many schools employ group-work…but Railside teachers went beyond this to encourage the students to take the responsibility very seriously” (p. 633). This fostering of conceptual rather than procedural learning is uncommon in many math classrooms across the U.S. (Hiebert et al., 2007). The use of
each of these engagement themes encourages students to take risks in learning to reason and solve non-procedural problems.

As we encourage students to explore mathematical concepts through the engagement themes already outlined, it is important to keep in mind that “any type of exploration involves risk” (Uhrmacher, 2009, p. 624). For students who have struggled with mathematics in the past, every time that they attempt a new problem or a new way to solve a problem may be a risk in their mind. Recognizing this, Willis (2010) makes several suggestions for reducing what she refers to as “mistake anxiety” including increasing “wait times,” asking for multiple responses, encouraging estimations, and offering multiple approaches to a problem. These strategies support the fifth Process Standard outlined by the NCTM (2000), “Problem Solving.” This standard encourages the use of multiple methods to solve problems that are presented in varying contexts, which requires students to feel comfortable in trying new methods of solving within unfamiliar contexts (i.e., taking risks). This creativity in solving problems leads to another engagement theme, imagination.

**Imagination.**

The use of imagination is not often associated with the learning of mathematics. However, would students be better able to appreciate mathematics if they realized how much imagination is involved with the subject? Imagination is defined by making connections with what is “old and familiar” (Uhrmacher, 2009) which is similar to ways in which students can visualize or imagine how new algebraic concepts relate to the old computation that they are familiar with. This can be integral to the learning of algebra, where students experience computation with the use of variables or unknowns for the
first time. Furthermore, for students to learn algebra, they need to move beyond the use of rules and “number crunching” to a more conceptual understanding. As Simon (2009) states, “Algebra is the process of organizing the arithmetic needed to find an answer to a question involving quantities that are not yet known” (p. 559). However, in order to truly internalize and be able to transfer the knowledge learned in algebra to real world examples, students must reflect on their learning.

Reflection.

An often overlooked method to foster student engagement is through reflection. This relates to imagination in allowing students to think algebraically and reflect on what they have learned or where they may still lack understanding. Reflection may involve the teacher asking students to share their understanding at the end of a lesson or journal about their thinking. It may also involve students not only computing a solution to a problem but also explaining the process of achieving the answer. This strategy not only provides the teacher with insights into his or her students’ thought processes, but also allows the students to better internalize the concepts necessary to solve a given problem.

Social engagement.

Learning in school is indeed a social event. The interactions between teachers and their peers, teachers and their students, and students and their peers, all influence the level of a student’s engagement. As Boaler (2008) described the ‘relational equity’ (see p. 28) at Railside, the impact of student interactions in the classroom can affect the culture school wide. In addition, with the adoption of the common core standards, “The classroom environment should encourage student interaction and conversation that will lead to mathematical discourse” in addition, “Students need training in collaborative
work” (Christinson, Wiggs, Lassiter, & Cook, 2012). Therefore, for reasons of classroom management, student collaboration, and mathematical discourse, social engagement is becoming increasingly necessary to students’ learning of mathematics.

**Engagement in this study.**

It is important that the focus on achievement extends beyond standardized tests to classroom level assessments of how benchmarks are being applied (NCTM, 2007). This study explores which factors contributing to engagement are occurring in Algebra classrooms. This is an understudied area given its impact on students’ opportunity to learn. “Most studies do not attempt to examine how teachers interpret curriculum materials or how teachers and students interact with the materials in the classroom” (Stein et al., p. 327), whether it be through the use of connections, active engagement, sensory experience, perceptivity, risk-taking, imagination, reflection, and social interactions. According to the National Research Council (2001) the opportunity to learn is defined as “circumstances that allow students to engage in and spend time on academic tasks…” (p. 333). However, the attitude that the student might have towards the subject matter is often overlooked in examining the opportunity to learn. As Uhrmacher (2009) suggests, teachers often focus on the glass half empty when viewing what students need to learn, rather than allowing students to make meaning of the subject through what they already know (i.e., glass half-full) through strategies involving connections, risk, and imagination. He states, “Meaning making refers to the idea that students have found some value in what they have learned that has personal consequences” (p. 631). This will contribute greatly to the attitude that a student might have toward the subject matter.

**Engagement in mathematics.**
When asked what their favorite subject in high school is or was people of all ages would rarely reply “math.” Perhaps they will mention that even though they were good at the subject they did not like it. This attitude is reflected in the fewer number of people going into what is referred to as the science, technology, engineering, and mathematical (STEM) fields particularly among minorities (Orchowski, 2008). Therefore, not only do we need to teach students how to be successful in algebra but also how to enjoy it. As mentioned previously, students’ attitudes towards mathematics are often attributed to the teacher. In one study regarding attitudes in Algebra I,

7 out of the 16 students attributed their positive attitude in math to their current Algebra I teacher. Student F said, “Coming to math class is always entertaining. I feel like Ms. Teacher puts on a different show each day. You never know what will happen from day to day. “The math attitudes of the 16 students were reflections of the teachers’ energy, excitement, and teaching styles. In one case, Student G hated math and had a negative attitude toward math previously because “the teacher taught directly from the book, and he “had to learn the material independently.” 4 students did not enjoy math when they had to learn the material through lecturing or book reading. (Allen, 2009, pp. 3-4)

This study reported that teaching strategies, much like those outlined in the engagement strategies above, along with caring for the students, contributed to better attitudes about mathematics (Allen, 2009). Indeed, this may be as important as whether they score well on a state test, particularly bearing in mind that as Uhrmacher (2009) points out, one of the benefits of students enjoying what they are learning is that “perhaps they will become lifelong learners in that area of study” (p. 630). Uhrmacher (2009) continues, “in addition to joy in learning, we should also find an increase in episodic memory retention” (p. 631), this in turn, may lead to rising test scores, better understanding of the concepts, and greater perceptual knowledge (Uhrmacher, 2009). In addition, “there is a direct link
between perceptivity and the building of concepts and facts” (Uhrmacher, 2009, p. 631). Therefore, through engagement strategies teachers have the potential to increase learning and enjoyment.

Research findings can be conflicting when one study recommends a particular curriculum or pedagogy for providing engagement opportunities for students, while another study suggests an opposing viewpoint; however, the teacher can play a large role. Therefore my hope is that this research will shed light on how teachers and curriculum materials help facilitate learning and the enjoyment inherent therein. While many studies have shown a connection between specific curricula and pedagogy, teachers and curricularists need to know how this connection occurs (Stein, Remillard, & Smith, 2007). Therefore, my study includes an examination into the teacher’s use of different curriculum materials in order to highlight some of these engagement strategies.

As discussed in this section, students’ background experiences are pivotal in how they experience different engagement strategies. Making connections to the waves coming in on a beach will hardly be relevant to a student who has never been to the beach. Therefore, in order for these engagement strategies to be effective, teachers must know their students and their backgrounds. This point brings me to the issue of the need to combine student engagement strategies with culturally relevant pedagogy.

**Culturally Responsive Pedagogy**

Many of the physical and emotional challenges facing students from low SES backgrounds have already been highlighted in this chapter; however, it is important to recognize that these students are also, often from racially and ethnically diverse backgrounds. According to Chau, Thampi, and Wight (2010), adolescents who live in
poverty comprise 26 percent of white adolescents, 58 percent of black adolescents, 36 percent of Asian adolescents, 59 percent of Hispanic American adolescents, and 54 percent of American Indian adolescents. The higher percentages of Black, Hispanic, and American Indian adolescents in poverty would suggest that race and ethnicity are important to consider when implementing engaging learning opportunities in low-SES schools.

While the challenges that poor students of color face both in and out of school are influential on their learning, some studies have shown that fewer students believe an education will improve their lives. As students begin to believe that education does not “matter” at earlier ages, communities need to work with schools and policy makers to advocate for better educational and job opportunities (Anyon, 2008). On the contrary, unlike the white, middle-class student, “…most poor students of color look to schools as the vehicle for social advancement and equity. They are totally dependent on the school to help them achieve a variety of goals” (Ladson-Billings, 2006, p. 32). Other studies have found that many people of color are concerned about discrimination or limited opportunities in schools (Hawley & Nieto, 2010); therefore schools must be aware of both the faith and wariness families may have about their students’ opportunities to succeed. Given the traditional hopes and concerns of poor students of color, teachers must have an understanding of culturally relevant pedagogy (CRP) to best meet the needs of a diverse student population.

In today’s data-driven educational world, academic success is often defined by standardized test scores. The discrepancies in test scores between SES, gender, race and ethnicity has been well publicized (as previously mentioned). One unfortunate
consequence of this achievement gap has been a focus on the skills and knowledge certain groups of students are lacking. However, through CRP, the gaze is shifted to an acknowledgement and appreciation for students’ background knowledge and values that can contribute to a more equitable learning environment. Furthermore, as the gaze is shifted from the gap and the deficits of certain groups of students, it is important to examine what is helping students. As Abreu (2002) states, “The information that students from a particular background generally achieve below, or achieve above, other groups is of limited use for the planning of interventions if the reasons for the differences are not addressed” (p. 376). This research sheds light on some of the classroom management, engagement activities, and caring interventions that are being addressed with success, with the belief that “culture determines how we think, believe, and behave, and these, in turn, affect how we teach and learn” (Gay, 2000, p. 9).

Ladson-Billings (2006) explains that teachers using CRP “assume that an asymmetrical (even antagonistic) relationship exists between poor students of color and society. Thus, their vision of their work is one of preparing students to combat inequity by being highly competent and critically conscious” (p. 30). In addition, teachers are asked to know themselves and their own biases and to know their students and their beliefs and values (Ladson-Billings, 1994). Studies have found that CRP can help students of all cultures, but particularly those traditionally underperforming ethnic groups (Ladson-Billings, 1995).

Culturally relevant pedagogy rests on three criteria or propositions: (a) students must experience academic success; (b) students must develop and/or maintain cultural competence; and (c) students must develop a critical consciousness through which they challenge the status quo of the current social order. (Ladson-Billings, 1995, p. 160)
The commonalities often found in classrooms that promote CRP include high expectations, challenging curricula, and care and respect for differences. Therefore, this study describes how academic success and high expectations, challenging curricula, cultural competence, and critical consciousness manifest themselves in high school Algebra I classrooms whose teachers adopt CRP.

Academic success and high expectations are two cornerstones of CRP that go hand in hand but are often difficult to define. As Kitchen et al. (2007) explains, it is not simply setting the expectation and seeing who can meet it; it is the sustained support for students to meet the expectations that contribute to academic success. A large part of this support for learning involves teaching students the skills necessary for success in the classroom and the workforce (Enyedy & Mukhopadhyay, 2007). In classrooms with high expectations students are taught how to be responsible for their own learning, teachers foster appreciation for different perspectives and different learning styles, and students learn how to accept challenges (Boaler & Staples, 2008). These are all skills outside of academic content knowledge that can influence a student’s opportunity to learn. Such teaching does not replace cultural norms and expectations, but rather bridges what is known in and out of school by teaching “to and through the strengths of the students” (Gay, 2000, p. 29). Not only do teachers need to provide the tools for learning, they need to believe students can achieve at high levels.

The teacher’s expectation must be that all students will meet higher standards of learning (Kitchen, 2007). In order to establish higher standards of learning, mathematics teachers must move beyond computation to a higher level of thinking conceptually and
reasoning in mathematics. This synthesis of expecting all students to succeed at high levels is even recognized by the students who reported the high demand placed upon them by teachers (Boaler & Staples, 2008). Expecting students to reason conceptually can be difficult when students lack the basic skills needed to conquer high levels of algebraic reasoning. However, in some schools effective teaching is leading to high levels of student achievement. “Students attending schools in which teachers presented and faithfully implemented more challenging problems were more likely to develop increased conceptual understanding of the mathematics” (Hiebert & Grouws, 2007, p. 390). Basics can be learned while engaging students in cognitively demanding activities (Hawley & Nieto, 2010). For example, kindergarten students may be learning reading, writing, and arithmetic basics, yet engage in highly sophisticated, philosophic and sociopolitical discussions (Hawley et al.).

It is important to keep student engagement in mind when combining “challenging mathematical content” and “high-level instruction.” When combining the two, the content must remain relevant and interesting. Boaler et al. (2008) refers to this combination of engaging and challenging curricula as multidimensionality. “Multidimensionality is encouraged by open curriculum materials that allow students to work in different ways and bring different strengths to their work” (Boaler et al., 2008, p. 640). This is often seen with students exploring a mathematical concept by using the skills and knowledge that they bring with them from previous experiences and relying on the knowledge and skills of their classmates. In addition, teachers can help translate mathematical vocabulary terms and change story problems to be more relevant to the students’ environment and personal experiences.
The affective component of teaching students to appreciate their own and others’ backgrounds and strengths is integral to CRP. While researchers who study the achievement gap focus on students’ test scores, Boaler (2006) calls for researchers to study how students treat each other. “Schools are places where students learn ways of acting and being that they are likely to replicate in society, making respect for students from different circumstances an important goal” (Boaler & Staples, 2008, p. 625). The norms and values that the teacher and students both bring to the classroom contribute to the classroom culture (Nickson, 2004). Within CRP, cooperative learning is often used so that students are responsible for their classmates’ learning as well as their own (Gay, 2000). Therefore students learn to work with others from different cultures and learning styles, creating a greater appreciation for differences. Klump and McNeir (2005) found that this appreciation was shown through respect and value for students’ cultures; teachers learning about students’ cultures and making ties to the curriculum and instruction; and building relationships with families. While it is important for students to learn to appreciate and encourage their peers of differing cultures and learning styles, the teacher must also embrace students’ backgrounds by incorporating them into the curriculum.

While the benefits of ethno-mathematics have been recognized in many studies (Kelly, 2005), the purpose of this study is to investigate the classroom culture and the practices that foster equitable interactions and learning. Some teachers have fostered a learning environment through adapting more to the students’ academic needs than to “incorporating students’ cultures or socioeconomic and political realities in the curriculum” (Kitchen, Depree, Celedon-Pattichis, & Brinkerhoff, 2007, p. 163). In
addition, other studies have found that speaking the students’ language and designing lessons with a cultural viewpoint are not necessary to improve student success (Gutierrez, as found in Boaler and Staples, 2008). However, the use of engaging, rigorous activities based on a core curriculum for all students is necessary to improve student success (Boaler & Staples, 2008) in order to thoroughly examine the educational opportunities of poor students of color, it is important to examine disciplinary practices and relationships in classrooms.

In a culturally responsive classroom, placing high expectations on students, as well as showing compassion and caring are found to be significant factors in successful classroom management. However, there is a gap in the research regarding whether a greater use of CRP would result in lower discipline referrals (Gregory, Skiba, & Noguera, 2010). This supports the notion that teachers must understand the meaning of the behavior (Wilen, Bosse, Hutchison, & Kindsvatter, 2004). Is a student acting out or falling asleep in class because he or she is homeless and not able to sleep at night, missing meals, struggling with an underlying learning disability, or does the student feel discriminated against and has simply given up? All of these causes of misbehavior can be addressed and may help the students not only feel cared for and supported by the teacher, but also may alleviate the cause of the misbehavior. As mentioned before,

some teachers perceive certain behaviors typical of low-SES children as “acting out,” when often the behavior is a symptom of the effects of poverty and indicates a condition such as a chronic stress disorder… and often lead to greater impulsivity and poor short-term memory. (Jensen, 2009, pp. 11-12)

Much like a doctor diagnosing the cause of symptoms, this is the only way to begin to prescribe some solutions.
Studies of different cultures have found that some relational interactions and values may conflict in the classroom. While all students share a “drive for reliable relationships; the strengthening of peer socialization; and the quest for importance and social status” (Jensen, 2009, pp. 19-20), different cultures may attempt to foster these relationships in different ways, including the difference in teen culture and classroom or school culture. Gay (2006) argues that the competition and individualism fostered in many classrooms support the norms of the Western European culture as opposed to the communal norms of Black, Latino, and American Indian cultures. When considering classroom management and engagement strategies teachers must consider the cultural relevancy to their students so that “teachers can incorporate classroom strategies that build relationships and strengthen peer acceptance and social skills in class” (Jensen, 2009, p. 20). Relationships are so central to some cultures that students may choose to help a friend work on an assignment over completing an assignment for their own grade (Wilen, Bosse, Hutchison, & Kindsvatter, 2004, p. 34). A classroom’s emphasis on individual over group achievement “may clash with a stronger emphasis on communal values in Black, Latino, and American Indian culture” (Gay, 2006). Therefore, many of the individually and competitively based activities in the classroom may negatively bias minority students (Gregory, Skiba, & Noguera, 2010). Clearly the students’ cultural and individual values are highly relevant to their engagement and behavior in the classroom.

While some mathematics teachers may assume that the subject of mathematics lacks a connection with culture, their students do not. Research involving diverse student populations finds that the qualities in the classroom that students respond to the best include “high expectations, educational environments characterized by caring and
respect, positive and close relationships with their teachers, and interventions and educational strategies that build on rather than demolish their native language and culture” (Nieto, 1999, p. 45). The caring relationships between students and teachers and among students of diverse backgrounds are the bookends to high expectations and fostering cultural awareness and appreciation. Caring relationships are central to CRP; however, as an important part of the framework for this study, it will be described separately.

**Care**

One of the cornerstones of an engaged, culturally responsive classroom is a caring environment. High school can be a very difficult time for many students. Thus, the stresses in students’ personal lives combined with the achievement pressures of being in an undesirable mathematics class requires a caring and safe environment in which students feel comfortable taking risks in order to learn. In addition to the concerns that most teens have, diverse students from poverty face additional challenges and barriers, as mentioned previously. Therefore, the relationships that students form with each other, their teachers, and the subjects that they are engaged in are paramount.

Amidst the demands for high standardized test scores, students need to learn in environments that they feel cared for as human beings with hopes and dreams along with fears and insecurities rather than as mere test scores. As Noddings (2005) states,

> We cannot ignore our children – their purposes, anxieties, and relationships – in the service of making them more competent in academic skills. My position is not anti-intellectual. It is a matter of setting priorities. Intellectual development is important, but it cannot be the first priority of schools. (p. 10)
This perspective is particularly pertinent in an era of data-driven results. Students must be seen as individuals rather than as data points or as members of an unsatisfactory versus proficient group of learners. The belief is that all students need to be cared for beyond or in addition to their educational needs. In a recent article titled “The neglected topic in school turnarounds” Pappano (2010) discusses the current focus on student data as related to school reform including leadership, curricula, or restructuring. Pointing out that “one of the most powerful tools… is embarrassingly plain and lacking a data column: it’s about relationships” (Pappano, p. 24). Noddings (2005) supports this belief in saying that “Too many of us think that we can improve education merely by designing a better curriculum, finding and implementing a better form of instruction, or instituting a better form of classroom management. These things won’t work” (p. 173). Therefore, studies that intend to shed light on effective curricular and instructional strategies must keep relationships and caring environments in mind. Teachers must remember that they are teaching future citizens, workers, parents, and neighbors.

Algebra is not the only knowledge that can help students in these future roles; the caring attributes that they learn will not only help them be better citizens but also better employees and bosses. Unfortunately, many of the students who struggle in high school report feeling alienated and believe that teachers do not like or believe in them and ultimately drop out (Mouton & Hawkins, 1996). Many teenagers feel alienated on occasion; however, “it’s common knowledge that unless there are caring adults in their lives – at home, at school, at church, in their community – they are in danger of becoming the next generation’s statistics” (Holbrook, 2006, p. 113). As educators it is difficult to influence the adults in students’ lives outside of school, but with up to seven teachers in a
student’s day, these teachers are very influential. When this feeling of alienation is combined with the absence of other caring adults (as is often the case), students need to have teachers who they can rely on and who will encourage them to achieve in school (Jensen, 2009; Noddings, 2005). Teachers can begin to do this by creating a safe environment in which peer relationships are open and supportive of one another.

As highlighted previously, on occasion students need to struggle with mathematics to better understand it. To do so, they need to feel safe in their classes and open to; articulating their mistakes, lack of understanding, and distaste for the subject matter. A common theme of studies of successful high-poverty schools is that “teachers across sites expressed concern for their students’ affects in general, and wanted to develop their students’ confidence in mathematics while still challenging them mathematically” (Kitchen, Depree, Celedon-Pattichis, & Brinkerhoff, 2007, p. 123). Therefore, students need to be taught to honor each other’s answers (correct or not) and to help their classmates when needed. Without trusting relationships, a classroom environment cannot be conducive to learning (Silver, Smith, & Nelson, 1995). While the focus of this study will be how to engage students in learning high school Algebra, it is my belief that this cannot be fully explored without examining the relationships between students and between the teacher and students.

Classrooms need to be consistent caring environments with high expectations for learning to occur. Successful teachers who establish such environments are supportive, accessible, and tough (Gay, 2000). Most of us can remember a special teacher who pushed us to be the best that we could be, while portraying the idea that what we did mattered. While we cannot always remember how they taught the material, how they
made us feel will always be remembered. Gay (2000) recognized these teachers as being attentive and invested, while truly listening to and respecting their students.

Pedagogically, these teachers allowed their students to make choices about their learning and when they struggled with a concept, they would strive to make concepts clearer (Gay, 2000). The fact that these teachers believe in their students and their potential to achieve academic success empowered students and helped build their self-confidence (Scribner, 1999). The academic benefit to this empowerment is that often believing translates to achieving.

Unfortunately, traditionally underserved students often encounter teachers who expect less academically from them (Gay, 2000). At times, these teachers have stereotypical beliefs about students from different ethnicities, for example that Asian students will be more studious; whereas, African American males are more prone to be in gangs or violent (Gay, 2000). Teachers may also lower their expectations of students in poverty, feeling sorry for their plight and not wanting to push them academically. As Gay (2000) states, “a most effective way to be uncaring and unconcerned is to tolerate and/or facilitate academic apathy, disengagement, and failure” (p. 48). Having high expectations for all students is imperative for fostering a caring learning environment. Finally, the relationship that the student has with the subject matter can also influence their learning.

As previously mentioned, many students have negative feelings about mathematics. These feelings, along with the lack of value they place on learning the subject, can have a great influence on how hard they are willing to work to learn the concepts. Understanding these feelings and values is important in how a teacher approaches a student’s engagement in learning.
Teachers with this aim will work flexibly in teaching mathematics – inspiring those who care about mathematics for itself to inquire ever more deeply, helping those who care instrumentally about mathematics to prepare for the line of work they desire, and supporting as best they can those students who wish they never had to encounter mathematics. (Noddings, 2005, p. 154)

Often students in high school Algebra I classrooms fall into the final category. These students need a consistent, caring learning environment for their confidence in their own abilities to grow and be receptive to learning new concepts. Additionally, diverse students will often need to reconcile how they see themselves as members of a certain racial, cultural, gender, or age group versus how they see themselves as a member of an academic group. This self-perception can at times be conflicting (Nasir, 2007); therefore, students will also need to identify their relationship with the subject, viewing themselves as either mathematicians enjoying math, or a student who will do what they need to in order to graduate and go on to the next level.

Ultimately, teachers and schools need to offer safe, welcoming, and supportive learning environments. The subtle reactions that occur in the classroom between students, between the teacher and students, and between the students and the subject matter can provide a foundation for learning to take place. This research illustrates how students’ behavior, engagement, and cultural competency are influenced by relationships.
Chapter Three: Research Methodology

The Value of Qualitative Research

The questions being posed in this study are well matched for a qualitative research. Recalling the analogy of the theatre production to the Algebra I classroom in the introduction, it seems fitting that a qualitative study is used to describe the intricate portrayal of student, teacher, and content interactions. While quantitative studies have their place in educational research, in working with humans it is often difficult to quantify beliefs and values that are linked to behaviors (Merriam, 1998). Cobb and Jackson (2008) point out that “different methodologies make different assumptions about the phenomena under investigation, ask different question, and produce different forms of knowledge that are useful for different purposes and that are frequently complementary” (p. 574). The questions being asked in this research align with the basics of qualitative research focusing on discovery, insight, and understanding from the perspective of
teachers and students (Merriam, 1998). The aspects of qualitative research are best aligned to answer the questions posed by this study.

Qualitative research provides the framework from which the story or stories can be told of how high school Algebra I classrooms are providing traditionally underserved students the opportunity to learn as outlined in the literature review. Using this methodology, the researcher can collect and analyze the data using her own perspectives, as they are the instruments through which the information is collected and aggregated (Merriam, 1998). According the Merriam (1998), the attributes of qualitative research include: selecting the sample purposefully, working towards a theory, being emergent and flexible with data, and providing richly descriptive analysis. These attributes align perfectly with my study of three high schools Algebra I classrooms in diverse, high-poverty schools.

Qualitative inquiry is still not universally accepted in mathematics educational research. In March 2008, the National Mathematics Advisory Panel (NMAP) published its final report as commissioned by executive order from President George W. Bush in which they supported only quantitative experimental studies. In response to these findings, the journal, *Educational Researcher*, devoted an issue to respond to the panel’s findings. The panel’s findings were widely criticized (Kelly, 2008). Foremost, this recommendation of only experimental studies allowed for only eight studies to be used for making recommendations on improving mathematics teaching and learning while many highly rigorous quantitative and qualitative studies exist that could have made the panel’s findings much more significant (Boaler, 2008). Boaler also points out that this method of experimental research is not practical because teachers are working with
children and many parents, understandably, do not want their child’s education to depend on which group they would be assigned to. Furthermore, experimental research is not optimal for explaining the “how” of teaching and making recommendations to teachers about what to do (Cobb & Jackson, 2008), as this research hopes to do. In addition, Cobb and Jackson (2008) point out that the classroom is a system of interrelated variables that cannot be isolated from one another as is necessary in experimental design. Finally, in the context of equity research, the experimental research supported by the panel identified group differences and the sources of those differences, rather than concentrating on what is happening in the classroom to perpetuate these achievement disparities (Cobb & Jackson, 2008). While this panel’s recommendations have merit, its limitations provided quite the stir in the educational research community about the benefits of other research methodologies. The special issue of the Educational Researcher includes the suggestion that an agenda of this magnitude should be educated by studies that identify causal relations as well as those that seek to identify how and when the relations exist (Cobb & Jackson, 2008).

The need for qualitative research to provide a vivid portrait of what is happening in successful classrooms is paramount for reaching the teachers and administrators who are in the classroom and asking for answers. A recent Google Scholar search of mathematics education produced 1,880,000 articles, adding SES narrowed it to 60,600 articles, and narrowing it further with high school algebra 1 produced 7,890 articles, whereas mathematics education and qualitative research produced 210,000 articles. This concentration of quantitative or mixed methods articles leaves us “wondering about the specific ways in which teachers might modify their classroom practices to provide social
and intellectual support to particular groups of students” (Cobb & Jackson, 2008, p. 577).

Many teachers that I know would love the opportunity to observe other teachers in order to improve their teaching. Unfortunately teachers rarely have the time; therefore, in this qualitative research I have intended to answer questions about the “specific ways” teachers are meeting the needs of diverse students in high school Algebra I classrooms. In the introduction, I compared the interactions in the classroom to those of the theatre, in order to provide an even more vivid description and use this artistic connection I used an arts based qualitative research methodology.

**Educational Criticism and Connoisseurship**

While I appreciate the tradition for research to generate knowledge and discourse, I believe in research that is also applied or action oriented. As Ladson-Billings (2006) states,

> Education research has devoted a significant amount of its enterprise toward the investigation of poor, African American, Latina/o, American Indian, and Asian immigrant students, who represent an increasing number of the students in major metropolitan school districts. We seem to study them but rarely provide the kind of remedies that help them to solve their problems. (p. 3)

I have read many articles, both qualitative and quantitative that provide information regarding a particular situation or perceived phenomena, without addressing its practical implications. Educational Criticism and Connoisseurship enabled me to not only describe what was happening in the three classrooms studied, but also offer a solution. Elliot Eisner (1998) states that, “…the toughest test of educational criticism (and it is the same test I would apply to any form of educational research) is, does it contribute to the improvement of education?” (p. 114). While all qualitative inquiry seeks to improve the
field, educational criticism suggests an action component. Other qualitative inquiries suggest that, “the purpose of the study is to describe, understand, develop, or discover something” (Johnson & Christensen, 2008, p. 77). Eisner goes a step further by suggesting that the researcher evaluates and offers suggestions for next steps or answers the question of why this information is important.

**Connoisseurship.**

The connoisseur is one who has an appreciation for what is being studied as well as the experience to be able to discern what is significant (Eisner, 1998). Flinders (2005) refers to this as “informed perception” (p. 135), whereas, one can observe what is happening in the classroom and make judgments about how and why the events might be taking place. For instance, someone who has no experience in early childhood education may observe students “playing” with small objects and manipulating them with tongs or tweezers. However, the connoisseur would perceive this as a way to improve fine motor skills in working towards holding a pencil for writing. Eisner (1994) refers to these as “perceived subtleties” (p. 216), applying the meaning of the event observed to the social constructs in which they take place. Many nuances of the classroom structure, activities, and interactions can influence a student’s learning of both curricular and non-curricular notions. According to Eisner (1998), there are five dimensions of schooling that these nuances might fall under: intention, structure, curriculum, pedagogy, and evaluation. I chose to evaluate the data for the first research question using these five dimensions and the addition of one more dimension, the administrative dimension, as interpreted by Uhrmacher (2008).
Eisner (1998) defines the intentional dimension of the school and classroom as the “aims or goals that are explicitly advocated and publically announced as well as those that are actually employed” (p. 73). It is important to note that the goals that are conveyed are not always those that are actually happening, or experienced by those involved, also known as the intended, operational, and received curriculum respectively. Through evaluation of curriculum materials, observations, interviews, and student focus groups, I highlight the intent and how well it was received. Within the intentional dimension, the aims and goals of the student and the teacher can be evaluated.

The structural dimension of schooling focuses on how a student’s day is organized (Eisner, 1998). The amount of time spent on different activities or on a particular topic may teach the student about its value. Other factors considered in this study are class size, classroom layout, lesson structure, standardized testing, class resources, and teacher collaboration. Each of these factors teaches students less about content and more about how learning is valued. For instance, Railside teachers allocated the most class time to group work, emphasizing the importance of collaborating with peers (Boaler, 2008). The structure of how they are being taught can be significant to what they are learning.

The curricular dimension “focuses upon the quality of the curriculum’s content and goals and the activities employed to engage students in it” (Eisner, 1998, p. 75). The quality of the mathematics curriculum has been of national interest with the writing of the new common core state standards and impending assessments that correlate with the standards. Interestingly enough, while most high school mathematics classes are subject specific, i.e., algebra, geometry, pre-calculus, the Colorado state standards and
assessments are not. Therefore, every ninth grader is currently assessed in the same way regardless of whether they are in pre-algebra, algebra, and geometry. It is unclear how the new assessments for the common core will be organized (by grade or subject); however, the importance placed on these test scores is having significant impact on the curriculum. Ironically, one of the primary reasons for the poor performance of students in schools that serve the poor has been the extraordinary focus at these schools on preparing students for success on “the test” (Kitchen et al., 2007, p. 2). The effects that state standards and assessments have on the curriculum are certainly a factor in this study.

An appreciation for how the teacher teaches is considered the Pedagogical dimension (Eisner, 1998). Rather than judging the quality of the teaching in search of best practices, the belief is that teaching is an art that can’t be standardized and that in a given context some practices may be more affective. This aligns well with my belief that teachers do not need to adhere to traditional or reform practices, but must use what is most effective for a given content or group of students. Therefore, this study will aspire to “celebrate productive diversity rather than standard uniformity” (Eisner, 1998, p. 79). Offering particular practices that were effective under precise conditions, rather than suggesting a uniform practice for all. Classroom artifacts, interviews, and student focus groups provide insight into how teachers and students react to the various practices in the three classrooms in this study.

The evaluative dimension seeks to illuminate the effects of how students and teachers are evaluated. This includes both how the student receives the feedback and what the teacher does with the data that the assessments provide. Another facet of this dimension includes the evaluations that the teachers experience and how the information
can impact teaching and learning. This can include both formal and informal, formative and summative assessment methods and how they influence the teacher and the students in the classroom.

The evaluation of teachers highlights the significance of the final dimension, the administrative dimension. With the recent focus on teacher accountability as it relates to student learning, the administrator has taken a more central role in the classroom. The evaluation of teachers can serve two purposes: to assess teacher effectiveness and to support teachers in improving their practice (Papay, 2012). The administrative dimension is focusing on the influence that the administration has on teaching and learning.

These six dimensions encompass the areas that the researcher might focus on in observing the teacher and students in the classroom. This study uses these dimensions as a framework to answer the primary question that examines the practices of algebra teachers in high poverty, diverse high school classrooms to implement the curriculum and influence student learning. While connoisseurship is the appreciation for what is happening in the classroom, criticism is conveying how these “happenings” are perceived (Uhrmacher and Matthews, 2005).

**Criticism.**

The criticism on the part of the researcher is not in any way to censure what has been observed, but rather to “illuminate, interpret, and appraise the qualities that have been experienced” (Eisner, 1998, p. 86). Through educational criticism, I portray the classroom management, engagement, CRP, and caring strategies that are occurring in the three high school algebra classrooms that are a part of this study. While many articles are written for journals primarily read by researchers, school leaders, and policy makers, my
hope is that this study is accessible and useful to teachers as well, by highlighting the struggles and successes of other teachers in similar settings that might offer some empathy and solutions to others currently in the classroom. As a manner of organizing the educational criticism research, Eisner offers four dimensions: description, interpretation, evaluation, and thematic.

Through the description dimension, the researcher brings the reader to experience the classroom through their senses (Eisner, 1998). Through a depiction of the sights, sounds, and smells of the classroom the reader can attend the classroom vicariously. Lawrence-Lightfoot and Davis (1997) described this as trying to “feel as the subject feels and to represent that understanding in a portrayal that exceeds the level of literal depiction found in a map or a plan” (p. 25). Exceeding the level of concrete description requires interpretation.

“If description can be thought of as giving an account of, interpretation can be regarded as accounting for” (Eisner, 1998, p. 95). Many of us who have taught can remember a time when a well-planned lesson was hugely successful with one group of students and then failed miserably with another group. What were the reasons for the success of one and the failure of another? The interpretive dimension seeks to answer this question, providing context and explanation to the events (Eisner, 1998). Chapter 4 provides the description and interpretation of the three classrooms, teachers, and their students observed and interviewed in this study. With the interpretation of how and why certain events have occurred comes the evaluation of the events.

The component of education criticism that seeks to provide a solution is in the evaluation. This is the chapter where I, as the researcher, make judgments based on the
observations and interviews that have been conducted over several weeks. The criteria for these judgments are based on the researcher’s own values (Eisner, 1994). These values must be based on the history and philosophy of education as well as their own experiences in education (Eisner, 1994). Just as, not all students are the same nor are their teachers; therefore, teachers bring their own values into the lesson. Similarly, the researcher focuses on different aspects of schooling based on their values of what is most important. The values that I emphasize in my evaluation will be those regarding classroom management, student engagement, culturally relevant pedagogy, and caring relationships. Ultimately, the evaluation provides feedback for teachers, administrators, and policy makers about what is going on in our schools, when they may often be too close to the subject (Eisner, 1998). As the descriptions, interpretations, and evaluations take place, certain commonalities begin to appear.

The fourth and final dimension of educational criticism is thematics. Eisner (2008) points out that in classrooms as in the theater the characters are often bigger than life. Take for instance the academy award nominated movie, The King’s Speech depicting the life of Britain’s King George VI. This movie was about much more than this man’s life and more about the difficulties of having a speech impediment. The value of this movie to those who have suffered from similar disabilities is much like the depiction of the trials and triumphs experienced by teachers and students in a high school Algebra I classroom to teachers in similar situations. This allows the researcher to make “general observations from particular circumstances” (Eisner, 2008, p. 20), which will be accessible to multiple audiences.
Data Collection

This study takes place in three different schools in two different districts in the same city in Colorado. I began my search for participants for this study by looking at the demographics of the high schools in my city (see http://www.cde.state.co.us/cdereval/download/PDF/2011PM/PK-12FreeandReducedLunchEligibilitybyCountyandDistrict.pdf). Within these districts, I identified three that had higher free and reduced lunch percentages. I then searched for information about individual high schools, to narrow the ones that best met my criteria for diversity and poverty. One district in particular had the highest rates of poverty (70% free and reduced lunch) in my city and I was able to gain permission from the superintendent and the two high school principals to perform research in those schools. I then contacted the other district that had two high schools with similar demographics; unfortunately, my request was denied due to the upcoming state tests needing all of the energy and attention of the teachers. (This is ironic given the findings of my study.) Ultimately, I gained access to another district’s high school that had substantially less poverty and diversity, yet similar free and reduced lunch (33%) as the state average (35.7%) (The Annie E. Casey Foundation, 2012). After receiving permission from the districts and principals, I asked principals and other teachers in these schools to identify Algebra I teachers who had shown success with students and their achievement. In the first district, at Highland High School, Ms. Green was the only teacher recommended and at Lincoln High School I was given the name of Ms. Reed and one other male teacher. I approached both of these teachers and at first they both accepted, unfortunately before I was able to begin observing in the male teacher’s class, he withdrew from the study.
fearing that it may have a negative effect on his employment. Finally, at Springfield High School in the other district I was given the name of Ms. Merrit and a male teacher. Both of these teachers accepted my invitation to be in the study and I observed, interviewed, and conducted focus groups for both teachers; however, I chose not include the male teacher, based on discrepancies between the observations and the student focus group. All of these teachers were sent a letter of invitation to participate (Appendix A) along with a letter of informed consent (Appendix B).

**Student Participants**

The choice of which students should be requested to participate in the focus groups I left, primarily, to each teacher. The only student who I requested was “Asiah” from Ms. Green’s class. I was particularly interested in her thoughts about the class due to her observable behavior that is outlined in the next chapter. Otherwise, I only requested that the genders be relatively balanced for each group, requesting 4-5 students from each teacher. My intent was to conduct focus groups with all of the students from a given class at the same time; unfortunately, it proved difficult for students to bring back their consent forms (Appendix C and D). Therefore the groups ended up being two at a time (for a total of four students each) for Ms. Merrit and Ms. Green’s classes and only three at once for Ms. Merrit’s class. The students ended up being a good representation in both gender and ethnicity of the class. I used the student focus group guide, created prior to the study, and occasionally asked questions for clarification.

**Observations**

I spent 11-15 hours in each teacher’s class over a period of two months. During each observation I generated hand-written record that I later fully transcribed. In addition
to classroom observations, I analyzed classroom materials, such as, curriculum materials and student work. Since my intention was to portray the ways that classroom management, student engagement, culturally relevant pedagogy, and caring relationships influence student learning, I would often make one of these my focus for an entire class period. I interviewed each of the teachers at the end of my observation period using the teacher interview guide (Appendix E) constructed before the study about these four categories as well. In addition, I would occasionally ask for clarification right after an observed class. Additionally, I spoke informally with principals and teachers from each of the participating schools about the curriculum.

**Writing the Educational Criticism**

As I mentioned previously, my data consisted of observations, interviews, student focus groups and classroom materials. After transcribing all of the data, I analyzed the data that I collected for each teacher individually, identifying common characteristics or events. I chose to write the interpretations and description of each teacher based on the common characteristics unique to each teacher in order to truly understand her and the setting in which she teaches. In order to confirm my interpretations, I sent each teacher the section about them and asked for their feedback.

After writing Chapter 4, I went back to the data and coded using Eisner’s (1998) dimensions of schooling: intentions, structure, curriculum, pedagogy, evaluation, and Uhrmacher’s (2008) administrative dimension; along with my own categories identified as classroom management and behavior, student engagement, culturally relevant pedagogy, and caring relationships. It was using these codes, that I was able to write the evaluation and identify themes throughout the three classrooms.
Limitations of the Study

There are many limitations to this study. First, having only three participants in this study may have limited my data. Some may argue that this gave me a narrow view from which to find themes. In addition, two of the teachers were from the same district and given the amount of district wide mandates, as outlined in Chapters four and five; this may have led to themes that were specific to that district. However, the methodology that I chose to use required a smaller number of participants in order to provide a vivid portrait of the experiences of each teacher rather than to make suggestions about a general population.

Secondly, my intention was to focus on low-income high schools. Springfield, with a free and reduced lunch of 33%, may be considered by some as outside of the low-income qualification. Unfortunately, I was denied access to the other high-poverty high schools in another district, leaving me no other options. It was my desire to bring the perspective from more than one district for the reasons that I mention above, leaving Springfield as a necessary option.

Thirdly, the fact that these were all white women may cause some to question parts of this study based on gender or ethnicity. The sad truth is that every math department in this study was 100% white, making it impossible for me to diversify the participation pool at these schools. In addition, the majority of the Algebra I teachers at these schools were female. As I mentioned previously, I did try to have male participants, but they did not work.

Finally, having only the perspective of low-income, diverse, and low-achievement schools as a part of a study that becomes highly focused on standardized testing may
have been limiting. It is possible that many of the low-poverty and high-achieving schools are experiencing similar standardization practices as the schools in this study. My research, however, was focused on ways to improve learning in low-income diverse schools not as a comparison to their counterparts.

**Implications of the Study**

Collaboration and apprenticeship are the cornerstone of any good professional. From the plumber to the president, people talk to each other about their experiences on the job and their triumphs versus their failures. Many articles have been written on the benefits of collaboration among teachers; unfortunately, they are often too busy to spend multiple days in another person’s classroom, observing the interactions between teachers and students. It is my hope to portray these interactions in a manner that takes the reader into the classroom in order to glean tools to be used in their educational career in the future.

In addition to opening the doors of these teachers’ classrooms to other teachers, I wish to bring the community of researchers and policymakers into the room, providing a true portrait of the effects of the current reform policies on teachers and students in a low-income and diverse setting. Beyond the statistical analyses and standardized test scores, teachers and students are performing great scholarly tasks that can be lost in the data. I hope to provide the conditions in which great learning and data can take place.

Eisner cautions about how this feedback is provided, emphasizing that it is important that the researcher while being a critic, also offers support, because “without a critical assessment there is no growth, without support there is no acceptance” (pp. 116-17). Eisner proposes the question, “What lessons can be learned from doing educational
criticism?” The answer that I would give is “many.” The observations and interviews provide lessons about schools and the people in them and the interpretation and evaluation provide an insight into what the researcher values. Most importantly, however, is the artistic manner in which the information is presented, as it makes the account more accessible to a number of audiences hoping to improve education.

This study will contribute to the research on school reform, particularly in low-income schools. The results will provide a point of conversation as to the experiences of the teacher in this time of accountability. Furthermore, as indicated in “Limitations” this study provides a springboard for future research comparing the experiences of teachers in low-income schools to those in high-income schools in the name of reform. Finally, the results of this study will contribute to the literature regarding care theory and relationships in the shadow of Culturally Responsive Pedagogy.

About the Researcher

I am currently taking the year off in order to finish my Ph.D. and finish the administrative license program that I started three years ago. These were both projects that I knew would need significant time and energy and that I would not be able to continue teaching at the same time. What I found in the last three years of teaching was that my students would come first, at the expense of these other projects. What is sad is that when I tell people that I am not teaching this year, the typical response is, “I understand, it must have been very hard teaching in such a rough school.” My response is relatively simple, I have taught students ages 11 through 50 in mathematics levels 6th grade through calculus, I have taught a vast array of race and socioeconomic groups, and I found this job the most rewarding. I miss my students and have gone back to my school
this year to visit. My hope is to return to working with these “challenging” kids again next year.

Most of my adult life has been focused on equity and opportunity for all children. While I was raised in a middle-class white family, I was acutely aware of the opportunities that I had that other children did not. As a college student, I tutored and mentored elementary, middle, and high school students, which led me to my career in education. My studies of Spanish led me to live in Mexico for a summer and experience a culture and language that was not my own. My Master’s degree turned my focus to linguistics, teaching English as a second language, and a thesis concentrating on the affects of dialect differences on high stakes test scores. Finally, my desire to learn more about what can be done to make education more equitable led to my doctorate at Denver University. Through this program I have learned about how many of the great philosophies of education have shaped many of the policies of today. This has influenced my research focus and my current career path.

I began my career in white, upper- and middle-class schools teaching middle and high school Spanish and mathematics. While starting a family, I spent time teaching at the community college level. A few years later, with the encouragement of my husband, I finally pursued my dream of teaching in a high-need school. My first year at this high school was like my first year teaching, a constant learning experience. The challenges placed on me by my administration and by my students, made it one of my hardest years in the profession.

At my previous teaching positions students were generally at grade level and test scores were never a huge concern. As long as I taught the material, my students generally
did well and I was never pressured by the administration to do more. As a contrast, my new position acknowledged that the students were below grade level and I was constantly challenged to take the students beyond “basic” expectations for learning. I was pressured to think outside of the box in order to improve student achievement with nothing more than chalk, paper, and an imagination. As my administrators poured over my student data and evaluated my pedagogy, my students were challenging my commitment.

My experience at other schools had been with students who complied with classroom norms, such as, speaking appropriately in the classroom, sitting in your seat, taking notes, and doing your homework. In my new school, I discovered students who questioned and often rebelled against these norms in general and against me in particular. Ironically, the students that gave me the hardest time my first year were the ones that frequented my room the most in subsequent years. One student even apologized for his and his peer’s behavior saying that they thought I was a good teacher and he did not know why they had given me such a hard time. I can’t be sure, but I believe that these students were testing me. They wanted to know if I was serious about being a teacher at their school, if I would be there for them, no matter how they behaved.

At times I dream of the days when I came to school and taught my lessons, graded homework, and went home; however, I remember how boring teaching was then. I love teaching students about classroom expectations, sometimes knowing that they are just testing me with a twinkle in their eye. I love having to be creative about engaging them in learning when they want nothing more than to sleep, talk, text, etc. I love understanding more about their cultures, beliefs, and languages. I even love crying with them over the injustices in their lives because it means that I can also celebrate with them their
successes. This explains my focus on classroom management, engagement, culturally relevant pedagogy, and caring that all takes place in a first-year Algebra I classroom.

My focus on 9th grade Algebra students is derived from the frustration that often accompanies learning algebra and the critical time in a child’s academic career that occurs around the time of becoming a high school freshman. This age was critical for me in deciding who I was in relation to the world around me and I have watched countless students struggle with the same. However, when I was growing up I was fortunate enough to have a safe environment in which to explore my own identity, whereas many of my lower SES students do not have this luxury.
Chapter Four: Descriptions and Interpretations of Algebra 1 Classes

Lincoln School District – Setting the Scene

Lincoln School District can be found in the most impoverished area of a city in Colorado. As so happens across our nation today, the impoverished citizens of this city have been relegated to a particular part of town in what Tate (2008) refers to as “geography of opportunity.” Lincoln school district is not only the poorest in the city, but it is also the lowest performing with only 21% of their students proficient or advanced in mathematics. They have been on an improvement plan for several years and are making progress in student growth; however, student achievement is still low. In order to improve test scores, they have implemented several reform efforts including, but not limited to, a district curriculum to meet the standards and state testing, district wide testing, and a new teacher evaluation system.

Before discussing the particular scenes of Ms. Reed and Ms. Green’s classrooms in this district, it is important to first provide a description of what is happening behind the scenes. In the 2010-2011 school year, teachers used a 2002 version of Glencoe Algebra I, following the scope and sequence of the text rather closely. In subsequent years, the curriculum maps became a stronger focus for instruction, strongly diverting from the text, with a new map presented in September 2011 to closer align to the state test, and finally a new map presented to the teachers at the beginning of the 2011-2012
school year to align to the newly adopted Colorado Academic Standards that aligned to the Common Core. The latest changes require the teachers in the Lincoln School District to work together to create lessons, activities, and homework with neither the use of a textbook that aligns to the curriculum map nor one that is less than ten years old. These factors render the use of a textbook for students virtually useless. In order to evaluate student learning of the prescribed curriculum, the district tests students quarterly, sometimes for two days at a time with an extended time for the tests and an altered class schedule.

Furthermore, the teachers in this district are encouraged to follow the curriculum map down to the month through frequent spot observations. The spot observation evaluation instrument used in this district; however, requires that teachers: posted and aligned, clear, and rigorous objectives; posted and aligned assessment to conclude the lesson; provided purposeful instruction with a variety of activities and checks for understanding; and fostered high engagement involving multiple response strategies, 100% student participation, and rigorous and differentiated lessons. These were all rated on a scale from one to three with a place for comments left below. The formal (summative) observation, contrarily, involves a rubric over 30 pages long that incorporates the above criteria as well as several other factors, including student achievement and teacher leadership and occurs twice each year. Thus providing the boundaries in which these teachers perform.
Scene I: Lincoln High School

Lincoln High School sits in the southern part of a growing Colorado city. As one of the older high schools, the city has grown around it. The highway curves around the west and south side of the school like a river working its way around a rock formation. To the east are city playing fields, warehouses, and trailer parks, and to the north are hotels and office buildings. Within a few miles to the west are a world-class resort and million dollar homes, while the other direction holds poverty and crime. The student to teacher ratio at Lincoln High is 13 to 1 with a total of about 990 students. The student body comprises 43% Hispanic, 27% White, 23% Black, 5% Asian, and 3% other, and approximately 70% of the students are eligible for free or reduced lunch. The Lincoln principal has held that position for the past seven years and maintains an institution intent on students attending college. Behavior that deviates from this goal is not tolerated.

The route to access Lincoln is somewhat confusing and circuitous as it has changed to accommodate buildings and highways. Finally arriving at my destination, I find a long, one-story brick building with a limited number of windows and a small parking lot. As I approach this one story building, I pass by the police car parked in the front drive, and find students gathered on the front lawn, some tossing a football, others in groups talking as they finish their lunches. A security guard greets me at the door with a smile and I head down the hall to the math wing after signing in. I enter through a pair of large double doors to a “common room” with two math classrooms on either side. Each of these classrooms has an opening into the common room that spans half the length of the wall, making it impossible to close off any of the rooms and enabling me to hear other teachers as they address their classes. A group of tables are assembled in the center
of the common room in the shape of a rectangle with chairs encircling the outside. A row of six computers from the last decade can be seen at the far end of the room and as I pass them on my left, I turn right to enter Ms. Reed’s classroom.

**Ms. Reed.**

The windowless room is open and tidy. At first glance, I find desks in straight rows as pairs facing the front of the room, an uncluttered teacher’s desk at the front, and a small bookshelf with a few books neatly aligned with a few file crates neatly tucked inside. For the last period of the day, I am surprised at the absence of scraps of paper or forgotten pencils as remnants of the numerous students passing through the room each hour. A large white board covers the wall at the front of the room, where the daily warm-up is being illuminated from the projector mounted on the ceiling. The room is decorated on one side with posters of the Colorado Mathematics Standards, directions for various group activities, and a bar chart of test score averages for each class period. To the left of the white board at the front of the room is a poster of “Women in Science” while on the right is the teacher’s desk with a desktop computer and a single basket for papers. To the right of the teacher’s desk is a blackboard with the daily objective and agenda for Algebra I and College Algebra, along with a handmade poster spelling SCHOLAR that looked like this:

| S | it up |
| C | heck yourself |
| H | one in on teacher |
| O | n task |
| L | isten |
| A | sk questions |
| R | espond with answers |
On the back wall that spans half the length of the room are cabinets that stretch from the floor to the ceiling with doors, hiding their contents. When you enter Ms. Reed’s room, you can feel the order and tranquility.

Ms. Reed is a white woman in her late twenties who has been teaching for four years. She chose to work at a highly diverse, poor high school, hoping to make a difference in the lives of her students. Ms. Reed takes her teaching role to the pool in the winter, coaching the girls’ swim team. Her dedication to her students and her craft is evident in many ways. One day while I was observing her class, I noticed a video camera at the side of the room. When one of the students asked why she was videoing her teaching, she replied that she was trying to see how she can become a better teacher. In addition to wanting to be a better teacher, she strives to remain accessible to her students. When I interviewed her, she received a call on her cell phone from a student asking about getting ready for the upcoming swim meet. These are just two examples of how Ms. Reed dedicates herself to her students and teaching, and throughout this section, I will describe several others. As I spent nearly 12 hours in her classroom and interviewed Ms. Reed and three of her students, I came to realize that the stability Ms. Reed offers in her classroom through clear expectations of active learning and respect, led to her success with her students.

**The ‘unorganized’ curriculum.**

The curriculum from which Ms. Reed teaches has changed multiple times over the last three years. When I asked Ms. Reed how she felt the curriculum influenced her teaching she explained that for classroom behavior,
It hurts it. Due to the fact of the unorganized chaos of it all… I especially noticed it last year when it was thrown on us without really understanding what was going to happen or the progress it was going to go to… and my honor kids last year really could tell. I just don’t feel as confident as a teacher when I am not sure what it is or how it is supposed to be taught and that hurts because they don’t see you as a strong member of the class.

This new curriculum deviates greatly from the traditional Glencoe text, as it requires more conceptual understanding. The uncertainty that Ms. Reed refers to regarding how a concept should be taught refers to the ambiguity of the map as it aligns to the district assessments. However, Ms. Reed feels that the increased focus on conceptual understanding aides with student engagement. She clarifies, “Compared to the old traditional Algebra I, I feel like there is more real-world to the math now and that helps with the think-pair-shares and that kind of thing. But I also appreciate the plug and chug through problems.” So, obviously the lesson planning is much more labor intensive with a new curriculum and without a textbook from which to glean activities or assign homework. Ms. Reed described some her struggles with the curriculum, “I felt that it took a little time for me to think it through to make sure I understand exactly what it was stating. I feel that if you didn't have a strong math background or experience teaching, some experience to fall back on, it would be very difficult to understand.” The lack of clarity and lack of resources with curriculum requires great collaboration on the part of the teachers. Therefore, when I refer to the lesson or the homework throughout my observations, keep in mind that these were all created by teachers in the department using materials found on the internet, from a collection of old textbooks, or from their own expertise in the area.
The curriculum map affects not only the “what” and the “how” of Ms. Reed’s teaching, but also the pacing. When Ms. Reed discusses the level of control that she has over the curriculum, she explains,

Admin was very strict about following the map. We would spend weeks reviewing instead of moving on to the new content only because the district test was coming up. I felt the pacing was uneven between assessments. There were some assessments were we had plenty of time and spent weeks reviewing while others we barely had time for one or two days.

With the level of importance to her evaluations as described in “Lincoln School District” Ms. Reed did not have a choice in what was best for the learning of her students when it came to preparing them for the district tests.

**6th period Algebra.**

On my first visit, 17 students, 9 girls and 8 boys, entered the room in an orderly manner occasionally joking with each other and returning Ms. Reed’s greeting. Due to absenteeism, the class normally averaged 14 students during my 12 observations of the 60-minute class periods. The racial make-up of the class mirrored that of the school with one girl from India, seven Hispanic students, four White students, and five Black students. On entering, the students collected their composition notebooks from the cabinet in the back of the room and made sure they were in their seats before the bell rang.

Every class begins with a warm-up, followed by a lesson, culminating with an activity to reinforce the lesson. The warm-up normally reinforces what they learned previously as a review or serves as a precursor to the upcoming lesson. During the warm-up activity students work on the problems projected at the front of the room in their notebooks and Ms. Reed works her way around the room answering questions and
initialing their work if it is done well. Ms. Reed describes her teaching style as traditional because “I expect them to be quiet and I expect them to listen.” However, she clarifies with the following explanation,

> the activity helps because they do get to move around or I can use that as a ploy where I can say that we are not going to get to the activity today if you guys don’t settle down. Students know that the activity would offer a time for them to talk to each other or work with each other and they like that.

One of her students referred to this during an interview: “I think that there should be more activities than just taking notes. Notes are boring.” I will refer to the many different games and cooperative activities that Ms. Reed uses to provide practice with the concepts, but let me assure you, Ms. Reed’s class is anything but boring. She has clear expectations that are consistently enforced, the most pronounced of which is that active participation is always required in her class.

**Active learning.**

To the casual observer of a traditional high school math class with students seated in rows, actively taking notes, and raising their hands to answer questions, students may appear to be actively learning. However, students can copy down notes without thinking about the material and what it means and often the students who raise their hands are the same ones every day. Many of us can recall slouching in our seats, avoiding eye contact to escape being called on in class. In Ms. Reed’s class, this type of “hiding” is impossible. During my observations, I found that the focus is on the students doing the work nearly as often as the teacher showing how to do the work. In her class, all students must participate, physical responses are regular, and collaborative learning is expected.
Many teachers strive to have all students actively participate in the class; however, when they call on the reluctant student who says, “I don’t know” and refuses to try, the teacher often reluctantly moves on to another student to save time. This does not happen in Ms. Reed’s class. She uses a large timer for certain activities that has a random number selector and each student’s desk has a corresponding number taped to it. If the student whose number is chosen does not know how to find the answer, Ms. Reed will either provide hints so that they can solve or tell them that they can ask a friend for help. However, ultimately, they are still expected to answer the question.

Another problem that teachers often face is how to manage the student who understands the concept in a class and wants to answer all of the questions. At times it is easier to call on these willing and able students; however, this also did not happen in Ms. Reed’s class. On one occasion, a male student answered a couple of questions and then she told him that she needed to have other people answer. When he told her that this hurt his feelings she apologized and explained that she needs to give the other students in the classroom the opportunity to respond. On another occasion, when she had called on almost everyone she stated the names of four students who had not yet participated, asking, “Which one is going to go first?” Immediately one of the students raised her hand and answered the question with a little help from the teacher. Subsequently, the remaining three students were quick to volunteer, not wanting to be the last student to be called on. Ms. Reed asked the last two students if they could do the problem on their own or if they would like to do it together and they opted to work together; ultimately, they did complete the problem for the class.
Physical response to learning.

Not only are students encouraged to be mentally active in their learning, but also physically. Everyone is required to participate by raising his or her hand or a white board to give the answer. This can be intimidating for students who don’t want to look stupid giving the wrong answer; therefore, this provides a safe way for a student to glance around the room and compare their answer to others to see if it makes sense before exposing their own answers. In addition, since everyone is doing it, one student is not being put in the spotlight. Almost daily, students are asked to show hand signals using: sign language, hands in the shape of mathematical symbols, and showing fingers representing numbers. These hand signals are used to set up a solution, provide a solution, or self-assess his or her learning of a concept.

Often times, in mathematics, word problems are particularly problematic for students. Students may be unsure how to set up a problem or unable to identify the steps necessary to solve it. One of the lessons that I observed involved inequality word problems and Ms. Reed found that the students were struggling with which direction the inequality symbol should face. To help students with this concept, Ms. Reed broke it down into steps that the class did together. Students began by reading an inequality word problem and identifying the important information. They would underline the significant parts and then would show the number of underlines that they had using their fingers. The next step was to set up the equation leaving the part where the inequality symbol would go blank. Then the class was instructed to show their hand in the shape of a mouth facing the direction that it should go for the given inequality (< or >). With the first problem, almost the entire class showed the wrong symbol, so Ms. Reed reviewed the vocabulary
used in the problem “minimum” and “maximum.” She then allowed everyone a chance to answer again and the class answered correctly, as they did on subsequent examples. It was apparent from the responses shown with hand signals that one student was still struggling, so Ms. Reed worked with her individually on additional tasks while the class worked in pairs.

Research has shown the benefits of exposing students to both right and wrong answers during classroom discourse (Borasi & Seigel, 1994; Boaler, 2002). Students need to be able to discern between a reasonable and unreasonable answer, and if a particular wrong answer is common it is important for the teacher to determine the misconception that so many students are having. Ms. Reed encourages the mathematical reasoning needed to discern between reasonable and unreasonable answers, for instance, when working with inequalities and integers, students often have difficulties with a problem such as, $-2x < 10$. The common confusion is determining if the correct answer is $x < -5$ or $x > -5$. By showing students both possibilities and having students vote for the right answer, they need to reason through the problem and the answers rather than waiting for someone to give them the correct answer and why. She also often elicits answers from several different students and puts them all on the board and then has students vote for the correct answer. If a large number of students vote for the wrong answer, then she can uncover the misconception with the class. Otherwise, she can just work with a couple individuals who are still making mistakes. Once again, all students are asked to participate. During one observation, one male student was not participating; consequently Ms. Reed had the entire class vote again with him participating, explaining to the class, “We need to vote again because some people were not participating”. The student sighed
and then raised his hand. On another occasion, Ms. Reed projected inequalities and their graphs on the board and students used thumbs up or thumbs down to say whether or not they were correct. This was a quick check for understanding that also reinforced the concept for students.

Students also used hand signals to show their answers to math problems. If the answer is less than 11, Ms. Reed often has the students hold up their hands to show their answers. This also gives the students a hint if they have a reasonable answer. On one occasion, however, students misled each other when the answer was negative 1 and they hesitated when showing their answers, looking around to see how most were answering, and the majority of the students showed just a number one. Only one student, Jenny, showed a negative one using two hands, and when Ms. Reed forwarded the slide to reveal the answer Jenny shouted “Yeah” pumping her fists in the air and Ms. Reed shared her excitement saying, “Good job, Jenny!” Other times, Ms. Reed has students use sign language to identify the correct answer to a multiple-choice question. This is a way to check answers and to practice for standardized testing.

Hand signals are also used in Ms. Reed’s class as a way to check for overall understanding. On one day, after students completed their warm-up problems and the answers had been given to them, Ms. Reed asked for a show of fingers to determine whether to focus on problem #1, 2, 3, or 4. According to the fingers shown by the students, two of the four problems were found to be the most troublesome, so Ms. Reed only gave an explanation of how to solve those two. Another method that she uses to gauge how the class is grasping a concept is by having them work in pairs on problems. By having student pairs give each other high fives or fist bumps when they get the right
answer, she can determine which students understand. This is also a quick way to
determine who needs help. At other times, she asks students to show her how they rate
their understanding on a scale from zero to five, zero being no understanding and five
being completely understanding. This strategy quickly shows her whether or not the class
is ready to move on.

The preceding examples illustrate that Ms. Reed is not the center of learning in
her classroom. Students are encouraged to work together and learn from each other. If
some students finish working on a problem before others in the class, they are
encouraged to talk about their answer and compare the strategies they used. Also, Ms.
Reed is not the only source of information in the room. Students are often heard asking
each other, “How do you do this?” and after showing each other how, they promptly
begin work on the next problem. I also heard some students asking, “Is this right? Did
you get this?” and their partner would respond with a “Yes” or “No” and a discussion
would ensue. During one observation, Ms. Reed approached a pair of students saying,
“You guys have different answers. Who is right?” She encouraged them to work together
and one of the students realized his mistake. On a different day, students were put into
groups of four to work on an envelope of math problems. The students took turns
drawing a problem from the envelope and then everyone solved that problem on a white
board. After everyone had completed the problem they showed their answers to each
other to see if everyone had the same answer. The students challenged and corrected each
other and then recorded the agreed upon answer on a group answer sheet. On yet another
occasion, pairs of students were given an envelope of cards with mathematical equations
and cards with the corresponding solutions and they were given ten minutes to match
each equation to its solution. In this situation, pairs were encouraged to work together to match more equations to its solution than any other pair in the room.

Friendly competition between small groups was found to be very motivating for students. During the matching competition referred to above, one student was singing and off task and Ms. Reed walked past his desk and asked, “You do realize that this is a contest don’t you?” He promptly began working and when the timer went off, he pleaded for ten additional seconds. He and his partner did not win, but he announced to Ms. Reed, “I was really trying on that” and she expressed her happiness with his work saying, “I know, and that is awesome.” On another day, Ms. Reed announced, “For our review we are going to play jeopardy.” The whole class cheered, “Yeah!” The groups were given the opportunity to name their team of four. They chose names like “Paco,” “Timmy,” and “Dragon Pacman”. The student with a birthday closest to that day was asked to choose the first category. As the game progressed, students worked on problems on their dry erase boards and compared the answers within their groups. At one point, two students debated over how best to solve an equation and eventually they were able to arrive at the answer together. Competitions like this appeared to motivate students to work hard to win. At one point, one of the groups noticed that an opposing team was catching up with them and one student said, “Oh, we are not letting them get any more of the points.” Students stayed engaged in this game for almost 45 minutes.

Clear expectations.

Ms. Reed’s expectations of students’ behavior and learning are clear and explicit. Her rules and procedures are established and consistent and students understand and abide by them. Everyone helps to enforce the rules and procedures in the classroom
because the expectations meet both Ms. Reed’s needs for teaching, but also the students’ needs for learning. Ms. Reed is equally clear about how to approach mathematical problems. Through explicit instructions, Ms. Reed increases student engagement with the materials by helping them create behavioral and problem solving habits that in turn leave the class relatively free of distractions from learning.

During one of my early visits I noticed that the expectations of listening, working, and learning are profound. She began the lesson by saying; “We are going to be doing some review with different ways of responding and I need you to listen to the instructions. First, I need you to cap your markers and put them on the desk” (she waited for everyone to comply). The students were shown a review problem and she explained to show their fingers indicating the correct answer. She moved on to the next step in the problem explaining that the students would talk to their partner about this step in solving the problem. During her explanation, she noticed that a student was playing with his marker. She turned to him surprised, “I asked you to put your marker down” and then she waited for him to comply. Another student turned to him and said, “You are like a baby; listen to the directions.” The student’s admonishment shows that some students do not appreciate having their class time delayed by others who were not paying attention. They know that Ms. Reed will hold them accountable for not following directions and will stop the class if necessary.

Transitions take away little time from instruction and applying concepts because instructions are given precisely and in small steps. On one occasion, after students had finished taking notes for the day, Ms. Reed raised her hand holding one finger, and says, “This is what you are going to do.” Then she said, “Put your notebooks away” and raising
two fingers adds, “Grab a white board and marker.” Everyone knew to stay seated until she released them and to follow the instructions quickly and completely. These class activities after the notes vary in group structure and in directions and students learned to quickly arrange their desks from groups of two to four. For example, during “Show Down” (a Kagan (1994) strategy) the students quickly turned their desks to face each other in groups of four. Ms. Reed stood under a poster on the wall titled “Show Down” and read through the steps of the activity outlined on the poster. She finally questioned students about the instructions before allowing them to begin the activity. The students promptly began performing the activity as the instructions outlined. While some teachers may only give explicit instructions the first time they engage in a particular activity, Ms. Reed explained that while the students knew how to do this activity, she wanted to make sure to avoid any problems by explicitly reminding them of each step in the directions.

The limited loss of time on task is a result of explicit instructions along with routines. When asked about the routines established at the beginning of the year, Ms. Reed explains that the warm-up from day one tells students “this is what you are going to see every day, so get used to it!” In addition, she puts a time limit on it so that they “don’t dilly dally.” The students know to get the warm-up signed by Ms. Reed for accurate and complete work within the time limit and that encourages them to be productive from the first minute after the bell. When I asked if the warm-up is for points on their grade, she explained, “yes, part of the notebook check.” This is combined with the “expectation with taking notes.” Their warm-ups and notes are written in a composition notebook that is stored in the classroom each day and Ms. Reed grades their organization and comprehensiveness every couple weeks. Ms. Reed also expects students to work until the
end of the class period explaining that “some people try to clean up early and I try to put a stop to that as quickly as I can. They say ‘but we are out of time’ and I tell them ‘not until the bell rings.’” Not only did student actions confirm their understanding of the expectations but so did their explanations, when interviewed, the students talked about not interrupting, staying in assigned groups, and paying attention. They also talked about other “general rules” that are common in all of their classes. However, the students recognize the routines, such as note taking, make it easier for everyone to follow the rules.

**We are in this together.**

Ms. Reed puts the responsibility of learning on every person in the classroom both through the structure of class activities and through behavioral expectations. Not unlike the student who scolded their classmate for failing to follow instructions, the students hold each other accountable for learning. The impression is that everyone is going to succeed together. With Ms. Reed’s help and the help of their peers, students can succeed in algebra. Complacency or distractions are not an excuse for anyone in this class because of an attitude by most that seems to say, “If you choose to slow us or yourself down we will let you know our disappointment.”

The class activities that take place each day after the lesson are usually interactive in some way. Many teachers worry about doing this because it can lead to more socializing than learning. Ms. Reed showed that if the expectations and routines are set in place ahead of time more learning will take place. One such activity involved giving each group of four students a series of mathematical tasks to work on. In order to get the full points, every group member needed to have the correct answer and they needed to answer
before the other groups in the class. After the first group had shown Ms. Reed the correct answer, subsequent groups that have all members complete the task will receive half the points. The group’s desire to be first supersedes their desire to socialize. Additionally, the requirement of every group member to understand the answer holds group members accountable for each other’s learning. Ms. Reed worked her way around the room checking on the groups and their work. At times she would have a group redo a problem, reprimanding them, “the goal here is for everyone to do the problem right because if only one does, that is not good, we want all four of you to do it right.”

This group accountability carried over even in less structured activities. On one occasion, a friendly debate ensued between two students over which way to solve for a variable. One student suggested adding an integer to both sides of an equation and another student questioned why he would not subtract the other number from both sides. They both showed correct mathematical reasoning; however, Ms. Reed explained why one way might save subsequent steps. Both students were able to articulate their reasoning and hold each other responsible for learning the correct problem solving steps. Not only are students conscious of how their peers’ mathematical reasoning may affect them, but also their actions.

Students watch their behavior carefully, wary that group members may criticize them for their actions. This was made apparent when a student made an inappropriate remark after his group lost part of a group competition. Ms. Reed told him that if he said something like that again, his group would lose points, for every inappropriate word. With this level of accountability, students are taught that what they do affects everyone in the classroom. Ms. Reed explained how she reinforces this, “I make everyone answer.
Like when I make the whole class wait and they get annoyed with me and I say, ‘no get annoyed with him, he is the one who is not answering’ and they go, ‘Dude, seriously?’”

She clarifies that “it is a management thing; I try to put it on them. They hold that in their eyes higher than what I think of them so if [the students] can fix the problem then it saves me a lot of struggle.”

Ms. Reed admits that her teaching has changed and that she has grown with experience. Describing her teaching style she clarified this point:

It was traditional. The traditional helps because I expect them to be quiet. I expect them to listen. The activities help because they do get to move around or I can use that as a ploy where I can say that we are not going to get to the activity today if you guys don’t settle down. So they know that the activity is going to mean them talking to each other or them working with each other and they like that.

She admits that this is a very good class; however, she has also enforced high expectations more consistently over the years. When asked if her administration assisted in her efforts for student behavior, she explained,

Admin did call in students to discuss behavior but at times they were too soft and gave them too many chances before consequences. Also the consequences didn't really have an effect on their behavior. I felt students had the reaction of “I hate you, you got me in trouble” versus “I did something wrong and need to change my behavior so I don't get in trouble again.” On the flip side, this last year I felt more supported with discipline than I had in previous years.

Given this reaction from students and the inconsistency of the administration, it was more effective for Ms. Reed to have the students correct themselves and their peers.

**Specific problem solving.**

Word problems often worry even the strongest of math students. This can become even more worrisome for students with limited vocabulary, background knowledge, or English skills. An example of this was apparent when students were asked to solve a
problem involving taxi rides. A discussion ensued in which many students had questions about how a taxi charges, what the standard rates are, and the distance from the school to different locations. All of these questions identified some of the background knowledge that might be applicable to a “real-world” mathematical problem. Acknowledging that these difficulties might exacerbate already existing difficulties with word problems, Ms. Reed gave explicit strategies for test taking and problem solving to reduce students’ anxieties.

District tests are given to the students quarterly, which dictates that ample opportunities are provided for test-taking practice. Mrs. Reeds’ strategies range from “read the questions carefully” to highlight or underline the important information needed to solve the problem. In addition to verbal instructions, she has posted two poster prompts on the wall and often points them out to students as an aid in answering mathematical questions. They then use these prompts to solve the problems. The following is an excerpt from one of my observations:

Ms. Reed announced, “Today we are going to do word problems.” Moans emanated from the students. Ms. Reed handed out the problems already typed so that students could tape them into their notes, alleviating the waste of time and energy copying the problems down. She then handed out highlighters to each of the students. After having them highlight the important information in each problem, as a class, they walked through the problem solving steps with one student chosen to ‘read the problem,’ another student ‘identifying the important information,’ the next student explaining how to ‘set up the mathematical equation,’ next a student was asked to explain the steps for ‘solving the equation,’ and finally a student was asked to ‘give the answer in clear,
As one student gave the final answer Ms. Reed said, “You know this…clarify so we get it all in one sentence.” Students did this together for a couple of problems and then they were asked to work in pairs to practice using the same routines.

**High expectations.**

Ms. Reed’s concise explanations carry over to her expectations: everyone will succeed, everyone will know how to be successful, and everyone will understand why success is important. To emphasize this, posters on the wall depict a bar graph identifying each class average by test, titled with a broad learning objective. This explicitly reveals to the students how they, as a class, compare to their peers and what the class’ strengths and weaknesses might be. For individual reflection, students are given their grades weekly and instructed to graph their scores in a “portfolio” preserved in a file in the classroom, so that students can monitor their own progress.

Ms. Reed describes the make-up of the class and her expectations of them: “This is a typical freshman class, ability levels are varied, the desire to learn varies, and their concentration varies.” When asked whether she thought that the class’ desire to learn varied by student or day to day, she responded, “Both…definitely by student, but some days I hear ‘I don’t want to work today’ or there is something going on at home. I get kids some days and I am just like ‘who are you?’ ‘What is with this attitude that you are giving me?’” Some teachers might feel sorry for the plight of their students and allow them to take time from their school obligations because of the overwhelming situations that they often must live with. Ms. Reed, however, describes her high expectations and her compassion for her students this way:
I usually tell them ‘I still expect you to do the work.’ If I catch on that they are really having a bad day I will tell them, ‘I will stop bugging you if you just participate… Do the bare minimum in your mind.’ I feel like in the adult world if you are having a bad day, you are still expected to perform. And you [as a teacher] need to start treating them like that.

It is also important that students who are already behind many of their peers in education be pushed to perform in school, to offer them a chance of a different life in adulthood.

Some teachers might fear that students will think that they are mean or uncaring if they push them at school despite difficulties at home. However, Ms. Reed illuminates otherwise when she describes how her students might describe her as a teacher. “I know that they think I am hard, tough, expect too much, but I have also had some of my hardest, most difficult students come back and say ‘Hey, what is going on?’ I am getting more and more of that as I get more students.” The fact that students return years later is evidence of their endearment and appreciation for her dedication to them.

High expectations can be described in many different ways. For Ms. Reed, the students “know that I have high expectations because they don’t reach them every day.” When she describes what this looks like in the classroom, she explains,

I tell them when they are disappointing me: this is not what I expected of you; I expected you to do this and you are not; I expected you to do your notes today; if I expect you to be taking notes and they are taking notes and you are not, why are you special, why do you get out of it?

Ms. Reed’s description of high expectations and how they are taught is evidenced repeatedly during my observations. Ms. Reed holds high expectations for behavior, work ethic, academics, and student responsibility for learning.

As discussed previously, Ms. Reed maintains a high expectation for behavior in the classroom and enforces these expectations consistently. A stern look in the offender’s
direction is often enough; however, sometimes a comment is warranted. On one occasion, a student disrupted class by telling a joke and she gave “the look” and then said, “I understand that you do not want to be here, but I still expect you to do the work and you are not living up to my expectations.” Two other students had received two different warnings for talking during the lesson and she finally said, “Okay which of you is going to move?” One of the students volunteered and moved and the lesson picked up the pace and became more focused.

During the student interviews, I asked about students misbehaving:

Cassie: “Do you think that the topic… you mentioned that it is complicated or hard, do you think that is why some people are off task or cause distractions?”

Drae: “I think that they don’t care and if they don’t get it they just quit.”

Cassie: “Do you think that some people already know it and they don’t pay attention because the already know it?”

Josue: “A couple, yeah.”

Cassie: “What about tests and quizzes, do you think that affects how people act in the class, like if they do really well or they don’t do very well?”

Drae: “Like people don’t care if they do bad. They don’t pay attention that much in class. Like some people in the class if they do bad they really don’t care because in other classes they do bad in that class too.”

Reyna: “I care when I do bad because if I fail this class then I will have to do this class again, so I want to fix it.”

Ms. Reed enforces in her class that in order to “fix it” a good work ethic is essential.
Why learn algebra?

The topics learned in an Algebra I class can often be complicated and require an abstract way of thinking that is frequently difficult for students. Therefore, students need to learn a good work ethic that includes not giving up, asking good questions, and practicing through homework and classwork. Ms. Reed lets the students know if they are not living up to her expectations. During one particularly difficult task, she said, “I am a little disappointed in the work ethic that I am seeing. I am a little disappointed that some of you were not getting this done and you were not asking questions.” Students are repeatedly encouraged to ask questions of both the teacher and their peers. In addition, students are encouraged to keep a notebook with examples and to complete classwork and homework daily. It is obvious that students do not see Ms. Reed as the only source of knowledge in the classroom. Whereas students from other classes that I observed explained that they would know if they had learned something by asking the teacher if they were right and if they were, they must know it. Ms. Reed’s students explain that they know they have learned a topic, “When you can do it without looking at your notes. You can just do it off the top of your head.” This reply makes it apparent that the students see themselves as responsible for their own learning.

Ms. Reed does not take class time to go over the homework instead, she hands it out at the end of class with a brief explanation and then collects it the next day. However, Ms. Reed values the work, making a point of talking to students individually if they are not doing their homework. One student told her, “You know that I am not going to do my homework” after she asked him why he had not turned it in and her reply was, “but I am not going to stop bugging you because I want you to be successful.” Ultimately, the
students are told over and over that their success in the class and their learning is up to them. If they are willing to work hard, they can learn and be successful; this is enforced by teaching students how to identify their learning needs and the importance of learning algebra. Ms. Reed helps them identify what they do understand so that they can ask better questions. For example, one student said to her, “I don’t get it” and she responded, “I need you to be more specific about what you don’t get.” After that, the student began walking through what she did understand and then identified where she got stuck. That made it easier for Ms. Reed to help her and will probably enable this student to solve other problems in the future, knowing how to identify her specific learning needs.

Likewise, Ms. Reed encourages students to seek help from her before or after school. She would often ask students privately if they intended to pass the class. When they would answer affirmatively, she would explain that in order to do so, they needed to come in for help. She also makes sure that their decision to succeed in the class is in their control. Students know that their failure in this class is not an arbitrary decision made by the teacher, but rather a result of their actions.

In addition to passing the class, students are encouraged to have a desire to learn. I was struck by one exchange between Ms. Reed and a consistently unruly student. One day she asked him, “Do you want to learn or do you want to go out in the hall?” The student retorted, “Pretty tempting, but then I will be in trouble.” Ms. Reed repeated her question, “So, do you want to learn?” When he did not reply, she tried again, “Do you want to learn?” He finally replied, “Yes, I want to learn.” He then set to work on the task. After class she had another conversation with him in which he assured her that he would work harder. I find it interesting that the question was never, “Are you going to do your
work?” or “Are you going to start behaving?” but “Do you want to learn?” This shows a big difference between the expectations of compliance versus learning.

The importance of learning is also a priority over getting the right answer. Ms. Reed often has students explain why or how they arrived at a certain answer. One day, when the students were using white boards to show their answers, there was one problem in particular, in which almost everyone’s white board revealed the correct answer. However, when Ms. Reed began asking students to explain their reasoning, no one could explain. She asked, “Truthfully, how many of you guessed?” Many students raised their hands and she asked them, “Why are you selling yourselves short?” She obviously feels that the students are capable of solving the given problem and explains the importance of understanding how to do a problem, rather than just getting the right answer and moving on. The importance of understanding how to do the problems is only significant, however, if students understand the importance of the course to their futures. Ms. Reed consistently enforces the importance of learning algebra to the students’ futures.

Throughout my observations, Ms. Reed would remind students that algebra is necessary in order to graduate from high school, stressing the reality of having to take the course again next year if they did not learn the material the first time. She also found many opportunities to talk about going to college and the importance of this class for both admittance and degree requirements in post high school endeavors. When I interviewed her students it was obvious that they understood the importance of learning algebra for their future goals. One student explained that he needed it “for college; I want to be a scientist and you have to learn math to be a scientist.” Another student rationalized, “I want to do sports; my main thing is that I want to do sports, so I have to
keep my grades up.” One student also mentioned the importance placed on schooling by his parents, stating, “I don’t want to disappoint my parents and all that and get grounded.” Yet another student described how Ms. Reed, “will talk to us about tests and about how it will affect us in life.” I asked if that related to graduation or to jobs and he replied, “Like if you go to college then you can get a better job than somebody that doesn’t go to college or is a high school drop-out.” Often it is difficult for teens to see past their immediate future and for students whose parents never attended college and do not talk to them at home about college, it is even more difficult to understand the importance of a good education.

Respect for others.

As I have mentioned throughout this section, Ms. Reed teaches her students much more than algebraic concepts. Another lesson that students leave her classroom with is a respect for others. This respect ranges from understanding common courtesies to respecting racial and ethnic differences. This expectation of being respectful was clear during my observations and punctuated in the interviews with both Ms. Reed and her students.

The common courtesies that are taught to the students originate with the basic manners of not talking when someone else is talking. Ms. Reed expounded,

I do expect them to give the person talking the attention. When someone in the room is talking, you should be listening to them, because it is important, it is not just random words coming out of their mouth. So I feel like I try to do that for myself as well as for each other. The class that you watch is pretty good about redirection, even though they do it over and over again wrong, they understand ‘oh yeah, I am wrong’ and redirect. Just with that class… it does not happen all the time… I don’t know if it is since it is the end of the day and I am a little bit shorter with them or catching it faster, cutting it off sooner or if it is the personality of the
class… but I do enjoy structure more than chaos… when they get a little bit of room they take a mile and it is difficult to want to give them that room when they know they are going to abuse it.

This expectation is apparent daily both between peers and between students and teacher. On one occasion, Ms. Reed said reprovingly to a group of students who were talking, “I think that Sashi is asking really good questions and I am sorry that you guys are missing out.” Turning to Sashi, she asked, “Can you say it again?” Another student started talking and she stopped her again apologetically, “Oh, Adolpho was talking can you repeat it again?” Finally, the class realized that Ms. Reed expects everyone to listen to Sashi’s questions (which were probably applicable to several other students). Pointing out to the class and Adolpho in particular, the importance of being respectful is a lesson always worth teaching.

On yet another occasion, a student started talking while another student, Jenny, was answering a question. Ms. Reed, of course, stopped Jenny, apologizing for stopping her, and this time also had the student who interrupted apologize to Jenny as well. After the apologies were made, Jenny was then able to finish answering the question. Not only did having the student apologize emphasize the importance of respecting your peers, it also deflected the attention away from Ms. Reed and turned it back to the person interrupting.

There are times that one student in particular, Jack, is difficult to keep on task. One day, right before Thanksgiving break, the students were particularly chatty and off task. Ms. Reed announced, “I am not very happy about the noise level in this classroom… I can think of about three students who can be removed and make this room better.” The class settled down for the most part, except for Jack. She asked him to move
to the back of room and he ignored her. She counted to three and he did not listen. So, she picked up his white board and marker and had him sit in the common room, outside of the class. Jack left and the noise level automatically decreased. Occasionally a couple of students were off task but most of them did their work. On this day, the class was only able to work on about ten problems in 45 minutes, which is significantly less than normal. Other than Jack’s occasional head down on his desk or talking out of turn, Ms. Reed’s class is generally focused, hardworking, and respectful of their teacher and peers.

Not only are students encouraged to be respectful of each other, but they are also required to treat their teacher with the same respect. If a student talks to a neighbor while Ms. Reed is explaining a problem, she normally stops talking until they end their conversation. Ms. Reed, however, is not the only disciplinarian in the room; often other students redirect their peers to the work at hand. One day, a student turned around in their seat and was talking to the person behind him. As Ms. Reed started to walk over, the student next to him slapped his desk as a warning, he immediately turned around and said sorry and then went back to work. Ms. Reed describes how she encourages students to be respectful of her in the classroom in the following manner,

I try to put it back on them, “do you want me to treat you that way? How would that make you feel?” I feel like I have expressed that more this year. I don’t know if it is because I get sick of it sooner in the year (laughing) every year sooner and sooner my patience gets cut shorter and shorter and this is like trying to show them that I am here for you, every night I go home and work hard for you to make sure that you have something, trying to show them that I am being selfless and maybe then they will realize and give me a little bit more respect and maybe they will give me a little bit more consideration when they do something wrong. You just need to help me out by paying attention.
This respect that Ms. Reed fosters between herself and her students ranges from common courtesies, as outlined above, to respect for differences in both background and learning.

This is a diverse class of students with many different races and ethnicities. It is common for schools and teachers to report conflicts between students from different backgrounds. When Ms. Reed addresses this concern, she explains,

I do not allow racial slurs or derogatory terms; even saying ‘nigga’ I say ‘no, even if you are black that is a no.’ I don’t let them say ‘gay,’ I don’t like it and I think that it helps them know that I don’t care who you are or what you do [you don’t talk like that in my room].

The students reiterate Ms. Reed’s resolve in this matter explaining that the class likes to joke around; however, if anybody is mean to someone, they will be sent out of the classroom.

While Ms. Reed fosters a culture of respect for others regardless of race, ethnicity, or background, she explained that race occasionally becomes a factor.

At times, someone will say something like, “You are picking on me because I am Mexican” and I will say that “I pick on that guy over there too but today you are the one being rude.” I guess that I just try to treat them as equals. As well as requiring that of others too, even if it is not directed toward them but just in general, you can’t put others down.

This is also enforced through group work. Student seating is assigned by Ms. Reed and changes each month. Students are required to work with whomever they are matched up with through the seat assignments. During the months, I observed students of all races, genders, and ethnicities working together without any disagreements other than over an answer to a math a problem. This observation epitomizes the opportunity to learn fostered through engagement and a well-managed, respectful, caring, culturally respectful classroom.
The future for Ms. Reed.

Ms. Reed did not return to Lincoln High the year after this study. Through a recent correspondence she explained,

I am still working at a Title 1 school with similar demographics at Lincoln High School. One major difference is the textbook and curriculum strength. The text has been worked through and common assessments have been created. Common assessments are not given at the district level, but building level. I feel this removes some of the stress on teachers and students to have more freedom with the content and assessment dates. It is refreshing to be able to consider what is best for the student rather than teaching what is on the test so specifically. Since I still teach freshmen and lower level upper class men, discipline is still an issue but I do feel I have more students that care about their academics. I have more students coming in for help, asking questions, and taking advantage of retake opportunities. In general the school environment is different. There is more focus on involvement in clubs and sports. The school spirit is stronger and more prevalent. While I have more issues with skipping, students overall understand the need to work for their grade. (personal letter to researcher, October 12, 2012)

Ms. Reed’s response to this interpretation.

I sent this description and interpretation to Ms. Reed two months ago and recently she replied with an apology for not reading it yet. She explained that she is very busy with a new school and new curriculum and is hoping to have time to read it soon.

Scene II: Highland High School

Highland High School sits on the eastern corner of Lincoln School District. The high school has approximately 860 students, 65% of whom are eligible for free or reduced lunch. The student population is comprised of 2% American Indian, 5% Asian, 36% Black or African American, 36% Hispanic or Latino, 20% White, .5% Hawaiian, and .5% having two or more ethnicities. Highland High is the newer of the two high schools in the district, having been built in the 1980s. While Highland is newer and more
modern looking, the other high school in the district, Lincoln High, houses the only stadium and is the district’s namesake. Therefore, all of the major outdoor sporting events for Highland must be held at Lincoln, this and other events make it seem at times like the forgotten stepchild of the district.

Highland High is situated to the east of a struggling commercial parkway with apartments and housing complexes scattered throughout the neighborhood. A new YMCA shares a parking lot with the faculty of Highland High to the East, and to the West are practice fields. The front of the building is adorned with a green lawn and tall deciduous trees with the United States flag flying prominently by the entrance walkway. The circular driveway separates the front sidewalk and lawn from a small parking lot and a grassy knoll with a few trees and a bulletin board announcing upcoming events at the school. I find a visitor’s parking space in the small parking lot and approach the front entrance. To my left, a group of students are having lunch on a concrete patio in front of what appears to be the cafeteria. Other students are gathered near a large, raised brick planter talking. To my right, I observe a large group of boys playing football in the grass with a large stone placard stamped “Highland High School” in the forefront. As I approach two large double doors, a student holds a door open for me; I enter, and pass through another set of double doors to be greeted by a security guard standing behind a podium. After passing through another set of double doors, I walk down a long, wide hallway lined with students’ lockers to a set of stairs. Ms. Green’s classroom is situated at the top of the stairs and through yet another set of double doors. As I pass through this set of double doors to her hallway, I notice that the floors change from tile to carpet and that
the cinderblock lined hallways are much narrower. Her room is located in the corner of
the next hall and as I enter, I am greeted by Ms. Green’s smiling face.

Ms. Green.

Ms. Green’s classroom is her stage. It is adorned with Christmas lights strung
along a wall and a poster saying “Life’s a beach” with a slash through “life” and the word
“math” written above it. This explains the beach motif that is scattered throughout the
room with paper sunglasses, straw hats, and paper suns wearing sunglasses; it is quite
unlike any other mathematics classroom I have ever been in. Ms. Green explains that she
loves to have a different theme each year to decorate her classroom. Two years ago her
classroom was literally a stage with curtains on the side of a chalkboard that displayed
the objectives and agenda for each day. Last year her room was inspired by a greeting
card that read, “This year I am going to dress up as something really scary for Halloween,
a math teacher.” She described the first day of school when she wore a witch’s hat and
pulled papers from the cauldron that she had in the middle of the room. Thus, Ms. Green
grabs the attention of the students from the very first day as I imagine many students
wondering what to expect from high school algebra.

The classroom or “stage” is a rectangular room with a chalkboard on two adjacent
walls and a whiteboard along the third, narrower side. The desks are arranged in rows of
pairs, two to three desks deep along the length of either side facing the center of the
room. This creates an aisle through the middle of the classroom from the whiteboard to
the chalkboard with the rows of desks facing the aisle. As Ms. Green walks up and down
this aisle, she talks to the students with an animated voice and uses hand gestures to
emphasize what she is saying. This classroom is much like a theatre with Ms. Green playing the leading role and the students as the supporting cast.

Ms. Green is a 5\textsuperscript{th}-year mathematics teacher who has just restarted her profession after staying home and raising three children until they were ready to begin school. She is also a minister’s wife who has done missionary work around the world helping children in need. Her first teaching job, after having children, was at an alternative high school in a small mountain town and after her family moved to the city she sought a teaching job where she could continue to work with challenging students. Her success with the students at Highland High School for the last two years has made her a teacher who is respected and admired by her administration, peers, and students.

When I observed Ms. Green, I began with her fifth period class. After several days of observing this class, it occurred to me that perhaps this class was unique in its challenges and not the best reflection of the type of teacher Ms. Green really is. I will outline through interviews and observations the number of ways that the students in this class made it difficult for Ms. Green to teach. Then I began observing in both her fifth and sixth periods to make a comparison. The difference in teaching and learning between the two class periods was profound although they were both high school Algebra I. Finally, I began observing solely in her sixth period class, becoming too distracted with the behavior of a number of students in the fifth period class, and I felt that it was not beneficial to my data collection. When I asked Ms. Green how she would describe the two classes that I had observed, she sighed and explained:

\begin{quote}
Fifth period is loud, rambunctious, and unmotivated – lazy, not all of them but generally they don’t care to learn. And those were the strong personalities. Those strong personalities separate would be fine, but
\end{quote}
together it was almost toxic. I lost four of those along the way; one student was expelled. Him being gone really helps; one dropped out, another is possibly being expelled because he is out for his 5th suspension, and one transferred to another class because of a schedule change. Getting all four out of that class changes a lot. That class is now down from 28 to 21 students, but I don’t know what happened with the others.

I recall that her voice was a mixture of exhaustion and sadness as she described this class. She stared off as though reliving some of those darker times in that class with each of those four students.

Alternatively, when Ms. Green began to describe 6th period, she perked up and her face and eyes became animated again. She explained, “6th period is smart, highly motivated, and highly chatty. There is maybe one exception, but the atmosphere, intellectually, is significantly higher. As I said, they are really chatty, however, they are also easier to redirect.” The classroom dynamics are more academic in sixth period than in fifth because of a handful of students. While Ms. Green is a compassionate, strong, and engaging teacher, this had little bearing on fifth period. More on this can be found in the “behavior” section of this chapter.

A typical day.

Ms. Green’s class begins before the bell rings when she greets students as they enter reminding them to pick up their warm-up paper and notebooks. Students all have composition notebooks given to them by the teacher at the beginning of the year, and the notebooks are left in the classroom on a bookshelf by the door every day so that they will not be lost or forgotten. Ms. Green also offers paper to students as they enter to do the opening and ending problems each day. It appears that the only thing students are required to bring to class is a pencil
(although a few students ask to borrow these as well). The opening or “warm-up”
problems review information from past classes at the beginning of each class, and
the problems at the end of each class (called the demonstration of learning) assess
that day’s lesson. Each day students turn in this paper with the “warm-up” and
end of class assessment problems so that Ms. Green can monitor both retention
and new understanding. She does not grade these sheets but rather gives points for
completion and looks the papers over to see if any students have
misunderstandings. Usually she has few surprises as she has spent so much time
progress monitoring throughout the class.

Ms. Green begins each class quickly, moving around the room making
sure that everyone is working on the warm-up and checking to see if anyone
needs help. If the student gets the problem(s) correct, she will put her signature on
their paper. She is almost a blur as she goes over questions with multiple students,
responding to each of their inquiries. It is evident that this practice is for the
benefit of both the teacher and the students as she will normally let the class know
how they are doing as a whole and what the expectation is. Ms. Green announces
to the class, “Most students did really well on A, most did really well on B, but
listen up because a lot of people had problems with C and D” or “You are my first
class that I don’t think that I need to do this on the board! Good job!” She stops
and hurries over to a student to give a hint, and then says, “You got it, good job!”
At other times she is heard saying, “I like this, this, and this, but I don’t like this.”
Every day, she can be seen dashing around the room giving hints and then moving
on to check on the next student giving praise and pointing out errors. She often
stops the class to explain a common mistake. After approximately five to ten minutes, Ms. Green stops the class to address the problems that she noticed on the warm-up, either doing the problem herself or having students from the class come up to the board and explain.

Throughout the class, Ms. Green highlights to students the important concepts of the day constantly saying, “Pay special attention to…” or “Listen up because this is really important…” These verbal cues focus their attention on key concepts and foreshadow the tasks that they will be asked to complete on the end of class assessment. When it is time for these problems at the end of class, again Ms. Green dashes about the room checking and correcting and letting the class know how they are doing. She announces, “We are at about 50% correct; I was hoping for 100% – We need to do some more.” In these instances, she will explain the answers and then give the students three new problems, saying, “We need to do three more so we can get 100%. After you have done it, I will give you the homework.” Ms. Green tells students what they need to learn and to what degree, which enforces to the students what they really need to learn that day and that everyone needs to learn it, not just a few. The fact that she will keep giving them new problems until they get it right emphasizes the importance of mastering the objective before they leave for the day.

With the warm-up and the demonstration of learning beginning and ending the typical class, the lesson and activities are provided daily to learn the posted objective. After the warm-up, Ms. Green often instructs the students to open their notes and title them with the day’s objective. During the lesson, she instructs
students to write down pertinent vocabulary and key examples to reference when doing the activity. The class activity that normally follows often involves students working in pairs or groups of three or four, completing tasks that enforce the lesson. While Ms. Green plays the leading role in her classroom, it is evident from the beginning that everyone plays a significant role in the learning that takes place in the classroom.

**The curriculum mandates.**

In the two and a half years that Ms. Green has taught at Highland, the curriculum that she has been expected to teach for this class has changed significantly three times (see the previous section, “Lincoln School District”). The students were not issued textbooks this year, as Ms. Green did not feel that the text and map correlated at all. Ms. Green has been directed by her administrator this year not to deviate from this guide in pacing, breadth, or depth. While Ms. Green has been expected to adhere to the district curriculum maps throughout her tenure at Highland High, this year’s new administration brought an increased scrutiny on the pacing and content of the classes. They frequently check on Ms. Green’s lessons for their adherence to the pacing and the content of the map. This scrutiny is often without regard to the pace at which the students were learning. Moreover, the topics outlined in the map are somewhat nebulous and left to the interpretation of the reader, which can become a problem if the teachers interpret them differently from the administrator.

With the strict direction of the new administration, Ms. Green feels conflicted between following the administrative guidelines and the needs of her
students. In addition, she explained that while she had received high marks from her administration in years past for her teaching, this new administration was neither complementary of her work nor supportive in the changes they sought. Further investigation showed that low scores were common for many of the teachers throughout the school and that it made moral incredibly low. The negative impact of the administration on the curriculum, pedagogy, and assessments is pervasive for Ms. Green.

**Administrative oversight.**

As mentioned previously, this is Ms. Green’s third year at Highland High. During this time, she has experienced two different principals and seven different vice-principals. Typically one of these evaluators will be in her classroom for a ten minute “spot observation” seven times throughout the semester and a “formal observation” once each semester for the entire class period (a description for the district wide teacher evaluations can be found on p. 80) While Ms. Green has scored high in previous years, this year’s new principal and two new vice-principals have not given her as high of marks and the comments are merely a script of what took place during that time period rather than praises or suggestions on ways to improve. In addition, Highland High is a focus for the district this fall and Ms. Green voices her frustrations at having close to 60 visits to her classroom over three months. The feedback from these visits is either negative or nonexistent. Furthermore, in the first two months of this school year, the principal has fired several teachers and one vice-principal, creating a culture of fear. In fact, feelings about the actions of the administration became so heightened during my
time observing Ms. Green; the students staged a walkout during third period, which many of their parents attended. Ms. Green laughed sadly when I came in to observe that afternoon telling me that she had been observed during that time. This amount of oversight without a clear message about expectations is very distracting for Ms. Green’s teaching; she refers to it as a moving target that she cannot quite see. These frustrations are compounded by the district assessments, which are also used to evaluate Ms. Green’s teaching abilities.

Assessments.

The students are assessed by the district using a common assessment quarterly. In addition to the district assessments, students are assessed by the state every spring. It is due to these assessments that Highland High is under so much scrutiny. Traditionally, Highland High has very low achievement scores on the state assessments. While they have made small gains over the last several years, their test scores remain some of the lowest in the state. The district assessments are aligned to the curriculum map, which, as I explained in the “Lincoln School District” section, has been written to align to the state test. The district assessments are administered quarterly and are required to be factored into the student’s class grades and as part of the teacher’s evaluation. The difficulty with this is that the teachers do not write the test and they are only allowed to view the test one time during a scheduled viewing with the district mid-quarter. These frequent common assessments guide how Ms. Green assesses her students.

Due to the pacing of the curriculum map and the frequent common assessments, Ms. Green has chosen to give short quizzes over each topic rather
than longer unit tests in hopes of taking away less time from instruction. Students are given the opportunity to retake any of these quizzes that they do not pass, in the hopes that they will eventually master the concept. Giving short assessments linked to particular topics is similar to Ms. Merrit’s standards-based grading (that can be found in the next section); however, Ms. Green also grades based on other factors such as homework and classwork.

**Meeting diverse learning needs.**

With large variations in student abilities, it is often difficult to meet the needs of all students in order to maintain their engagement in the subject matter. This is particularly true at this high school where every entering first-year student takes Algebra I or a higher math. Regardless of gaps or previous learning, the school expects all students to take algebra or higher their freshman year, for no alternative classes are offered. Therefore student mathematical abilities range from basic arithmetic to algebra-ready. The hope is that this policy will hold students to high expectations; however, careful study of the map shows less content and a lower level of rigor than in most Algebra I books. This is combined with a strict adherence to the curriculum map as mandated by the district. When I asked Ms. Green how the curriculum fosters high expectations and inclusion for all cultures and backgrounds, she replied, “It does not [foster high expectations], I don’t think the expectations are high enough for the curriculum.” She explained that in her class, she always tries to have different levels of questions that are accessible to everyone. For example, the first two would be easier, and then the examples would become more difficult. Unfortunately, the curriculum map
dictates slow review at times while at other times requiring that complex concepts be taught in a small period of time. The student interviews confirm Ms. Green’s belief regarding the low expectations of the curriculum. The two high-performing students voiced their frustrations with repeating concepts that they had already learned and the lower performing students described their struggles with misconceptions (both of which appear to hinder student engagement).

The two higher-performing students in Ms. Green’s class, Kadeem and Teran, explained how they appreciate being challenged by the curriculum. When asked about what they liked the most about learning algebra they both replied, “It is difficult.” Kadeem elaborated that the challenge was good “to a certain point.” However, both students expressed their dissatisfaction with the recent lessons. Teran explained, “Constantly reviewing and doing the same stuff. We have done this before; we don't need to keep doing it again.” Kadeem concurred, adding, “Yeah we have heard it before, and we don't want to keep hearing it again.” It is possible that the students needed the review if the topic had not been learned. When I asked the boys to explain how they knew if they had learned a topic, Teran said, “She would give us a worksheet on it and if you really did get it, then you would go through the worksheet really quickly and without any problems. Then you would know that you have it.” Both Kadeem and Teran welcomed a challenge and understood how to evaluate their own learning. They also explained to me that they earned high scores on their quizzes and tests in class and that this was another method that “proves to me that I know what I am doing.” The repetition of the assessments appeared to frustrate Kadeem as well when he explained, “Well if you have to keep taking the same test on the same stuff with just different questions on the same
subject, I would not want to have to do that.” While Kadeem and Teran appear to be frustrated with the simplicity of the current curriculum and assessment, I questioned them about what they would do if they were struggling with a new concept or if they failed a quiz. Teran explained, “It makes me want to get help. It just makes me want to pay attention and take better notes so I can do better on a quiz.” These higher-performing students want to be challenged, and are self-directed and willing to work hard for success.

I found the opposite to be true of the two lower performing students that I interviewed. Asiah and Kendra emphasized their desire for support and repetition. Kendra felt that it is important to “push students; it is important not to give up on them.” Asiah agreed and added, “It is not good when you don’t explain it. I struggle, and I need to do it over and over and practice with the class.” What is interesting is that neither girl seemed to recognize their responsibility to learn outside of class; rather, the responsibility was put solely on the teacher. When asked how they would know if they had learned a topic, Kendra replied, “When the teacher checks it and you get it right.” The resiliency of these students compared to Kadeem and Teran were also markedly different. Asiah described her response when she did poorly in class. She declared, “When I do bad, I either give up or just write down random answers.” Other students exhibited a similar defeatist attitude during my observations. Consider this scene that occurred during one of my observations:

Ms. Green: “I need you guys to do these two problems while I pass back your quizzes.”

Maleek: “You’re teaching 6th grade stuff.”

Ms. Green: “Then why aren’t the quiz grades higher?”
Jaime: “I am doing well.”

Ms. Green hands Jaime his quiz.

Jaime: “Why did I get a 6/10?”

Now Jaime is mad and talking loudly. He wants her to re-grade the quiz right now.

Ms. Green says to him, “I am not going to do it right now.”

Jaime retorts, “I am not going to donate my time if you won’t donate your time to me.”

He then leaves and comes back after about 15 minutes with a note for Ms. Green; however, by this time, he has missed a large portion of the class and is clearly unengaged when he returns.

Another student described similar frustrations to Ms. Green one day after class. The bell rang and most of the students had left the room; she stopped Trevon and asked, “What happened today?” He replied, “I was doing fine, and then I did not quite understand. And so I quit.” She asked, “Why is it that you seem to usually shut down when you get confused?” He answered, “I don’t know; I just don’t want to crash and burn. You just aren’t teaching it right.” She replied, “I would love to help you.” He answered, “Forget it; it doesn’t matter.” And he left. These examples illustrate how students’ emotions can cause them to become frustrated, give up, and jeopardize their learning.

Other students may become disengaged when things happen at home or with a boyfriend or girlfriend. The emotions of a teenager are volatile and many factors can shift a student’s focus away from their learning. Sometimes the response is very disruptive to others, while at other times it is a private withdrawal; either way when students put up
barriers it inhibits learning in the classroom. I will elaborate on this issue in the next chapter. The often dichotomous needs and varying responses to failure of students can make the job of teaching challenging. Given the learning diversity in the classroom, Ms. Green incorporates active learning and challenges student thinking with support and encouragement.

Cooperative learning and activities.

Ms. Green’s description of engagement is very similar to that outlined in the literature review. She describes it as, “On task learning, interacting with material in a meaningful way, asking a question relating to the content and making connections.” She describes wistfully the satisfaction she feels when she sees, “that light bulb of when they finally get it and when they get excited about it and they are internalizing it.” Her voice changes a little as she thinks about some of her more challenging students, saying, “and if they don’t get it if they are at least trying by active listening or taking notes…” she explains that while that is the low end of engagement, it is better than the alternative. Engagement, she clarifies, “does not mean tune me out or put your head down.”

Ms. Green encourages students to participate actively in their own learning using cooperative learning, physical actions, and personal contexts. These help alleviate students’ belief that the teacher is the provider of all knowledge and motivate the students to learn who do not have a predilection for the subject. Students learn to find answers from their peers and from themselves. Ms. Green explains that for every class, she has some activity that requires them to work with each other and the material. It is through these activities that students are most able to become involved in their own learning.
Ms. Green utilizes a variety of cooperative learning strategies in order to encourage students to learn from each other. In some instances, the interactions are brief. On one occasion, she directed the students to “talk to the person next to you about the independent versus dependent variable.” The students were sitting in pairs, so it is easy for them to turn and talk. Subsequently, she called on a couple of students to share what they had talked about with the rest of the class. On other occasions, students are encouraged to compare answers. During one lesson involving solving inequalities, Ms. Green started a rather complex problem for the class and then asked them to complete it on their own. As the students were working, Ms. Green worked her way around the room checking students’ work. To one student she commented, “Good start; make sure that you check with the students around you in finishing this up.” Every day that I observed Ms. Green’s class I witnessed her encouraging students to work together and help each other in learning. When a boy raised his hand and said, “Luke needs help,” Ms. Green turned to the class and asked, “Is anyone capable or willing to help Luke?” A student volunteered, and several minutes later she followed up with the students asking, “Was he able to help you?” The student replied, “Yes.” And Ms. Green told him, “Good. Don’t you feel good? I feel so good for you!” Most students became very accustomed to working with other students and more comfortable asking and giving suggestions.

Sometimes math can be tedious to students who do not find excitement in the ability to solve a complex task. In addition, some concepts may require rote use of rules and procedures. These times make it very difficult to engage some students. Ms. Green believes that the students should interact somehow with the material and that lectures hinder this process. However, she also points out that:
Math in itself sometimes does not lead itself to the real world, so it often hinders the ability to make real world connections. And while I struggle to make connections, sometimes you just have to learn the concept in the isolated, [such as] graph a line. It can all be hands-on, but is it real world to the student?

On one such day that I was observing students were learning how to solve complex equations that required a number of steps. While solving multi-step equations is a tedious concept, it is also a foundational concept to higher levels of mathematics. As the students were working through examples individually and as a class, intermittently, I began to notice that students were becoming disengaged, so I began recording the number of students engaged every 5 minutes. I began with recording seven students who appeared to be actively involved in solving the problems with the class. Five minutes later, a student walked in; Ms. Green paused to give him the paper that they were working on, and he yelled out, “Suspend me more!” Another teacher in the room took this student to the hall for a private conversation; however, she soon returned to call security who promptly arrived to remove the student from class. Meanwhile, Ms. Green was trying to continue the lesson and bring attention back to the assigned tasks. Unfortunately, by this time, everyone was focused on the disruption and not engaged with the material. Within five more minutes, only half of the class was working on the classwork.

At this time, Ms. Green also recognized the number of students who had become disengaged and decided to do an impromptu game of “Simon Says.” She explained to the class that it was obvious that they were getting restless with so much challenging work and that she could understand. She asked all of the students to stand, and three students refused; however, for those students involved, it became a fun break to awaken their senses. The game lasted almost two minutes and when it was over, they laughed and
clapped for the winner. Then everyone sat down and resumed working on the mathematical problems. At the time the game ended, 12 students were actively involved in solving the problems; five minutes later, all 16 students were engaged. While this short game did not involve any mathematics, this two minute pause for waking up the senses made the remainder of the class time productive and engaging to the students.

Another way for students to become physically active during math class is through the use of clickers which are a computerized student response system in which every student enters their answers into their assigned remote which is in turn recorded in a central data base (the teacher’s computer). Students were introduced to a set of clickers to record their answers and then see how they did in comparison to their peers. They were given a certain amount of time to do each problem before the answer was revealed. The timer went off and some students became really upset about not having enough time. Then when the answer was revealed, a couple of students cheered and said, “Darn!” For the next problem, students tried to work a little quicker and when the answer was revealed, there were several cheers. Several students stayed after class to see their score in comparison to their classmates. The scores were displayed according to anonymous numbers assigned to each student and many students asked their friends how they had done in order to compare their scores. The students confirmed their love of games, stating that they encouraged their involvement in class. New ways of presenting the material or just changing the pace occasionally can awaken the senses and allow new learning. At other times, giving the work personal meaning can provide the impetus to become involved in learning.
Connecting to students.

Ms. Green’s classroom is always teaming with stories and multiple representations to engage students with the learning. She provides classroom activities that involve solving problems in order to create a drawing and tells stories that students describe as interesting and relevant. In addition, she provides context for the mathematical concepts being learned that are personal to the students. Ms. Green explains that she tries to make connections to things that are relevant to them, i.e., sports and lower priced cars. She rationalizes that she purposefully uses examples of apartment rent rather than house mortgages and uses skateboarding instead of skiing and snowboarding. “I think of the student’s socioeconomic status and I try to keep it more local. I also try to put the kid’s name in the problem, use their class grade (9th, 10th, 11th, or 12th grade), or use one of our school sports teams.” An example of this connection was found during one of my observations involving the teaching of unit conversions.

Ms. Green began the lesson by asking how many students drive. Immediately six hands went up and many other students mentioned how much longer they had until they too could drive. The next question is of a student’s mileage. Most of them are unsure and thus began the discussion of how to find this unit rate and then Ms. Green asked, “How many of you have been to Canada or Mexico?” With a large number of Latino students, and two students shouting, “I have been to Canada,” about half the students raised their hands and they were asked how mileage is calculated in either of those countries. Many of the students were anxious to share their knowledge of this subject and many shouted out “kilometers.” Thus begins the lesson of converting from one set of units to another, having connected on a meaningful level with a majority of the students. This is also an
example of how all students can participate in a lesson regardless of their mathematical ability. Ms. Green points out in her interview, “something should always be accessible.”

On another occasion, Ms. Green connected with students using a topic that was relevant and accessible to all the students. This activity involved them using a Google map of the area around the school on a graphical grid for practicing coordinates. Ms. Green explained that they needed to start by determining where to put (0, 0) so that the entire class would have the same origin on their map. She made it a class decision about where to put the origin, and a debate ensued about which location would be the best. Everyone agreed on the location of the x and the y, and drew it on their individual maps mirroring the one on the projection. Subsequently, students were tasked with finding the coordinates of major locations around the school (including the school). This activity was highly engaging with students working individually on coordinates regarding familiar locations near the school such as McDonalds, the movie theater, and 7-11. After about 15 minutes Ms. Green announced, that they could work with a friend while she quickly moved around the room checking on students. She found that the students were working hard and getting the answers correct. As the class came to a close, Ms. Green chose students to write on the board the different coordinates of the map so that they could check their answers. Students were exiting class, commenting on how much fun this activity was.

Ms. Green also finds ways to make the solving of mathematical problems personal by making analogies between algorithms and familiar objects. One day she introduced the topic of solving a multi-step equation for a variable. She began the lesson by asking, “Gabi, what does it mean when we say that the equation needs to be
balanced?” When another student called out an answer, Ms. Green remained focused on Gabi who replied, “You need to add and multiply evenly.” Ms. Green exclaims, “Good, now we are going to use this classroom as an example.” She explained that they would pretend that one side of the equation is the right side of the classroom and the other side of the equation is the left side of the classroom with the aisle that divides the left from the right signifying the equal sign. Then she provided examples of adding a boy to both sides and giving a high five or fist bumps to only one side of the classroom. As Ms. Green moved students or gave high fives and fist bumps, she simultaneously asked if the equation was still balanced. The class answered each time in unison with a “Yes” or a “No.” She culminated this lesson with a mathematical example. She asked a student go to the board to show each step for solving the problem as the other students solved the problem at their seats. As the students worked, Ms. Green circulated the room giving high fives or fist bumps to those students getting it right. For the student who solved correctly at the board, Ms. Green led a round of applause. This activity segued naturally into a complex mathematical algorithm.

The abstract complexity of algebra often prevents students from thinking about the common sense approach to a problem or solution. Ms. Green asked questions during the solving of such problems that made the process more personal and therefore more relevant and less complex. During one lesson, students were asked to solve complex word problems that involved several different steps and the use of more than one algorithm in order to find a solution. The students began the problem individually, and Ms. Green noticed several students struggling. She announced, “Okay, let’s talk about something that will make this all make sense and come together. I saw some great work.
Let’s talk about this problem for a minute. What is the question asking?” A couple of students replied, “How long before she gets home.” Ms. Green exclaims, “Yes!” She followed this excitement by saying, “This is cool. Please watch this. If we use 0 for f(x); we have been solving problems like this for the last couple of weeks. You know how to do this; now solve.” A couple of students whisper, “Ohhhh!” and everyone gets back to work. The answer that the class arrives at is 8.78 minutes, which involves another discussion, making the problem more personal. Ms. Green does not direct students on how to answer the questions, but simply asks, “Can you convert 8.78 minutes into seconds?” Some of the students argue that this is the same as 9 minutes and 18 seconds because there are 60 seconds in a minute. Ms. Green asks if they can convert the units using proportions. The students respond affirmatively and find the correct answer. One student raises her hand and asks, “Miss, why did we have to do all of that? Why can’t we just say 8.78 minutes?” Ms. Green asks her, “If someone asked you how much time it would take, is that how you would answer or would you say 8 minutes and so many seconds?” The student replied, “Yes, but couldn’t you just look at the multiple choice options and get the right answer?” Ms. Green smiled and said, “Yes, but in real life, we don’t have multiple choice.”

Ms. Green also draws upon students’ experiences to bring math problems to life. During one lesson, she asked if anyone knew their height when they were born, when they were in kindergarten, and now. She gave the students a minute to think about this while she explained that they would be graphing the change in a person’s height over time, while she reviewed the vocabulary: independent variable, dependent variable, scale, x-intercept, y-intercept, interval, rate of change, domain, and range. A student who was
not normally active in the class discussion raised his hand to tell his height measurements over time as students wrote the vocabulary in their notes. While the class was graphing this student’s measurements, Ms. Green explained how long most babies are when they are born and that most toddlers are about the same height and weight as their age in months. This provoked some side conversations about babies that students knew, and the students were very excited with this activity that could have been a dry review of vocabulary. However, the relevance of a person’s height to everyone in the classroom caused students to be interested and engaged. The last question that Ms. Green asked the class to think about was whether the graph will continue to increase. Many students adjust their graphs after this question, and another conversation ensues about why humans shrink as they age. These examples are relevant to the students and provide context to the vocabulary and concepts that they are required to know. They illustrate how Ms. Green brings the learning back to the students’ everyday lives and pushes them to think about the mathematics that they are doing rather than simply following a series of steps in order to solve.

**Higher-order thinking skills.**

A long standing criticism of the mathematics curriculum in the United States has been that it is a mile wide and an inch deep (Christinson, Wiggs, Lassiter, and Cook, 2012). The current push in student learning at all levels of mathematics involves higher order thinking skills. In Algebra specifically, students are also required to think more abstractly. As we have seen, challenging students can be difficult given the constraints of the curriculum map; however, students are given multiple opportunities to delve deeper into the concepts. For one classroom opening exercise, Ms. Green drew a graph that
students were asked to interpret. This seemingly simple task showed a y-axis labeled “student’s grade” and a decreasing line. The students were asked to surmise how a dependent variable that was increasing would cause a student’s grade to decrease. This task caused students to discuss different hypotheses with each other. They were able to give several conjectures – some of which could work and others that would not. In doing so, students were forced to think deeply about interpreting graphs and were anxious to discover the true meaning of this particular graph. Ultimately, Ms. Green revealed that the graph represented an actual study in the 1930s of a student’s grade in relation to how close they were to the teacher’s desk. She explained that in that time period, teachers rarely left their desks; therefore, students who were seated closer to the teacher’s desk tended to have higher grades. She then asked students to sketch the graph as if the same study took place today. The students surmised that the location of the teacher’s desk would probably have little correlation to a student’s grade in most classrooms because teachers move around the room. This simple problem challenged students to think at a higher level with a graph rather than just describing or interpreting the slope given the dependent and independent variable.

Another lesson was introduced with what appeared to be a challenging concept. In actuality, it was a very rote, disconnected lesson involving the vocabulary for parts of an algebraic sentence (as required by the curriculum map). Ms. Green began the lesson by writing this complex problem on the board \((\sqrt{5}x^3 + 18xy - 14)\) and saying, “By the end of the day, we can do this, and it won’t be scary.” The murmur around the room showed some students’ doubts at this prospect, but they were definitely interested in how that
would happen. Ultimately, the students were only asked to name the variable, constant, and coefficient; however, by foreshadowing the lesson with a seemingly difficult problem, the students were highly engaged. As discussed previously, students want to be challenged; however, there is a fine line between appropriately difficult and too hard. Following is another lesson that illustrates students’ desire to be challenged.

Ms. Green had split the class into two teams to play a game of Connect Four projected from the computer. The game involved solving multi-step equations correctly in order to place the Connect-Four piece in the chosen location. As the game began, team members were working hard to solve the problems. Some team members pressured their less motivated classmates to help do the work. Unfortunately, the problems were very easy for the students, and as the game progressed they began to lose interest. Ms. Green encouraged them and talked about how the winning team could get extra points, but this did little to motivate the students. After realizing how few students were actively participating, Ms. Green changed the rigor of the problems in the game. The increase in the complexity of the problems immediately increased the level of participation and effort, and the room was silent as the students worked to solve the problem. After most students had finished, the team members began talking about the problem and comparing answers. Unfortunately, both teams got the problem wrong. The moment was gone, and several students gave up; however, the other half were invigorated and continued to try as the class period ended. While the students who gave up on the very complex problems may have been the same students who struggle and often give up, it is interesting to note that all students welcomed the challenge in the beginning.
As outlined previously, Ms. Green is hesitant to give the students the steps to answer a question. Students are challenged to think abstractly and creatively about how to construct meaning from algebraic concepts. In order to do this, they must connect new topics to what they already know. Ms. Green encourages students to apply background knowledge and reasoning skills through her questioning. For instance, Ms. Green began a lesson involving unit conversions by asking students, “Now, how do people talk about distances of 16,000 feet? Do they say that many feet?” One of the students replied, “No, they say miles.” Ms. Green pointed at him and cried, “Right!” The student smiled and said, “I am so smart.” Ms. Green smiled back at him and agreed, “You are smart.” In this example, students were forced to think about the purpose for calculating unit conversions, rather than being told to convert 16,000 feet into miles. In addition to having students use reasoning skills, Ms. Green also required students to connect their previous knowledge with new concepts.

In the same lesson, students were given a rectangle with the length of the sides given in inches, and they were tasked with finding the perimeter in centimeters. This required them to apply what they knew about rectangles and relate that former knowledge to the unit conversions – a new concept. Ms. Green presented the task by saying, “This next problem you do not have to write down, but just solve. I love this problem. We can do geometry and algebra together, so this problem is talking about rectangles and inequalities.” After the students completed the problem, she extended the perimeter to an area problem. Students in her class were repeatedly asked to think about what they already knew, (i.e., perimeter and area). They combined what they already knew with a new concept (i.e., unit conversions), making it more relevant and requiring students to
use higher order thinking skills. Ms. Green’s enthusiasm for the mathematics coupled with her supportive hints and questioning made many of these concepts more accessible to students.

In addition to solving challenging problems requiring complex thought and connecting old information to new information, students were also asked to explain their reasoning. While many competent math students are able to plug numbers into algorithms to arrive at a solution, many times they cannot explain why the algorithm is used or how they know if the solution is correct. Ms. Green shares her belief on the subject during our interview, saying, “Multiple choice standardized assessments are un-engaging and un-motivating. However, a written paragraph where students explain their reasoning is powerful, and they have to be engaged to do that.” Ms. Green occasionally gives assessments of this nature; however, on a daily basis, she provides students with feedback on evaluating themselves in relation to learning the material and in relation to where many of their classmates may struggle as well. She points out how the class is struggling, declaring, “Most students did really well on A, most did really well on B, but listen up because a lot of people had problems with C and D.” In this instance, she explained the last two problems involving fractions, pointing out common mistakes while some students expressed their surprise at the process and the answer. At other times, she would take answers from several students and write the different answers on the board and then ask the class to decide which one was right and why. After several students gave explanations for each of the answers, the class was able to reason which answer was correct. On one occasion one of the students exclaimed, “I got it now,” and Ms. Green replied with equal enthusiasm, “Perfect!” The challenge and high level of thinking that
Ms. Green demands of her students also requires support and encouragement – particularly for the students who struggle.

**Support and encouragement.**

As highlighted previously, students often struggle in algebra and become discouraged. Encouraging students to take risks and continue working in a mathematics class can be very difficult especially when they have already experienced failure in the past. Ms. Green encourages students to take risks by offering open-ended problems, familiar contexts, support, and encouragement. She offers her support by showing that everyone makes mistakes, expressing joy in their successes, pain in their struggles, and believing that everyone can and should do the math.

It is a general belief in society that some people are born able to do math while others are not. I often hear parents explain that they were not very good in math, which is probably why their son or daughter struggles. Ms. Green constantly reminds her students that everyone can make mistakes and that the so called “Math gene” does not exist. She obviously loves math and wants others to share her love. During one observation, some students were struggling with a particular problem while others were racing through it, and as Ms. Green circulated around the room she noticed some careless mistakes. She stopped the class and talked about one of the examples, “On this one, really smart people say $x = -17$, and they would be wrong.” A couple of students laughed and revealed that was their answer. Ms. Green continued, “I hope you learned something today that even smart people make some mistakes because they try to go too fast and skip steps. So please, slow down, and let the math do the work.” This reminded the higher level
students to be careful, while showing the lower level students that everyone makes mistakes without pointing out any one student’s difficulties. On another occasion, Ms. Green encouraged her struggling students by saying, “I have tutored many students through ACT, SAT, College Algebra, and it never fails that if they see a fraction, their brains want to quit. Don’t be scared, what does that fraction bar mean?” The class answered in unison, “Divide!” Ms. Green responded, “Good!” She continued to walk the students through the steps of solving an open equation with division. By pointing out to the struggling students that even higher-level mathematics students become frustrated or feel their minds go blank, hopefully some of the anxieties that students might have can be alleviated. Ms. Green also encourages students to ask questions; for example, one day a girl asked why she did not combine two terms. Ms. Green exclaimed, “Excellent question,” and asked the rest of the class if they knew why. Everyone else appeared confused as well. After a few seconds, two of the students explained the difference and Ms. Green turned to the student who asked the question and said, “Thank you so much for asking that question. We all now know about this.”

When Ms. Green teaches she expresses her joy in students’ learning and her sorrow in their struggles and complacency. As outlined in previous scenarios, she expresses excitement when the class or a student grasps a concept. As she circulates around the room, she can be heard daily shouting, “Good job!” and “You totally know what you are doing!” She also celebrates with her students, giving them high fives and fist bumps for work well done. Often the students work to elicit these responses by shouting, “We have it Miss!” Other times, Ms. Green is a cheerleader. She called to her class, “Don’t be scared. What does that fraction bar mean?” The class shouted: “Divide!”
Ms. Green chanted back, “Okay – does the fraction bar scare you?” The class replied, “No!” “Excellent!” Ms. Green responded. On other occasions, students were solving integer equations and she said to the class, “Careful, are the signs the same or different?” The students shouted “Same!” and Ms. Green chanted back, “Add or subtract?” The students replied in unison, “Subtract!” Ms. Green frowned, and the students giggled and all shouted: “Add!” Ms. Green replied, “Good! Don’t forget to use your calculator to check.” Enthusiasm for the subject matter and student learning emanates from everything that Ms. Green does. However, at times, this passion is clouded by disappointment when students are not working to their potential.

Ms. Green communicates with her class when she is disappointed. At the closing of the warm-ups one day she asked for volunteers to help answer a problem. Not one student raised his or her hand, and she made the comment, “I am sad because my other classes could do this problem.” They obviously did not want to disappoint their teacher, consequently, hands raised and students were eager to answer.

At other times, Ms. Green’s encouragement is much more subtle, personal, and occasionally extrinsic. At the end of class, she frequently comments to particular students as they leave for the day, “Thank you for working today” or asks them, “Would you like to come in for some help? I would love to help you.” During one class, a girl asked if she could have a reward for doing well. When Ms. Green asked what kind of reward, the student replied, “I want candy.” Ms. Green’s response was, “If you get 100%, I will give you a candy.” The student retorted, “Miss, you know that won’t happen to me.” Ms. Green whispered to her, “It can be you.” As Ms. Green circulated around the room helping and encouraging as she moved, she made a point of whispering to the girl every
time she passed her desk, “It can be you.” At the end of class, the girl brought her paper to Ms. Green who exclaimed, “I knew you could do it!” Smiling, the girl left with a small piece of candy.

This focus on individual students made all the difference for some but not all of Ms. Green’s students. As I have mentioned, she had many challenging students, particularly in 5th period. While many teachers would have written referrals, worked to remove the disruptive students, and ignored the complacent student in the back of the room with his head down on the desk, Ms. Green felt that every child in her class needed to learn. She believed that the best way for a child to learn would be to have them in her classroom every day. She worked with the disruptive students daily, taking them in the hall for private conversations and encouraging them to work. The energy that she poured into each of these students was both admirable and exhausting. Two examples of these students are Asiah and Damian.

Asiah is a fifteen-year old, strikingly beautiful young woman. I did not realize how beautiful she was during my initial observations, however, because her head was always down on her desk with her pink sweatshirt pulled up over her head. Ms. Green would walk by her desk several times each day tapping on her desk, bending over and whispering for her to get to work, and keeping her after class to ask why she was so tired. Occasionally, Asiah would lift her head up barely opening her eyes as if she had not slept for weeks. Her head would always end up back on her desk. After a few days, I noticed that Ms. Green was talking to Asiah at the beginning of class, and later on during that class, Asiah was working! I was shocked her head was off the desk; she was taking notes, and she worked in her group on the activity for the entire class period. I noticed Ms.
Green walking by and checking on how she was doing intermittently. Immediately after class, I asked Ms. Green what she had done to create this wonderful breakthrough and she explained nonchalantly, “I finally got a hold of her grandma who she lives with and found out that she [Asiah] not only has glasses that she never wears, but that she did not learn how to write until 4th or 5th grade. So that attributes to a lot of her struggles and not working.” Therefore, Ms. Green had printed the notes for Asiah and continued to do so each day.

A few days later although Asiah was wearing her glasses, Ms. Green continued to print the notes for her because of her difficulties in writing. This was not the end of all struggles with Asiah; occasionally Ms. Green reminded her that she needed to do her work or she would call her grandma again. Other times, she would sit next to Asiah during classwork, providing extra help. Consequently, I never witnessed her sleep in another class period. While many teachers would have seen Asiah’s actions as defiance, Ms. Green took the time to find the root of the problem and work towards solutions. Thus, Asiah became more confident and celebrated her successes with Ms. Green shouting, “I got it right!” and they would high five while Ms. Green smiled broadly.

Unfortunately, not every student is present enough or open to the help that Ms. Green offers and these students can hinder the learning of every student around them. Damion was such a student. During the two months of a dozen observations that I conducted in Ms. Green’s classroom, Damion was only present four times. These four classes were a nightmare for anyone in the room with a goal of learning math. One of these days during the warm-up, he was talking to the person next to him when Ms. Green said, “Damion, I am really glad that you are back, but you need to be on task.” He started
to do some of the work; however, when Ms. Green took a student into the hall for a brief conversation about his behavior, Damion began walking his desk up and down the middle of the classroom, causing everyone to be distracted. Ms. Green returned, and he scooted his desk back in place. That day, class was stopped eight times for discipline (not all of which were for him). On days when he was not present, class was stopped almost half as many times. The worst behavior that I observed was when Ms. Green finally wrote a referral, saying to me, “I don’t know what else to do about him.” Very little learning could take place with a scenario like this:

The students were given clickers to use for the review for the district assessment the next day. Class began at 1:00 p.m. with a warm-up and, subsequently, a review of the problems. Following the review of the warm-up, Ms. Green passed out clickers to be used to review for the district assessment the next day. After explaining how to use the clickers, they began the review. The review is self-guided with students entering their answers into the clickers to be checked at the end of the class, while Ms. Green circulates around the room helping students. The following is a copy of my notes for the review.

1:22 Damion is bugging the girl next to him, poking her on the arm and talking to her. He is not doing any work. He begins banging the desk of the person on the other side of him.

1:25 Damion yells out in the hall to a student walking by the classroom.

Ms. Green announces to the class, “You can be working together, but you have to be working.”
1:30 Damion is now trying to distract the kids across the aisle from him by pointing his clicker at them and yelling “Pause.” When Ms. Green intervenes he turns back to the girl next to him.

1:31 Damion begins singing a song, “Don’t worry about a thing, everything is going to be all right,” and other students chime in.

1:32 Damion is now tapping the girl next to him, and she is covering her face with her paper and rolling her eyes.

1:33 Now, he is clapping his hands and dancing in his seat.

1:35 A couple of people are now finishing.

1:36 Damion is now talking to the guy across the aisle from him.

After this class, Ms. Green expressed her frustration with Damion. She explained that she had tried to call home and had been unable to reach anyone nor had her calls been returned. She had also tried to discuss the matter with the administration who told her that she needed to write down specific infractions for documentation. She explained that writing a student a referral for singing in class or bothering the person next to them did not seem worth a referral; however, this student definitely distracts other students from learning. She also expressed conflicting feelings about suspending and possibly expelling students who may then end up on the streets. After several referrals from many of his teachers, Damion did end up being expelled. I will return to this topic in Chapter 5.

**Student behavior.**

As outlined previously, the curriculum can be difficult for students at different levels and can be very frustrating particularly for those students who struggle with
mathematics. Unfortunately, Asiah and Damion are not the only distracting students in this class. One girl arrived repeatedly late for class carrying her McDonalds lunch or talking on her cell phone. When Ms. Green gave her a detention or sent her in the hall she would ignore her or roll her eyes. As Ms. Green mentioned previously, there were about four students in this 5th period class who were blatantly disrespectful, and a few others like Asiah who required extra attention. During one of my observations, I counted 20 names on the board for missing assignments and an additional five names for lunch detentions (from all five of her classes). Ms. Green estimated that she spent about an hour every day calling parents about how to help their student be successful.

Overall, Ms. Green is a dedicated, fun, and caring teacher. She believes that all of her students should and will succeed in Algebra I. Some of her students in fifth period made it difficult to convey the excitement that she has for the subject. Like Steve Jobs whose doctors told him that he could survive if he had surgery, yet he chose to not to; some of the students in Ms. Green’s class were supported and encouraged to learn algebra, knowing the consequences of failing, and chose not to. Some of the students did not listen to ways that would make them successful, choosing to inhibit their own learning and that of their classmates. While some may attribute this apathy or defiance to classroom management, I believe that the large proportion of disruptive students combined with the lack of support from the administration made classroom management very difficult. Many times, Ms. Green would overcome the disciplinary issues with strong engagement strategies, culturally relevant practices, and caring relationships.
The future for Ms. Green.

Ms. Green is no longer a teacher at Highland High School. Due to a family emergency, she chose to leave the school after Thanksgiving break. She is currently working on her administrative license and at the time of writing, she is not sure if she will return to the classroom. The negative impact of the accountability at Highland, along with the injustice that she believes is happening with both teachers and students have her currently focusing on alternative schools. While she remains intent on working with high-risk populations, she has become uncomfortable with many of the events happening in public schools.

Ms. Green’s response.

After completing this description and interpretation of my time in Ms. Green’s class, I sent her a copy and asked for her feedback. This is what I received from her via email,

Cassie- wow I just read the excerpt- nice job. I feel like you put to words what I was trying to do in my classroom. Thanks for making me look good! I did teach my first year right out of college at the public high school in [a mountain town in Colorado] – then pregnancy and an 11-year break then I taught the one year at the alternative high school before moving to [Highland]... Just a small correction on that section.

Setting the Scene – Springfield School District

Just a few short miles down the road from Highland High School sits the small, diverse, middle to low-income community of Springfield. The schools are the center of this community bearing the same name. Springfield Elementary School neighbors Springfield High School to the East and to the West is a small alternative high school. Springfield school district borders Lincoln school district on the outskirts of the city.
Similar to Lincoln, Springfield is also on an improvement plan, with 29.5% of their high school students proficient or advanced in mathematics. In efforts to improve achievement, this district has also implemented district testing to be administered to the students twice each year in order to compare the achievement of the students at the two high schools. Unlike Lincoln School District, the test scores do not reflect on the student’s grade or the teacher’s evaluation; however, it is a way to compare teachers in the district to each other and to prepare students and teachers for the state assessments. This community is not far from several military bases, and while I observe the United States flag flying prominently in the front of the school for the first time, I can also see military planes flying high above.

**Scene III: Springfield High School**

As I wind my way through the small homes bordering the schools, just off Main Street, I find it difficult to find parking with a half dozen spaces in the roundabout in front of the school reserved for the principal, vice principals, police officer, and two visitors. Springfield High School is the oldest of two high schools (and an alternative school) in this district of 8504 students. Approximately 1274 students attend Springfield High with a ratio of approximately 20 students to each teacher. Nearly 33% of the population receive a free or reduced lunch with 57% of the students being White, 20% Hispanic, 18% Black, 5% Asian, and 1% other. This is less diverse and more affluent than the other two high schools in this study; however, all three schools are within six miles of each other and consequently share many of the same students. In fact, during my first observation at Springfield High, I overheard one student talking about transferring from Highland High the week before.
As I enter Springfield through the two double doors for the first time, I follow the signs directing visitors to sign in at the front office. Unlike the other two schools, I am not greeted by a security officer upon my arrival. At the front office I am cheerfully greeted by a receptionist, who asks me to sign in and offers me a name-tag she has copied my name to. She is chatting with a student assistant sitting nearby, and I wait for the conversation to end before asking for directions to Ms. Merrit’s classroom. The receptionist is listening to the girl’s story about how her sister is having a baby with another student whom the receptionist seemed to know, and it was obvious that the woman did not quite approve of the young parenting but is trying to be supportive of the girl. After I signed in, the student escorted me to Ms. Merrit’s classroom. She explained that it could be confusing to find your way around the school. The school has three separate hallways that emanate from the central office with classrooms off of each hallway and a pod of classrooms at the end of each hall. The student pointed to the pod at the end of the hall and identified it as the “math area.” This “math area” has two entrances from the terminating hallway that follows from one entrance in a semicircle to the other entrance. Along the outside of this semicircle, seven classrooms can be found with a math office at the center between the two entrances. The student points me to the door on the right; I thank her, and am promptly greeted by Ms. Merrit.

Ms. Merrit.

Her classroom looks as old as the school with two walls of cinderblock and an old rust carpet. During one of the classes that I observed, Ms. Merrit reminded all of the students that they could only drink water in order to keep the carpet clean, and the students asked if the school ever cleaned it. She replied that they cleaned the floors every
summer; however, the same carpet had been there for the 25 years that she had taught there, so they needed to be well cared for. On one of the cinderblock walls to the right are four larger posters of learning topics for each of the subjects: Algebra I, Algebra II, Pre-algebra, and Geometry. On this same wall is a graph chalkboard and three inspirational posters entitled “Don’t Quit,” “Courage,” and “Teamwork.” Along the back cinderblock wall are several inspirational posters similar to the ones that you find in a calendar with people rock climbing or a mountain scene and small quotes. Each of these posters are titled: “Goal,” “Graduate,” “Persistence,” “Integrity,” “Perseverance,” and “We are all different.” Along the top fifth of this back wall is a narrow row of windows that opens part way on hinges like a mail slot. Along the bottom left half of the wall is an old radiant heating unit (also probably an original part of the building). Along the left wall is Ms. Merrit’s tidy desk with only a basket of papers and a laptop. A bulletin board hangs above a small bookshelf in front of the desk with a multitude of cards and notes obviously sent by students with several school pictures of students. On the bookshelf are a few textbooks, dry erase boards, and dry erase markers. The front of the classroom is covered with a long blackboard and a clock. The 30 desks in the classroom are arranged in six rows, each of which is five deep, facing the front of the room. Ms. Merrit shows me to a desk on the back left hand side of the room next to the teacher’s desk and I watch the stage being set.

One of the students is moving the overhead projector from the side of the room to the front center, while another student is pulling down the screen that hangs in front of the black board. Other students will help put these items away at the end of class like a well-oiled machine. Everyone else takes their seat and opens their notebooks for the
beginning of class while Ms. Merrit greets students as they enter. She then takes her place at the front of the room. Just before the bell rings, Ms. Merrit removes an overhead sheet from a folder and places it on the overhead and turns it on to reveal the warm-up problems. The bell rings, and the students promptly begin working. Ms. Merrit takes attendance, and then walks around the room stopping occasionally to help a student. Other than the whisper between Ms. Merrit and a student, it is completely silent.

The age of the building and the equipment is a definite contrast from the other two schools that I observed. When I asked Ms. Merrit about the use of technology, she explained that the department received a grant last year for four LCD projectors and laptops. She went on to say that hopefully more technology money would be made available for next year. Other than the four laptops and projectors to be shared among nine teachers, there were also three class sets of graphing calculators. It was obvious from my observations, however, that the lack of technology did not affect the students’ learning.

The fluorescent lights overhead cause a glare on the image being projected from the overhead, consequently, the classroom lights are normally off, leaving the classroom lighting similar to an overcast day. The only light in the room is emitted from the natural light through the thin row of windows and the overhead projector at the front of the room. The rows of students that I observed each day changed from 18 students to 20 students with a new face seen every few days. I was unsure how many students were actually enrolled in the class until well into my observations, when Ms. Merrit was taking roll and exclaimed, “Seven students are out today probably because of that cold and cough that has been going around.” After I counted the 16 students present, I surmised that the roster
must have a total of 23 students. She explained to me on a different occasion that it was common, in her years of teaching at this school, to have several students absent every day. Of the twenty students that I observed most regularly, nine were male and eleven were female. I also regularly observed approximately eight students who were White, six Black students, and six Hispanic students, which is similar to the ethnic make-up of the school.

A look can tell a thousand words.

Ms. Merrit is a petite, energetic woman with high expectations and a warm demeanor. This redheaded spitfire holds everyone to the highest expectations concerning behavior. The first time I commented on how quietly everyone was working in her class, I asked how she encouraged them to work rather than socialize; she looked at me through narrowed eyes and said: “They know me.” Ms. Merrit consistently challenges and supports students behaviorally and academically. Students are expected to work hard, and in turn, Ms. Merrit will provide the necessary support and encouragement for them to feel safe in accepting the challenges that she gives them.

The textbook used at Springfield High is College Preparatory Mathematics (Dietiker, Baldenger, Cabana, Gulick, & Shreve, 2006); however, this year Ms. Merrit decided to use the text as a guide and a resource for students only. She explains that she is avoiding some of the methodology associated with that curriculum because it requires almost daily group work. She feels that the students will work much harder individually at this age. In addition, the mathematics department at Springfield adopted a new assessment-based grading system that is explained in the following section; therefore, both pedagogical and assessment changes have influenced the curriculum.
Assessments.

Concept-based grading or standards-based grading has become increasingly popular in schools around the nation (Scriffney, 2008). The argument for this manner of grading asserts that the course grade will be a better reflection of what the student knows, rather than of their attendance or behavior. At Highland High, a group of mathematics teachers, working with an assistant principal, narrowed down the assessments to 49 different topics identified as essential to learning Algebra I. These assessments are given twice over the period of a few weeks in class after spending many days and sometimes weeks exploring and practicing the topic in class. Occasionally, Ms. Merrit gives the class a third opportunity for an assessment if the majority of the students do poorly on the first two assessments. Only the highest assessment grade counts towards the student’s overall grade. If a student does not pass the assessment on one of the occasions that it is given in class, they must receive tutoring (offered after school by math teachers) and then they must retake the assessment outside of regular class time. Students know that the only way to improve their grades is by retaking their assessments. Furthermore, grades are cumulative for the year; this allows a student who is failing at the end of the first semester to continue working on the mathematical concepts in hopes of mastering the subject before the end of the school year. Consequently, new students must take all assessments given in the year because these are a cumulative part of their Algebra grade.

As mentioned previously, the ultimate goal of standards-based grading is to grade students on what they know and are able to do. When asked if students are more aware of their learning and how that relates to their grade, Ms. Merrit replied,
I think that it gives them more accountability because they know that they have to pass a certain number (of assessments) and I think that it is a buy in; they can’t ‘play school’ with these assessments. It does not matter if they are here every day, it does not matter if they do their homework every day, [and] it does not matter if they are a nice kid and always helpful. The only thing that they are graded on is their knowledge.

Interestingly, Ms. Merrit has found that students’ grades have increased this year by switching to this standard-based grading.

Ms. Merrit normally gives these assessments on Tuesdays, Wednesdays, and Thursdays. Some teachers might worry about so many assessments taking away from instructional time; however, they are short tasks that take very little time. For example, one assessment given for “assessment topic #33 a & b” consists of two problems – one for finding the equation of a line given the point and slope, and the other for finding the equation of a line given two points. This particular assessment took most students less than seven minutes (with the warm-up illuminated on the board) to answer after they completed the assessment. Meanwhile, Ms. Merrit takes attendance and walks around the room checking on student’s work. Little instructional time is lost with these assessments, and entire days are no longer devoted to longer, end of unit exams.

A common difficulty for teachers in lower income schools is the high absentee rate. Most teachers from these schools can relate to the hassle of having students make up tests when they are absent the day that it is administered in class. This hassle is somewhat alleviated by the standards-based grading system since students have more than one opportunity to take an assessment for the same topic in class. For example, for the student who protested taking an assessment because he had been absent for a few days, Ms. Merrit explained, “We have been doing this topic for a long time now, and this is the
second time that we are taking the assessment for this topic, so you do need to take this.”

This places the responsibility on the student to get help and retake it if he fails.

Unfortunately, the opportunity for students to be accountable for their own learning is not always realized by young teens. I interviewed four of Ms. Merrit’s students about how the assessments affected their work. Enrique explained, “I think that if I do poorly, it encourages me to do better. If I do well, I keep working because I want my grade set.” However, Shayna described that,

Sometimes people blame the assessment. Unless they do well, and then they are confident, and they don’t blame anyone. I have a friend. When he does poorly on a test, he gives up, and when he is confused, he just sits there not doing anything. I feel sorry for him when it is difficult, and he gets confused.

Bill concurred, explaining, “I think that some students don’t even care about the assessments; I like it because you don’t get a grade for homework, and I don’t like to do homework. So I like the assessments.” As a teacher who believes strongly in the benefits of homework to practice and become better at a particular concept, I asked if anyone did homework. They gave a resounding “No” explaining that they did not do it because they did not get a grade for it.

The large poster on Ms. Merrit’s wall titled “Algebra I topics” described earlier, gives practice problems from the textbook for each assessment. Students are encouraged to practice different topics using the recommended passages in the text, particularly to prepare for an upcoming assessment. Conversely, most students only work on mathematics during class. All of the students interviewed agreed that a lot of students (if they are doing poorly in class) give up. Ms. Merrit noticed this in class as well.
Ms. Merrit would regularly provide problems for students to work on that were either unsolvable or at a level that they had not reached in class. I will elaborate more on the benefits of these practices in a later section. The lack of resilience that these young mathematics students demonstrated when faced with difficult or impossible problems was made apparent during one observation. One warm-up with three problems; the first one proved to be unsolvable with the basic knowledge the students had at the time. Ms. Merrit explained to the class, “I noticed that a lot of you were stumped on the first problem and just stopped. You need to move on if you can’t get one problem and work on the others, and then come back to the one that you can’t get.” This advice is even more important in this era of standardized testing. During my sixteen observations over the period of two months, these students not only took the standards-based assessments, they were also given a district common assessment to compare to the other district’s high school, and state tests were given to compare schools and students to others in the state.

These outside assessments disrupt both the daily routine and the flow of the curriculum. Teachers were not provided with a warning of the district assessments until the day before they were to be administered. Ms. Merrit announced, “We will not be having the assessment on factoring on Friday as I had told you before because we will be having the district assessment to compare our scores to those at Mountain Point [the other district high school]… I know you will do well.” Ms. Merrit later explained to me that they had not done well last year because the other school coached their students a few days before the test and at Springfield they decided that this practice would be unethical. Furthermore, there had been many technical and mathematical errors with the assessment that may have skewed the scores. She expressed confidence in her students’ abilities and
felt that if they had all followed the same rules and been given a valid test, their students would have proven to be better prepared mathematically.

The state tests did disrupt the daily academic routines more significantly. The testing lasted two weeks, with shortened classes for half of the day, and testing for the other half. While these two weeks were a significant loss of learning time, the week prior for reviewing concepts that the teachers predicted would be heavily tested also caused a disruption from the standard currently being taught. The week before the state tests began, Ms. Merrit explained that they would be doing some review and emphasized the importance of taking these tests seriously.

Your CSAP score will be at the top of your diploma so remember that if you stink (on the math portion) and you go for a job and they see that you can’t do math, I would not hire you. Also, remember that on ACT you may not get into college or will have to take remedial classes at (the local community college) unless you score well. One of the silliest things that I see on these tests is a student leaving an answer blank. What are you chances of getting the right answer if you don’t answer?

The class responded to this question saying, “Zero” and she asked, “and if you guess?” In unison they responded, “1/4.” These state tests obviously have ramifications for the students and Ms. Merrit wants them to be well aware of the importance placed on these tests. The tests can also be used to reflect the teacher’s abilities according to many school leaders and government officials (McNeil, 2012). This causes many teachers today to place a greater emphasis on these tests as they may be used as evidence of the teacher’s competence. Ms. Merrit is retiring from teaching at the end of the year and is more concerned with how the scores will reflect on her students and her school than on her professionalism.
The review activities for these standardized tests are a distraction from the current topic being studied and painfully irrelevant for many students. The only time that I witnessed any of the students unhappy about working on the assigned mathematical problems was during this review. Ms. Merrit devoted two days to reviewing proportions (a significant part of the 9th grade Colorado State Assessment) both as an algorithm, and as they occur in word problems. On the first day of review, students worked quickly through several proportion problems, using cross multiplication as Ms. Merrit gave them strategies that they could use for portions of the test for which calculators are forbidden. On the second day of review, she gave them a series of word problems on a worksheet and asked students to work individually on those practice problems, and when they were finished, they were directed to choose from one of three other practice sheets to continue practicing other key concepts on the state test. Each of these practice sheets was for a different review topic that the students were encouraged to choose from based on their own needs. Students were beginning to finish the first worksheet after about 15 minutes and Ms. Merrit requested, “Raise your hand if you are feeling pretty confident with these types of problems.” Most of the students raised their hands, and while Ms. Merrit circulated around the room checking their work, they immediately went back to working diligently and quietly. During this time, a student near me leaned back to the student behind him and said, “This sucks.” The other student nodded and said, “Uh huh,” and they returned to their work. While these students were unhappy about this activity and review, they continued to do their work. A few minutes later when Ms. Merrit went over the worksheet, every student asked had the right answer. I would surmise that the students’ unhappiness can be attributed to the lower level of rigor required from the
review, compared to the interrupted lesson of quadratic equations. What is remarkable, however, is that despite their unhappiness, the students continued to work hard as they did every day.

**High and explicit expectations.**

The work ethic in Ms. Merrit’s class is derived through consistent, clear student behavioral expectations. Every student in her class understands that they need to arrive to class on time with their supplies and be ready to work hard. These expectations may seem minor to many teachers; however, the other low-income schools that I have observed appeared to have less success with some of these expectations. The other schools had the students keep their notebooks in the classroom and often needed to remind students to bring pencils and calculators and arrive on time daily. Also, the complexity and amount of work that I witnessed in these 45 minute classes far exceeded that of the other two schools with 60 minute classes.

The students understand the expectation of working hard as much as they understand being on-time and prepared for class. These attentive students will not be derailed by anyone in Ms. Merrit’s class. She is energetic and efficient, and she explains,

> They must be on task, they must be participating, they may not sleep, they may not work on anything else. They may not talk – especially when I am talking. They are to come in, and I maybe said this 140 times, but they should know that there will be a warm-up on the board, and they should get a piece of paper and a pencil out – that would be assuming that they have a piece of paper and a pencil – because when that bell rings, I am going.

Ms. Merrit, with the support of her administration, is able to demand more of her students through explicit expectations.
As mentioned previously, every class begins with either an assessment or the warm-up problems on the board. Students know that they must be in their seat when the bell rings and ready to work. The system that Ms. Merrit uses is simple and consistent. She keeps a notebook behind her desk with an attendance printout for each of her classes. She explains,

I keep the attendance sheet with codes [the codes for] sent to the hall, unprepared, not working, sleeping, etc. When they get three of those, I fill out the referral sheets that are already pre-made. I write the dates down and fill in the name and take as little time away and as little distraction to the class as possible so that I am not taking time at my desk writing referrals. That is why I have them made up ahead of time, that is what enforces it. They also know that I am not afraid to call their parent, I am certainly not afraid to send an email home, and I use my evil eye.

The students understand these expectations, and any student being written up or receiving a referral understood their offense and realized the consequences. One of the students appreciated the consistency and high expectations from Ms. Merrit explaining, “We always work, we always have to. With Ms. Merrit, she teaches that you always have to do your work. She keeps on it, so it is an easy class where you are always working and multiple problems at once. But the same types of problems exist. So it is easy.”

Oftentimes the student’s infraction was dealt with so quickly and quietly that most of us in the room did not even know what happened. Ms. Merrit would just quietly ask a student to go in the hall, or hand him a referral. Then the student would gather their belongings while class continued as if nothing had happened. Other times, Ms. Merrit quickly reminded students that laying their heads down on the desk or propping up their heads with their hands over their eyes is unacceptable. One day she explained to the class playfully, “As long as I can see your eyes you are okay; when I was in college that was
my favorite move. But then I was looking around wondering what I had missed.” Other
times just saying a student’s name elicited the immediate lifting of their heads from the
desk. One girl’s head down on her desk caused Ms. Merrit to say unapologetically, “I am
tired too… today is worse than any other.” On all of these occasions, students adjusted
their behavior respectfully.

Some student expectations are more seasonal and require a firm reminder. As the
spring season began, Ms. Merrit took time (after students had completed the warm-up
and before the lesson) to remind students about the school dress code, and she did not
mince any words while keeping a sense of humor.

Let me be clear about the dress code before we get started. It is starting to get
nicer outside, and so I need to make sure that you understand what the
expectations are. I will give you one warning, and then I will just send you down.
No cleavage at all, no short shorts or short skirts, and guys those shirts that are 6
inches below the armpit, that is too much information. And if you have your pants
sagging way down, either pull your shirt down or pull up your pants.

A conversation did not ensue about the fairness of these rules. The students understood
that this teacher was going to enforce the rules and they better comply. Ms. Merrit is as
adamant about appropriate clothing as she is about language. While to many teenagers,
the short skirts or saggy pants may not be offensive, Ms. Merrit teaches students
appropriate school behaviors. On a different day, she overheard a girl say, “Shut up” to
another student; Ms. Merrit turned and said quietly, “Don’t use the S word.” The girl
replied, “Sorry, be quiet” and Ms. Merrit smiled and said “Thank you.” Ms. Merrit never
passes up a chance to teach a lesson. A phrase as benign, to many people, as “Shut up”
may not be acceptable in many social or work related situations, and therefore, is
unacceptable in this class.
Every student is expected to have a notebook for notes, a pencil, and a calculator every day. Ms. Merrit does not keep a supply of pencils for students who forget, and she does not accept work in pen. To enforce the importance of having these items, Ms. Merrit performs supply checks frequently, writing up anyone without the necessary items. Consequently, on days that students are asked to bring back a worksheet begun the previous day, everyone returns with the necessary document. This is different from the other two classes that I observed where class materials are routinely left in the classroom to avoid losing necessary documents. This is more remarkable given that it is not for a grade. Clear expectations and the efficient manner in which behavior is addressed lead to minimal distractions from algebra in this classroom.

A student working on mathematics is never delayed by the referrals or supply checks described previously. For instance, at the beginning of class one day, Ms. Merrit called three students over to her desk while the class was working quietly on their warm-up. These students were new to the class this semester, and she explained their grades and the need for them to make up all past assessments to increase their grade to better reflect their knowledge of algebra. After the conversation with these students she sent them back to their seats and called another student over who had walked into class a minute late. She wrote him a referral and began walking around the room offering help. This all took place in the first six minutes of class as the warm-up problems were completed by students.

Talking is routinely discouraged in Ms. Merrit’s class. When the bell rings, students are expected to begin work immediately and quietly. If the class is still talking when the bell rings or a side conversation begins during class, Ms. Merrit does not yell at
the class, but simply starts timing them. They have 10 seconds to quiet down, or they will be held after class. One day after the bell rang, without raising her voice, she said, “You might not have heard because you are being too noisy, but the bell did ring.” She proceeded timing them with quick results. She congratulated them on quieting down in less than 10 seconds and reminded them that the timing should not be necessary.

Most days as the students work on the three to five warm-up problems on the board, you can hear a pin drop. Ms. Merrit respects this silence by walking around the room and stopping occasionally to offer help in a whisper. One day a student received permission to get help from another student because she had missed class recently. Ms. Merrit acquiesced only after explaining to them that they needed to be quiet, or everyone would think that talking is acceptable. A short time later, two other students began talking and were given “the look.” One of the boys explained that he needed help, and Ms. Merrit immediately came over to help him, ending the side conversation. Routinely, as students finish their warm-ups, they sit quietly waiting for Ms. Merrit to go over the answers. While the wait is never more than a minute or two, I am impressed by their patience.

While students work individually or in pairs in this class, Ms. Merrit rarely has them work in groups. She explains her reasoning:

I changed the curriculum this year. In the past, the curriculum that we used the students had to work in groups of 4. Although I think that it works well in higher-level classes for students to work in groups, I do not think that it works well to have them work in groups of 4 at this age group and at this maturity. Because then they just spend time talking and it does not matter if you are out and about because I am always out and about with my kids and in a small room that makes it even worse. And so I have changed the curriculum and since I have them working independently so often, I can see, ‘are you working?’ You know, when I go around, I can answer individual questions, I can see if they are talking, I can see if
they are doing something else. So having it structured the way that I have it makes my discipline possible, because it was really difficult to have them in groups of four, and I tried groups of two. And they just don’t have that maturity level. Some of my other classes do, and I will have them work in pairs more often. But this particular group just can’t handle it.

Students working individually eliminate distractions for the students and also free Ms. Merrit from disciplinary issues so that she can concentrate on helping students who need it. Being able to work with individual students while the rest of the class works is only possible if most of the students have the self-control to work independently; therefore, Ms. Merrit frequently checks for understanding and adjusts the pace and the lesson accordingly.

**Checking their pulse.**

Like an athletic trainer, Ms. Merrit is constantly checking the vitals of her class. Students frequently use individual white boards to both solve problems and show answers. When students show their boards and a common mistake is identified, Ms. Merrit goes over the problem, pointing out the common mistake, reminding students, “Remember, that it is ok to use your notes if you need to.” The show of boards is coupled with Ms. Merrit’s constant circulation of the room. An example of a common use of boards in her room follows: “OK, boards at your ready. We are going to solve equations. Step one: write down the equation. Try to draw your parabola when you are done.” She proceeds to walk around the room checking students’ work. One student asks a question and she stops to answer. She stops half way around the room and announces,

**OK, I saw most of this side of the room had the right answer; everyone hold up your boards and let me see. OK most of you did get the right x-intercepts. And we have not talked about how far down to sketch our parabola, yet we do not have the y-intercept. But we will be getting to that. Let’s do another one.**
One time, I observed a couple of students across the room keeping track of the number of these practice problems that they had correct. They appeared to be competing with each other to see who could get the most problems correct, cheering and comparing answers.

This petite, energetic woman works her away around the room constantly, gaining a solid assessment of the progress the students are making. With this understanding, she expresses excitement to the students who are successful and often shows self-deprecation when students struggle. It is obvious from these interactions that Ms. Merrit wants all of her students to understand and feel the success and accomplishment of knowing how to do a complex problem.

With the countless problems that students work on daily in Ms. Merrit’s class, not all of them are done on dry erase boards. Often, students are instructed to work out problems in their notes in order to use these as a resource when working on assessments, warm-ups, and classwork. When this is the case, Ms. Merrit checks the “pulse” of the class by asking for a show of hands after revealing the answer to measure student understanding. When the majority of the class raises their hands showing their success, Ms. Merrit expresses how pleased she is with an exuberant, “Good, good, good!” or “Oh, good news!” However, at other times only a few students raise their hands, and Ms. Merrit will say encouragingly, “Okay, we need to do some more on these.” Through these group checks and her constant circulation, Ms. Merrit has a good understanding of the strengths and challenges of all her students.

Aside from the group checks, students are also checked many times individually before they are ever asked to perform on an assessment. Students are encouraged to work diligently on the assigned problems with the expectation that they could be called on to
explain it to the class. Ms. Merrit regularly brings out a stack of cards with each student’s name written on a notecard. She explains how these cards help to enforce her expectations of her students,

That they are paying attention and that they are working. And that means that when I ask questions I use the cards so that they don’t know who I am going to call on. And then sometimes I put the card back in after I call on them because you have to keep them on their toes. That is how you keep them engaged because they don’t want to be embarrassed, and they know that I am not going to let them go. If I call on them and they don’t know the answer, then we are going to work on it together; we are going to puzzle through it. So that keeps them on the hook.

Every day Ms. Merrit gets out the cards and has several students explain different problems. These students are rarely embarrassed if they don’t know how to do a problem because she “puzzles through it” with them. She repeatedly tells them, “If you don’t get the answer, you will walk it through with me” or “Okay you do it with me then.” After students work through the steps of the problem with her, she then exclaims, “Great, you were right!” Other times, students lack the confidence, and she encourages them saying, “I am pretty sure that I saw that you had this right on your paper, you can do this.” On one occasion, Ms. Merrit drew a student’s name who had been absent and acknowledging this, she asked, “Oh, you have been gone for a significant amount of time. Did you do this problem?” He replied, “Yes” and began the problem. When he began to struggle, Ms. Merrit called on another student to help him finish. After the two students explained this complex problem, Ms. Merrit praised them both, and another student clapped for them. These are just a few of the many examples of how Ms. Merrit is aware of a student’s comfort level, skill level, and attendance in order to best assess individuals and the class as a whole. As Ms. Merrit explained, the cards also motivate the students to get their work done.
As I already have highlighted, the students work hard in this class. It is not just the fear of Ms. Merrit’s “evil eye” that keeps these students working diligently and consistently on difficult and often complex topics. Most of these students seem to grasp the importance of focusing, working, and learning in class. An example of this student-directed behavior occurred one day while students were working on factoring quadratic equations and sketching the corresponding parabola. Ms. Merrit put a new problem up for students to practice and instructed the students to solve and graph the equation while she went to grab a new marker. She left, and the room remained silent with about half the students working on the problem. After roughly a minute of looking around, the other students began working as well. She returned and began walking around the room as the students finished the problem. The ability to leave a class knowing that they can and will do the work is unusual in my experience. This is only possible through setting clear, consistent expectations, along with students’ desire to learn.

**Balancing rigor.**

The support that the students receive is through a great balance of review and challenging problems. The task of solving a quadratic equation for the intercepts and line of symmetry in order to graph it can be quite complicated and difficult for students. During the several weeks that I observed Ms. Merrit’s class, she broke the process down into smaller steps, bringing them closer to the final product in the final week when she gave the students problems to practice all of the necessary steps for graphing the parabola. She supplied the students with special graph paper and a series of eight problems to work on in pairs. The problems became increasingly difficult and she highlighted the last one in particular: “Notice what is different about the last one.”
then clarified that completing all of the problems is not mandatory, saying, “You may not get to the last one although some of you are fast.”

Ms. Merrit constantly paces the class for the slower and the faster students by offering multiple problems at a time and encouraging the slower students to complete the first problem before proceeding to the next. Ms. Merrit balanced her expectations of different students by allowing some students to complete fewer problems than others and offering increasingly challenging problems for the more advanced students. At other times, all students will be challenged with the same problem and everyone is expected to try. The difficult problems are not so frequent as to be discouraging and many students appear to embrace the challenge. An example of this occurred one day when Ms. Merrit warned the students, “Here is a tricky one.” The whole class accepted the challenge at first and began to work on it; however, after everyone struggled with the problem for a short time, many appeared to be confused and stopped. Ms. Merrit recognized when most of the students had stopped working and revealed the answer. One student from across the room exclaimed, “Yes!” The excitement of this student who was able to master a complex problem is why many of us love teaching math. Many of the other students expressed how close they were to solving the problem as well, obviously liking the challenge. This was an example of a problem that the students had learned the concepts to solve; however, it was slightly more complex than they had seen before.

At other times, Ms. Merrit would allow students to struggle with a new concept that had never been presented in class. An example of this was on a day when the students had been working on factoring quadratics on individual white boards, and Ms. Merrit announced, “Okay, I see some good looking boards. Here is the answer and now I
am going to put another stick in the fire. Some of you will see this quickly and all I can say is GCF, GCF, GCF, [Greatest Common Factor]. So try this one, and I will go over it in a minute.” Students began working, trying to reason through a concept that they had never encountered before. A few students look puzzled and did not appear to be working; however, many students solved the problem to the best of their ability. After giving students a chance to try, Ms. Merrit explained how the concepts they have already learned work together to solve this problem. She used algebra tiles to explain the concept visually. Some “Ahs” could be heard around the room, and the students were given another similar problem. This time every student’s head bowed, working intently. After a few more difficult problems, Ms. Merrit recognized how hard the students had been working and announced, “I will give you an easier one so that your brains can relax a little.” An audible sigh could be heard around the room.

While the incredible effort of the students in Ms. Merrit’s seventh period class can be partially attributed to her teaching style, another part can be attributed to the goals of the students. Whether the goal is to go on for a college or non-college career, these students recognize the importance of learning algebra. One student explained, “I want to be an anesthesiologist, so this is one of those things that is required. So if I don’t do good in this subject, then I am not going to be able to do what I want to do.” Another student sees the importance of math in particular for his career explaining, “I am a racer and a mechanic and a lot of things having to do with math are going through your head, and so I think that it is very important for the stuff that I want to do.” Alternatively, a goal of graduating from high school may be motivating enough; another student explained, “I don’t know what I want to do. But I think that it is important to graduate from high
school.” Whether a student wants to pursue a math-related career or simply wants to graduate from high school, the motivating value of being both challenged and supported in learning algebra creates great results in Ms. Merrit’s class.

**Warm demander.**

While Ms. Merrit’s teaching style might be referred to as strict and traditional, her warmth and humor causes her to be beloved by her students. When the students describe their algebra class, they refer to the rules as “logical, strict sometimes.” Another student asserts, “Our class is a lot more relaxed than most. We have to be. Sometimes we get loud and rowdy, and every once in a while, she will let us. But for the most part, we do our work. Strict but relaxed.” When asked what she likes most about Algebra I, one student responded, “Ms. Merrit, she is nice, friendly, and when you understand more, it is fun. And she makes you feel good.”

Ms. Merrit teaches with a firm hand and a big heart. During the interview, I asked her how she addressed the racial diversity at Springfield. Her explanation gave a great description of how much her students mean to her.

I have worked with a group of kids that have been diverse since the beginning; we talked and that was your intention too – to work in a school district that was diverse. And it is hard because I know that in the outside world, they are judged differently if they are light or dark or white or black, but when I see my kids, I just see them as my kids. And I would have a really tough time telling you how many kids I have in any particular racial group. I don’t look at my kids that way, so I don’t think that I do a whole lot as far as their racial diversity because I don’t care; they are my kids. I took home a Latina girl so, it is like, I have offered my house to a Filipino girl, a Black girl, just kids who came from terrible backgrounds. I have taken in a handicapped kid, a White girl. So, to me it is such an unimportant thing and I do know that they carry some of that when they come in. But I don’t pair them according to color or make sure a Hispanic kid is working with a White kid – for one thing that would take too much time looking and trying to figure out, are they Hispanic?
Because I don’t know, I don’t know if I do a good job or a bad job with that because I don’t think that I really pay attention to that.

The students at Springfield are her children regardless of race, gender, or aptitude and they understand that.

One student realized her thoughtfulness when he complained of having a sore throat and she gave him a cough drop. Another student understood her caring when he returned from being absent and she asked him if he was feeling better. Yet another student arrived before class, telling Ms. Merrit that he might have surgery and be absent; her response was to ask him if he is eating healthily and staying away from pizza and ice cream. He smiled and nodded. On another occasion, a girl went to Ms. Merrit to ask a question about the assessment, and before answering Ms. Merrit looked at her and asked, “When did you get you braces off? Your teeth look very pretty.” The girl blushed and smiled answering, “Just yesterday.” It is obvious from this exchange that the people that Ms. Merrit teaches come first while the subject matter comes second. These students know that while Ms. Merrit definitely wants them to learn algebra, she cares about them as people too. When asked about this, she explains,

I think that they know that I do care about them. I think that a lot of them think that I am very strict and that I make them do their work, so they may not like me because of that but, that I love them, they love me. I miss them, they miss me, they come and tell me that. So yes, I think that I have a reputation amongst those kids that I am very loving and caring and in general, in my classes, they know that I care about them.

She goes on to explain that while they do not always appreciate how hard she pushes them during class, they can recognize how lucky they are in the future. She points to the bulletin board near her desk adorned with high school pictures and notes saying.
They always [come back] say hi to me and I get notes. There is one over there. “Even though I did not do well in your class, I know that it was my fault, and thank you for pushing me as hard as you could have.” I got another one from a girl at Christmas who graduated last year that said, “Thank you for your high expectations and pushing me and saying that I could do it even when I did not know if I could.

The students appreciate that Ms. Merrit expected them to work hard and also understand the much needed encouragement that she supplied.

**Encouraging and pushing.**

Ms. Merrit shows how a teacher can pressure her students to be successful while also encouraging them through kindness and patience. When I asked one of her students how she knew if she had learned a topic in this class she explained, “When you got good at it, you raise your hand because you know it. I mostly know it before an assessment. I’ll ask her if I don’t know, and she takes time to help me understand.” Another student explains, “She pushes us to do the best we can. She is encouraging.” Examples of how Ms. Merrit can both challenge and encourage her students can be observed daily. She walks around the room daily, praising and encouraging students as they work. She stops when she notices a mistake and helps students correct their answers. One day she made her way over to a new student asking him if he had done these types of problems before. He replied, “No,” and she asked him what school he had attended before. He replied, “Highland,” and she commented on how well he was doing on his work. She told him, “You must be a pretty good math student then.” He smiled and returned to his work as she moved on to the next student. Taking a moment to praise and encourage a student individually can be so motivating for some students who then want to do well because they know that someone cares about their success.
It is important that students are able to take risks in the math class, feeling comfortable in searching for solutions and being able to make mistakes. One day a student was called on to answer a question and he made an error. He seemed embarrassed, and Ms. Merrit helped him by talking through his thought process with him and the class. She pushed the student to complete the problem, yet encouraged him by averting the mistake to other students and telling him, “Do not to listen to the people around you, they are giving you the wrong answers.” He completed the problem without the distractions, and she praised him and moved on. On occasions, she would ask a student how they were feeling about a particular concept, and if they were unsure would suggest that he or she come in after school for help. She would encourage the entire class stating, “You are probably a little rusty at these and I understand that so let’s go over these together.” The students understand that if they are having difficulties, they will not be chastised or ridiculed, but rather, aided and reassured.

**The use of humor.**

As explained previously, Ms. Merrit expects her students to work hard at learning Algebra I; however, she also likes to have fun. Although she is matter-of-fact, she also has a quick wit and dry sense of humor that guides the students’ academic and behavioral attitudes in a playful way. When Ms. Merrit describes herself as a teacher, she straightforwardly explains,

I am funny, humorous, I make jokes, I am sarcastic, but it comes back so that I am making fun of myself more than I am making fun of anyone else. So, I think that most kids buy in, and the reason that I think that the teacher’s personality is important is because the students need to buy in.
The students do indeed “buy in,” and they appreciate her humor as well. One student described Ms. Merrit as “fun, she has her times but she is fun.” Another student elaborated, saying, “She is a pretty good teacher; if you ask questions, she will help you. And she is funny, no matter how many times you ask her about a certain type of problem she is always willing to help you.” Ms. Merrit’s sense of humor is another tool that she uses to curb behavior and encourage high academic conduct.

Her seventh period class has one student in particular who is a regular distraction, Jeremy. He was the receiver of at least one referral and called to the office twice during my observation period. Ms. Merrit did not always discipline him, and she sometimes changed his behavior with humor. One day in particular, Jeremy was very fidgety, drumming his hands on his desk and talking to the people around him. Ms. Merrit asked him to stop several times, and finally Jeremy asked loudly, “Why are you always picking on me?” Ms. Merrit was at the front of the room and looked to a student on her right and said, “Here it comes.” Jeremy asked, “Is it because I am African American?” She replied sarcastically, “Yeah right you read me like a book.” Both she and Jeremy laughed, and he seemed to settle down. Several minutes later Jeremy began singing, and Ms. Merrit said, “Your homework for the weekend is to talk all day every day, so you will be tired of it on Monday.” He made a comment about how his Mom would not like that very much, and Ms. Merrit smiled and said, “So she understands how I feel.”

On another day, Jeremy came running into class as the bell rang, and he was half way across the room when it rang. Many of the students watching him gave a collective, “Awe.” Ms. Merrit asked if he had any tardy passes left, and he said, “No.” She instructed him to take his assessment first and then go to the office, but she jokes with
him that if his pants were not sagging, he might have made it on time. He explains, “No, it is because Mr. Johnson keeps people after class for stupid reasons.” Ms. Merrit replies, “It is probably the same stupid reasons that I keep people after.” Another student offered her a tardy pass for him, and Ms. Merrit said, “That is very nice of you. Jeremy, you are indebted to her.” Ms. Merrit’s humor softens her discipline, reminding students that she still cares for them even when they need consequences for their actions.

The exchange with Jeremy about his ethnicity does not in any way suggest that Ms. Merrit condones any kind of racism in her classroom. When asked about how she fosters respect in the classroom, she explains,

I was actually surprised in talking to Mikayla [her adopted daughter] that kids do sit, like at lunch Hispanic kids sit together, the Black kids sit together, the White kids sit together, and some intermingle. But there are those big groups of kids, and to me, that is surprising because of the way I view my kids. I have a high level of expectation as far as how you treat each other, and I try to model a lot of that, and I try to enforce a lot of that, and I have zero tolerance for that, and I will take them out, and I will ream them because that is not what is going to go on here. I don’t know if they are afraid of me, or what, but they just know that that is not some place to go. I had a fight break out many, many years ago between a Hispanic kid and a Black kid, and I handled that by calling security because they were big guys. And I could not do anything about that. But maybe I am ignorant, but I just don’t think that I have that in my class.

When I asked Ms. Merrit if this is something that she addresses at the beginning of the school year, she explained that she had not specifically discussed treating each other with respect.

It is in my expectations, but I think that it is like the same reason that they don’t leave balled up paper on the floor. Because they know that that is not going to fly with me, they know just from my personality that it is not a discussion. It is just like when Jeremy was saying, ‘You do that because I am Black.’ I joke about it and say ‘Oh you’re right. You got me Jeremy. You got me nailed.’ But he does not really think that I am doing something because he is Black. So I will joke with him.
Jeremy is not the only student she jokes with. Most of her students have experienced her dry wit at one time or another throughout the year.

The fact that Ms. Merrit is just as strict as she is playful often catches the students by surprise. One day during the lesson a student started hiccupping. She looked at him and asked if he was hiccupping, he replied, “Yes” and she started walking towards her desk. She told him that he was going to write him up and send him to the office. With a panicked look on his face, he asked, “Why?” The class sat there with wide eyes, and Ms. Merrit started laughing and said that she was trying to scare the hiccups out of him. The entire class began laughing, and as he laughed the student said, “It worked; my hiccups are gone.” While Ms. Merrit takes the students’ learning of mathematics very seriously she recognizes that they are kids and enjoys them. This is apparent from her jokes with her students, and her tiny pigtails all over her head on “crazy hair day.” She enjoys her job and her students. Although Ms. Merrit creates a strict, rigorous learning environment, she has fun, and she wants her students to enjoy themselves as well.

In addition to Ms. Merrit’s humorous asides, she also tries to bring connections to the mathematics and the world. This is done both by giving examples of when these mathematical concepts are used in real life and by offering similarities between the mathematical process and other processes in their lives. An example of the former is given during a lesson involving parabolas.

Ms. Merrit: “Actually in real life you see a lot of these. If you launch a bomb or if you launch a satellite, these are all trajectories of an upside down parabola. I won’t go back to being a science teacher for too long, but if you look at this (she draws a picture).”

Student: “You were a science teacher too.”
Ms. Merrit: “Yes.”

Student: “That is dope.”

Ms. Merrit’s years as a science teacher offers her many other examples similar to the one described above.

At other times, Ms. Merrit draws from her students’ interests to help explain the process of solving a particular problem. One day as she was explaining how to factor a complex problem that involved first finding the greatest common factor and then factoring the remaining trinomial into two binomials in order to solve, Ms. Merrit made a connection to a car engine. Knowing that some of her students are interested in cars, she asked these students to name different parts of a car engine. She then asked them to describe what would happen if they were rebuilding the engine and decided to leave one of those pieces out. They told her that the car would not run without all the pieces, and she explained, “Just like you can’t leave out any of the parts from the expression that you have factored.” This is a common mistake for students to make that will hopefully be less likely when they remember this comparison.

Overall, Ms. Merrit orchestrates her class with a delicate balance between austerity, compassion, and wittiness. It is through this trio of characteristics that her students succeed in learning freshman Algebra I. Recalling the Venn Diagram of classroom engagement, classroom management, culturally relevant pedagogy, and caring relationships in the literature review chapter, it is obvious that Classroom Management and Caring Relationships are more prevalent in Ms. Merrit’s classroom. However, these are supported by culturally relevant pedagogy by embodying the characteristic described by Ladson-Billings (1994) as “the warm demander.” In addition, Ms. Merrit keeps
students engaged through stories and by holding them accountable for their own learning. This combination created an opportunity to learn for all students in this class. Therefore, embedded throughout is a classroom with highly engaged students with intense classroom management through culturally relevant and caring attributes.

The future for Ms. Merrit.

This was Ms. Merrit’s last year of teaching public high school. While she continues to teach part-time at the local community college, she had reached her years for retirement and was ready. Over the time that I observed Ms. Merrit, we frequently had casual conversations about administration and student testing. During these conversations, she implied that the changing administration and increased demands on student test scores influenced her decision to retire. While the administration that she had this year was supportive, she had experienced negative and frustrating administrators in the past. In addition, she was not interested in beginning a new curriculum with the recent state adoption of the Common Core standards. Ms. Merrit had so much energy and great opportunities to share with her students; it is a shame that this is her last year.

Ms. Merrit’s response.

I sent my description and interpretation of my time in Ms. Merrit’s class after completing this section. Her reply is as follows:

Hi Cassie, I just finished reading your paper and I must say that I think you are overly generous to me!! But, I thank you for the kind words. I enjoyed reading the paper and may have all 30 pages framed ; - ) I am so glad that my students came out looking so well. They really were a good class and I am proud of them:

She also made some grammatical and content comments. I chose to use some of her grammatical suggestions and the content related comment is as follows: “pg.1 – We do
have a football field, baseball diamond, and soccer field behind the school. There is also a ‘Community Center’ that has newer fields.”
I conducted this research with the firm belief that every student can learn algebra. As shown in the literature review, the necessity for graduating from high school and subsequent work or schooling is predicated on the successful completion of Algebra 1, particularly by the end of the freshman year. Furthermore, every student should be given the same opportunity to learn algebra regardless of their family’s educational or economic background. I hoped to understand how educational equity might best be accomplished by searching for common practices employed by successful algebra teachers. The greatest achievement challenges in mathematics occur in schools with low socioeconomic status and high diversity (Darling-Hammond, 2011). In order to identify ways that teachers can help students become more successful, I searched for practices that were applied by teachers identified as successful in teaching this high-risk population of ninth graders in Algebra I. I employed one major question with 5 sub-questions to satisfy this goal.

The overarching question that guided my observations and interviews was: (1) What practices do teachers in high poverty, diverse high school algebra classrooms use to implement the curriculum and influence student learning? My assumption was that classroom management, student engagement, culturally relevant practices, and caring relationships all play a significant part in the success of teaching. As outlined in the literature review, these four categories have been studied extensively as they pertain to high school students in diverse, low-income schools; however, to my knowledge, no research has documented how these categories work together to create a classroom of learning Algebra I. This led me to the following sub-questions: (a) What classroom management strategies contribute to the implementation of the curriculum and influence
student learning?; (b) What engagement strategies contribute to the implementation of the curriculum and influence student learning?; (c) Which culturally relevant pedagogy practices contribute to the implementation of the curriculum and influence student learning?; (d) How do relationships in the classroom support classroom management, engagement strategies, and culturally relevant practices?; and (e) How are the four categories interrelated?

The need for highly qualified teachers in low-income schools has been well documented (Darling-Hammond, 2012a; b). Despite educational policies over the past decade to help recruit and train high-quality teachers to work with high-needs students, the injustice of the low quality of teachers still dominates low-income schools compared to those in often neighboring high-income schools (Lankford, Loeb, & Wyckoff, 2002). For the purpose of this study, high-quality teachers were chosen upon recommendation of their principals and peers. In the previous chapter, I provided a description and interpretation of what it was like to be in those three teachers’ classrooms, using the methodology of Educational Criticism and Connoisseurship (Eisner, 1998). I did not code the data according to the research questions, but rather chose codes that best described the practices of each individual teacher. According to Eisner (1998):

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\text{The creation of patterns derived from observation as a basis for explaining and predicting is both the boon and the bane of observation. Knowing what to look for makes the search more efficient. At the same time, knowing what to look for can make us less likely to see things that were not a part of our expectations. (p. 98)}
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I will attempt to answer the primary question using Eisner’s (1998) five dimensions of schooling with the administrative dimension (Uhrmacher, 2008), henceforth referred to as the ecology of schooling framework, as found in Chapter 3. In addition, I will answer the
sub-questions using the data coded by each of the four categories: classroom management, student engagement, culturally relevant pedagogy, and caring relationships.

The purpose of this section is to evaluate what these three high-quality teachers are doing in high school algebra classrooms to increase students’ opportunities to learn and be successful. In order to do this, I must first set the stage, providing the context in which these students are teaching through the ecology of schooling framework. I will then describe the differences that I observed in these teachers’ methodology despite the similar school ecologies. Finally, I will answer the sub-questions, pointing out commonalities and differences between the three teachers that will be more specific to the four categories; classroom management, student engagement, culturally relevant pedagogy, and caring relationships. Eisner (1998) explains that for “education criticism, the evaluation of what is seen is vital.” (p. 99). This ability to be an educational critic and illuminate the significance of certain observations requires a connoisseur (Eisner, 1994; 1998). The connoisseur has the experience and knowledge to truly appreciate and discriminate the information that is important to a situation. “The major distinction between connoisseurship and criticism is this: connoisseurship is the art of appreciation, criticism is the art of disclosure” (Eisner, 1994, p. 214). To fully appreciate what the three teachers are doing in this study, I have chosen to evaluate the answer to the first overarching question within the framework of the ecology of schooling.

**Question One: Teaching Practices**

The pursuit of equity in mathematics education has spurred many calls to action in recent years that all focus on the teacher. It began with a requirement for every classroom to have a highly qualified teacher (No Child Left Behind) and has evolved into
a demand for “teacher effectiveness.” An anonymous (2012) writer to the *Harvard Educational Review* recently pointed out that “…even with decades of research, we still grapple with the basic questions: What does it mean to be an effective teacher? How do we tell which teachers are the most and least effective?” (p. 78). By interpreting, describing, and evaluating the practices that the three teachers in this study used to implement the curriculum and influence student learning, I discovered two different ways to answer this question. My findings were that these teachers were working in a highly standardized and controlling environment and that despite the focus of the schools on standardized testing, the practices of each of these three teachers were different. In their own unique way they were able to implement the curriculum and influence student learning.

**The Discipline of Schooling**

Many factors influence student learning. Educational research is rife with recommendations about the best ways to teach students of all ages, interests, and abilities. In addition, the content that should be delivered throughout a child’s schooling has become prescribed with the advent of the national standards in mathematics and language arts, with science and social studies on the horizon. The combination of these recommendations has greatly influenced what Eisner (1988) refers to as the ecology of education, particularly in schools that serve the poor. The ecology of schooling framework can be broken down into the six dimensions of: intention, structure, curriculum, pedagogy, evaluation (Eisner, 1998), and school administration dimension (Uhrmacher, 2008) and to change one of these dimensions changes them all (Eisner, 1998). Through these dimensions, I intend to provide an understanding of the teacher’s
experience with standardized test scores and accountability that influenced what was observed in the classroom. Furthermore, I will incorporate the warning that Foucault (1977) put before us by evaluating the organization of power and discipline as they relate to the amount of control enacted in schools today. Ultimately, I will outline the ways that the teachers’ autonomy and professional integrity were undermined by standardized testing.

**The discipline of intentions.**

The intentional dimension refers to the “goals or aims that are formulated for the school or a classroom” (Eisner, 1998, p. 73). Eisner (1998) clarifies that at times the teacher’s intentions are made explicit, while other times they may not correlate with what actually takes place; however, sometimes aims are assumed by the students without being intended. Therefore, when evaluating the intentions of all three teachers, it is important to also evaluate the response of the students. Ms. Reed, Ms. Merrit, and Ms. Green all shared similar intentions for their students while at times the outcomes differed. The overarching intentions of all three teachers were the same: teach diverse, low-income students; and all students can and will learn algebra.

Ms. Reed, Ms. Merrit, and Ms. Green each voiced their intentions to teach disadvantaged students. This intention is unusual given that “a substantial body of research also shows that schools with large populations of poor, nonwhite, and low-achieving students, on average, have more difficulty attracting and retaining teachers” (Boyd, Lankford, Loeb, Ronfeldt, & Wyckoff, 2011, p. 377). I will speak to the issue of retention later in this chapter; yet, it is important to note that each of these teachers came to their schools with the specific desire to make a difference in the lives of students who
do not always get high quality teachers. Boyd, et al. (2011) point out that “this difficulty in recruiting teachers to schools with high concentrations of low-income students likely reduces the educational opportunities of students in areas of concentrated poverty” (p. 377). Contrarily, these three teachers had three or more years of experience and were deemed successful by their administration and colleagues. Most of the students that I interviewed at these three schools appreciated their algebra teachers, knowing that they care about them and that these teachers teach at their school because they want to.

Ms. Reed, Ms. Merrit, and Ms. Green wanted all of their students to learn. Not one of these teachers allowed a student to sit quietly in the back of the room doing nothing and failing. Ms. Green worked individually with students, identifying underlying problems and working to provide solutions (see the section “Support and Encouragement” on p. 137). She provided supporting materials for those who needed it and peer tutors for others. Ms. Merrit identified struggling students by constantly circulating around the room; checking work and calling on students randomly to explain a mathematical problem (see the section “Checking their Pulse” on p. 162). Opting out of working in Ms. Merrit’s class was never an option. Likewise, in Ms. Reed’s class, every student was expected to participate and work. If any one student chose not to work in her class, she would have everyone stop and wait, using peer pressure to get everyone involved in learning (see the section “We are in this Together” on p. 96).

The intentions for each of these teachers were for their students to enjoy algebra and recognize the need to learn it. I will elaborate on the ways that these teachers worked to make this subject enjoyable for their students later in this chapter in the section “Student Engagement.” What I discovered is that the students realized the importance of
learning algebra when they spoke of their desire to complete the class successfully for reasons that were similar to their teachers. They talked of needing the class to graduate from high school as a prerequisite to college and as a skill set necessary for their job ambitions. Being successful in this class was never defined by these teachers as increasing standardized test scores or achieving a certain letter grade, but rather as learning the necessary topics outlined in class. Each one of these teachers was observed asking a student to come in for help with a troubling concept or asking how they could help. Furthermore, students were heard talking more about what they did or did not understand than on a particular grade. The disconnect between the intentions of the teachers and those of the school will be outlined in the following dimensions of schooling. Primarily the students were sent conflicting messages regarding the importance of learning and the importance of standardized test scores.

As I will show in the following dimensions, the school’s intention is to increase state test scores. The incongruence between the school’s intentions and those of the teachers in this study posed the first problem for the ecology of schooling. The teacher’s intent for student learning was not contrary to the school and district’s intention for higher standardized test scores; unfortunately, it did provide a divide in how each party defined the purpose of schooling. The standardized testing required a measurement based on the Normal, referred to by Foucault (1977) as a way to classify and judge students, and in this case, teachers. Conversely, the teachers were classifying students on the level of their learning, rather than comparing them to their peers. While the teachers understood the importance of standardized testing, it did not support their intentions to provide traditionally underserved students with a good education to further their
opportunities after high school. The evidence of this is outlined in the following five dimensions.

**Structural discipline.**

Another major dimension of education is the structural dimension (Eisner, 1998). This dimension refers to the organization of the school in terms of the routines and expectations regarding length of time, number of classes, etc. (Eisner, 1998). The structure at all three of the schools where these teachers worked was oriented around standardized testing aimed at teacher and student accountability. For the 2008-2009 school year, (this being the most recent I could find) none of the three schools in this study made Adequate Yearly Progress (AYP) in math as defined by the Colorado Department of Education. The results that were released for the 2010-11 school year (the year before this study) showed low achievement in all three schools. Conversely, Ms. Reed’s school showed high growth, Ms. Green’s school showed median growth and Ms. Merrit’s school showed low growth, all in mathematics, for the same school year (Colorado Department of Education, September 25, 2012). These abysmal achievement scores have made testing a priority in all three of these schools. Testing has become such a large part of their structure that they all have district testing as well, in order to both practice for the state level exams and for the administration to monitor student progress more frequently. The practice instituted at each of these schools was in the hopes of making the testing requirements routine. When Foucault (1977) describes the acute level of control in schools, he classifies the four characteristics describing discipline as: “it is cellular (by the play of spatial distribution), it is organic (by the coding of activities), it is genetic (by the accumulation of time), it is combinatorial (by the composition of forces)”
Likewise, through the standardized testing practice, the four characteristics of discipline are found by the students and teachers trained to: sit in rows with just a pencil and calculator; remember to stay quiet and follow the standardized directions; remain testing for a given amount of time; and implement the routine school-wide.

State and district tests altered the structure of the school day several times each year in this study. For Ms. Merrit, the changes were less intrusive, with district tests occurring twice per year and taking place during the regularly scheduled class. For the state assessments, her school set aside several weeks for testing to take place in the morning and an abbreviated form of the regular classes taking place in the afternoon. Ms. Reed’s and Ms. Green’s schedules were disrupted much more at their schools. For district testing each quarter, the schedule was altered for two days to allow for longer class periods dedicated to testing at the elimination of regular classes. For state testing, three days out of two consecutive weeks were dedicated to testing, with the elimination of regular classes for those days. Thus, sending the message that standardized testing is so important as to alter the regular school day several times a year.

**Curricular discipline.**

The great importance placed on state and district testing and accountability lends naturally to close adherence of the alignment between the curriculum and the test. Eisner (1998) explains that, “One of the most important aspects of connoisseurship focuses upon the quality of the curriculum’s content and goals” (p. 75).

As a teacher of mathematics courses, including algebra, for the past 17 years, I consider myself a connoisseur of the mathematics curricula, and the quality of the curriculum at Ms. Green and Ms. Reed’s
schools was inadequate. Compared to the concepts that were taught in Ms. Merrit’s class and a typical Algebra I book, the district curriculum map used by Ms. Green and Ms. Reed contained much fewer topics and with much less complexity. For example, as discussed in the last chapter, Ms. Merrit’s students were working on quadratic equations, a topic typically found in an Algebra I textbook, that follows a natural progression from linear to quadratic equations. However, the curriculum map used by Ms. Green and Ms. Reed never reached quadratic equations, but rather focused primarily on linear equations. As Ms. Green mentioned, the mandated curriculum was not rigorous enough for this level of mathematics (see the section “The curriculum mandates” on p. 117). Moreover, Ms. Reed stated that “the unorganized chaos of it all” hurts her teaching and classroom behavior (see the section “The ‘unorganized’ curriculum” on p. 84). Part of the problem can be attributed to the district trying to transition to the new common core standards, while students are still being tested on the old standards. Therefore, the district attempted to blend parts of the old and the new standards in hopes of increasing test scores. In addition, both Ms. Green and Ms. Reed experienced three different curriculums in three years. Furthermore, none of the curriculums followed the scope and sequence of a textbook in their possession, but rather that of the state tests. The multiple changes in the curriculum inhibited the teacher’s ability to understand how the concepts built on each other and decreased their ability to predict the gaps that may have occurred in student learning as these transitions occurred.

Lerman (2000) points out that “the mathematics curriculum, in terms of topic content, remains very similar to that of 50 years ago” (p. 30). This resistance to change may be true for the teachers following a curriculum published before 2011; however, the
advent of the Common Core State Standards (Bell & Thatcher, 2012) and the subsequent adoption of these standards by 45 states intend to change this course. Foucault (1977) may describe the adoption of these standards as a way of control and discipline, explaining that by purporting an increase in aptitude also increases domination. Indeed as reformers seek to increase the mathematical aptitude of today’s students; it is by controlling that which is taught. Furthermore, Foucault (1977) found that the increased domination is normally preceded by the identification of a need. In the case of the common core standards, this need is identified as; a competitive workforce, higher national test scores, and equity. At the time of this study, the schools were at various levels of implementing the new standards. Ms. Merrit’s school had not yet begun to implement the new standards and therefore used the same textbook and standards as before. On the contrary, Ms. Reed and Ms. Green both taught at schools that were working to fully implement the new standards as interpreted by the district. Unfortunately, the interpretation of these new standards was nebulous and, at times, confusing in the curriculum maps, lacking a cohesive sequence (see Ms. Green’s example of parts of an algebraic equation in “Higher-order thinking skills” on p. 132).

While the changing curriculum to meet the standardized tests impacted Ms. Reed and Ms. Green significantly, the variability of the curriculum was a less dramatic factor for Ms. Merrit. Ms. Merrit’s curriculum was dictated by both the standards-based assessments created by; the teachers in the department with the support of the vice-principal; the topics as outlined by their textbook; and by the state tests. As mentioned in Ms. Merrit’s “Assessments” section (p. 151), she departed from the content of quadratic equations as outlined by the standards-based assessments in order to review proportions
for the state test. Thus, the curriculum was changed in Ms. Merrit’s classroom to meet the needs of the state tests as well.

As districts transition to the next phase of reform in national standards, it is important to recognize some of the problems that have arisen for these teachers trying to follow the changing demands. The need for teacher support in implementing these standards has leading organizations offering workshops nationwide. Unfortunately, like Ms. Reed and Ms. Green, I fear that many teachers will be implementing the new standards without the full understanding of how the concepts work together and as the transition takes place, that students will experience gaps in their understanding. As a result, without examples or a textbook; Ms. Green and Ms. Reed were left to interpret the standards to the best of their ability as they followed the curriculum map. As Ms. Reed pointed out, this hurt her ability to teach, for she was unsure about the standards’ depth or direction. For example, an algebraic concept such as “slope” without context or scope is difficult to teach. “Slope” can be interpreted or calculated, and it can be used in a basic mathematical problem, or in calculus. Consequently, it can be difficult for teachers to determine the depth in which a concept should be taught. Ms. Reed agreed with this point when she explained,

I felt that it took a little time for me to think it through to make sure I understand exactly what it was stating. I feel that if you didn't have a strong math background or experience teaching, some experience to fall back on, it was would be very difficult to understand. (see p. 84 in the last chapter)

Without the necessary information it is very difficult for teachers to teach a curriculum that lists and groups a set of standards. An additional problem that Ms. Reed and Ms. Green both noticed using this curriculum is that it often became difficult to tie different
standards together or make them relevant. Recall the lesson by Ms. Green involving the parts of an algebraic expression (see “Higher-order thinking skills” on p. 132). She engaged her students in learning the vocabulary of the different parts of the expression; unfortunately, this concept did not appear on the map in conjunction with working on algebraic expressions. Therefore, this concept was given in isolation, making it less meaningful. Finally, the high stakes of the district assessments coupled with a strong administrative oversight, made it difficult for Ms. Reed and Ms. Green to pace the lessons according to student learning. If ten concepts were prescribed for the month of November, then those ten concepts were required to be taught regardless of the ability of the students to learn and retain the information in that time. Conversely, as identified by Ms. Green’s students, sometimes the curriculum map dictated an unnecessary amount of time on a topic, making it boring and frustrating.

The new standards make for exciting and scary times for teachers. It is important that district and school leaders recognize the need to support these teachers through professional development and resources to better implement and understand the standards. It is also important to consider the faith in teachers that is necessary when teaching the curriculum. The desire for frequent standardized assessments in hopes of guaranteeing that a student in the same subject will not receive a higher-level curriculum than a student with a different teacher is noble. In addition, I am optimistic about the possibility of smoother transitions for students who change schools, as there will be greater consistency between states. However, I offer a warning of how this standardization can undermine the professionalism of a teacher who may need to slow down or speed up in some places for his or her students. The student learning needs to
become more important than the schedule. While the curriculum has become more prescriptive, some may argue that the pedagogy is the freedom teachers still hold.

**Pedagogical discipline.**

As Eisner (1998) explains, this dimension has been studied immensely in search of the ideal or “best” way of teaching. As I will outline in the next section, “Diverse Teacher Effectiveness,” teachers can be effective in different ways. Furthermore, although testing dictates so many aspects of schooling, in the next section I will show that these teachers were able to use some methods that best suited their strengths and the perceived needs of their students. In this section; however, I will show that even pedagogy can be greatly influenced by standardized testing. While all three teachers emphasized to their students the need to learn the material, I also observed various ways that they altered the way that they were teaching a concept to re-enforce test taking skills.

Ms. Merrit devoted several class periods to preparing for the state tests. As I will elaborate more in this chapter under “Intellectually Connected,” the fact that she diverged from the topic of quadratic equations to review a more basic, albeit highly tested, concept of proportions greatly diminished student engagement. In addition, she coached them on making educated guesses for problems that were too difficult, as well as persisting in their efforts at solving problems (see “Assessments” under Ms. Merrit on p. 151). Ms. Reed on the contrary, imbedded the preparation into daily lessons. The class would have multiple choice practice problems and discuss ways to narrow down the answer along with discussions about the topics that might appear on the district assessments (see “Specific Problem Solving” on p. 98). Ms. Green and Ms. Reed encouraged their students to identify which answers were reasonable by putting several student answers on the
board and asking students to vote on the most reasonable or accurate answer.

Furthermore, both of these teachers lamented having to spend too much time reviewing for some district assessments, while having to rush through other topics for the next assessment. None of these actions by these teachers were directly focused on teaching students the mathematical topics. While additional pedagogical strategies will be illuminated in the following sections, it is important to realize the energy that teachers and students expend towards increasing test scores. These “test taking strategies” of targeting the most tested topics, making educated guesses, or returning to more difficult questions for time management may align with the school’s intention to increase test scores; however, it is at the detriment of the teacher’s intention of learning and enjoying mathematics. I would surmise that it also undermines the teacher’s expertise in teaching mathematics, as these skills can be taught by anyone. Unfortunately, teaching to the test becomes necessary when a student’s test scores are incorporated with a teacher’s evaluation. As has been seen throughout the ecology of schooling framework, the effort seems to be moving towards the regulation of every aspect of teaching. Foucault (1977) argues that through the regulation of even the smallest detail, “The meticulousness of the regulations, the fussiness of the inspections, the supervision of the smallest fragment of life and the body will soon provide, in the context of the school, the barracks, …a laicized content…” (p. 140). Thus removing the power of the educated, experienced teacher to bring the beauty and complexity of mathematics to the classroom when the practicing of test taking tricks become more important. I will describe more ways that teachers are disenfranchised in the following two dimensions, evaluative and administrative. I will show that by the very nature of describing an “effective teacher” in
a low-performing school, the process of standardization is disempowering and discouraging the teacher.

**Evaluative discipline.**

The evaluation of students is pervasive in the lives of these three teachers; it strongly influences the school structure and the curriculum. As evidenced by the state test scores from each of the schools in this study, these are low-achieving students. The cause of low-achievement has been attributed to many factors outside of school, including social, emotional, and economic, to name a few (Duncan & Murnane, 2011). Reformers, on the contrary, put the responsibility on teachers for low-test scores; furthermore, the influence that these tests have on teaching and learning in the name of reform is remarkable (Rose, 2011). Noddings (2010) gives a Lewis Carroll style story depicting the ridiculous use of tests to dictate everything, while nothing really seems to make sense, relating a math teacher in today’s schools to Alice in Wonderland. In each of the schools in this study, teachers were observed teaching the curriculum or giving assessments that did not really seem to make sense as well. In each classroom three levels of testing occurred with a purpose that ripples out from a student or classroom level, to a district level, and then to a state level. As the assessments went from small and teacher written to longer and written by those further from the school, it began to lose sense and purpose. Each of these teachers had a specific aim for classroom assessments giving them a micro view of student learning as it aligned to teaching. Unfortunately, beyond that, they had absolutely no control over district and state tests that gave a macro assessment of learning in comparison to their peers.
Assessments in all three classrooms were used as a way for students to track their understanding of particular topics in the curriculum. Ms. Reed had students chart their individual scores and evaluate their strengths and areas in need of improvement. In addition, she had charts on the wall that showed the achievements of each class on different classroom assessments. Ms. Green and Ms. Merrit used classroom assessments in a more targeted way with more specific topics assessed each time. Students in these classes were told that in mastering these topics they should receive at least an 80% or 70% respectively on each assessment and they were given the opportunity to retake each assessment. Within the prescribed curriculum, these teachers worked with their peers to develop assessments that were fair and worthwhile. They are the subject specialists, and we can assume that these assessments were somewhat reliable in their measurement.

On the contrary, district assessments were written by outsiders. We can assume that these tests were written by subject specialists and we can hope they have experience teaching the subject in a classroom. Unfortunately, all three of these teachers noticed errors with the concepts aligning with the curriculum and questions aligning with the answer choices. Additionally, they expressed concerns around the overabundance of some topics and the absence of others. Tyler (1949) describes assessment as “…essentially the process of determining to what extent the educational objectives are actually being realized by the program of curriculum and instruction” (p. 106). Indeed the scores from these tests were used to determine the teachers’ effectiveness in teaching the students the curriculum mandated; unfortunately, the problems and concerns voiced by these teachers invalidated its use.
The state-level tests are more valid as an instrument, having been piloted and vetted by many experts. However, the fact that they are given by grade level rather than subject level deem them less reliable as a measurement of what students have learned for the year. With students required to take the same test according to grade rather than class content, teachers were forced to teach content that was either above or below the level of the student. In Ms. Green’s class all ninth graders were required to take the same class, which made it difficult for some students while too easy for others. In addition, in order to review proportions, Ms. Merrit deviated from a tenth grade topic, quadratic equations, making many of the students miserable (see “Assessments” p. 151).

Neither the district nor the state assessments provided the teachers or students with an understanding of the growth that had occurred in that school year while they could still make a difference with their students. Instead, they compared schools, teachers, and students using these scores that purport to give a grade for learning and teaching for a given time period. It is interesting that these tests intend to evaluate the students and teachers without an understanding of where they began. “One is not able to evaluate an instructional program by testing students only at the end of the program. Without knowing where the students were at the beginning, it is not possible to tell how far changes have taken place” (Tyler, p. 106). Furthermore, “Test score gains are not accurate measures of teachers’ quality, even adjusted for other variables or factors” (Darling-Hammond, 2011, p. 54). Unfortunately, the students in this study only knew that they are low achievers and that they have been most of their lives. As Foucault (1977) warns, these standardized tests enable us to classify, rank, and punish both the students and the teachers. Therefore, “In it are combined the ceremony of power and the
form of the experiment, the deployment of force and the establishment of truth” (Foucault, 1977, p. 184). Many of these students may have grown substantially in their knowledge, but all that they saw in the newspapers was that their school was low achieving. Ms. Reed, Ms. Merrit, and Ms. Green all told their students, “I know that you are going to do great!” In their minds they did not really know what was going to be on that district or state assessment and they could only hope that they had prepared their students adequately. “With the advent of No Child Left Behind, a feeling of a ‘lack of success’ with students has become much more public and, in some circles, defined in terms of test results” (Santoro & Morehouse, 2011, p. 2674). This feeling of inadequacy can be either compounded or softened by the school administration.

**School administration discipline.**

Uhrmacher (2008) added school administration to Eisner’s dimensions of teaching. The influence that this dimension has on the ecology of schooling has become increasingly important in light of current reforms focused on teacher effectiveness and, in turn, teacher evaluation. In recent decades, the responsibility for student achievement has been placed on the teachers and the administrators. The pressure has become so great, that they are at risk of losing their jobs if their school is consistently underperforming (Sergiovanni & Starratt, 2007). As I outlined in the previous sections, the use of standardized test scores as a measurement of student learning is pervasive in the schools I observed in; therefore, principals are becoming more involved in working to improve teacher effectiveness. As seen from the experiences of the teachers in this study, the intentions of the school are to increase test scores. To ensure this end, the principals in this study were very active in these teacher’s classrooms, particularly as instructional
evaluators. The teachers in this study all received varying levels of support and oversight from their administrators in the name of student achievement.

Ms. Merrit enjoyed the most autonomy in her teaching and of the three teachers; she reported feeling the most supported by her principal. While her curriculum was designed within the department, the topics for algebra in which the teachers were to teach and assess were identified under the watchful eye of the vice-principal. The curriculum was originally created by teachers within the department with the recommendation and monitoring of the administration. Additionally, Ms. Merrit was free to teach the topics in the manner that she felt was most effective. The time and structure of the district assessments were mandated by the school administration; however, they did not seem to have any bearing on Ms. Merrit’s evaluation and did not affect her pay in any way.

Finally, Ms. Merrit’s expectations for classroom behavior required the support of the administration. As outlined in the section “High and explicit expectations” (found on p. 157), the process of curbing bad behavior in her classroom culminated with a referral to the principal. If the principal did not support her in this process, it would have failed. The students would have learned quickly that without consequences, the discipline is meaningless, and the behavior would have persisted.

Ms. Reed and Ms. Green had many similar administrative experiences to each other, being in the same district. They taught in a standardized environment as described by Wills and Sanholtz (2009). Their curriculum was handed to them at the beginning of the year in the form of a curriculum map written by the district central administration. How they taught this curriculum, without the guide of a textbook, was left largely to the teachers working together in their schools. As outlined in the descriptions of both
teachers, the lessons, activities, and homework were created entirely by the teachers at those schools. The degree to which they interpreted the curriculum map and thus taught their students was assessed on district assessments also created by the central administration. The students’ district and state test scores would then be factored into the teacher’s summative evaluation, thus creating a large amount of pressure on the teacher to teach to the test.

In a recent study regarding teacher evaluation and fear, Conley and Glasman (2009) found that one of the greatest causes of teachers’ fear is being evaluated regarding something over which they have no control. Both Ms. Reed and Ms. Green lacked control over what was being taught, the pace at which it should be taught, and a significant portion of how students would be assessed. This feature is reflected in the literature:

Teachers in low-income schools were nearly three times more likely to report insufficient academic freedom than their peers in high-income schools. Teachers in low-income schools also reported being explicitly required to prepare students for testing and that their efforts were monitored (43 percent versus 18 percent of teachers from high-income schools). (Johnson, Kardos, Kauffman, Liu, & Donaldson, 2004, p. 61)

Teachers were told that they had complete freedom over how to teach the curriculum; however, close appraisal of the forms used to evaluate Ms. Reed and Ms. Green draw this into question. The multiple spot observations and two summative evaluation forms used by both Ms. Reed’s and Ms. Green’s school administrators emphasized certain aspects of how every lesson should be taught, limiting the freedom of the teachers. Neither of these teachers scored at the highest level on these check sheets although they were recommended by both their administrators and their peers as highly effective teachers. In research conducted by Conley and Glasman, (2008) these practices seem to be generating
a feeling of fear in schools; “In environments compromised by fear, administrators might restrict information in teacher evaluation by generating evaluation criteria that are overly simplistic, such as those that can be measured on simple behavioral checklists” (p. 72). Foucault (1977) refers to this as a panoptic schema in which the administrators impose the set of behaviors that they are looking for and are constantly monitoring that the teachers are doing as they are told. While the administrators hold the power, they do it in the name of furthering the student’s education, thus making it more acceptable and powerful. These checklists and the exercise of power may have had some impact on why neither of these recognized master teachers, returned to their school the following year.

“Teachers in disadvantaged schools give much lower ratings to administrative support and encouragement, enforcement of school rules, and their general assessment of how the school is run” (Grissom, 2011, p. 2568). Ms. Green could attest to the lack of administrative support the most. With the dozens of administrators that walked through her room in a matter of months, she was rarely told that she was doing a good job. She discussed the lack of support that she felt when working with Damion in her class within the section “Student Behavior” (see p. 143). Unlike Ms. Merrit, Ms. Green could not depend on a referral to the principal to help with student behavior.

In the state of Colorado, Senate Bill 191 was passed in 2010 and is expected to be fully implemented by 2014 (information can be found at http://www.cde.state.co.us/EducatorEffectiveness/index.asp). The goal of this bill is to evaluate teacher and principal effectiveness using student assessments as 50% of the evaluation. The other 50% of a teacher’s evaluation will be based on a teacher’s: mastery of content, learning environment, facilitation of learning, reflection on practice, and
demonstration of leadership (Colorado Department of Education). These qualities will be ranked as: “highly effective, effective, partially effective, or ineffective” (Colorado Department of Education). Unfortunately, the schools where these teachers worked were low achieving. This did not just happen in the year that these teachers were working. These students did not come to their classes at high, or even, medium achievement levels. Regardless of their teacher effectiveness rating, 50% of their evaluation will be negatively influenced by their location of employment.

Wills and Sanholtz (2009) describe the impact that this era of accountability is having on the relationship between teachers and school administrators:

In response to state-level test-based accountability and the federal No Child Left Behind Act of 2001, school administrators increasingly view centralized curriculum and prescribed instructional strategies as the most direct means of increasing student performance. This movement toward standardization reduces teachers’ autonomy and control over their classroom practices. The consequences of test-based accountability on teacher practice are often conceptualized as a tension between teacher professionalism and standardization. High-stakes standardized testing is seen as moving public education away from teacher professionalism and toward the adoption of standardized practices that undermine or eliminate teacher authority over curriculum development and instructional decisions. (p. 50)

Ms. Green and Ms. Reed both worked in schools where the school administration completely dictated the curriculum and influenced their instructional decisions. The demands placed on these teachers, with little observable control, leave them powerless and disenfranchised. Furthermore, I am confused by the fact that the administrators recommended Ms. Green and Ms. Reed to my study and yet did not seem to convey the same belief in their abilities when evaluating them. Given the experiences of the teachers in this study and the manner in which the school administration mandated and scrutinized
their practices in the name of higher test scores, I fear that no good teacher will want to work in a low-achieving school.

**The discipline of school reform.**

At the dawning of No Child Left Behind, the call for highly qualified teachers in every classroom was heard throughout the nation. Policy makers realized that teachers have the greatest impact on student learning and therefore, mandated that every teacher have a college degree, a teaching certificate, and aptitude in their subject area (Berry, Hoke, & Hirsch, 2004). In addition to realizing the importance of the teacher and their competencies, it became public that many of the teachers lacked a background in the subject area that they were teaching (Darling-Hammond, 1994). A decade later, the focus is shifting from the quality of the teacher to the effectiveness (Stumbo & McWalters, 2010/2011). Furthermore, policies are currently recommending the use of “value-added models that purport to estimate a teacher’s contribution to student test-score growth” (Papay, 2012). All of these policies are made in the pursuit of an equitable education system. Each of these policies was made as a result of the disproportionate number of good teachers being in the highest achieving schools. My finding, in this study, was that the current reform movement is, in fact, exacerbating these inequities.

Throughout this ecology of schooling framework, the standardized tests were the focus of the school. These teachers were recognized by their principals and colleagues as effective and good educators, yet they were treated with distrust and doubt in their abilities. Smith (2011) of the National Urban League discusses that,
…many reformers spend a great deal of time and energy on “teacher effectiveness,” but have limited definitions of effectiveness that exclude all indicators and measures of effectiveness save those that are directly tied to standardized test scores and formal credentialing. (p. 49)

Foucault (1977) describes the process of control and intervention as differentiation, correction, punishment, and elimination. The teachers that I observed in this study were shown the correction through the spot observations and check sheets that they received, and the emotional punishment and threat of elimination were well known. Unfortunately, the process lacked a differentiation. Why were these teachers recommend by their administrators treated the same as a first year teacher? Given a curriculum that they could not deviate from and a strong oversight of their pedagogy does not show the same faith in their abilities.

The impact of high stakes testing on teacher morale is worrisome. Santoro and Morehouse (2011) give powerful stories in their study of experienced teachers leaving high-poverty schools, for moral and ethical reasons. This study provides more support for their hypothesis that “the No Child Left Behind Act was primarily responsible for experienced and committed teachers leaving high-poverty schools” (p. 2699). As Foucault (1977) describes the history of accountability and political control he points out,

The classical age did not initiate it: rather it accelerated it, changed its scale, gave it precise instruments, and perhaps found some echoes for it in the calculation of the infinitely small or in the description of the most detailed characteristics of the natural beings. (p. 139)

Similarly, I would not say that No Child Left Behind started this reform movement; however, I do believe that it accelerated it and I fear for the calculations and descriptions that the common core may bring.
Using the ecology of schooling framework – provides a depressing view of the implications of standardized testing.

Even with the laudable university reform efforts to provide authentic content, assignments, and assessment in meaningful partnerships with local school districts, the transformational leadership that enhances a school's collective ability is not addressed. Still absent in these reform efforts is a clear understanding of what constitutes the complex problems of recruiting and retaining teachers in challenging schools. Unfortunately, principals that are able to build the capacity of teachers and improve student performance in the most disadvantaged schools are the exception not the rule. This implies that the leadership needed is not typically understood by universities or school districts. (Greenlee & Brown, 2009)

I would suggest that the ecology of these three schools, as described through the observations and interviews of three recognized effective teachers, provides a clear understanding of some of the problems of recruiting and retaining teachers in challenging schools. It is not just the challenge of teaching the students; it is also that of meeting all the demands of the administration.

In answering the question about what teachers are doing to implement the curriculum and influence student learning, based on these dimensions, it is easy to surmise that they are merely doing as they are told or as required by district, state, and national mandates. It is true that in many ways the creative gifts that these teachers have for teaching have been limited by the policies and procedures in their schools; however, by evaluating the work of these teachers through classroom management, engagement, culturally relevant pedagogy, and care, their gifts can be realized. Within the environment of oppressive, test-centered schools these teachers followed their intentions to teach disadvantaged children and improve their opportunities in life. In the following section, I will describe how these teachers’ style of teaching was as diverse as their students.

**Differentiated Teacher Effectiveness**
The desire for a ‘magic bullet’ or several bullet points that describe successful mathematical teaching practices has been the focus of many researchers and millions of dollars. As I attended over 10 hours of an algebra class taught by each of the three different teachers in three different schools for a total of almost 40 hours of observations, it became increasingly clear that large variations existed in their methodologies. The three teachers were recommended by administrators and colleagues in each of the schools as effective teachers. Furthermore, these were all teachers who would be considered highly qualified to teach algebra, having the necessary college mathematics prerequisites and teaching experience ranging from four to twenty-five years. While many of their specific practices were similar, as I will show below, the curriculum and pedagogy in each of these classrooms were vastly different.

As I discussed in the literature review, the pedagogy of teaching in a traditional versus reformist manner remains contentious and dichotomous in the literature (Kilpatrick, 2009; Schoenfeld, 2004). The three teachers in this study can be found at very different locations along this continuum between a traditional and a reformist methodology. Ms. Merrit would be found closest to the traditional aspects of pedagogy with the teacher as the focus of the classroom and the supplier of information (Schoenfeld, 2004). Ms. Green would lie closer to the other end of the spectrum offering more opportunities for students to generate their own knowledge and work in groups to complete mathematical tasks (Schoenfeld, 2004). Ms. Reed balances the two pedagogies by equalizing time in the classroom as the supplier of knowledge and having students work in groups to complete mathematical tasks. While the contention that one is superior to another still exists in the literature (Kilpatrick, 2009; Schoenfeld, 2004), I did not find
one practice to be any better than another. Eisner (1998) compares teaching to the arts, saying that, “If we take a leaf from the arts and apply what we can learn from them to the study of teaching, we would expect excellence in teaching, as in art to be of many kinds. That is, we would expect to find different kinds of excellence rooted in different genres of teaching” (p. 78). Each of these teachers proved masterful at their own art of teaching.

Ms. Merrit has been teaching for over twenty years. She has taught both math and science, always in the same school. She left another career with a desire to work with disadvantaged students, and truly loves “her kids.” She teaches in a traditional manner by supplying the necessary information to complete the given problems. She expects students to work hard and practice multiple problems in order to master a concept. The emphasis in her class is placed on the algorithm. According to the Merriam-Webster (2012) dictionary, an algorithm is “a procedure for solving a mathematical problem [or] a step-by-step procedure for solving a problem.” Students in Ms. Merrit’s class are given the algorithm up front and shown examples of the process used in solving a problem. Finally, multiple examples are provided to the students so that they can practice the procedure individually. While her students did not apply the algorithms to real-world problems, they did cover more complex algorithms than Ms. Reed and Ms. Green’s classes.

Ms. Reed is a fourth year teacher who teaches with an efficient and kind manner through consistent routines. She balances the traditional aspects of teaching mathematics with reform-oriented practices. The traditional style of teaching dominates the beginning of her class with the presentation of new material by Ms. Reed that students copy into their notes for future reference. During this portion of the class, students are receiving
new knowledge through examples and practicing it with additional examples. For the
second half of the class, the classroom takes on a reform-oriented atmosphere with
students working together on tasks, relying on each other for information to complete the
tasks. While Ms. Reed provides algorithms and encourages her students to use certain
procedures when solving problems, she also provides concept-based tasks that require her
students to work collaboratively in solving real-world tasks.

Ms. Green is a fourth year teacher with a passion for teaching and math. Her
desire to teach challenging students is driven by her dreams for their success. Her
teaching style is almost entirely reform-oriented, posing open-ended questions to the
students with the hopes that they will work together to form the necessary solutions. This
requires students to create their own processes for solving problems at times. The
problems that she poses to her students, such as the graph of student learning dependent
on proximity to the teacher’s desk (see p. 133), often have more than one possible
answer, requiring students to reason through their understanding of the mathematics.

The current reform movement supported by the Common Core standards is to
promote discourse and provide complex, meaningful problems (Christinson, Wiggs,
Lassiter, & Cook, 2012). “Educators have fought over the best way to teach numbers to
kids. Advocates of traditional math tout the practice of algorithms and teacher-centered
learning, whereas reform-math proponents focus on underlying concepts and student
inquiry” (Baker, 2010, p. 2). These teachers show that either approach or a combination
of the two can be effective when they support the teacher’s intentions for everyone to
learn. They were notably described as successful teachers by both administrators and
their colleagues. While none of the teachers spoke of a predilection to one form of
teaching versus another; their favored approach merely seemed to work better for their classroom expectations and perhaps their dispositions.

Classroom expectations for behavior had a greater impact on each teacher’s practices than their philosophy of learning. Ms. Merrit chose to have students work individually, providing classroom instruction and practice in a controlled and supportive manner because of her belief that her students could not handle an open atmosphere. She explained that her older students were more capable of staying on-task and working in groups on mathematical reasoning (see p. 159). Ms. Reed explained that her preference had been for a traditional classroom, worrying about off-task behavior; however, the new curriculum required more inquiry and group work and therefore she incorporated reform practices more often. She believed that the conceptual tasks increased student engagement with students working together. Finally, Ms. Green preferred an open or reform-oriented classroom with thoughtful dialogue and students working to help each other master new material. Given descriptions of her fifth period class (see “Support and Encouragement” on p. 137), it is possible that Ms. Merrit was correct and that a more traditional pedagogy would have benefitted that class, whereas Ms. Green’s 6th period class flourished from the challenge and the dialogue.

Schoenfeld (2004) outlines the history of the “math wars” suggesting that there are merits to both sides and that it is not necessary to choose one extreme over another. While Ms. Merrit and Ms. Green showed preference to the traditional or reform spectrum of teaching respectively, I cannot know from my limited observations that they did not incorporate the other side’s ideals occasionally. Indeed, Ms. Green was observed having her students solve computational problems and Ms. Merrit was observed talking to her
students about the parabola representing the trajectory of a missile. Ultimately; however, the nature of the classroom for each of these teachers was as different as the students that they taught. My fear is that as “effective teaching” becomes more narrowly defined, the art of teaching that fits the style and personality of the teacher and their students will be lost. In answering each of the sub-questions in the following sections, I will show how these teachers, amid the high stakes and within their preferred teaching style, brought light to the lives of their students and a joy to learning algebra.

**Sub-Question a: Classroom Management and Student Behavior**

As discussed in the literature review, behavioral problems caused by environmental, developmental, and sociological issues are a common hindrance to learning in low-income schools. Gregory, Cornell, and Fan (2011) found behavior to be a particular concern for ninth graders, discovering that this age group contributes to almost half of the discipline issues in their study. Duncan and Magnuson (2011) “…found that high-poverty classrooms have four times the concentrations of academic, attention, and behavior problems as low-poverty classrooms” (p. 65). The higher concentration of behavior problems in ninth grade high-poverty classrooms makes classroom management a dominant factor in a student’s learning in the classrooms observed in this study. Creating a need for evidence of strategies that teachers can use in their classrooms was the focus in this study; however, I discovered that students should be the focus. In this study, I found that students can contribute to and detract from the learning of algebra through peer-relations and peer influence.

The literature regarding classroom management focuses on the need to establish a classroom environment that supports learning, rather than the teachers establishing
themselves as the disciplinarian (Brophy, 2010). Through clear and consistent goals and routines for classroom behavior, all three of these teachers promoted an environment conducive to learning. Through observing three different teachers with differing teaching styles and one of these teachers with two different classes of students, I noticed that more than clear and consistent goals and routines are necessary for an environment that promotes learning. In this study, the interactions of the students in the classroom as a community provided intriguing aspects of classroom management and student behavior.

Dewey (1916) refers to the community as a society that has similar “aims, beliefs, aspirations, knowledge – a common understanding” (p. 4). As shown in the last chapter, Ms. Reed helps create a classroom community whose aims and beliefs are to learn algebra in order to help them reach their aspirations. As found in the section, “We are in this together” (see p. 96), Ms. Reed does not allow anyone to go off task. She stops class when a student is not participating or following directions. At times, just a look in their direction or a tap on their desk will redirect the student, and at other times the students redirect their peers. In the section “Respect for others” (see p. 106), Ms. Reed explains that she teaches her students that when she needs to stop class for one person, it hurts everyone in the room. She has students apologize to each other for talking when someone else is talking or interrupting. This would not be possible if the students did not recognize the value in learning. I would surmise that to stop the class for a disruptive student would only work if the majority of the students or the disruptive student realized the importance of learning the material. Recall Ms. Reed questioning the student, “Do you want to learn or do you want to go in the hall?” (see p. 103). The question of whether a student wants to learn is at the foundation of Ms. Reed’s disciplinary techniques.
A recent quantitative study supports other similar studies that link peer relations to student classroom motivation (Nelson & DeBacker, 2008). Nelson and DeBacker call for assessing specific features of peer relationships and interactions for future studies. The descriptions and interpretations of the three classrooms regarding peer interactions and motivations are intended to meet that call. As noted in the aforementioned study, peer relations can influence student motivation both negatively and positively; I will draw on my observations from all three classrooms to depict these occurrences.

In Ms. Merrit’s classroom, I described a strict disciplinarian with a clear message about what constitutes poor behavior and the consequences that ultimately lead to a referral to the principal. More interesting, however, is the influence that students have on classroom behavior. Recall the time that the teacher left the room to retrieve a marker (see “Checking their pulse” on p. 162). Only about half of the students began working as Ms. Merrit had instructed, while the other half looked around the room to gauge their peers’ responses. After realizing that their peers would do as they were told, the hesitant half began working as well. As Dewey (1916) suggests, “The communication which insures participation in a common understanding is one which secures similar emotional and intellectual dispositions” (p. 4). Similar to Ms. Reed’s room, the class had a community conveying the importance of doing the work as they were told.

The community established by Ms. Reed was articulated previously and to further this evaluation, I would like to underscore the influence that classmates in her room had on behavior. Students were observed slapping the desk of a neighbor who was not paying attention and admonishing each other for failure to follow directions. On one day, a student said to another, “You are like a baby; listen to directions” (see p. 93). If such
ridicule is supported by the community of the classroom Ms. Reed’s students will certainly be more motivated to follow directions.

Unfortunately for Ms. Green, the fifth period classroom community was less motivated to learn. Recall Damion who distracted students around him by banging on their desks or poking them on the arm (see “Support and encouragement” on p. 137). He also called to a passing student in the hallway and then started pointing his clicker at students saying, “pause.” These behaviors all occurred within ten minutes of each other and yet not one student rebuked him for this rude and distracting behavior. Alternatively, in the following five minutes, as students were trying to work on the assignment, he began singing and other students chimed in. Damion influenced his peers in being motivated negatively in the classroom. To further Dewey’s philosophy, Damion and his peers need to be taught the importance of schooling and learning-related behavior, as they are “…not only unaware of, but quite indifferent to, the aims and habits of the social group [and they] have to be rendered cognizant of them and actively interested.

Education, and education alone, spans the gap.” Learning-related behaviors have a profound effect on a student’s achievement (Farkas, 2011; Duncan & Manguson, 2011). According to the Farkas, these learning-related behaviors include but are not limited to: the ability to follow rules, class-participation, effort, organization, disruptiveness, and sociability.

The need to establish a classroom community supportive of student learning is particularly important in 9th grade low-SES schools. As Dewey (1916) suggests, education is the key. This need would support the quest of reformers for increased student achievement, by decreasing the number of disruptions from the content.
Therefore, in order to increase behavior for the benefit of achievement, teachers need the full support of the administration to ensure student preparation for learning. I do not believe that even with the support of the principal, teachers can ensure the learning of every student if they have 25 students, 10 of whom lack essential classroom behavioral skills. In other words, too many students like Damion in one room without a strong group of students opposing the negative behavior decrease all students’ chances of learning. In order for a teacher to be effective in teaching, both the content and the learning-related behaviors necessary, the proportion of students needing extra behavioral support to those who are prepared needs to remain relatively low. I feel that increasing the teaching of learning-related behaviors and decreasing the number of students who lack these skills in one classroom is better than removing disruptive students completely. I fear for the social implications on our society if we choose to eliminate the students who lack school-related behavior skills.

As outlined in the literature review, Gregory et al. (2010) concentrate primarily on the impact that frequent disciplinary actions of sending a student out of the classroom have on his or her academic opportunities. I too am concerned for the learning of disruptive individuals, and like Ms. Green, do not wish for them to be suspended or expelled. However, after observing students such as Damion in Ms. Green’s class, Jeremy in Ms. Merrit’s class, and Jack in Ms. Reed’s class, I am increasingly concerned for the learning of these students’ classmates. Unfortunately, these three students are probably not the only ones to cause disruptions in these schools and like other students’, Damion’s problems were not limited to one class. The impact of multiple disruptions in multiple classes on the learning of the entire school is a violation of students’ rights to
learn free from frequent distractions. According to Farkas (2011), 27% of children with low learning behaviors were in high-poverty schools (more than 50% of the students receiving free and reduced lunch) whereas only 17% of these students were in high-SES schools. Therefore, teachers and students need to be supported in high-poverty schools, in particular, to ensure that students remain in class and do not disrupt the learning of their peers. Duncan and Magnuson (2011) explained, “…we noted, but were unable to test for, how one child’s achievement or behavior problems might prove detrimental to the learning of his or her classmates” (p. 65). The high concentration of disruptive students in Ms. Green’s fifth period class was indeed detrimental to their classmates (see section titled “Student behavior” on p. 143). “The primary ideal of education criticism is that it should contribute to the enhancement of the educational process and through it to the educational enhancement of students” (Eisner, 1998, p. 114). I would, therefore, suggest that teachers be supported in building classroom communities that support learning-related behaviors by providing the tools necessary to do so and the combination of students conducive to this end.

**Sub-Question b: Engagement Strategies**

As I outlined in the literature review, student engagement can be fostered through the use of connections, active engagement, sensory experience, perceptivity, risk taking, imagination, reflection, and social interactions (Uhrmacher, 2009; 2012). I observed daily as students were riveted by the three teachers in this study and by the tasks that they posed to them; however, after analyzing the data using Uhrmacher’s framework for engagement, I found some interesting themes. All three of the teachers in this study incorporated the aforementioned engagement strategies with varying degrees and
contributions to student learning. While it is important for students to learn in an atmosphere free from distractions, it is equally important and perhaps mutually exclusive with student engagement. As already suggested, the purpose of schooling is so much greater than a test score. My hope is that students gain a love (or at least an appreciation) for math.

A ‘feel’ for math.

Connections can be made with students to engage in the mathematical concept through emotions, intellect, communication, or senses (Uhrmacher, 2008). As evidenced in the previous chapter, students can become very emotional about their achievements and struggles in mathematics. Students in all three classrooms cheered when they realized they had solved a problem with the teacher always sharing their joy and cheering them on. Conversely, students were also observed giving up or becoming incensed when they did not understand. The three teachers engaged their students emotionally by attempting to teach resiliency and establishing personal relationships.

Many studies have evaluated the need to instill resiliency in at-risk students (McMillan and Reed, 1994; Edwards, 2000; Krovetz, 1999). However, the often negative feeling towards mathematics can be attributed to countless struggles and failures in the subject (Willis, 2010). Ms. Reed’s student Drae explained, “…if they don’t get it they just quit” (see p. 101). Similarly, Ms. Green’s student, Asiah, explained that when she did poorly, she would either “give up or just write down random answers” (see p. 120). Ms. Merrit experienced similar responses to a difficult warm-up problem. As described in “Assessments” (p. 151), she noticed that when students reached a difficult problem, they just stopped working. They did not proceed to other problems that might be easier to
solve. All three teachers worked with their students to persevere. Ms. Merrit suggested moving on from difficult problems and coming back after completing easier problems; Ms. Green suggested asking a partner for help; and Ms. Reed, like Ms. Green and Ms. Merrit, offered her support when students were struggling in order to help them understand.

At times, students can become upset when they are struggling. Failure can be difficult to experience, and when it has occurred for students in mathematics repeatedly it can be very frustrating. Recall Jaime in Ms. Green’s class who became enraged with a 60% on a quiz and left in the middle of class (see p. 122). Other times, students are afraid of failure. One of Ms. Green’s students described this fear when she asked him why he shuts down when he gets confused and he replied, “I don’t know I just don’t want to crash and burn” (see p. 122). Fear and frustration are two challenges to a student’s resiliency. The three teachers found ways to engage students emotionally in a more positive way through relationships. The literature supports the findings that positive, supportive relationships with teachers have shown an increase in academic resiliency (Nieto, 1999). These stories seek to contribute to this literature.

Ms. Reed, Ms. Green, and Ms. Merrit all talked to students who were struggling individually. They conveyed their desire to help them succeed and asked how they could help. Both Ms. Reed and Ms. Merrit acknowledged that their students would probably describe them as tough; however, they believed that their students understood that it was because they cared. They described some of their more challenging students returning in subsequent years to thank them or just to say, “Hi” as evidence of this fact.
Alternatively, Ms. Green was probably not described as tough by her students, but she did push individuals to work and find success. Asiah showed how much she appreciated Ms. Green’s efforts in finding ways to support her learning when she began participating in class for the first time (see p. 139). Another example of Ms. Green making emotional connections was with the girl to whom she whispered repeatedly, “It can be you” (see p. 139). This student began the lesson doubting her ability to succeed; however, with Ms. Green’s belief in her (and a reward of candy), this student felt what it is like to be successful.

These teachers also capitalized on their students’ emotions when they expressed their disappointment with their lack of effort. As Ms. Reed explained, “I tell them when they are disappointing me” (see p. 100). Her students did not seem to want to disappoint her, as this would often change their behavior. Similarly, Ms. Green announced one day, “I am sad because my other class did this problem” and immediately, students began raising their hands and working on the problems (see p. 138).

Students are frequently unable to become connected to the abstract concepts of algebra intellectually; therefore it is important to establish positive emotional connections. As shown in this study, because students can become fearful or frustrated with learning these difficult mathematical topics it is important to teach resiliency. My findings suggest that often the best way for a student to make emotional connections to a subject is through a relationship with their teacher.

**Mathematical discussions.**

Communicative connections involve having the students explain their reasoning. As Smith and Stein (2011) explain,
It is unrealistic to expect students to learn to grapple with the unstructured, messy challenges of today’s world if they are forced to sit silently in rows, complete basic skills worksheets, and engage in teacher-led “discussions” that consist of literal, fact-based questions and answers. (p. 1)

Ms. Green felt that the increased focus on standardized testing hindered this process at times, as it requires multiple-choice answers rather than explaining their reasoning.

As discussed in the previous chapter, Ms. Green placed importance on students working together. The section, “Cooperative learning and activities” (p. 124) outlines the various ways that students explained their reasoning and helped their peers to better understand. Additionally, she used open-ended problems, such as, interpreting a graph (see p. 133) to promote discussions and reasoning skills. Another way that both Ms. Green and Ms. Reed encouraged students to have meaningful conversations about math was to provide multiple answers and have students identify which answer was most reasonable for the question. They were both careful not to divulge the correct answers too soon. In addition, Ms. Reed was observed walking by a student’s desk and pointing out to their neighbor that their answers differed, asking, “Who is right?” (see p. 92). On the contrary, while Ms. Merrit had students explain their process of solving an equation, it rarely involved “sense-making.”

In order to understand a concept a student needs to be able to explain it. With the adoption of the new standards for mathematical process, an emphasis is made for students to “construct viable arguments and critique the reasoning of others” (Christinson, Wiggs, Lassiter, & Cook, 2012, p. 54). Furthermore, some learners may be able to connect with a mathematical topic if they are able to discuss with their peers its different aspects. For example, Ms. Reed’s students who debated whose answer was correct were engaged by
the friendly debate. In addition, Ms. Green’s students enjoyed evaluating their peers’ conjectures and debating their merits. Communication will soon be mandated by the national standards, yet it will be interesting to see if teachers interpret this as the explaining of a process as shown by Ms. Merrit, or by an explanation of reasoning as portrayed by Ms. Reed and Ms. Green. This type of engagement can happen for all ability levels even though the intellectual connection for students may vary.

**Intellectually connected.**

Intellectual connections are possible for students of all abilities; however, it is important that students are placed appropriately in classes and given the proper supports. Creating ways for intellectually engaging a group of students placed in a calculus class when some have a 6th grade math background while others the necessary prerequisite skills for the course is particularly difficult. Ms. Green expressed concerns over some of her students’ background skills, and the challenges that she faced with intellectual engagement were different from the ones in the other two classes. The examples that I will provide from the three teachers in this study, however, show the symbiosis of challenge and support necessary for student intellectual engagement (Schussler, 2009).

Ms. Green and Ms. Merrit both had students identify their enjoyment in the difficulty of certain aspects of this course. One of Ms. Green’s students explained that when she struggles she wants support. This delicate balance of challenge and support can be difficult in classrooms with varying abilities and background knowledge. This difficulty was portrayed wonderfully in Ms. Green’s class when students were playing a game of Connect 4 linked to math problems (see “Higher-order thinking skills” on p. 132). As the game began, students were working hard in teams to get the correct answer...
to each problem. After a few minutes, however, the students began losing interest, saying the problems were too easy. Ms. Green increased the difficulty of the problems two fold and the students became engaged in the game again. Unfortunately, the problems proved too difficult and everyone got them wrong; hence, after several tries, the class’ engagement was lost again.

Similarly, Ms. Merrit occasionally gave a more difficult problem to the class, encouraging everyone to try to the best of their abilities (see p. 163). After allowing students to struggle for some time and circulating around the room providing support, she revealed the steps used to solve the problem. She closed these difficult problems with congratulations for the few who were correct and then provided easier problems that were more accessible to everyone. Notably, the only time that I observed Ms. Merrit’s students frustrated by the classwork was when they deviated from the regular rigorous lessons regarding quadratics to review for the state test, practicing proportions (a more elementary concept). In the words of one of her students, “This sucks” (see p. 156).

Because of the low achievement levels on state tests at these three schools, it is safe to assume that many of the students in these classes were struggling in mathematics. Recognizing that struggle, however, does not mean that the curriculum should be diluted to meet the needs of students with lower abilities. On the contrary, by providing the necessary supports and varying the difficulty of the tasks given, this study found that students appreciated being challenged. The levels of engagement exhibited in Ms. Merrit and Ms. Green’s classes were decidedly higher when students were intellectually challenged; therefore, it is important to remember to keep all students intellectually connected regardless of their background knowledge.
Meeting the students where they are.

Many students use their background, interests, and multiple forms of representation to find connections to learning algebraic concepts sensorially. Typically, the algebra curriculum lends itself to the use of multiple representations such as tables, graphs, pictures, and stories. A recent study to be published later this year shows the significance of making problems that students can relate to, particularly for struggling students (Sparks, 2012). Ms. Green’s students were highly engaged when they were tasked with graphing a human’s height from birth using data from a student in the class (see p. 131). On another day, students were given graphing problems using a Google map of the school’s surrounding area, to which, students commented on how fun graphing could be (see p. 129). In addition, Ms. Green discussed using the school sports teams and other aspects pertaining to the lives of her students in problems (see p. 127). To a lesser extent, Ms. Merrit made connections between taking a car engine apart and putting it back together as similar to factoring an algebraic sentence and then multiplying it back to the original problem (see p. 172). Ms. Green’s class was the only one observed using the lives of her students in the context of the mathematical problems.

Within the engagement category, “connections,” all four were observed in every classroom in varying degrees. The most prominent in every teacher’s classroom were emotional connections through relationships and intellectual connections through challenge and support. Ms. Green and Ms. Reed were both observed requiring their students to connect using communication by explaining their reasoning. Finally, Ms. Green was the only teacher who was observed using sensorial connections by creating a context for the math that was familiar to her students.
Who is doing the work?

In looking for active engagement in these three classrooms, I consistently asked myself who was doing the work. As explained in the literature review, I am as concerned with the work that the teachers are doing as I am with the work that the students are doing in mathematics. I have observed many mathematics classrooms with a teacher driven by the textbook where teachers routinely review the homework, turn the page, explain the new problems in the book for notes, and then release the students to complete more homework problems from the book. However, none of the classrooms in this study were textbook-driven. These teachers were very engaged with the material, and worked to find meaningful or challenging ways for students to access the concepts.

Ms. Merrit collaborated with colleagues in determining the key concepts that students should learn in algebra and creating common mini-assessments on each concept. Her lessons and examples were primarily driven by the assessments rather than a text. As explained in the previous chapter, it was imperative that Ms. Green and Ms. Reed work with their colleagues to create all of the learning materials used in class as they lacked textbooks to use as resources at their schools. These teachers were all highly engaged in their students’ learning, working hard to create lessons that provided access to the material. In addition, they expected their students to work equally hard in learning the material.

In Ms. Merrit’s section “High and explicit expectations” (see p. 157), I outline the many problems that students were expected to work on every day. Indeed the students themselves described that they worked hard. In a traditional classroom, critics fear that students will spend the majority of the time watching the teacher do the math while they
copy the examples into their notes without having to think. In the previous chapter I described extensively how students were expected to work independently through multiple problems in a given day.

Ms. Reed and Ms. Green also expected their students to work hard solving problems and applying algebraic skills. In support of these expectations, they gave their students multiple strategies for working with the material, offering various ways to check for understanding, and activities in which to practice the concepts. The active engagement in these two classrooms could be both seen and heard. At times, I could hear students active in friendly competition in solving mathematical tasks.

The use of competition to motivate students was apparent in all the classrooms. Research has argued against using competition, particularly in reference to culturally relevant practices (Ellison, Boykin, Tyler, & Dillihunt, 2005; Gay, 2000). Contrarily, as Burguilko (2010) points out in his study using game theory, most of the students in school today have spent many hours playing competitive games, including computer based games; therefore, friendly competition can increase participation and performance. The games observed in Ms. Green and Ms. Reed’s classes were organized into teams so that students worked together in solving problems to defeat other teams in the class. The prospects of winning often engaged them in working hard. In fact, one student in Ms. Reed’s class was observed not working until she reminded him that it was a competition, and then he not only worked hard but wanted more time to work (see p. 93). The collaborative nature of the games in these classes engaged and motivated students. The competition observed in Ms. Merrit’s class was less formal when students used white boards to practice problems; I noticed that a few students on the other side of the room
were keeping track of how many problems they had done correctly so that they could compare their individual scores at the end of the class (p. 160). These students enjoyed the competition and stayed highly engaged in the activity.

**Awakening the senses.**

Students were observed throughout this study engaged in sensory experiences. As outlined in the literature review, traditionally teachers have done this by offering “hands-on” materials to represent mathematical concepts. These teachers, however, engaged students with physical activities that were at times not math related and at other times directly linked to the content. While algebra teachers often incorporate manipulatives such as algebra blocks or algebra tiles, my experience is that high school students often reject these tools, feeling that they are too old for them (these tools are for middle school students). Furthermore, the traditional paper and pencil approach to practicing multiple problems in order to enforce a new concept can be very monotonous. Regardless of whether the students were physically active with the mathematical concepts, I found that this “awakening of their senses” increased the student’s level of engagement in the algebra.

I was amazed at the impact a quick physical activity had on the level of student engagement in Ms. Green’s class. While her administrator would likely have frowned on her taking two minutes during class to focus on an activity that was not math related, it was powerful for the learning that took place afterwards. As I described in “Physically Active” the students who appeared to be engaged in the concept of the day, solving complex algebraic equations began diminishing from less than half of the class to almost none when a student outburst occurred (see p. 126). Consequently, Ms. Green engaged...
almost the entire class in a quick game of “Simon Says.” After two minutes, the game was over and the students began working on solving equations again and the level of engagement increased to almost 100%. In addition to this physical activity, the teachers attempted to provide different mediums to engage students using white boards and clickers. The only teacher; however, to use movement as a means of using the mathematics was Ms. Reed.

While Ms. Green used physical representations for solving an algebraic equation by referring to the aisle as an equal sign and the students as different parts of the equation (p. 129), this did not require the students to move around, but rather to observe. On the contrary, students used hand signals to represent different mathematical symbols when solving problems in Ms. Reed’s class. Recall students using hand signals for ‘greater than’ or ‘less than’ symbols when solving inequalities (see “Physical Response to Learning” on p. 88). In addition, students often used sign language to identify the answer to a problem. Ultimately, students in Ms. Reed’s class were observed using hand signals to set up a solution and to provide a solution.

Ultimately, students are working hard every hour of the school day. Each teacher is concentrating on delivering the material as required, and demanding that their students work hard to learn the required topics. The cognitive demands placed on students can be overwhelming at times, and although a game of “Simon Says” will not be effective on a daily basis, allowing students a moment to stretch or “awaken their senses” may provide an avenue for increased engagement.

Perceptivity engagement.
While sensory activities engaged the body, in this study the perceptivity engaged the mind, demanding students to use higher order thinking skills in solving mathematics. Ms. Reed pointed out that the new curriculum required an increased focus on conceptual skills (see “The ‘unorganized’ curriculum” on p. 84). Her experience aligns with the new standards that purport to provide a focus on students struggling with more complex tasks (Christensen, Wiggs, Lassiter, & Cook, 2012). As mentioned previously, Ms. Merrit’s school had not yet adopted the new standards; therefore, while students worked on difficult algebraic equations, I did not observe students working on any concept-based problems in her class. Conversely, Ms. Green and Ms. Reed offered multiple opportunities for students to work through conceptual-based “word problems.”

The moans heard from Ms. Reed’s students when she announced that they would be working on word problems are similar to the ones heard by most math teachers (see p. 98). However, as Ms. Green’s and Ms. Reed’s classes discovered the relevancy of these problems, they became engaged in the tasks. Capitalizing on the sensorial connections discussed previously, students became engaged in problems demanding higher-order thinking skills. For example, a traditional word problem involving rate, distance, time, and unit conversions would go something like this: Mr. Smith is driving to Mrs. Jones house that is 145 kilometers from his house. If he drives for 5 hours until he arrives at Mrs. Jones house, how fast was he driving in miles per hour? Students struggle with these real-world problems, using distance and changes in units of measurement. Ms. Green uses this struggle to spark conversations about the context of the problem (see p. 127). In her classroom she asks, “How many of you have been to Canada or Mexico?” Many of the students have been to these countries and can relate to the difference in measurement.
In addition, she was observed contextualizing several other mathematical concepts to familiar aspects of the student’s lives, making them more accessible and engaging. Similarly, real-world applications of mathematical concepts involving taxi fare, rate, time, and distance caused Ms. Reed’s students to inquire about the distance to different locations and how taxi rates are applied (see p. 98).

Ms. Reed and Ms. Green both challenged their students to also use higher order thinking skills to identify the reasonableness of an answer. Research supports the practice of offering complex tasks as a way of encouraging students to think beyond finding an answer, to identifying what their answer means as described in the communication connection (Boaler, 2002, 2008; Boaler & Staples, 2008). As indicated from the moans of Ms. Reed’s students, stretching their mathematical thinking can be scary; therefore, as we encourage students and teachers to incorporate more conceptual problems and reason through their answers, it is important to provide support in taking these risks.

**Providing a safety-net.**

For some mathematics students, attempting to solve a problem seems risky. Willis (2010) describes the anxiety that many students experience upon even entering a math classroom due to past negative experiences. A common intention for all of the teachers in this study was that every student work on the problems presented to them. The combination of students’ anxiety and teachers’ expectations necessitate the need for support. Encouragement and assistance were offered to all students in this study providing them with a safety net.

Ms. Green, Ms. Merrit, and Ms. Reed circulated the room frequently offering private help to students in need. They were sensitive to their students’ feelings, making
sure that students felt safe asking questions and getting additional help. Additionally, students were frequently asked to participate in front of the whole class. The teachers never admonished a student for not having an answer or for having the incorrect answer; rather, they offered their assistance and acknowledged that other students have made similar mistakes. In addition, none of these teachers told a student he or she was wrong and moved on to another student to answer. Contrarily, these teachers offered hints so that the students could revise their answers and produce the correct solution.

Ms. Reed and Ms. Green also encouraged students to get help from a classmate if needed (see p. 87 & p. 124). The norms established in these classes made working with peers an acceptable and safe practice. I never witnessed a student rebuking a peer for not understanding; rather they excitedly helped their peers understand a new concept. In addition, Ms. Green taught her students that everyone can make mistakes in mathematics. She pointed out mistakes that even high level mathematics students make, showing that everyone struggles sometimes and that it is acceptable to struggle (see p. 136). Moreover, when a student asked a question about why a problem was solved in a particular way, Ms. Green explained the answer and then thanked the students for bringing it to the class’s attention (p. 138). The common belief that some people have a natural predisposition for mathematics while others lack the same abilities can result in students who struggle being afraid to take risks in math classes. Given the need for resiliency as discussed in “A feel for math,” it is important that teachers offer the supports for students to feel safe in struggling and asking questions in algebra.

Reflection.
In order for students to be able to take risks when asking questions and struggling with new concepts, it is necessary for them to be able to identify their own needs. This identification requires reflection. Reflection requires more than a student looking at their letter grade for the class and surmising that they have mastered a corresponding percentage of the material. Students need to know which areas of mathematics that they struggle with and, just as importantly, what their strengths are, in order to improve. I propose that this may be an avenue to counter the “math anxiety” referred to in “Risk Engagement.” According to Merriam-Webster (2012), the definition of anxiety is “an abnormal and overwhelming sense of apprehension and fear often marked by physiological signs (as sweating, tension, and increased pulse), by doubt concerning the reality and nature of the threat, and by self-doubt about one's capacity to cope with it.” It is; therefore, through the use of reflection, that I will show the ways in which these teachers alleviated doubt and clarified the so-called “threat.”

In all three classes students were given opportunities to reflect on their previous learning with the warm-up. This short review of prior concepts provided students with immediate feedback about their learning and their retention without negative consequences for incorrect answers. Furthermore, in Ms. Green’s classroom, the problems given at the end of class allowed them to reflect on their understanding of the lesson from that day without threat. Additionally, when she announced to the class which problems were being missed by the majority of the class or what percentage of the students were getting the problems correct, it allowed students to reflect on their learning in comparison to their peers in a private, non-threatening way.
An aspect of anxiety is doubt concerning the nature of a threat. I would surmise that this occurs in math classes when students are unclear about the steps necessary to be successful and learn. Ms. Merrit and Ms. Green used short quizzes that were given frequently over one concept rather than a longer “unit” test like Ms. Reed. This gave students opportunities to reflect on their learning of targeted, specific concepts. The purpose of shorter quizzes was to give the teacher and the student a better understanding of which specific concepts were difficult or troublesome. In addition, both of these teachers encouraged their students to get help and review a concept if they did poorly on one of these quizzes so that they could retake the quiz for a higher grade.

Finally, students need to reflect on what they do not understand in order to get the help they need. Ms. Reed emphasized this point with her student in the section, “High Expectations.” When her student told her that she did not understand, Ms. Reed required the student to be more specific, asking her to narrow down exactly what she did and did not understand. The resulting explanation made her request for help much more explicit and Ms. Reed’s help targeted and useful. These teachers all used reflection to empower their students and reduce anxiety.

**Imagination.**

The use of imagination is rarely identified in learning mathematics. Using the definition from Uhrmacher (2009), connecting what you are learning with what is old and familiar, imagination is imperative for algebra. Using this definition literally capitalizes on the need to have the background knowledge for learning the next level of mathematics. Alternatively, connecting mathematics to what is familiar figuratively may be the avenue to bridging the gaps students have in the concepts. The concepts of
Mathematics build from basic and concrete to more complex and abstract. Therefore, students are expected to use the concepts that they learned in the previous years of mathematics to bring meaning to these new concepts.

Ms. Reed and Ms. Green showed how to make connections to both real-world conceptual understanding and complex algorithms through previously learned mathematics. Ms. Merritt showed her students how the launch of a satellite or a bomb was like a parabola, and she compared assembling and disassembling a car engine to that of factoring an equation (p. 173). Referencing what is well known helps students relate complex mathematical concepts like parabolas and factoring to a familiar model.

Similarly, Ms. Green used the real world to help students understand why they would not use “8.78 minutes” as an answer (p. 131). She pointed out to the class that life is not a multiple-choice test and that they use math regularly in their lives. Ms. Green made connections to previous math knowledge when teaching about unit conversions. She incorporated the use of perimeter and area to solve the problem (p. 135), requiring students to use the previous knowledge that they had about perimeter and area in order to apply a new concept of unit conversions. This example not only provides connections but also allows access to students struggling with newer, more difficult concepts whereas they may not fully grasp one part of a problem, but this does not preclude them from working on the parts of the problem that are familiar to them.

Interestingly, the new common core standards emphasize the need for k-8 teachers to place emphasis on both mathematical reasoning and math fact fluency, while the high school standards emphasize mathematical reasoning and applying mathematics to the real-world (Christinson, Wiggs, Lassiter, & Cook, 2012). As discussed in this
section, in order for students to use imagination for engagement, they will need to be able to have both a reference for the math facts and the conceptual to learn high school algebra.

Learning socially.

Social engagement is the final category of engagement and perhaps one of the most important. This realm of engagement focuses on the affects that the different personalities in the class have on the overall learning climate. Artzt and Armour-Thomas (2002) point out that “the social and intellectual climate defines the tone, style, and manner of the interpersonal interactions in the classroom” (p. 15). The teachers in this study support this assertion in the ways that they describe the classes that I observed. Ms. Green explained that her fifth period class had increased from 28 to 21 students and that the removal of four students in particular had made a big difference in the classroom dynamics (see p. 112). Similarly, Ms. Reed told her students, “I can think of about three students who can be removed and make this room better” (see p. 106). In actuality, she removed just one student and the learning environment improved immensely. In addition, Ms. Merrit described the makeup of her class when explaining why they must work individually as she explained, “I think that it works well in higher level classes for students to work in groups; I do not think that it works well to have them work in groups of four at this age group and at this maturity” (see p. 161). Occasional outbursts or whispering to a friend can be expected in a classroom full of young teens; however, as I highlighted in the classroom management section, the frequency of these occurrences are
far more prevalent in schools that serve the poor. Combining the behavioral findings in other research with the observations of the three classrooms in this study, it is important to look at how the students’ interactions might affect their engagement. For a detailed analysis see the previous section on “Classroom management.”

The interactions with the teacher may have been most socially engaging for Ms. Merrit’s class in particular. Recall the descriptions of her teaching as more traditional, with procedural problem solving and limited use of real-world problems. Imagine my surprise when her students described her class as “fun.” In “The use of humor” (see p. 171) Ms. Merrit’s quick wit and dry sense of humor engaged her students. She described her use of humor in this way, “I am funny, humorous, I make jokes, I am sarcastic, but it comes back so that I am making fun of myself more than I am making fun of anyone else. So, I think that most kids buy in.” The social interaction that Ms. Merrit had with her students showed an increase in their engagement and motivation.

**How much engagement is enough?**

Ultimately, student engagement is a multi-faceted aspect of student learning. While I observed students engaged in the material and working to learn the concepts, these categories of engagement focused my observations on the particulars that made these classes engaging. I found that all three of the teachers fostered emotional connections through relationships, intellectual connections through challenging and supporting their students, active engagement through the teachers working collaboratively with their colleagues in creating engaging materials and their students in turn working hard to learn, and all of the teachers engaged their students using risk and reflections to identify their struggles and needs to further their own learning.
Alternatively, only Ms. Green and Ms. Reed were seen using communication and perceptivity to explore higher level mathematics. For social engagement, Ms. Reed and Ms. Merrit engaged students by creating a classroom community intent on learning algebra, and Ms. Merrit used her humor to engage students even more. Ms. Green was the only teacher observed engaging her students through imagination and sensorially, connecting what they know outside of mathematics to the new algebra concepts. Finally, Ms. Reed was the only teacher observed using sensory engagement by allowing students to demonstrate the mathematics physically. Consequently, while all of these teachers were engaging to their students, they did not need to practice all areas of engagement in order to be so.

In order to illuminate the magnitude of the different aspects of student engagement throughout the three classrooms in this study, I tallied the number of times that each engagement strategy was found in Ms. Reed’s, Ms. Green’s, and Ms. Merrit’s classes by coding the data according to the areas of engagement. In doing so, I found connections most frequently (approximately 20% of the time); followed by active engagement, risk-taking, and reflection (10-15%); perceptivity, imagination, and social engagement (5-10%) and sensory engagement (less than 5%). While not a statistical analysis, these percentages are interesting. To illustrate these proportions, Figure 2 depicts the relative degree to which each engagement strategy was found.
Sub-Question c: culturally relevant pedagogy

As can be found in the literature review,

Culturally relevant pedagogy rests on three criteria or propositions: (a) students must experience academic success; (b) students must develop and/or maintain cultural competence; and (c) students must develop a critical consciousness through which they challenge the status quo of the current social order. (Ladson-Billings, 1995, p. 160)

My assumption at the beginning of this study was that these aspects would be found in successful teacher’s classrooms regardless of their intent to do so. What I discovered is that these classes did not embody the criteria of CRP but rather connected with students through respectful relationships instead. Conrad (2011) had a similar discovery when studying culturally relevant pedagogy and presented the termed ‘relational pedagogy’ as
an alternative. As found in the literature review, Boaler (2008) found a similar phenomenon, which she termed ‘relational equity.’

I believe that Ms. Merrit aptly described relational pedagogy and relational equity when she explained the way that she felt about her students:

I have worked with a group of kids that have been diverse since the beginning; we talked and that was your intention too - to work in a school district that was diverse. And it is hard because I know that in the outside world, they are judged differently if they are light or dark or white or black, but when I see my kids, I just see them as my kids. And I would have a really tough time telling you how many kids I have in any particular racial group. I don’t look at my kids that way, so I don’t think that I do a whole lot as far as their racial diversity because I don’t care; they are my kids. I took home a Latina girl so, it is like, I have offered my house to a Filipino girl, a Black girl, just kids who came from terrible backgrounds. I have taken in a handicapped kid, a White girl. So, to me it is such an unimportant thing and I do know that they carry some of that when they come in. But I don’t pair them according to color or make sure a Hispanic kid is working with a White kid - for one thing that would take too much time looking and trying to figure out, are they Hispanic? Because I don’t know, I don’t know if I do a good job or a bad job with that because I don’t think that I really pay attention to that.

While not every caring teacher brings their students home with them (or should), I would argue that they care for their students just the same. Although the literature suggests that a student’s culture should be a part of how they are taught, I would suggest that it is much deeper than the race or ethnicity of the student. Namely, these teachers looked at their students as much more than their race, as teens, homeless, female, male, unwed mother, unwed father, football star, or any other of the many aspects of their lives that impact who they are as people. These teachers can only know these things; however, if they have established relationships with them.

**Sub-Question d: Caring Relationships**
With the emphasis placed on test scores in the three schools, it is important to remember that the art of teaching involves sensitive and emotionally connected human beings. The emotional and physical wellbeing of students needs to be as important as their intellectual well-being (Noddings, 2003). Despite the pressure put on the teachers in this study to produce higher test scores, they found ways to connect with their students in a more personal way. The teachers showed the numerous ways that they care about more than their students’ intellect, and the students found ways to show that they appreciated their teachers in return. I will begin by outlining the ways that these teachers established relationships with their students, followed by its relation to Noddings’ (2005) theory of care.

Ms. Green made a personal connection with each student in her class both academically and behaviorally. She used individual relationships and attention to manage and motivate her students. She consistently took time outside of class to contact parents and dig deeper into the reasons behind a student’s misbehavior. Her work with Asiah exemplified this dedication to her students as individuals. She helped bring about the transition from a girl who refused to lift her head off the desk to an active participant in the classroom. Ms. Green sought to make this personal connection with all of her students. Rather than disciplining a student publicly, she either took them in the hall for a quick conversation about expectations, or pulled them aside after class. This focus on individual needs made the students in Ms. Green’s class more than a test score.

Ms. Merrit cared for the students as if they were her own children. She also focused on the individuals in her class, offering them health advice when they were not feeling well, asking about their hobbies, and noticing subtle differences like a student
getting their braces removed. She cared for their academic welfare similarly, as one student voiced her appreciation in knowing that Ms. Merrit would help her when she needed it (p. 169). She cheered her students’ success daily in class. Finally such care and respect were reciprocated by both past and current students. Ms. Merrit’s bulletin board was covered with cards from students thanking her for pushing and caring for them. Additionally, her current students showed their respect and care for her by taking on the responsibilities of assembling the class at the beginning and disassembling in the end. Furthermore, they made sure that the room was always left with the rows of desks straightened and the floors free of scraps of paper or pencils.

Ms. Reed could also count on her students to respect her and her room enough to leave it clean and free from debris. She repeatedly reminded students that her intent was for them to be successful and that she believed in their abilities. Her belief in her students was exemplified when she realized that they had guessed the answer to a problem that they did not understand, and she asked them why they were “selling themselves short” (see “Why learn algebra? ,” p. 103). The students realized that she believed in their capabilities, knew that they could work out the problem, and recognized that she was pushing them because she cared. She explained that this was evidenced by their return to visit her in subsequent years.

As outlined in “A ‘feel’ for math” (see p. 214), the students in each of these teachers’ classrooms sought to bond with their students and establish trust to further their learning. Noddings’ (2005) elaborates on the need for care of self, care for the inner circle, and care for ideas, among others. What I observed from these three teachers was the message that; if you care for yourself and your future, you will work hard in school
and graduate; if you care for the inner circle, you will help promote learning in the classroom so that everyone can be successful; and that if you care for ideas, you will open your mind to the excitement that I have for mathematics. Notice that to care for their students did not involve increasing their test scores. While many of us remember the teacher who had the greatest influence on our childhood, I doubt that one of the reasons would be that they helped raise our test scores. It is more likely that we will remember their care, support, and respect.

Sub-Question e: Categories Intertwined

When I began this research, I perceived the four categories, classroom management, student engagement, culturally relevant pedagogy, and relationships to be equally important and necessary for effective teaching. In Chapter One, I illustrated the interaction of the four categories as a Venn diagram (Figure 1), surmising that the area of intersection would offer the greatest opportunity for learning. I have changed my views based on my observations, interviews, and evaluation of the previous questions. I have seen highly effective teaching that favors one category over another, either based on the preferences of the teachers or based on the demands of the school, administration, or class of students. In answering the primary question, I outlined the many demands placed on teachers and how these influence what takes place in the classroom. Therefore, I would like to offer an analogy in answering this final question that is a revision of the original Venn diagram.

In my answer to sub question (a), I outlined the aspects of classroom management (community and learning-related behaviors) that appeared to have an impact on teaching and learning. Similarly, I outlined the various impacts of engagement strategies
connections, sensory experience, active engagement, perceptivity, risk taking, reflection, imagination, and social structure) that I discovered when answering sub-question (b).

When answering sub questions (c) and (d), however, I found that culturally relevant pedagogy was largely absent and caring relationships were the foundation for everything. Therefore, the image that I would like to use is that of two hands juggling several objects. The objects represent the aspects of classroom management and student engagement, while the hands represent caring relationships. While the size of the objects may change depending on the class or teacher, the hands need to always be available to keep the objects in the air. In some classrooms, the objects for classroom management will be much larger as we observed in Ms. Merrit’s class. The objects representing classroom management had greater significance in her class than those representing aspects of engagement; nonetheless, the practices she incorporated using classroom management and engagement strategies were all supported by caring relationships. As I tallied the data used to describe and interpret the various aspects of Ms. Merrit’s class according to the categories of student engagement and classroom management, I was able to loosely quantify the prevalence of these categories by coding the number of times that each was present in the data. What I found was that 20-25% of the data linked to connections and learning-related behaviors; 15-20% to active engagement, close to 10% linked to risk-taking, reflection, social engagement and classroom community; while of the data linked to sensory experience, perceptivity, and imagination was not found. The percentages are not a result of a statistical analysis, but rather a proportion according to the assigned codes. These percentages are linked to the size of the corresponding objects in Figure 2.
In Ms. Reed’s class, the prevalence of each of the aspects for classroom management and student engagement was relatively equal; making the representative objects similar in size. When tallying the data for Ms. Reed, I found that classroom community dominated the data with almost 25% of the tallies; active engagement, reflection, social engagement, and learning-related behaviors linked to 10-15% of the data; and connections, sensory experience, perceptivity, and risk-taking linked to 5-10% of the data. Therefore, the sizes of the objects representing each category are represented in similar proportions in Figure 3.
Figure 4. The magnitude of student engagement and classroom management found in Ms. Reed’s class.

Alternatively, Ms. Green showed greater emphasis on engagement strategies in her classroom, allowing representations of her classroom management to be smaller in size by comparison. When evaluating the data for Ms. Green according to each student engagement category and classroom management, I found 20-25% of the data related to connections; perceptivity and imagination related to 15-20% of the data; active engagement and risk-taking related to 10-15% of the data; and reflection connected to 5-10% of the data; while sensory experience, social engagement, learning-related behaviors, and classroom community represented less than 5% of the data. Therefore,
Figure 4 depicts the relative student engagement and classroom management evident from the data.

Figure 5. The magnitude of student engagement and classroom management found in Ms. Green’s class.

Regardless of the size or importance of one aspect of classroom management and student engagement in each of these classes, teachers were effective in their teaching because they supported their practices with heart and respect for the students they taught.

Themes and Summaries

Judging a teacher

During the 2012 Summer Olympics, I was watching the women’s gymnastics competition televised from London. The commentator was commenting on one young lady’s balance beam routine, pointing out different technical aspects and its difficulty.
The commentator was obviously an expert on the subject and a former gymnast himself, considering this routine to be superb; however, when the judges reported their scores for this particular routine, he was amazed by how low the scores were. He commented on how the judges were trained on a particular rubric to use when evaluating the routines and that he could not understand, given the routine that he had observed, how the score could be so low. Consequently, this one judgment, that was arguably too low, eliminated this woman from earning a medal.

The recent focus of policy makers on evaluating teachers to score their abilities should take this gymnast’s lesson into consideration. Supporters argue that the judging will be fair and standardized with the use of a rubric and student test scores, quantifying the important aspects of teaching. Unfortunately, like gymnastics, one judgment of the quality seen in a classroom may differ greatly from that of another. A connoisseur of teaching will recognize the strengths and the weaknesses in the classroom outside of the checklist as the commentator did of the gymnast. As I discovered in this study, while the literature supports strong classroom management, student engagement, culturally relevant pedagogy, and caring relationships to influence student learning in high-poverty schools, the absence of some qualities at the enhancement of others does not make a bad teacher. What makes one teacher great may differ significantly from the qualities of another great teacher.

Ms. Merrit is a teacher who loves her students and expects them to work hard every day learning Algebra 1. She is supported by her administration in her strict discipline and in her traditional pedagogy. In this study, I coded for classroom management, student engagement (connections, active engagement, sensory, perceptivity,
risk, reflection, imagination, and social), culturally relevant pedagogy, and care and respect. The evidence that I found showed that the strategies for classroom management and evidence of caring relationships far outweighed those of engagement or culturally relevant pedagogy in Ms. Merrit’s classroom. I did not see evidence of students using materials to interact with the concepts sensorially, nor did I see students investigating and using higher order thinking skills. I did, however, see students working hard every day on complex equations, and the students enjoyed Ms. Merrit. They told me that they had fun in her class; her strict discipline was tempered by her great sense of humor. A judge may have questioned Ms. Merrit’s engagement abilities based on a rubric, but I found students to be actively engaged in their learning.

Ms. Reed is a teacher who works to balance the technical aspects of learning mathematics with the creative exploration of the subject. My coding of Ms. Reed, based on the four categories of classroom management, student engagement, culturally relevant pedagogy, and caring relationships, shows a balance with all four aspects in her classroom. While Ms. Reed uses classroom management strategies in the classroom, it does not play a significant role. Similarly, the engagement strategies that she uses get students physically and collaboratively involved in their learning although students are not pushed to investigate and use higher order thinking skills. The culturally relevant practices showed high expectations and caring relationships, nonetheless, the relationships were not observed to be significant. Overall, on a rubric judging these categories, she would have scored well, but not significantly high.

Ms. Green is a highly engaging teacher who pushes her students to think about mathematics conceptually. She was shown to have the least amount of control over what
and how she teaches. Given the aspects of her classroom that she does have control over, in one of the two classes that I observed, she struggled with classroom management. As outlined in “Learning socially,” some of that could be attributed to the peer grouping of the students. For this teacher, the evidence would support high scores for her abilities in student engagement by: pushing students to work together, using multiple forms of representation, helping students reflect on their learning, and encouraging them to use their imaginations. Ms. Green used all of these engagement strategies to urge students to use higher order thinking skills. Culturally relevant practices were moderate with certain activities tied to student background and interests. Finally, the relationship aspect of the classroom was strong on the part of the teacher; however, the evidence does not support that it was actualized in the students, making this a moderate score as well.

Additionally, as I have shown in this study, we can only judge a teacher on the aspects of his or her job that are under their control. The mandates that have been placed on teachers in the name of standardized test scores are increasingly restricting the influence of the teacher on student’s learning. As we saw, teachers are already being told what to teach and when to teach it. In addition, as I mentioned throughout this chapter, the new standards give many suggestions about how students should be taught mathematics using communication and problem-solving skills. The evaluation of a teacher will then be more of the degree to which they did as they were told and also how this affected student test scores.

These teachers were identified as great teachers by their administrators and colleagues; however, based on a rubric that would score the four categories of classroom management, student engagement, culturally relevant pedagogy, and caring relationships,
all of these teachers would receive an average score. In addition, many evaluators see one class like the one routine seen by the gymnastics judges. I, conversely, spent 12-15 hours in each of these classrooms, interviewing the teacher and some students. Rarely is an evaluation by an administrator conducted with such evidence. Even with the frequent spot observations conducted at Ms. Green’s school, the total amount of time that administrators were in her room may only add up to a few hours.

In addition to the cursory observations following a narrow list of teaching objectives, it is concerning to think that the intent in Colorado is to make student test scores 50% of the teacher’s evaluation. For the teachers in this study, as well as those in other low-income and low-performing schools, this would automatically relegate them to below average. Furthermore, I eliminated factors that were outside of the control of the teacher such as curriculum and assessment, although an administrator might not be as forgiving. Therefore, I leave you with this question: did any of the teachers described in the last chapter seem average or below average? If you answer “no,” please reconsider how teacher quality is judged.

Teacher Retention

It is significant that not one of the teachers in this study returned to the school in which I observed them. When I began observing Ms. Merrit I was aware that she intended to retire that year. I was surprised since she appeared to be young and energetic, and she still had a daughter at the school. She explained to me that she had accumulated enough years (having purchased a few) in order to retire and that it was becoming too difficult. She now teaches at the community college part-time. Ms. Green, as I mentioned in the last chapter, left her school during the year of this study for personal reasons. She
did not return to teaching the next year explaining that she was not ready and that she did not believe that she would ever return to a public school, narrowing her focus on alternative schools instead. She continues to pursue her administrative license, taking evening classes. Finally, Ms. Reed has relocated to another city and continues to teach in a diverse, high-poverty district. Her desire was to continue to work with at-risk students, but was in hopes of finding a more supportive work environment. In a recent correspondence with me she told me that while her new school still has its challenges, the students are much better behaved and she loves having resources to use such as textbooks.

The lack of quality teachers and the high rates of teachers leaving low-income schools is a civil rights issue (Darling-Hammond, 2011). In fact, the majority of teachers left both Ms. Reed and Ms. Green’s schools the same year. I recently became aware that only one teacher returned to Ms. Green’s school and that all the new teachers are also new to the profession. The three teachers’ self-imposed pressure to meet their intentions was compounded by pressures from administrators and society to improve test scores. The focus of our society on evaluating our schools through student achievement scores and teacher effectiveness scores has blurred many people’s sight of the humans involved. I do not know any teachers who joined the profession for the pay or prestige; rather they wanted to help children learn.

While I know that the desire for all children to learn to the best of their ability is not always realized, teachers need to be coached in a supportive manner, assuming the best rather than expecting the worse intentions. In recent years, many proposals have been advanced to this end, from changes in training, to certification, to professional
development. “Yet so often basic, everyday policies and practices seem entirely inconsistent with what we know about working well with people, so that we fail to keep our current people feeling supported, or fail to keep them at all!” (Levin, 2008). Just as these teachers considered their students’ individual strengths and needs as they pushed their students to learn, administrators need to do the same as they push their teachers to become more effective.

I do not propose to allow every teacher to close the door of their classroom and teach what and how they please. Given the transiency of our population today, I am looking forward to the common core standards that will, hopefully, allow a student to move from state to state relatively seamlessly within the curriculum. In addition, many beginning teachers need support and coaching. The challenges that these teachers face; however, cannot usually be solved with a quick-fix or a list of procedures, they need to try different solutions to see what works best for them and their students. In addition, as teachers gain more experience and become more comfortable with the students and the curriculum, they gain the ability to try new ideas regarding classroom management and student engagement. I also believe that teachers need to work together in order to grow in their art form, learning from each other about new ways to engage students. I am, however, proposing that a recognized, successful teacher be given some freedoms to explore the directions that meet their and their students’ needs. At some point, a teacher should be able to earn the respect and confidence of the administration to teach the students without the risk of ridicule or shame.

The need for experienced, qualified, and effective teachers in low-SES classrooms is indeed a civil rights issue as Darling-Hammond (2011) suggests. While the focus of
administrators has been to recruit effective teachers to high-need schools, I believe the emphasis should shift to retaining good teachers in the schools that need them the most. Unfortunately, the current movement to remove the teacher’s control over what and how to teach, compounded by the humiliation of low test scores will only drive the good teachers away. Why would highly-educated, ambitious teachers subject themselves to this level of shame and ridicule when they can teach at a high-income school with classroom freedoms and higher test scores? Ultimately, I would argue, that the greatest loss in the failure to retain highly effective teachers at low-income schools is the relationships between the students and the teachers. Recall the need for the hands of caring relationships to keep the aspects of classroom management and student engagement “in the air.” With the teachers that students built these relationships with leaving each year, it will be difficult to maintain a school and classroom environment conducive to learning and student achievement. Therefore, it is imperative that we cultivate the well-being of the dedicated, successful teacher in low-income schools, treating them as the skilled professional that they are.

**Concluding Thoughts**

Everything that can be counted does not necessarily count; everything that counts cannot necessarily be counted.

(Albert Einstein)

This study serves as a warning to the unintended effects that have occurred in the name of reform. I have outlined the various ways that teachers are held accountable for increasing performance without the necessary freedom and support required to best meet their students’ needs. This has resulted in the loss of these master teachers who were making an impact on the daily lives of their students. In addition, I found teachers
engaging students in different ways, yet experiencing similar results. The teachers chose a methodology that best served their intentions to engage students in learning algebra. Ms. Reed, Ms. Green, and Ms. Merrit were ultimately able to make the greatest difference to their students by caring for them and establishing strong relationships. If relationships are the key to effective teaching, it is possible that the low achievement of the students in this study was related to the loss of teachers with whom they had established relationships. The current reform movement needs to be wary of eliminating effective and experienced teachers in the name of getting rid of the ineffective ones.

I am a supporter of the common core standards. Given the transiency of many of the students in the United States today they need to be able to seamlessly transition from one mathematics classroom to another with the common curriculum. However, it is imperative that teachers are supported in translating the standards into practical lessons in the classroom while being held accountable. If we are consciously filling our classrooms with teachers who have majored in the subject area, why would we assume that someone at the district level would have a better knowledge of how the curriculum should be translated into the classroom? In fact, if the ultimate goal is for the students to learn the curriculum, the pacing cannot be mandated by anyone outside of the classroom. One group of students may learn at a quicker pace given some concepts versus another.

In addition to the common standards, I am not opposed to a standardized test to evaluate students compared to their peers statewide or nationally. However, this test only provides one piece of data (a comparison to their peers) and does not provide useful information to help a specific student on a specific concept. This test does not provide a good picture of the learning that took place that year, without a clear picture of where the
student began. It can identify for teachers possible strengths and weaknesses of their program compared to other similar schools; however, it should not be used as a way to classify and punish teachers, administrators, and students. A teacher should not be evaluated according to their students’ test scores.

I strongly believe that teachers should be held to the same high expectations as students. They should not be allowed to show movies to pass the time or read the newspaper instead of teaching as depicted in the documentary, *Waiting for Superman* (Chilcott & Birtel, 2010). Instead, they should use every method possible to reach their students. However, the teacher whose intentions are to increase the learning of their students should be evaluated with the same level of differentiation as they are expected to teach their students. A 25 year veteran teacher should not be evaluated in the same way as a first year teacher. Furthermore, one of the engaging aspects of learning in a typical high school with six different teachers each day is the changes that occur as the student transitions from one class to the next. To standardize the way that every student in every class period should be taught will eliminate the value of those practices making them routine and un-engaging. Therefore, if one teacher decides that the best way to teach a group of students does not satisfy the list of boxes that need to be checked to signify effective teaching, even though the students are actively working and learning, the measurement tool is defective.

My hope is that administrators and policy makers will heed these warnings as they promote reform, particularly in schools that serve our most impoverished students. We have talented teachers whose desire is to teach in these schools and yet they are treated as the scape goat. They make a difference in the lives of their students, laughing
and crying, and pushing and encouraging them to make the most of their lives, yet they leave for schools with greater support and appreciation of their efforts. In lower socioeconomic schools, the teachers are accustomed to doing more with less and then punished if their students do not perform equally to higher socioeconomic schools. Why would a master teacher remain? In addition, at schools that have higher socioeconomic students, their standardized test scores are higher and they are evaluated as more effective teachers. Consequently, the students who need these supporting relationships with their teachers the most are forced to experience loss and disappointment each year. Ultimately, the task of evaluating teachers is as complicated as the human species. Policymakers including school and district administrators and legislators should support teachers and students by creating an educational community based on trusting relationships so that administrators, teachers, and students can collaborate for a more equitable education for all.
References


Appendix A: Letter of Invitation to Participate

Dear (Participant),

I am studying high school Algebra teaching and learning for my doctoral dissertation research. In particular, I am interested in classroom management and engagement strategies used in a culturally relevant and caring environment. Through this research I intend to describe and interpret teacher and student interactions in the classroom.

I believe that your expertise in teaching can provide great information to our field of education. I hope that you will consider allowing me into your classroom for observations and interviews at the beginning of the 2011-2012 school year.

Sincerely,

Cassie Gannett
Appendix B: INFORMED CONSENT FORM

CLASSROOM RESEARCH
Teacher Consent

Attending High School Algebra I: In search of well managed, engaging, culturally relevant, and caring classrooms.

You are invited to participate in a study that will describe and interpret classroom management and engagement strategies used in culturally relevant and caring Algebra 1 classrooms in highly diverse schools to enhance student learning opportunities. In addition, this study is being conducted to fulfill the requirements of my doctoral dissertation. This study is conducted by Cassie Gannett, University of Denver doctoral candidate in Curriculum and Instruction. Results will be used to inform other teachers, researchers, and educational experts about how these practices work together for traditionally underserved students. Cassie Gannett can be reached at cassie.gannett@du.edu. This project is supervised by her advisor, Dr. Nicholas Cutforth, Curriculum and Instruction, University of Denver, Denver, CO 80208, nick.cutforth@du.edu.

Participation in this study should take about 4 or 5 weeks of your time. Participants have the opportunity to choose the dates and times of all observations and interview and may reschedule or cancel at any time. Participation in this project is strictly voluntary. The risks associated with this project are minimal. If, however, you experience discomfort you may discontinue the interview at any time. We respect your right to choose not to answer any questions that may make you feel uncomfortable.

Only the researcher will have access to your individual observations and interviews data and any reports generated as a result of this study will use only group averages and paraphrased wording. However, should any information contained in this study be the subject of a court order or lawful subpoena, the University of Denver might not be able to avoid compliance with the order or subpoena. Although no questions in this interview address it, we are required by law to tell you that if information is revealed concerning suicide, homicide, or child abuse and neglect, it is required by law that this be reported to the proper authorities.

If you have any concerns or complaints about how you were treated during the interview, please contact Paul Olk, Chair, Institutional Review Board for the Protection of Human Subjects, at 303-871-4531, or Sylk Sotto-Santiago, Office of Research and
Sponsored Programs at 303-871-4052 or write to either at the University of Denver, Office of Research and Sponsored Programs, 2199 S. University Blvd., Denver, CO 80208-4820.

You may keep this page for your records. Please sign the next page if you understand and agree to the above. If you do not understand any part of the above statement, please ask the researcher any questions you have.

I have read and understood the foregoing descriptions of the study called “In search of well managed, engaging, culturally relevant, and caring Algebra 1 classrooms”. I have asked for and received a satisfactory explanation of any language that I did not fully understand. I agree to participate in this study, and I understand that I may withdraw my consent at any time. I have received a copy of this consent form.

Signature _____________________ Date _________________

___ I agree to be audiotaped.
___ I do not agree to be audiotaped.

Signature _____________________ Date _________________

___________ I would like a summary of the results of this study to be mailed to me at the following postal or e-mail address:
Appendix C: PARENT CONSENT FORM

CLASSROOM RESEARCH
Parent Consent

Attending High School Algebra I: In search of well managed, engaging, culturally relevant, and caring classrooms.

You are invited to participate in a study that will describe and interpret classroom management and engagement strategies used in culturally relevant and caring Algebra I classrooms in highly diverse schools to enhance student learning opportunities. In addition, this study is being conducted to fulfill the requirements of my doctoral dissertation. This study is conducted by Cassie Gannett, University of Denver doctoral candidate in Curriculum and Instruction. Results will be used to inform other teachers, researchers, and educational experts about how these practices work together for traditionally underserved students. Cassie Gannett can be reached at cassie.gannett@du.edu. This project is supervised by her advisor, Dr. Nicholas Cutforth, Curriculum and Instruction, University of Denver, Denver, CO 80208, nick.cutforth@du.edu.

If you agree to allow your student to participate, the researcher will ask your student to answer questions about their mathematical experiences in the classroom. These questions will be asked during one lunch period (pizza will be provided) with approximately 4 other students. Participants have the opportunity to reschedule or cancel at any time. Participation in this project is strictly voluntary. The risks associated with this project are minimal. If, however, your student experiences discomfort he or she may discontinue the interview at any time. I respect your student’s right to choose not to answer any questions that may make them feel uncomfortable.

Only the researcher will have access to interview data and any reports generated as a result of this study. I will use only group averages and paraphrased wording. However, should any information contained in this study be the subject of a court order or lawful subpoena, the University of Denver might not be able to avoid compliance with the order or subpoena. Although no questions in this interview address it, we are required by law to tell you that if information is revealed concerning suicide, homicide, or child abuse and neglect, it is required by law that this be reported to the proper authorities.

If you have any concerns or complaints about how you were treated during the interview, please contact Paul Olk, Chair, Institutional Review Board for the Protection of Human Subjects, at 303-871-4531, or Sylk Sotto-Santiago, Office of Research and Sponsored Programs at 303-871-4052 or write to either at the University of Denver,
You may keep this page for your records. Please sign the next page if you understand and agree to the above. If you do not understand any part of the above statement, please ask the researcher any questions you have.

I have read and understood the foregoing descriptions of the study called “In search of well managed, engaging, culturally relevant, and caring Algebra 1 classrooms”. I have asked for and received a satisfactory explanation of any language that I did not fully understand. I agree to allow my child to participate in this study, and I understand that I may withdraw my consent at any time. I have received a copy of this consent form.

Signature ____________________________________________________ Date ___________________

Signature ____________________________________________________ Date ___________________

___ I agree to have my child audiotaped.
___ I do not agree to have my child audiotaped.

Signature ____________________________________________________ Date ___________________

___________ I would like a summary of the results of this study to be mailed to me at the following postal or e-mail address:
Appendix D: MINOR ASSENT FORM

CLASSROOM RESEARCH
Student Assent Form

Attending High School Algebra I: In search of well managed, engaging, culturally relevant, and caring classrooms.

You are invited to participate in a study that will describe and interpret classroom management and engagement strategies used in culturally relevant and caring Algebra 1 classrooms in highly diverse schools to enhance student learning opportunities. In addition, this study is being conducted to fulfill the requirements of my doctoral dissertation. This study is conducted by Cassie Gannett, University of Denver doctoral candidate in Curriculum and Instruction. Results will be used to inform other teachers, researchers, and educational experts about how these practices work together for traditionally underserved students. Cassie Gannett can be reached at cassie.gannett@du.edu. This project is supervised by her advisor, Dr. Nicholas Cutforth, Curriculum and Instruction, University of Denver, Denver, CO 80208, nick.cutforth@du.edu.

If you agree to participate, I will ask you to answer questions about your experiences in the math classroom. These questions will be asked during one lunch period (pizza will be provided) with approximately 4 other students. You will have the opportunity to reschedule or cancel at any time. Participation in this project is strictly voluntary. The risks associated with this project are minimal. If, however, you experience discomfort you may discontinue the interview at any time. I respect your right to choose not to answer any questions that may make you feel uncomfortable.

Only the researcher will have access to interview data and any reports generated as a result of this study. I will use only group averages and paraphrased wording. However, should any information contained in this study be the subject of a court order or lawful subpoena, the University of Denver might not be able to avoid compliance with the order or subpoena. Although no questions in this interview address it, we are required by law to tell you that if information is revealed concerning suicide, homicide, or child abuse and neglect, it is required by law that this be reported to the proper authorities.

If you have any concerns or complaints about how you were treated during the interview, please contact Susan Sadler, Chair, Institutional Review Board for the Protection of Human Subjects, at 303-871-3454, or Sylk Sotto-Santiago, Office of Research and Sponsored Programs at 303-871-4052 or write to either at the University of
I have read and understood the foregoing descriptions of the study called “In search of well managed, engaging, culturally relevant, and caring Algebra 1 classrooms”. I have asked for and received a satisfactory explanation of any language that I did not fully understand. I agree to participate in this study, and I understand that I may withdraw my consent at any time. I have received a copy of this consent form.

Signature ________________________________ Date __________

___ I agree to be audiotaped.
___ I do not agree to be audiotaped.

Signature ________________________________ Date __________

__________ I would like a summary of the results of this study to be mailed to me at the following postal or e-mail address:
Appendix E: Teacher Interview Guide

General

• How would you describe this class?

• How would you describe yourself as a teacher?

Classroom Management

• Can you tell me a little bit about your aims for classroom behavior?
  
  o How do you expect students to relate to each other?

  o How do you expect students to relate to you?

• How do you structure the classroom environment to meet these aims for behavior?

  o Are students expected to work in groups?

  o What routines are established early in the year?

• How does the curriculum either support or hinder your aims for classroom behavior?

• How does your teaching style either support or hinder your aims for classroom management?

• How do the assessments either support or hinder your aims for classroom management?

Student Engagement

• What does student engagement look like to you?
• How do you structure your classroom and lessons to foster student engagement?

• How does the curriculum that you use foster or hinder student engagement?

• What teaching styles do you find foster or hinder student engagement?

• Do some assessment practices foster or hinder student engagement?

**Culturally Relevant Pedagogy**

• How do you address the diverse cultural backgrounds in your classroom?
  
  o What do high expectations look like to you?

  o How do you address student’s interests and backgrounds?

• How do you structure the classroom or lessons to foster understanding and acceptance of differences?

• How does the curriculum foster high expectations and inclusion for all cultures and backgrounds?

• How does your teaching style foster high expectations and acceptance of others?

• How do different assessments foster high expectations and understanding of student differences?

**Caring Relationships**

• How do you view the relationships between your students?

• How do you view your relationships with your students?

• Do you organize your classroom and lessons to foster caring relationships?

• Does your curriculum foster caring relationships in the classroom?
• Does your teaching style support caring relationships between students and/or between you and your students?

• Do the assessments used in this class affect student’s feelings about other students or you?
Appendix F: Student Focus Group Guide

General

- How would you describe this class?
- How would you describe your teacher?

Classroom Management

- Can you tell me a little bit about the rules for classroom behavior?
- Do most students follow these rules?
- Are there structures in the classroom that make it easier or harder for some students to follow the rules?
- Does the topic being taught either support or hinder your classroom behavior?
- Does the way something is taught support or hinder your classroom behavior?
- How do the tests, quizzes, or projects affect your classroom behavior?

Student Engagement

- What activities make learning algebra fun? i.e. group work, hands on activities, projects, etc.
- What classroom structures make learning more fun or engaging? i.e. the way you are seated, the way the class period is structured, etc.
- What do you like most about learning algebra?
- What do you dislike most about learning algebra?
• What does your teacher do to make the learning more fun or more meaningful?

• How do you know if you have learned a topic in this class?

• When you do well/poorly on a test, quiz, or project, does that make you want to get more or less involved in the class exercises and activities?

**Culturally Relevant Pedagogy**

• Do you respect students from different cultures and backgrounds in this class?

  What does that look like?

• What does the teacher do to foster respect for other students?

• Do you feel that the teacher has high expectations for you in this class? In what way?

• Do you feel that your interests and background are valued in this class? How?

**Caring Relationships**

• How do you view the relationships between you and your classmates?

• How do you view your relationship with your teacher?

• Do any of the class activities foster respectful or caring relationships?

• In what ways does your teacher support caring relationships between students and/or between you and the teacher?

• Do the assessments used in this class affect student’s feelings about their relationship with other students or with the teacher?