CULTURALLY RESPONSIVE TEACHING IN AN ALGEBRA I CLASS
FOR REPEATING 9TH GRADERS

By

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A DISSERTATION PRESENTED TO THE GRADUATE SCHOOL
OF THE UNIVERSITY OF FLORIDA IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
DOCTOR OF EDUCATION

UNIVERSITY OF FLORIDA

2017
To our children
ACKNOWLEDGMENTS

I would like to begin by thanking my doctoral committee. I appreciate your feedback, questions, and the ways in which you challenged me to continually improve my practice as an educator. I had the great fortune of having Aki Murata as my committee chair and Nancy Dana as co-chair. Aki’s passion and expertise in teaching mathematics combined with Nancy’s passion and expertise in teacher inquiry and practitioner research were the perfect combination. I appreciate their enthusiastic, celebratory way of challenging me to think deeply about how I, as a classroom teacher, could make an impact and do my part to transform classrooms, schools, and communities for the benefit of all students. I will be forever grateful for the endless hours spent reading and critiquing my work in order to help me tell my research story.

I would like to thank those that have inspired me as an educator. To my students past, present, and future, I hope that you will always view your mistakes as opportunities to learn rather than as failures. I am proud of your achievements, I celebrate your successes, and I look forward to seeing the great things you will do in the future. To the teachers in my life who inspired me to do more and be more than I ever thought I was capable of, thank you for believing in me and serving as examples of the kind of person I want to be. To my colleagues, thank you for sharing your wisdom and for the encouragement you provide during our daily work. To my UF cohort, words cannot express my gratitude for our friendship and shared experiences. I am forever changed and inspired by learning alongside such diverse, caring, and like-minded people. I pray that you keep fighting the good fight and working to change the world for the better.
Most of all, I would like to thank my family. Thank you for believing in me, supporting me, and encouraging me to work hard to achieve my goals. To my children, thank you for being my reason for everything. I love you more than I ever thought possible. You are the light of my life, my greatest joy, and my hope for the future. I wish you every good thing that the world and life have to offer.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACKNOWLEDGMENTS</td>
<td>4</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>8</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td>9</td>
</tr>
<tr>
<td>ABSTRACT</td>
<td>10</td>
</tr>
<tr>
<td><strong>CHAPTER</strong></td>
<td></td>
</tr>
<tr>
<td>1 INTRODUCTION AND BACKGROUND</td>
<td>12</td>
</tr>
<tr>
<td>Background and Significance of the Problem</td>
<td>13</td>
</tr>
<tr>
<td>Purpose of the Study and Research Question</td>
<td>16</td>
</tr>
<tr>
<td>Significance of the Study</td>
<td>16</td>
</tr>
<tr>
<td>Overview of Dissertation</td>
<td>17</td>
</tr>
<tr>
<td>2 LITERATURE REVIEW AND PERSPECTIVES</td>
<td>19</td>
</tr>
<tr>
<td>Challenges</td>
<td>20</td>
</tr>
<tr>
<td>Curricular Tracking</td>
<td>20</td>
</tr>
<tr>
<td>Student Diversity and Disproportionate Representation</td>
<td>21</td>
</tr>
<tr>
<td>Teacher Beliefs, Biases, and Prejudices</td>
<td>22</td>
</tr>
<tr>
<td>Lack of Interest in Learning Mathematics among Students</td>
<td>24</td>
</tr>
<tr>
<td>Culturally Responsive Classroom Practices and Pedagogy</td>
<td>25</td>
</tr>
<tr>
<td>Relationship Building</td>
<td>26</td>
</tr>
<tr>
<td>High Expectations</td>
<td>29</td>
</tr>
<tr>
<td>Engaging Lessons and Learning Activities</td>
<td>31</td>
</tr>
<tr>
<td>Summary</td>
<td>33</td>
</tr>
<tr>
<td>3 RESEARCH METHODS</td>
<td>34</td>
</tr>
<tr>
<td>Context</td>
<td>36</td>
</tr>
<tr>
<td>Participants</td>
<td>37</td>
</tr>
<tr>
<td>Data Collection</td>
<td>38</td>
</tr>
<tr>
<td>Student Interviews</td>
<td>38</td>
</tr>
<tr>
<td>Researcher Journal</td>
<td>39</td>
</tr>
<tr>
<td>Observation/Field Notes</td>
<td>40</td>
</tr>
<tr>
<td>Lesson Videos</td>
<td>40</td>
</tr>
<tr>
<td>Student Work Samples</td>
<td>41</td>
</tr>
<tr>
<td>Data Analysis</td>
<td>42</td>
</tr>
<tr>
<td>Researcher Positionality</td>
<td>51</td>
</tr>
<tr>
<td>Enhancing Trustworthiness</td>
<td>52</td>
</tr>
<tr>
<td>Limitations of the Study</td>
<td>53</td>
</tr>
</tbody>
</table>

6
Summary .......................................................................................................................... 53

4 FINDINGS ...................................................................................................................... 54

What are Relationships between Students and Myself as well as among Students Like? .......................................................................................................................... 54
  Relationships between Students and Myself .................................................................. 54
  Increasing my understanding of students' backgrounds and learning styles .................. 55
  Trusting relationships .......................................................................................................... 57
  Relationships among Students ......................................................................................... 59
  Answering Question 1: Classroom Relationships .............................................................. 62

How are High Expectations for Academics and Behavior Communicated and Enacted in my Algebra I Class? ...................................................................................................... 64
  Academic Expectations ...................................................................................................... 64
  Behavior Expectations ....................................................................................................... 69
  Answering Question 2: Communicating High Expectations .............................................. 71

How do Students Engage in Learning Activities in my Algebra I Class, and How Might Student Engagement be Negotiated Depending on their Individual Backgrounds and Prior Experiences? .......................................................................................................... 72
  Engagement in Collaborative Group Work ...................................................................... 73
  Engagement in Teacher-Led Discussions, Notetaking, and Independent Practice ............... 77
  Answering Question 3: Student Engagement .................................................................... 79

Summary .......................................................................................................................... 79

5 PRACTITIONER REFLECTIONS ....................................................................................... 81

Continued Self-Reflection and Change within my Classroom .............................................. 82
  Advocating for Changes Outside of my Classroom ........................................................... 87

Summary .......................................................................................................................... 90

6 IMPLICATIONS ................................................................................................................ 91

Implications ......................................................................................................................... 91
  Implications for Teachers ................................................................................................... 91
  Implications for Future Research ..................................................................................... 95

Conclusion ......................................................................................................................... 96

APPENDIX: LESSON PLANS FOR UNIT 10: EXPONENTIAL FUNCTIONS ............. 101

LIST OF REFERENCES ....................................................................................................... 115

BIOGRAPHICAL SKETCH ................................................................................................. 119
## LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>page</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-1</td>
<td>Student interview themes.</td>
</tr>
<tr>
<td>3-2</td>
<td>Finalized codes.</td>
</tr>
</tbody>
</table>
# LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-1</td>
<td>Printed teacher researcher journal, day 1</td>
<td>40</td>
</tr>
<tr>
<td>3-2</td>
<td>Example of student work</td>
<td>41</td>
</tr>
<tr>
<td>3-3</td>
<td>Posters for sub-question 1</td>
<td>46</td>
</tr>
<tr>
<td>3-4</td>
<td>Posters for sub-question 2</td>
<td>47</td>
</tr>
<tr>
<td>3-5</td>
<td>Poster for sub-question 3</td>
<td>47</td>
</tr>
</tbody>
</table>
CULTURALLY RESPONSIVE TEACHING IN AN ALGEBRA I CLASS
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By
Jenny Lott Van Buren

December 2017

Chair: Aki Murata
Cochair: Nancy Dana
Major: Curriculum and Instruction

Despite efforts to achieve educational equity in the United States, inequalities still exist through policy, practice, and tradition (Bonner, 2014; Gay, 2010; Gorski, 2013; National Council of Teachers of Mathematics, 2014). Many educators fail to consider the opportunity gaps that exist for students across the achievement spectrum (Horn, 2012). To increase equity, many teachers are working to provide culturally responsive instruction that is designed with students’ unique learning styles, family values, and cultural and linguistic frames of reference in mind. Research suggests that culturally responsive teaching is critical to creating equitable learning environments in which students who have struggled in the past become successful and engaged in learning (Gay, 2002; Gay, 2010).

The purpose of this study was to learn more about what it means to be a culturally responsive teacher for students enrolled in an Algebra I course for repeating ninth graders at a public high school in Anderson, South Carolina. I used practitioner teacher research to examine my practice and reflect on my instruction, focusing on building relationships, communicating high expectations, and increasing student
engagement. There were 12 students enrolled in my course at the time of the study. As I worked to create a more equitable learning environment for repeating ninth graders in my Algebra I classroom through culturally responsive classroom practices, I collected data to gain insights into my research question through (1) student interviews, (2) a researcher journal, (3) observation/field notes, (4) lesson videos, and (5) student work samples. I used both formative and summative data analysis.

This study illustrates the ways in which I attempted to increase my culturally responsiveness as a teacher and the resulting student responses. The data from this study indicated that relationships between myself and students, as well as among students, impacted how students engaged in learning. In general, students did not engage with mathematics in open and authentic manners. However, I could impact student engagement as the teacher by focusing on the instructional design of the lesson, the appeal of the activity to students’ individual learning styles and needs, and my facilitation of the lesson.
CHAPTER 1
INTRODUCTION AND BACKGROUND

In educational contexts, equity can be considered as meeting the needs of all students regardless of racial, cultural, or socioeconomic backgrounds. When defining the principles of equity literacy, Gorski (2013) suggested that congruence exists between what educators believe due to their own individual biases and prejudices and what educators believe about what it means to be effective in working with diverse ranges of students and families. Equity-literate educators recognize the biases and inequities that impact students and families, and they act immediately to respond. Equity-literate educators work to reject stereotypical and deficit views and move toward recognizing communities and families as assets to learning (Dray & Wisneski, 2011; Gorski, 2013; Gay, 2010; Kose & Lim, 2011; Schillwer, 2008; Ullucci & Howard, 2015). Educators that are concerned about equity work to move from aesthetic caring, which emphasizes students’ adherence to school policies and a visible investment in academic achievement, to authentic caring, which emphasizes relationship-building between school personnel and students. Teachers who authentically care are concerned about student academic achievement, but they also care about students’ communities and families and value relationships (Ross & Adams, 2010; Gay, 2010; Schillwer, 2008). Overtime, equity-literate educators redress biases and inequities, creating and sustaining a bias-free and equitable learning environment for every student.

Achieving educational equity is an ongoing challenge for educators, as it requires awareness of one’s own cultural and social positions as well as the positions of students. “Equitable” rarely means equal, and many schools lack the resources needed
to provide high quality programs for all students. Low income families may also lack access to the resources and experiences both inside and outside of schools that are afforded by wealthier families. While some educators are highly effective in engaging low-income and minority students, the persistence of the achievement gap suggests that there is still need for improvement (Books, 2007; Bonner, 2014; Darling-Hammond, 2010; Gay, 2010; Gorski, 2013; Milner & Howard, 2015; Nieto, 2013; Ross, Bondy, Gallingane, & Hambacher, 2008). Therefore, it is important that educators reflect upon current practices, constantly work to revise their own practices, and advocate for reforms to promote equity (Darling-Hammond, 2010; Dray & Wisneski, 2011; Gay, 2010; Milner & Howard, 2015; Nieto, 2013). One way in which teachers work to promote equity in the classroom is culturally responsive instruction. The focus of culturally responsive teaching is students’ unique backgrounds, learning styles, family values, and cultural and linguistic frames of reference. The purpose of this study was to learn more about what it means to be a culturally responsive teacher for students enrolled in an Algebra I course for repeating ninth graders at TL Hanna High School.

**Background and Significance of the Problem**

Historically, education in the United States has excluded particular cultural groups, either by not permitting particular races, genders, or classes of students to attend school at all or by providing a lower level of education as compared to the education of white middle class students. For example, in the 19th Century, school reformers such as Horace Mann argued that, while male and female students should attend school together, black students should not be permitted to attend the same schools as white students (Rury, 2013). Since the 1970s and the rise of the multicultural education movement, Americans are increasingly concerned about
inequities that are apparent in learning opportunities and outcomes for students (Gay, 2010; National Council of Teachers of Mathematics, 2014). Despite improvements and efforts to achieve equity through various reforms and litigation, including the outlawing of racial segregation in public schools, inequalities still exist through policy, practice, and tradition. An enduring problem in schooling is the failure of American schools in educating poor and minority children (Bonner, 2014; Darling-Hammond, 2010; Gay, 2010; Gorski, 2013; National Council of Teachers of Mathematics, 2014; Nieto, 2013).

Many examples of American schools disprove the idea that American schools represent a meritocracy in which people’s achievements are based solely on merit. In fact, in contrast to the popular belief that everyone has an equal chance to success, evidence proves that children who are at risk due to being economically disadvantaged are more likely to attend schools that lack basic conditions necessary to provide a quality education. There are inequities regarding student access to preschool, school funding, school resources, support services, and technologies. In addition, students from lower socioeconomic backgrounds are less likely to be educated by well-paid, certified, and experienced teachers and are often subjected to lower educational expectations and lower quality curricula (Darling-Hammond, 2010; Gorski, 2013).

As a result of America’s failure to provide equitable opportunities in education, poverty, imprisonment, and unemployment rates are rising (Darling-Hammond, 2010; Gorski, 2013; Nieto, 2013). Meanwhile, American companies struggle to find suitable candidates for employment, particularly in mathematics and science related fields, threatening the position of the United States as a global leader (Darling-Hammond, 2010; National Council of Teachers of Mathematics, 2014; Rice & Alfred, 2014).
Women and people of color are a minority in professions related to mathematics and science, suggesting that K-12 experiences along with family and cultural factors impact career choices (Rice & Alfred, 2014).

As a white female mathematics instructor, I am concerned that I may hold biases and prejudices that I may or may not be aware of. Unless I make an effort to change my own thinking and biases, I may unintentionally act on them and negatively impact students. According to Nieto (2013), “Two of the most damaging (and unfounded) societal ideologies are that students’ social and cultural identities and backgrounds determine their intelligence and ability, and that intelligence is fixed and unchanging” (p. 12). Societal ideologies are deeply embedded and often go unnoticed, appearing to be normal, despite negative impacts on students. Therefore, I must work to recognize and change my own biases to be more supportive of all students. It is important for me to constantly reflect upon my own practices in order to promote educational equity.

Prior to this study, I was also concerned as I was new to TL Hanna High School in Anderson, South Carolina, and teaching in a 4x4 block schedule and in an inclusion classroom for the first time. Inclusion classes in South Carolina are general education classes in which students with special education services are included with accommodations to instructional practice and/or assessments. Unlike my teaching experiences in previous schools, where classes changed every 50 minutes, students in my Algebra 1 course remained in class for a 90-minute period. All of the students in the Algebra 1 course were repeating ninth graders, and the course met for a full year instead of a semester like other classes at TL Hanna High School. These changes required me to alter my practice to better support students in my new context, in
addition to understanding my students, their backgrounds, and the communities they were coming from.

**Purpose of the Study and Research Question**

The purpose of this study was to use practitioner research to learn more about what it means to be a culturally responsive teacher for students enrolled in an Algebra I course for repeating ninth graders at TL Hanna High School. Practitioner research is the systematic, intentional study of one’s own practice that involves constructing knowledge from experience and other sources (Cochran-Smith & Lytle, 2009; Dana & Yendol-Hoppey, 2014, York-Barr, Sommers, Ghere, & Montie, 2006). The research question that guided my study is:

What does it mean to be a culturally responsive teacher in the context of an Algebra I class for repeating ninth graders?

Within the central question regarding what it means to be a culturally responsive teacher in the context of an Algebra I class for repeating ninth graders, I developed the following sub-questions:

1. What are relationships between students and myself as well as among students like?
2. How are high expectations for academics and behavior communicated and enacted in my Algebra 1 class?
3. How do students engage in learning activities in my Algebra 1 class, and how might student engagement be negotiated depending on their individual backgrounds and prior experiences?

**Significance of the Study**

During this study, I implemented instructional strategies, intentionally collected and analyzed a variety of data, and reflected on my own work as a mathematics educator. I focused on creating an equitable learning environment, implementing
culturally responsive practices, and increasing student engagement among students enrolled in an Algebra I course for repeating ninth graders. Personally, I benefited from this reflective work by improving my own professional practice and increasing my own capacity for learning. Practitioner research also has potential to restore teachers’ balance and perspective and to renew clarity of personal and professional purpose (York-Barr et al., 2006). In this study context, it is possible that student learning, engagement, and motivation in mathematics increased as I made changes to my practice based on the data I collected and analyzed. This study will also potentially impact other teachers at my school as I share my experiences and learning with them. Other teachers may choose to improve their practice in creating equitable learning environments and being more culturally responsive for students as a result of this work.

This study provides insights into how to improve teaching mathematics and regarding social justice for high school mathematics teaching that are applicable to other contexts. It adds to the existing body of research about social justice, equity, culturally responsive teaching, and mathematics education in that it is a practitioner research study focusing on Algebra I students in an inclusion classroom who were repeating ninth grade.

**Overview of Dissertation**

This dissertation is the result of my realization of the need to increase equity within my own classroom. The purpose of this study was to learn more about what it means to be a culturally responsive teacher for students enrolled in an Algebra I course for repeating ninth graders at a public high school in Anderson, SC. I hoped that increasing my own cultural responsiveness would lead to more of my students being successful and engaged in learning (Gay, 2002; Gay, 2010). I used practitioner teacher
research to examine my practice and reflect on my instruction, focusing on building relationships, communicating high expectations, and increasing student engagement.

In the next chapter, I will discuss relevant literature to identify challenges teachers face when working with diverse groups of students who have previously been unsuccessful in mathematics courses. I will also explore elements of culturally responsive pedagogy as described in literature. Chapter 3 will address my methods of research, and I will discuss the findings in Chapter 4. Chapter 5 will focus on my own reflections as the practitioner researcher for this study, and I will discuss possible implications of this study beyond my own classroom in the final chapter. In summary, this dissertation will illustrate the ways in which I attempted to increase my culturally responsiveness as a teacher and the resulting student responses.
CHAPTER 2
LITERATURE REVIEW AND PERSPECTIVES

The achievement of educational equity, meeting the needs of all students regardless of racial, cultural, or socioeconomic backgrounds, is an ongoing challenge for educators. Despite initiatives that attempt to address discriminatory practices in America’s schools, inequalities still exist (Bonner, 2014; Darling-Hammond, 2010; Gay, 2010; Gorski, 2013; National Council of Teachers of Mathematics, 2014; Nieto, 2013).

The purpose of this study was to learn more about what it means to be a culturally responsive teacher for students enrolled in an Algebra I course for repeating ninth graders at TL Hanna High School. The following question guided the study: What does it mean to be a culturally responsive teacher in the context of a Algebra I class for repeating ninth graders? Within the central question regarding what it means to be a culturally responsive teacher in the context of an Algebra I class for repeating ninth graders, I developed the following sub-questions:

1. What are relationships between students and myself as well as among students like?

2. How are high expectations for academics and behavior communicated and enacted in my Algebra 1 class?

3. How do students engage in learning activities in my Algebra 1 class, and how might student engagement be negotiated depending on their individual backgrounds and prior experiences?

In this chapter, I review literature to identify challenges teachers face when working with diverse groups of students who have previously been unsuccessful in mathematics courses. I also explore elements of culturally responsive pedagogy.
Challenges

Curricular Tracking

Curricular tracking in mathematics is a common practice in American high schools and is intended to assign students to courses that align with their perceived level of ability. However, while achievement and ability may be related, many educators overlook the possibility that mathematical competence is not necessarily correlated with student achievement. Some students perform well but lack deep understanding, while other students understand deeply but perform poorly. The idea that differences in student achievement are a natural consequence of differences in student ability does not take into account the opportunity gaps that exist for students across the achievement spectrum (Horn, 2012).

The practice of tracking does not solve the problems of low performance and disproportionate numbers of poor students and students of color in low-level courses. Rather, some argue that because tracking negatively impacts students’ access to advanced mathematics courses, low achievement will continue. For instance, in a one-year case study of an American high school mathematics department attempting to decrease failure rates in standard level courses, Buckley (2010) found that, despite redesigning or replacing existing courses and adding new courses to the curriculum, the results did not create more equitable mathematics education settings. The courses lacked critical components of content, were shallow in depth, and did not provide students with opportunities for future mathematics course-taking. Although the redesigned curriculum permitted a small percentage of students to have access to more mathematics content, the teachers failed to critically analyze the content for individual courses or teaching strategies. Changing the tracks were not enough to challenge the
existing underlying assumptions regarding students who had a history of low performance in mathematics courses.

**Student Diversity and Disproportionate Representation**

Students in remedial mathematics classes each have a unique story, with individual backgrounds and experiences, but a single common factor unites them: previous failure in mathematics coursework (Hill, 2010). Students of color have an increased risk of being placed in low level courses or being identified as having developmental disabilities. If students have been subjected to racism, classism, or other forms of discrimination, they may have come to believe negative perceptions about their own identities and abilities (Gay, 2010; Nieto, 2013). Unlike their more advantaged peers, low income students have fewer opportunities for second chances when their failure is a result of academic disengagement (Bondy & Ross, 2008). Teachers must take students’ thoughts and feelings into consideration when planning learning activities (Hill, 2010).

As Blanchett, Klinger, and Harry (2009) pointed out, students of color who are identified as developmentally delayed are also more likely to live in poverty, receive inadequate prenatal care, and have limited access to early intervention services that would assist them in school. When families of color seek services, “they are likely to encounter systems and structures that are not prepared to help them navigate services while living life at the intersection of race, culture, language, and disability, which results in them ultimately receiving culturally unresponsive and inappropriate services and intervention” (Blanchett, Klingner, & Harry, 2009, p. 392). Teachers are challenged to combat deficit thinking and to think deeply about the role of context and other factors
external to students that cause the complex phenomenon of disproportionate representation.

**Teacher Beliefs, Biases, and Prejudices**

Beliefs, including biases and prejudices, about people informs how teachers manage classrooms and relate to people (Bondy, Ross, Gallingence, & Hambacher, 2007; Gay, 2010; Gorski, 2013; National Council of Teachers of Mathematics, 2014; Nieto, 2013). For example, when managing classroom behaviors, some teachers may mistake culturally defined actions as resistant or disrespectful due to their own cultural assumptions about appropriate classroom behaviors, leading to conflict, the alienation of certain students, or disruption in the classroom environment (Bondy et al., 2007; Gay, 2010; Weinstein, Tomlinson-Clarke, & Curran, 2004). A teacher’s beliefs, cultural frame of reference, and personal background will influence how he or she responds to students (Dray & Wisneski, 2011). In addition, biases and preconceived notions about students and what they are capable of learning may cause a teacher to have higher or lower academic expectations for particular groups of students (Gay, 2010; Gorski, 2013).

Whether intended or unintended, research suggests that teacher actions are often the result of internalized beliefs and impact students’ self-concepts, particularly in mathematics. For example, in a statistical study regarding the relationships among teacher differential treatment and relevant math instruction on African American students’ self-concept of math ability, math task value, and math achievement, Diemer, Machand, McKellar, and Malanchuk (2006) used structural equation modeling (SEM) to examine data regarding the African American subsample \( n = 618 \) in the longitudinal Maryland Adolescent Development in Context Study (MADICS), which sampled children.
from all 23 public middle schools in Prince George’s County, Maryland. Upon examining the relations among various concepts, the researchers found that relevant math instruction promoted and teacher differential treatment corroded students’ math beliefs and achievement over time. Teacher discrimination undermined students’ perceptions of their teachers. Prejudices, stereotyping, and racism are proven to impact student self-esteem, mental health, and stress levels, creating self-consciousness and causing disengagement from learning tasks (Gay, 2010).

Gay (2010) suggested, “Even without our being consciously aware of it, culture determines how we think, believe, and behave, and these, in turn, affect how we teach and learn” (p. 9). A teacher’s understanding or misunderstanding of the diverse social context in which learning occurs may be due to differences in gender, race, economic status, geographic location, language, religion, family structures, abilities, and family and personal history. Teachers that are unaware of how diversity influences both students’ actions as well as how those actions are perceived may misinterpret a difference as a deficit (Dray & Wisneski, 2011; Weinstein et al., 2004). Teachers are challenged to understand how their own culture and the culture of their students impacts the educational process and act to bring about changes to prevent inequities. Discontinuities between school culture and different ethnic groups may interfere with student learning and success in school. Schools are heavily impacted by dominant norms, and educational practices can privilege certain groups of students while marginalizing others. By placing culture at the center of analysis of underperforming students, teachers may broaden their educational practices to be less biased and more equitable for all learners (Bondy & Ross, 2008; Weinstein et al., 2004).
Lack of Interest in Learning Mathematics among Students

Students in poverty generally have less access than their wealthier peers to higher-order, engaging, and challenging curricula and are more likely to be subjected to rote-memorization or skill-and-drill instructional practices (Gay, 2010; Gorski, 2013). This disparity exists not only between low income and higher income schools, but also within schools due to the disproportionate representation of poor and minority students in lower curricular tracks. Since many teachers of lower-level mathematics classes focus on simple memory, procedural-based problems, and comprehension skills, another challenge faced by remedial mathematics teachers is to create opportunities for students to think critically and at higher levels about problems that they could encounter in the real world (Buckley, 2010; Gorski, 2013; Hill, 2010; Horn, 2012). If students’ previous teachers have excluded practices designed to engage, empower, and challenge, students may enter new mathematics courses with a preconceived lack of interest (Bonner, 2014; Fredricks, Brumenfeld, & Paris, 2004). Negative attitudes and lack of interest in school may lead to poor attendance, disruptive behavior, academic failure, and drop-out (Fredricks, Brumenfeld, & Paris, 2004). Students who have previously struggled to pass coursework and proficiency tests may have decreased interest in learning mathematics due to self-esteem or their perceptions of their teachers’ or peers’ beliefs about students who struggle academically. According to Horn (2012):

Status plays out in classroom interactions. Students with high status have their ideas heard, have their questions answered, and are endowed with the social latitude to dominate a discussion. On the other side, students with low status often have their ideas ignored, have their questions disregarded, and often fall into patterns of nonparticipation or, worse, marginalization. (p. 21)
Students who are continually ignored in classroom discussions continually have their questions unanswered and confusions unaired; they rarely have the opportunity to suggest their own ideas. These students, having few opportunities for academic success or engagement, may internalize their lack of success as negative ideas about their value as human beings, deeming themselves failures and making school pointless (Gay, 2010; Horn, 2012). This learned helplessness, or lack of confidence in one’s own ability to succeed after repeated failure, can be difficult to overcome and influences student participation and classroom conversations that are key to learning mathematics.

**Culturally Responsive Classroom Practices and Pedagogy**

Strategies for strengthening school engagement and learning must be based on evidence for what works rather than what has been done traditionally in remedial courses (Gorski, 2013; Hill, 2010). It is important for teachers to be able to provide culturally responsive instruction that is designed with students’ unique backgrounds, learning styles, family values, and cultural and linguistic frames of reference in mind. According to Gay (2002), “Culturally responsive teaching is defined as using the cultural characteristics, experiences, and perspectives of ethnically diverse students as conduits for teaching them more effectively” (p. 106). It is based on the assumptions that knowledge and skills are learned more easily and thoroughly when learning is situated within the lived experiences and frames of reference of individual students. In the context of a classroom of students that have been previously unsuccessful, it is important that teachers consider how students’ prior lack of success impacts current and future learning. By making lessons more personally meaningful to students and considering how students will respond to the lesson, culturally responsive teachers engage students in learning by increasing their interest in course content and learning
activities. Research suggests that culturally responsive pedagogy is critical to creating equitable learning environments in which students who have struggled in the past become successful and engaged in the learning process (Gay, 2002; Gay, 2010).

**Relationship Building**

In contrast to educators who practice aesthetic caring, which focuses primarily on adherence to school rules and academic achievement, equity literate educators work toward authentic caring, which focuses on relationship-building between school personnel and students, families, and communities (Ross & Adams, 2010; Gay, 2010; Schillwer, 2008). Culturally responsive teachers honor their students’ humanity, hold students in high esteem, expect high performance, and take action to not only show that they care about, but that they care for, their students. They actively engage in students’ lives to have a positive impact. They persist in the effort to help students succeed, even when others give up or diminish the possibility for student success (Gay, 2010).

Culturally responsive teachers initiate and maintain strong, caring, respectful, trusting and personal relationships with students (Bondy et al., 2007; Bonner, 2014; Gay, 2002; Ladson-Billings, 1995; Nieto, 2013; Ross et al., 2008). For instance, teachers communicate with students to learn about their home lives, beliefs, community, and funds of knowledge (Bonner, 2014; Morrison, Robbins, & Rose, 2008). They share detailed information about themselves to help students get to know them better (Bondy et al., 2007). Working to gain as much knowledge as possible about students’ cultures and recognizing that communication is deeply rooted in culture assist teachers with incorporating students’ communication styles into lessons to better communicate instructional content.
Culturally responsive teachers strive to make teaching match the cultures of students, fostering classroom interactions that are reminiscent of interactions that may occur in the home of their students (Bonner, 2014; Ladson-Billings, 1995; Morrison, Robbins, & Rose, 2008). Teachers that effectively implement culturally responsive classroom practices understand that definitions of appropriate classroom behavior are culturally defined. They become aware of individual students’ cultural backgrounds to better understand the biases and inequities they may experience. They work to build caring classroom communities in which students feel safe to take risks, respected, and trusting of one another and the teacher (Bondy et al., 2007; Bonner, 2014; Gay, 2010; Gorski, 2013; Morrison, Robbins, & Rose, 2008; Ross et al., 2008; Schillwer, 2008; Weinstein et al., 2004).

Culturally responsive teachers do the hard work of figuring out who they themselves are in relation to others, engaging in critical reflection of their own values, assumptions, and biases. They work to realize the ways in which they are privileged and how those privileges may obstruct their understanding of students, families, and communities. They reflect critically to improve their cultural responsiveness for the benefit of all students. They are open to new ideas and are receptive to the opinions of others (Bondy & Ross, 2008; Dray & Wisneski, 2011; Gay, 2010; Ladson-Billings, 1995; Nieto, 2013; Weinstein et al., 2004).

Culturally responsive teachers incorporate activities that help students to get to know and connect with other students and establish an atmosphere in which students respect and are kind to one another (Bondy et al., 2007; Gay, 2010; Horn, 2012; Nieto, 2013; Weinstein et al., 2004). The classroom environment is nurturing and cooperative,
and activities are designed to assist students in developing a sense of belonging. To assist students in reimagining themselves and their classmates as competent mathematics learners, teachers establish norms for students to communicate in small groups. The selection of group members is done randomly, affirming the belief all students can learn from each other (Horn, 2012). Students share resources, encourage each other, and work closely together to achieve academic success (Gay, 2010; Ladson-Billings, 1995). When classroom inequities occur, teachers intervene and encourage peer support to increase students’ sense of belonging (Horn, 2012; Morrison, Robbins, & Rose, 2008). Culturally responsive teachers assist students in recognizing social inequities and why they occur (Ladson-Billings, 1995). They honor students’ identities, welcome diversity into the classroom, and instill values of empathy and responsibility for others in their students (Gay, 2002; Gay, 2010; Nieto, 2013).

Culturally responsive teachers work to understand the history of racial injustice that has influenced the present lives of people of color and strive to view communities of color as educational assets rather than as deficits that need to be corrected (Gay, 2010; Ladson-Billings, 1995; Nieto, 2013; Schillwer, 2008). They reach out to parents that may not be able to attend meetings and other school events, greet parents at every opportunity, and personally extend invitations for parents to become involved in their children’s educational experiences (Nieto, 2013). In some studies, teachers reshaped the prescribed curriculum by asking students and families to share resources or to serve as teaching resources for curriculum reform. Connecting school learning to students’ prior knowledge and experiences and attending to students’ individual learning styles enhanced academic success while maintaining cultural competence (Gay, 2010;
Morrison, Robbins, & Rose, 2008). By building relationships with families and communities, culturally responsive teachers also increase students’ social capital to support academic success, developing a network of adults to assist students in navigating school and other social structures (Schillwer, 2008).

**High Expectations**

Culturally responsive teachers establish and communicate clear and high expectations for both academic performance and behavior (Bondy et al., 2007; Bondy & Ross, 2008; Bonner, 2014; Ross & Adams, 2010; Gay, 2002; Gay, 2010; Gorski, 2013; Ladson-Billings, 1995; Morrison, Robbins, & Rose, 2008; Nieto, 2013; Ross et al., 2008). To ensure that expectations are made clear, teachers make sure that students hear, understand, and practice routines, providing both examples and non-examples of appropriate behaviors. Students are required to restate the expectations and demonstrate understanding through practice (Ross et al., 2008).

Culturally responsive teachers promote academic engagement through insistence, exhibiting a personal power that pushes students to meet higher standards personally (Bondy et al., 2007; Bondy & Ross, 2008; Ross & Adams, 2010; Gay, 2010; Ross et al., 2008). They model metacognitive activities such as thinking aloud, scaffold instruction, and provide clarification of challenging curriculum to support meeting high academic expectations. Both individual and collective accomplishments are celebrated, as students work together to solve problems, collaborate and model thinking for each other (Gay, 2010; Ladson-Billings, 1995; Morrison, Robbins, & Rose, 2008). For example, mathematics teachers may expect students to be able to exhibit mathematical thinking at any time by being randomly called upon to work problems on the board, viewing mistakes as learning opportunities rather than failures (Bonner, 2014).
The classroom is a business-like setting in which excuses are unacceptable and students persevere through difficult tasks, feeling confident to take risks (Bondy et al., 2007; Bondy & Ross, 2008; Ross & Adams, 2010; Gay, 2010; Ladson-Billings, 1995; Morrison, Robbins, & Rose, 2008). Students are not permitted to choose failure, and, rather than focusing on student characteristics and shortcomings, teachers engage in deep reflection and data collection and analysis to identify their own shortcomings and changes needed to their own practice to ensure student success (Bondy & Ross, 2008; Ladson-Billings, 1995). By communicating high expectations and the idea that all students are capable of learning, mathematics teachers can build student confidence in mathematics and personal identity. Transitions and movement between tasks become easier as students are able to self-direct themselves through varied learning activities while the teacher walks around the room, facilitating activities and generating discussion (Bonner, 2014).

The classroom environment is task-focused and calm to ensure that everyone has the ability to concentrate and learn. Teachers are kind, but firm, and use both verbal and non-verbal communication to make expectations clear without demeaning students (Bondy et al., 2007; Ross et al., 2008). For instance, teachers may repeat requests verbally or remind students of expectations by miming appropriate actions or simply moving closer to misbehaving students to encourage more focus on assignments (Ross et al., 2008). When behaviors do not meet expectations, culturally responsive teachers follow through on consequences that are clearly communicated to students in advance (Bondy et al., 2007; Bondy & Ross, 2008; Ross & Adams, 2010; Morrison, Robbins, & Rose, 2008; Ross et al., 2008).
When behaviors repeatedly do not meet expectations, culturally responsive teachers collect data to better understand situations, reaching out and respectfully listening to students in order to gain insight regarding how best to intervene and improve behavior (Bondy & Ross, 2008). Culturally responsive teachers engage in deep reflection of their own thoughts and feelings regarding working with particular students, consider alternative explanations for behaviors, monitor their own assumptions, and collaborate with colleagues as well as families of students to plan how to change the classroom environment or take action to improve outcomes. Once a plan is developed, culturally responsive teachers continuously revisit the reflection process and reassess progress (Dray & Wisneski, 2011).

**Engaging Lessons and Learning Activities**

Teachers that effectively implement culturally responsive classroom practices understand that there is a positive association between student engagement and academic achievement. Student engagement is a multidimensional construct consisting of behavioral, emotional, and cognitive factors. Behavioral engagement factors draw on the idea of participation in educational and extracurricular activities in terms of effort, attention, and positive versus disruptive behaviors. Emotional engagement factors include positive and negative reactions to teachers, classmates, academics, and school that impact students’ sense of belonging and willingness to work. Cognitive engagement concerns students’ commitment to, or investment in, learning and their willingness to exert the effort necessary to understand complex ideas and master difficult skills (Fredricks, Brumenfeld, & Paris, 2004).

Culturally responsive teachers work to incorporate high interest, engaging activities to combat previous experiences that have caused students to become
disinterested in mathematics (Hill, 2010). Routes to student engagement may be social or academic and include opportunities for participation, interpersonal relationships, and intellectual endeavors (Fredricks, Brumenfeld, & Paris, 2004). Culturally responsive teachers may use students’ strengths as starting points, planning sequences of activities that ensure students have positive first encounters with content before moving to the more challenging parts of lessons (Gay, 2010; Morrison, Robbins, & Rose, 2008). They attend to student learning styles by allowing opportunities for collaboration, movement, hands on learning, and choice in activities or assessment format (Morrison, Robbins, & Rose, 2008). Content is presented in a variety of formats and thoroughly explained to ensure that all learners understand prior to moving on to new material (Bondy & Ross, 2008). By providing opportunities for meaningful participation in learning, linking curriculum to students, and incorporating experiential learning and group processes throughout the curriculum, teachers create a more equitable learning environment (Bondy et al., 2007).

According to the National Council of Teachers of Mathematics (2014), effective mathematics teaching incorporates activities that are specifically designed to foster student engagement in learning mathematics. Specifically, mathematics teachers should design lessons that enable students to:

- engage with challenging tasks that involve active meaning making and support meaningful learning;
- connect new learning with prior knowledge and informal reasoning and, in the process, address preconceptions and misconceptions;
- acquire conceptual knowledge as well as procedural knowledge, so that they can meaningfully organize their knowledge, acquire new knowledge, and transfer and apply knowledge to new situations;
• construct knowledge socially, through discourse, activity, and interaction related to meaningful problems;

• receive descriptive and timely feedback so that they can reflect on and revise their work, thinking, and understandings; and

• develop metacognitive awareness of themselves as learners, thinkers, and problem solvers, and learn to monitor their learning and performance. (National Council of Teachers of Mathematics, 2014, p. 9)

In contrast to many teachers that believe that students learn mathematics best through memorizing facts, procedurally using formulas, and practicing skills repeatedly, the culturally responsive and effective mathematics teacher centers lessons around students. By carefully selecting activities and facilitating discussions that promote reasoning and problem solving, teachers work toward the goal of helping students make sense of mathematical concepts.

Summary

In this chapter, I reviewed literature to identify challenges teachers face when working with diverse groups of students who have previously been unsuccessful in mathematics courses. Specifically, I discussed how curricular tracking, disproportionate representation, and individual teacher beliefs, biases, and prejudices can negatively impact students. In addition, I described how remedial mathematics teachers are challenged to combat student lack of interest in learning mathematics. I defined culturally responsive teaching, and I explored the culturally responsive practices of relationship building, having high expectations, and designing and delivering engaging lessons and learning activities. In the next chapter, I will describe my research methods and how I used practitioner research to increase my own learning about what it means to be a culturally responsive teacher in my context.
CHAPTER 3
RESEARCH METHODS

To gain insight regarding what it means to be a culturally responsive teacher in the context of my inclusion Algebra 1 class for repeating ninth graders, I used practitioner research to examine my practice and reflect on my instruction. Practitioner research is the systematic, intentional study of one’s own practice that involves constructing knowledge from experience and other sources (Cochran-Smith & Lytle, 2009; Dana & Yendol-Hoppey, 2014, York-Barr, Sommers, Ghere & Montie, 2006). As Bonner (2014) suggested, successful mathematics teachers of traditionally underserved students reflect and revise techniques constantly with an explicit focus on the classroom environment and cultural connectedness. It was my intention to critically examine student behaviors and perceptions as well as my own practices as a mathematics educator in order to construct knowledge about culturally responsive teaching within my context.

Over the course of Unit 10, Exponential Functions, I wrote detailed lesson plans and intentionally worked to increase the use of culturally responsive pedagogy in my instruction. Instruction for Unit 10 took place towards the end of the spring 2017 semester and lasted approximately 3 weeks. The key concepts for the unit included evaluating and graphing exponential functions, modeling growth and decay using exponential functions, writing and using recursive and explicit formulas for geometric sequences and arithmetic sequences, and comparing linear, quadratic, and exponential functions graphically, tabularly and verbally (Anderson School District 5, 2016). I chose this unit as the focus of this study because these concepts are particularly applicable to real world problem solving. The lesson plans are provided in the Appendix.
As the lessons that I planned were implemented, I carefully observed my Algebra I students and their engagement in mathematics and problem solving while collecting data. To measure behavioral engagement, I observed and documented discussions with my students, particularly documenting the presence or absence of positive conduct, the level of involvement in learning tasks, and contributions to class discussions in my field notes. For example, I documented when students were writing, talking about mathematics, asking questions, and assisting their peers. I also documented instances of observed emotional engagement through students’ affective reactions in the classroom and to my instructional practices (Fredricks, Brumenfeld, & Paris, 2004). For example, I documented students resisting working with particular students or eagerness to get started with activities. I took notes of my observations and wrote reflections in my researcher journal regarding equity issues that arose during class or discussions with students. For example, I wrote down my questions or ideas about how I could better communicate with particular students based on my observations and experiences.

Each lesson was recorded by video to capture discussions and activities that took place during the lesson. After the lesson, I watched the videos and added notes to my researcher journal in order to remind myself of important details and support my thinking. I conducted interviews to better understand the background and experiences of individual students in order to inform instructional practices. In addition, I reviewed student work samples to reflect upon how well I communicated high levels of expectation regarding student effort and achievement using equity as a critical lens.

Practitioner research was appropriate to answer my research questions because I examined my own practice and reflected upon my own instruction in an attempt to
construct new knowledge about my specific practices in my specific context. This study documented my practices and student responses that occurred as a result of my work as a practitioner researcher. This study emerged from my own sense of urgency to find ways to increase equity for students in mathematics courses through culturally responsive teaching.

**Context**

This study took place within an Algebra 1 inclusion class for repeating ninth graders at TL Hanna High School in Anderson, South Carolina, during the 2016-2017 school year. In 2014-2015, 52% of students in South Carolina were white, 37.3% were African American, 2.1% were Asian/Pacific Islander, 8% were Hispanic, and 0.6% were American Indian/Alaskan, while 77.6% of South Carolina teachers were white, 15.2% were African American, 1.1% were Asian, 1.1% were Hispanic, 0.2% were American Indian, and 4.8% were not reported. Statewide, the graduation rate for 2014-2015 was 80.3%. 82.7% of White students, 76.7% of African American students, 91.1% of Asian/Pacific Islander students, 77.1% of Hispanic students, and 79.5% of American Indian/Alaskan students graduated (South Carolina Public Schools, 2016).

TL Hanna High School is located in Anderson School District 5, and is one of three high schools in the district. In 2015, 1,773 students attended TL Hanna High School and 90.3% of students at the school scored 70% or higher on the Algebra I/Math for the Technologies 2 End of Course test. Statewide, 85.7% of students in South Carolina scored 70% or above on the Algebra I/Math for the Technologies 2 End of Course test in 2015. In 2015, the School Four-Year Cohort Graduation Rate at TL Hanna High was 83.3% (South Carolina Department of Education, 2016).
Participants

The participants in this study were students in an Algebra 1 inclusion class for repeating ninth graders at TL Hanna High School in Anderson, South Carolina. Inclusion courses in South Carolina are general education courses in which students who receive special education services are included with modifications to instructional practices and/or assessments. Since TL Hanna High School operates on a 4 x 4 block schedule, each class session was 90 minutes in duration. Unlike other courses at TL Hanna that only last for a single semester, this class met for the entire school year. Since the class was an inclusion class, a special education teacher joined me to assist and co-teach for 45 of the 90 minutes daily.

As of April 2017, 12 students were enrolled in the course. At the beginning of the school year, the class had 20 students enrolled, but eight students were withdrawn prior to April. Of the eight withdrawn, 2 students were expelled for discipline issues, 2 students moved to other schools within the district, 1 student moved to another district, and 3 students were dropped for non-attendance. Of the 12 students that remained in the class and were present at the time of this study, five students were female and seven were male. Five students were black and seven were white. Three of the students were 15 years old, six were 16, and three were 17 at the time of the study. Eight of the 12 students had excessive absences from the course (more than 10 days absent). Of the eight students with excessive absences, five had missed more than 20 days of class. Based on their annual household income, 10 of the 12 students qualified for free lunch. Two of the 12 students had IEP accommodations as follows:

- Student 1: Calculator
• Student 2: Preferential seating (instructional), calculator, small group setting for quizzes and tests, and oral administration

One of the 12 students had accommodations of preferential seating near the source of instruction, time and a half for tests and use of calculator based on a 504 plan.

**Data Collection**

Practitioner research is different from other research in that the work is specific to the context of the researcher, requiring data that documents classroom practices, student learning, and the thinking and reflections of the researcher (Cochran-Smith & Lytle, 2009). As I worked to create a more equitable learning environment for repeating ninth graders in my Algebra I classroom through culturally responsive classroom practices and pedagogy, I collected data to gain insights into my research questions through (1) student interviews, (2) a researcher journal, (3) observation/field notes, (4) lesson videos, and (5) student work samples.

**Student Interviews**

Individual interviews are a way to capture perceptions through discourse. In addition to regular, unstructured interviews in which I asked students about their thinking and learning during naturally occurring classroom conversations, I also conducted semi-structured, more formal interviews with students (Creswell, 2013; Dana & Yendol-Hoppey, 2014). Notes about the unstructured interviews were recorded in my field notes on a daily basis. The semi-structured interviews were conducted at the beginning of the unit to better understand the background and experiences of individual students in order to inform instructional practices. The focus of the interviews was elements of culturally responsive classroom practices and pedagogy, specifically relationship building, high expectations, and engaging lessons and learning activities.
The prompts below guided the initial interviews, and additional questions were posed based on participants’ responses:

- Tell me a little about yourself.
- Tell me about your family.
- Describe your relationship with your classmates.
- Tell me about a time when you really liked being in class.
- Tell me about a lesson that made you feel smart or successful.
- Tell me about a lesson that you did not like.
- Tell me about a lesson that you struggled with.
- Based on what you know about me and this class so far, what things do you think are most important for you to keep in mind in order to be successful in Algebra 1?
- As you look back on my actions in class so far this school year, what stands out for you?

The semi-structured interviews were audio-recorded and transcribed (Creswell, 2013).

**Researcher Journal**

After each teaching session, I reflected on my teaching practices, student actions and conversations, and student work in my researcher journal. By keeping a journal, a person can capture his or her own thinking (Dana & Yendol-Hoppey, 2014). As part of my reflecting on the work that took place in the classroom, I documented successes and areas of need and recorded my thoughts about what steps I should take next to create a more equitable learning environment and improve my practice through culturally responsive classroom practices. Each day I used the same three questions to guide my journal reflection and writing: (1) What did I do today that related to being a culturally responsive teacher?, (2) How did students respond?, and (3) What did I learn today
about being a culturally responsive teacher? Figure 3-1 illustrates one page from my researcher journal.

Figure 3-1. Printed teacher researcher journal, day 1 (Photo courtesy of author)

Observation/Field Notes

To capture actions as they took place in the classroom, I took detailed field notes to record my observations. Field notes included scripts of dialogue or conversations, classroom diagrams, or notations about what individuals said or did. I attempted to keep my field notes non-judgmental and focused on capturing what was occurring (Creswell, 2013; Dana & Yendol-Hoppey, 2014). During each class, I recorded notes to capture the behaviors and statements of myself and students.

Lesson Videos

Each lesson was recorded by video to capture discussions and activities that took place during the lesson. The video camera was placed in the back of the classroom to record general lesson procedures and interactions. After each lesson, I watched the video and added additional notes to my field notes and researcher journal.
in order to remind myself of important details and support my thinking. By observing lesson videos and my own teaching, I was able to study “attitudes, skill and knowledge levels, nature of interactions, nonverbal behavior, instructional clarity, and the influence of physical surroundings” (Dana & Yendol-Hoppey, 2014, p. 108). When taking notes using the video, I was sure to include both descriptive and reflective notes. My descriptive notes summarized the flow of activities in the classroom in a chronological way, while my reflective notes focused on the process and conclusions that I made as a result of observing the video (Creswell, 2013).

**Student Work Samples**

Student work as artifacts were generated as a normal part of my Algebra I class. Figure 3-2 illustrates an example of student work that was collected during this study.

![Figure 3-2. Example of student work (Photo courtesy of author)](image-url)
By systematically collecting, labeling, and organizing student work documents, I was able to look within and across documents to analyze them and better understand changes in student learning and make instructional decisions. Student work throughout the course of the unit revealed shifts that I would not have been able to see when looking at a single work sample in isolation (Dana & Yendol-Hoppey, 2014). I particularly looked at student work samples to reflect upon how well I communicated high levels of expectation regarding student effort and achievement.

**Data Analysis**

To increase my understanding about what it means to be a culturally responsive teacher for students enrolled in an Algebra I course for repeating ninth graders, I used both formative and summative data analysis. In contrast to the research in which the researcher collects all data prior to analyzing it, I analyzed data during the study so that I could adjust my practices as the unit unfolded. When all the data were collected, I then reviewed the data in their entirety, paying attention to how each piece of data may be related and reflecting on what I learned.

Initially, student interviews were recorded for audio, transcribed, and coded with themes. To code the interviews, I read the transcriptions entirely and made notes about important details that related to my research question and sub-questions in the margins (Creswell, 2013). For example, I noted student comments about expectations for behavior in my class and their personal preferences about learning. From the notes that I wrote in the margins, I developed initial themes for the interviews (Table 3.1). Specifically, student interview themes that emerged included students’ perceptions of expectations regarding behavior, perceptions of expectations regarding academics, positive relationships with me as their teacher, positive relationships with their peers,
preferences of classes in which feelings of success occur, and specific learning styles or preferences.

Table 3-1. Student interview themes.

<table>
<thead>
<tr>
<th>Student Interview Theme</th>
<th>Examples of Student Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceptions of Expectations Regarding Behavior</td>
<td>“The way that you handle like the bad ones . . . I think you do good. Cause like, it’s distracting.”</td>
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<tr>
<td></td>
<td>“Homework and paying attention.”</td>
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<tr>
<td></td>
<td>“You don’t tolerate outbursts or disruptions to the class.”</td>
</tr>
<tr>
<td></td>
<td>“I need to . . . not play around so much, and do my work and turn it in on time.”</td>
</tr>
<tr>
<td>Perceptions of Expectations Regarding Academics</td>
<td>“I would say focusing and paying attention.”</td>
</tr>
<tr>
<td></td>
<td>“At least trying to make progress and doing it.”</td>
</tr>
<tr>
<td></td>
<td>“I need to work harder.”</td>
</tr>
<tr>
<td></td>
<td>“Always listen and look for things. Listen to directions mainly.”</td>
</tr>
<tr>
<td>Positive Relationships with Me as their Teacher</td>
<td>“The way you teach. You try to make it fun for everyone.”</td>
</tr>
<tr>
<td></td>
<td>“The fact that you’re an upbeat person. You’re always happy in the morning . . . I don’t know why, but that’s what always stands out to me, that you’re always upbeat and happy in the mornings.”</td>
</tr>
<tr>
<td></td>
<td>“You care.”</td>
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<tr>
<td></td>
<td>“You try to work with everybody individually and that you um give them time to do work and you help people out.”</td>
</tr>
<tr>
<td></td>
<td>“You get along with everybody and it’s a good thing . . . When you walk around the room, to see everybody and if they get it.”</td>
</tr>
<tr>
<td>Positive Relationships with their Peers</td>
<td>“I know all my classmates. I knew them last year.”</td>
</tr>
<tr>
<td></td>
<td>“I have no problem with no body.”</td>
</tr>
<tr>
<td></td>
<td>“We communicate a lot. You know, and I’m friends with everybody.”</td>
</tr>
<tr>
<td></td>
<td>“I mean I know everybody.”</td>
</tr>
<tr>
<td>Preferences of Classes in which Feelings of Success Occur</td>
<td>“The fact that I can do it . . . Because it’s graphing, and I actually enjoy graphing. It’s points, and seeing the plots, and seeing what it makes. I can connect the dots.”</td>
</tr>
<tr>
<td></td>
<td>“That was pretty easy . . . I knew how to do it.”</td>
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<td></td>
<td>[I like] “math. Cause I can catch on to that.”</td>
</tr>
<tr>
<td></td>
<td>“I’m visual and . . . I actually do better with like actual music going in my ears.”</td>
</tr>
<tr>
<td></td>
<td>“We get to interact with learning.”</td>
</tr>
<tr>
<td></td>
<td>[I like] “competing with other students.”</td>
</tr>
<tr>
<td></td>
<td>“Like breaking down into parts, I can catch on to most of that, and it makes it easy for me.”</td>
</tr>
<tr>
<td></td>
<td>“. . . hands on stuff, and that’s what I like doing.”</td>
</tr>
<tr>
<td></td>
<td>[I like] “when activities are hands on.”</td>
</tr>
</tbody>
</table>

I reflected on these themes as I wrote and modified the lesson plans for the unit of study. For example, I strived to incorporate a lot of hands-on and collaborative
learning activities to appeal to specific students’ learning styles. I frequently referred back to interview data when I reflected on particular student behaviors throughout the unit in order to try to make sense of things that were happening in the classroom. For example, when particular students did not respond well to my instructional decisions, I referred back to their interview responses to try to better understand individual perspectives.

Throughout the unit of study, I adjusted my practices as a result of ongoing formative data analysis. After each class session throughout the unit, I reflected on my teaching practices, student actions and conversations, and student work in my researcher journal. At the end of each day, I watched the video of the lesson and added notes to my researcher journal. By using my journal, I worked to capture my own thinking, document successes and areas of need, and collect data to inform instructional decisions for future class sessions. For example, I revised some lessons to have group activities and removed some group activities from other lessons as a result of my observations of student behavioral engagement during specific activities.

Classroom successes were identified by evidence of relationship building, effective communication of high expectations, and student engagement. For example, I noted when students talked about mathematical concepts, answered questions, asked questions, assisted others, took notes, took a leadership role during group processes, and followed the directions for lesson activities. Areas of need were identified when relationships could be improved, expectations are unclear, and student engagement was not apparent. For example, I documented when students did not follow directions and inappropriate classroom behaviors that I observed. I noted how my thinking on
these points influenced the next day’s teaching, then reflected on the changes made the following day. For example, I wrote down my thoughts about how I might improve how students are grouped for activities, the physical classroom arrangement, student activity guides, or other aspects of lessons. I made changes as needed, and I reflected on the outcomes after I implemented the changes.

Throughout the unit of study, my field notes and student work samples were analyzed using equity as a critical lens to reflect upon how well I communicated high levels of expectation regarding student effort and achievement. For example, if I noticed that particular groups of students followed directions more closely than others or that particular groups of students performed higher or lower than others, I modified the following lessons accordingly to communicate with all students better, and the changes were noted in my field notes. In addition, student work throughout the unit was systematically collected, labeled, and organized so that I could look within and across documents for shifts that occurred over time (Dana & Yendol-Hoppey, 2014).

After all data were collected, I reviewed the data in their entirety for summative analysis at the end of the unit. This process involved re-reading transcripts, re-reading my researcher journal, and reviewing the video data multiple times. As I reviewed the data, I wrote memos in the margins of documents to record ideas and concepts that occurred to me as I read. For example, my notes at this point included short transcripts from classroom conversations, details about the number of students that were off task at specific times during the lessons and the number of students that were on task as specific times during the lessons. Then, I jotted down short notes about details within my researcher journal and interview transcripts on post-it notes. I
made decisions about what to be included (and not included) in these short notes by focusing on my research question and sub-questions. I labeled and used a particular pen for each post-it note so that I could easily refer back to the full piece of data. For instance, notes about details from my researcher journal were written in green and labeled according to the number of the lesson (day 1, day 2, etc.). I sorted the post-it notes by placing them on posters that I created for each sub-question for my study. When I determined that a piece of data applied to more than one question, I duplicated the post-it note so that it would appear on all the posters for which the data applied. Then, I reviewed all the videos again, adding additional notes to my researcher journal and post-it notes to the posters. Figure 3-3, Figure 3-4, and Figure 3-5 illustrate the posters I used in the data analysis process.

![Posters for sub-question 1](image)

Figure 3-3. Posters for sub-question 1 (Photo courtesy of author)
Figure 3-4. Posters for sub-question 2 (Photo courtesy of author)

Figure 3-5. Poster for sub-question 3 (Photo courtesy of author)
When thinking about coding the data, I expected to find information related to culturally relevant pedagogy, but I also looked for code segments that represented interesting or unusual information that I did not anticipate (Creswell, 2013). For instance, anticipated themes/code segments included themes from literature about culturally responsive teaching such as practices that demonstrated caring, behavior expectations, academic expectations, academic support, and engaging lessons. However, I also understood that there may be code segments that I did not anticipate that are related to mathematics or instructional practices.

The posters assisted me in grouping the post-it notes that were related. I worked on each poster separately, and the initial groupings were more general and less specific. For instance, when grouping the post-it notes that I wrote about relationships, I initially divided all the notes into two categories: student-teacher relationships and relationships among students. The notes about high expectations were divided into behavior expectations and academic expectations. When grouping notes about student engagement, I initially divided the notes based on the activity taking place (group work, notetaking, whole class discussion, independent practice).

Within these general categories, I created sub-groups in an effort to make more specific groupings. As I grouped the post-it notes again, I wrote down possible codes and themes along with additional notes regarding my thinking about the data. Possible codes and themes at this stage in the analysis regarding relationships included increasing my own understanding of students, the physical arrangement of the classroom, student resistance to working with new and/or different people, students appearing uncomfortable answering questions unless they were confident, students
afraid of having the wrong answer, and dependence on teacher support. Possible codes and themes at this stage in the analysis regarding high expectations included the ways in which expectations were communicated (verbal, modeling, physical cue, etc.) and consequences for misbehaviors, as well as specific expectations that were communicated multiple times such as respecting classmates, following directions and/or completing work, listening/focusing/paying attention, explaining reasoning, and thinking deeply about mathematical concepts. Possible codes and themes at this stage in the analysis regarding student engagement included engagement in whole class discussions and notetaking, engagement in group work, disengagement in whole class discussions and notetaking, disengagement in group work, and interventions.

I also reviewed student work to search for evidence to support the ways in which I was thinking about the data. For instance, I specifically looked at student work samples to reflect upon how well I communicated high levels of expectation regarding academics since my observations were not enough to determine whether or not students clearly understood the expectation to think deeply about mathematical concepts and to explain their reasoning when solving problems. As themes and stories emerged during the data analysis, I referred back to my research questions to determine the relationship (Dana & Yendol-Hoppey, 2014). As I reread and reviewed the data multiple times, I was able to refine codes. For example, students appearing uncomfortable answering questions unless they were confident, students afraid of having the wrong answer, and dependence on teacher support were determined to all be related to trusting relationships. I then organized the final codes by sub-question, as shown in Table 3-2.
Table 3-2. Finalized codes.

<table>
<thead>
<tr>
<th>Code/Theme</th>
<th>Examples of Evidence from Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increasing my understanding of students’ backgrounds and learning styles</td>
<td>• Two-way communication between myself and students about their home lives, community, and funds of knowledge</td>
</tr>
<tr>
<td></td>
<td>• My own reflection and modification of lessons based on observing students</td>
</tr>
<tr>
<td>Trust of me as the teacher</td>
<td>• Students asking for teacher help</td>
</tr>
<tr>
<td></td>
<td>• Student talk about areas of weakness/problems</td>
</tr>
<tr>
<td></td>
<td>• Students taking risks (or not)</td>
</tr>
<tr>
<td>Student resistance to working with particular students</td>
<td>• Resistance to randomly assigned groups</td>
</tr>
<tr>
<td>Trust among students and student risk taking in mathematics</td>
<td>• Students asking for peer help/support (or not)</td>
</tr>
<tr>
<td></td>
<td>• Talk about areas of weakness/problems among peers</td>
</tr>
<tr>
<td></td>
<td>• Students sharing answers confidently (or not), even when there is a risk of being incorrect</td>
</tr>
<tr>
<td>How are high expectations for academics and behavior communicated and enacted in my Algebra 1 class?</td>
<td></td>
</tr>
<tr>
<td>Code/Theme</td>
<td>Examples of Evidence from Data</td>
</tr>
<tr>
<td>Communicating expectations to think deeply about mathematical concepts and to explain reasoning</td>
<td>• Students writing down the formula that they selected to use, showed what numbers were substituted into the formula, and showed steps that were used to simplify the expression</td>
</tr>
<tr>
<td></td>
<td>• Students effectively communicating their reasoning when solving problems</td>
</tr>
<tr>
<td></td>
<td>• Students making connections that they saw to prior learning</td>
</tr>
<tr>
<td>Communicating behavior expectations</td>
<td>• Behavior expectations provided in multiple formats</td>
</tr>
<tr>
<td></td>
<td>• Students self-directing behaviors and transitioning smoothly between tasks</td>
</tr>
<tr>
<td>Following through with consequences for inappropriate behaviors</td>
<td>• Me following through with consequences for misbehavior</td>
</tr>
<tr>
<td>How do students engage in learning activities in my Algebra 1 class, and how might student engagement be negotiated depending on their individual backgrounds and prior experiences?</td>
<td></td>
</tr>
<tr>
<td>Code/Theme</td>
<td>Examples of Evidence from Data</td>
</tr>
<tr>
<td>Engagement in Collaborative Group Work</td>
<td>• Collaboration, movement, hands on learning</td>
</tr>
<tr>
<td></td>
<td>• Students writing, talking about math, using the materials appropriately, and solving problems</td>
</tr>
<tr>
<td>Disengagement in Collaborative Group Work</td>
<td>• Students working independently and talking about non-math topics during group work</td>
</tr>
<tr>
<td></td>
<td>• Students not working together to solve problems together</td>
</tr>
<tr>
<td>Engagement in Teacher-Led Discussions, Notetaking, and Independent Practice</td>
<td>• On-task behaviors such as students writing in their notebooks, verbally responding questions, and watching me as I modeled activities</td>
</tr>
<tr>
<td>Disengagement in Teacher-Led Discussions, Notetaking, and Independent Practice</td>
<td>• Off task behaviors</td>
</tr>
<tr>
<td></td>
<td>• Me reminding students to either get started or to stop disturbing their classmates</td>
</tr>
</tbody>
</table>
The finalized codes developed are shown by sub-question along with examples of evidence from the data (Table 3-2). These findings are discussed in more detail in the next chapter. When choosing specific incidents in the data to share in the results, I narrowed the data to include critical incidences that sparked my own learning or changes in my own practice in order to become more culturally relevant.

**Researcher Positionality**

Creswell (2013) defined qualitative inquiry as including not only the voices of participants and a complex description of the problem, but also the reflexivity of the researcher. As I engaged in the process of practitioner research, it was important to be cognizant of who I am and what I brought to this study. I wanted the reader to understand any biases or assumptions that may have impacted this study. In this section, I describe my past experiences and orientations that are likely to shape the interpretation of data for this study.

I was raised by a poor single mother in a rural area of Louisiana. From an early age, I believed in the idea of meritocracy. I saw education as a means to escape poverty and to better myself for my family, and I believed that my hard work would pay off. I graduated valedictorian of my high school class, and I was the first person in my family to attend college. Looking back on my K-12 experiences now that I am adult, I see ways in which I was, and ways that I still am, privileged in relation to others. For instance, I see how being white has afforded me advantages over others that I have not earned. I also see ways in which I overcame the disadvantages I experienced in my youth. For instance, I realize how my belief in my own ability to succeed was largely influenced by my teachers, with whom I developed strong relationships with. I see the
network of people that assisted me in navigating school and getting through college. I brought these experiences to this study, along with a strong desire to help kids succeed.

At the time of this study I had been a mathematics educator for 11 years. Prior to August 2016, all of my experience as an educator took place in Florida, six years at a local high school and four years at a virtual school of choice. Although I always had a personal commitment to working to assist students who had not previously been successful in mathematics courses, this was my first experience teaching a class in which all the students did not pass in the previous year. It was also my first experience teaching an inclusion class and on a 4 x 4 block schedule. I realize that my past teaching experiences influenced the decisions I made as the teacher and as the researcher in this study, but I also believe that, in many ways, I ventured into the unknown. I had a strong desire to learn from this experience, and I was motivated to do everything I could to see students in this class succeed.

**Enhancing Trustworthiness**

In the previous section, I described my positionality as the researcher in this study. To further enhance the trustworthiness and validity of my research, I used the process of triangulation and rich, thick descriptions. Creswell (2013) defined triangulation as a process involving “corroborating evidence from different sources to shed light on a theme or perspective” (p. 251). I used student interviews, a researcher journal, observation/field notes, and student work samples as data. By developing rich, thick descriptions of the context, participants, and events, I attempted to assist readers in making decisions regarding the transferability of my work.
Limitations of the Study

This study is a small glimpse at my experiences as a teacher in an Algebra I class for repeating ninth graders at TL Hanna High School in Anderson, South Carolina. It is not meant to be representative of all Algebra I classes nor all classes of repeating ninth graders. Schools and classrooms vary greatly depending on geographical region, funding, organization, student demographics, and other factors. Individual teacher experiences can also vary widely, and I realize that this study was impacted by my own background and prior experiences as a white female educator with 10 years of experience teaching in public high school mathematics classrooms. However, I hope that teachers in other contexts will be able to transfer important concepts from my experiences during this study to their own settings.

One limitation of this study is that it was conducted within a single unit at the end of the school year. This study does not capture the events that occurred within my classroom prior to the unit of study or after the unit of study. The limited time frame may have impacted my ability to capture my own professional growth as well as the academic and personal growth of my students throughout the school year. Regardless of this limitation, this study serves as an important contribution to existing research about culturally responsive teaching and mathematics education and has implications for teachers beyond my context and for future research.

Summary

In this chapter, described my research methods and how I used practitioner research to increase my own learning about what it means to be a culturally responsive teacher in my context. Specifically, I described the context, participants, data collected, and data analysis process for this study. In the next chapter, I will present my findings.
This study focused on increasing my understanding of what it means to be a culturally responsive teacher in the context of an Algebra I class for repeating ninth graders. Within the central question, I developed the following sub-questions:

1. What are relationships between students and myself as well as among students like?
2. How are high expectations for academics and behavior communicated and enacted in my Algebra 1 class?
3. How do students engage in learning activities in my Algebra 1 class, and how might student engagement be negotiated depending on their individual backgrounds and prior experiences?

As described in the previous chapter, in an attempt to answer my research questions, I collected the following forms of data: (1) student interviews, (2) a researcher journal, (3) observation/field notes, (4) lesson videos, and (5) student work samples. My findings are organized by the sub-questions developed for this study.

**What are Relationships between Students and Myself as well as among Students Like?**

In this section, I will use actual classroom interactions from the data to describe relationships between students and myself as well as among students. The section will be organized to focus on two types of relationships separately. I will end this section with a summary of the section to answer Research Question 1.

**Relationships between Students and Myself**

One of my goals in becoming more culturally responsive is to practice more authentic caring for my students. In contrast to aesthetic caring, which focuses primarily on adherence to school rules and academic achievement, authentic caring focuses on relationship-building between school personnel and students, families, and communities
(Ross & Adams, 2010; Gay, 2010; Schillwer, 2008). In my daily interactions with students, I have always strived to honor my students’ humanity, hold students in high esteem, expect high performance, and actively engage in students’ lives. During this study, I intentionally worked to increase my understanding of students’ individual backgrounds and learning styles so that I could better plan learning activities that would meet individual student needs and interests and increase student engagement in the learning process.

**Increasing my understanding of students’ backgrounds and learning styles.**

Through the interview process, I became more aware of students’ individual backgrounds and their daily life experiences. I specifically asked students about their home lives in order to become more aware of their individual backgrounds and daily life experiences. I learned that many of my students came from low income, single parent families. Two of the seven students interviewed did not have relationships at all with either one of their biological parents, and two other students of the seven students interviewed lived with extended family members and not their biological parents. Six of the seven students interviewed had other children living with them as part of the household, and all six described having to assist with the care of younger children in the household. One of the students interviewed also worked part-time after school and on weekends, one of the students interviewed enjoyed playing sports in his neighborhood, and another enjoyed doing automotive work in his family’s garage.

I also worked to develop more understanding of my students’ learning styles and preferences. For instance, during the interview process, I noted that three out of the seven students interviewed described hands on learning experiences as lessons that they enjoyed. Two students indicated that they prefer to work alone, two students
specifically indicated that they liked working with other students in groups or as a team, and one student described himself as a visual/auditory learner.

Five of the seven students described struggling particularly with mathematics. Three of the five students specifically mentioned having difficulty remembering mathematical concepts. For example, one student said, “I still struggle sometimes with knowing what the signs are. Like telling whether you go down or up when you add or subtract.” Another student said, “I basically couldn’t remember anything from last year, and I was lost at the beginning” when talking about Algebra I lessons at the beginning of the school year. Another student described disliking learning about transformations of parent functions because he struggled with memory. The other two students that indicated struggles with mathematics specifically mentioned not liking word problems and having difficulty with multi-step problems. Five out of the seven students interviewed indicated that they felt successful during lessons or classes in which they found learning easy or caught on quickly.

As the Unit 10 lessons were taking place, I identified individual students’ learning styles and preferences through interactions that took place in the classroom and by observing student behaviors. I intentionally looked for students who were demonstrating behavioral engagement during lessons, which students were eager to assist others, which students were seeking help from me, and which students were seeking help from their peers. Behavioral engagement factors draw on the idea of participation in educational and extracurricular activities in terms of effort, attention, and positive versus disruptive behaviors (Fredricks, Brumenfeld, & Paris, 2004). After each lesson, I reflected on my own learning, and I planned future lessons accordingly. As I
increased my understanding of students’ individual backgrounds and learning styles, I became even more aware of how establishing and maintaining trusting relationships between students and myself as their teacher impacted student interest and motivation to learn.

**Trusting relationships**

I wanted my students to feel safe to take risks, to feel respected, and to trust me as their teacher (Bondy et al., 2007; Bonner, 2014; Gay, 2010; Gorski, 2013; Morrison, Robbins, & Rose, 2008; Ross et al., 2008; Schillwer, 2008). In general, the data indicated the presence of a trusting relationship between my students and me in that the students viewed me as someone who would help them with their lessons. However, some of the data suggested that, at times, particular students either relied too much on my support or did not seek support from me at all.

Student interview responses as well as particular student behaviors indicated that students trusted me to assist them with problems and answer their questions in class. For instance, during the interviews, I asked, “As you look back on my actions in class so far this school year, what stands out to you?” One student responded, “You try to work with everybody individually . . . you give them time to do work, and you help people out.” Another student indicated “you walk around the room to see everybody and if they get it.” Frequently and throughout the unit, students were observed asking me questions, asking me to check their work, or requesting my support.

On a few occasions, I noticed students not working at all unless I was physically near them, answering questions and/or assisting. For example, during the first lesson, when exponential growth was initially introduced, I noticed that some students did nothing while I was assisting other groups. I documented my thoughts and questions
about how to be more effective in scaffolding support and encouraging more peer
interaction as I reflected on my own learning in my researcher journal:

Several students did not begin the task until I moved closer to the desk. Some still did not begin working until I modeled how to fold the paper with them at their desk and even pointed to where they needed to be writing on the activity guide . . . When I told students they could work together, they did not talk as much as I anticipated. Some students did nothing while I worked with other groups. Perhaps they gave up until they got more support from me.

In contrast to incidences in which students appeared to rely too much on my support, there were also instances in which I noticed particular students rarely requested support from me or asked questions. When I watched the video of the second lesson, I noticed that I spent less time with these particular students. As a result of my reflection, I was more consciously aware of my need to look at their work, provide feedback, and solicit their questions. I also wondered if I would spend more time assisting them if they were seated closer to the front of the room, and I decided to also vary the position of students for future lessons. After the fifth lesson, I documented how I attempted to assist students that did not solicit my support in my researcher journal:

[They] had not asked me any questions, but they appeared to be working, so I stopped at their table to provide feedback. They said very little as I provided them with feedback, only nodding their heads to my comments. Later during the lesson, I asked if they had any questions, they shook their heads no.

One possible explanation for incidences in which students relied heavily on my support or had limited needs for my support is their relationships with peers. For instance, students may have felt more or less comfortable asking their classmates questions than asking me questions. Next, I will summarize the findings regarding relationships among students.
Relationships among Students

When I interviewed students, five out of seven students responded either positively or neutrally when asked to describe their relationship with their classmates. Two students specifically indicated that they liked working with other students in groups or as a team, and two students indicated that they prefer to work alone. When planning lessons and setting up the physical classroom arrangement for specific activities, I thought deeply about how students might interact with one another based on what I learned from the interviews and from the previous lessons. I wanted my lessons and classroom environment to promote the development of a caring classroom community in which students interacted in positive ways and discussed mathematical concepts in order to increase mathematical understanding (National Council of Teachers of Mathematics, 2014). My goal was for students to feel safe and comfortable enough to take risks, respected by their peers, and trusting of one another (Bondy et al., 2007; Bonner, 2014; Gay, 2010; Gorski, 2013; Morrison, Robbins, & Rose, 2008; Ross et al., 2008; Schillwer, 2008).

Resistance to working with particular students. While the interview data from specific students suggested that they had already established relationships with their classmates, the data collected during the lessons suggested that some of those students still resisted working with particular students in the class. I was surprised that four of the students resisted working with randomly assigned partners, while the majority of students, including the two students that indicated they preferred to work alone during the interviews, complied with my directive to pair with a random student. For instance, for the group activity in the seventh lesson, I asked students to draw numbers in order to randomize which students were paired together as well as their
physical position in the room. Four students resisted being randomly paired with another student at the beginning of class. For instance, one student said “Oh no, I can’t do that.” Another said, “I’m not doing that.” I listened to the students’ complaints and explained my reasoning for the decision to the students that resisted. I also followed through with consequences for students that still did not follow the directive, but the resistance made me question my decision. I wrote the following in my researcher journal after the seventh lesson:

> I am still unsure about the best way to group students. On one hand, I want them to build relationships and step outside of their comfort zones in order to work with other students. I also want to limit the interactions that are not related to the topic of study. On the other hand, the resistance to working with students that are chosen at random rather than by the students themselves is difficult to deal with.

The next day, I once again used random assignment to organize students into pairs for a group activity to explore geometric sequences. To assist the students that resisted the random assignment of groups in the previous lesson, I personally spoke to them before class to explain my reasoning for randomly assigning groups. I told them that I wanted them to step outside of their comfort zones and learn how to work with people that they may not normally work with. I asked for their cooperation, and they agreed. All of the students completed the activity and correctly answered the questions for practice at the end of the activity. During my observation, I noticed students writing, talking about math, using the materials appropriately, and solving problems. I was surprised that, even during the practice time after the activity, when I told students that they could choose to work independently or with their partner, many students chose to continue working with their randomly assigned partner.
Trust among students and student risk taking in mathematics. Throughout the unit, I noticed that many students seemed to lack trust or feelings of support from their classmates. In general, students were resistant to share or discuss their mathematical thinking when they were unsure about whether or not they were correct. For instance, during the fourth lesson, when students had to identify data and graphs as exponential growth, exponential decay, or neither with a partner, students engaged in meaningful discussion only after coming to their own conclusions. In general, students wrote their own answers, compared answers with the group, and discussed reasoning only after I prompted them. When I asked one group of students why they had responded in the ways that they did, they appeared to think that my questioning indicated an incorrect response. One of the students scratched out his responses when I asked him why he had responded that way. Another group of students refused to write their responses at all. When I asked why, they said that they were using pen and wanted to know they were correct before committing the response to paper. I further probed to see if they had discussed the reasoning with their partner, they indicated that they had only compared answers and agreed. I reflected on my need to improve the learning environment to encourage risk taking in my researcher journal:

Students did not seem confident in their responses, as they were unwilling to risk being incorrect when asked why they responded the way that they had. Students generally did not talk about mathematics or work together to solve problems when given a practice activity. One student appeared to be waiting for the others in the group to complete the questions so that he could copy down the answers. When using group work, I need to ensure that the task requires the input from all of the students in the group. I also need to work on improving the learning environment so that students feel safe taking risks, even if they are wrong.
Answering Question 1: Classroom Relationships

Within the context of my Algebra 1 class for repeating ninth graders, building relationships with and among students was particularly challenging. During this study, I intentionally worked to increase my understanding of students' individual backgrounds and learning styles. During the initial interviews, I learned that many of my students came from low income, single parent families, and some lived with extended family members instead of their biological parents. I increased my understanding of my students' learning styles and preferences by talking to students about lessons that they enjoyed or did not enjoy and by observing students in class. Consistent with literature regarding low level and remedial courses, my class had a disproportionate number of students of low SES and of color in comparison to the larger school population. By learning more about students' individual backgrounds, I began to see how racism, classism, or other forms of discrimination, combined with the history of academic failure could lead my students to have negative perceptions about their own abilities (Gay, 2010; Nieto, 2013). I also saw how these negative perceptions impacted their willingness to work with and trust teachers and/or peers.

While the data indicated that students trusted me to help them with their lessons, at times, particular students either relied too much on my support or did not seek support from me at all. Although five out of seven students responded either positively or neutrally when asked to describe their relationship with their classmates during the interviews, the data collected during the lessons suggested that some of those students still resisted working with particular students in the class. In general, students were resistant to share or discuss their mathematical thinking when they were unsure about whether or not they were correct. The importance of the right answer appeared to be
deeply ingrained in students. If I questioned students’ responses, students acted as if they were wrong. It is possible that these incidences demonstrate a lack of trusting relationships. Students may have had negative perceptions of their own abilities and/or the abilities of their peers. Students could have had preconceived notions about what their peers or teachers thought about them or remedial students in general due to their prior educational experiences.

Despite my efforts to plan learning activities that would meet individual student needs and interests, I sometimes felt unsuccessful in establishing an environment in which students felt safe to take risks and engaged in meaningful discussions about mathematical concepts. As I reflected on my own actions, I realized that I indeed held biases that I was not aware of. For instance, I noticed that I tended to spend more time with students that were vocal and asking me questions during class. When particular students rarely requested support from me or asked questions, I did not realize that I spent less time with them in comparison to the time I spent with other students until I watched the recording of the lesson. As I became more conscious of this bias, I also became more intentional about looking at student work, providing feedback, and soliciting questions. I became more aware of students’ lack of confidence when responding to questions, and I thought about possible reasons for their lack of confidence. Specifically, I thought about students’ backgrounds as repeaters. I realized the need to alter my questioning strategies and work to improve the classroom environment so that wrong answers were viewed as opportunities to learn rather than incidences of failure. I also realized my need to improve how I communicate expectations for both academics and behavior in order to increase positive interactions.
among students. In the next section, I will discuss how high expectations were communicated and enacted.

**How are High Expectations for Academics and Behavior Communicated and Enacted in my Algebra I Class?**

In this section, I will illustrate how high expectations were communicated and enacted in the classroom with illustrations of actual classroom interactions and student learning from the data. This section will be organized to focus on two different kinds of expectations, academic and behavioral, followed by a summary of the section to answer the Research Question 2.

**Academic Expectations**

*Communicating expectations to think deeply about mathematical concepts and to explain reasoning.* Student work samples collected throughout the unit indicated that students understood the expectation to show work to demonstrate thinking. For instance, when students were asked to solve word problems involving exponential growth, exponential decay, and compound interest, they wrote down the formula that they selected to use, showed what numbers were substituted into the formula, and showed steps that were used to simplify the expression. However, as I previously described, students were resistant to verbally share or discuss their mathematical thinking when they were unsure about whether or not they were correct. As I reflected on the student work samples from the first half of the unit, I realized that, while showing work on practice problems and assessments demonstrated student thinking to a certain extent, I also wanted students to effectively communicate their reasoning when solving problems or connections that they saw to prior learning.
As a result of my reflections of the first four lessons and student work samples, I intentionally worked to increase the number of students that discussed their reasoning and explained their thinking as they learned. I wanted them to talk through important concepts with their peers and think deeply about mathematical relationships (National Council of Teachers of Mathematics, 2014). I referred back to literature, and I thought about how I could “help students engage their thinking, not do the thinking for them” and provide students with “adequate time to make sense of the task” (Horn, 2012, p. 61). I revised the handouts and activity guides for the future lessons so that students were required to explain, describe specific details, and draw conclusions in writing. I also worked to scaffold my support during activities to allow time for students to think deeply about concepts and discuss with their peers.

For example, for the fifth lesson, students were asked to graph multiple transformed functions and draw conclusions about changing $h$, $k$, and $a$ based on their observations and discussion with their partner. During the lesson, as I circulated the room and provided feedback, I intentionally commented about correct answers and asked questions to probe further thinking. I told students to “be specific” and provided hints about how to be specific in their responses. When I noticed students struggling, I intentionally did not provide the answer. Rather, I asked more questions to assist students in coming to the correct conclusion on their own. For instance, when I noticed that a lot of students were struggling with domain and range, I attempted to intervene by asking, “What is domain in general?” and asked about the shape of the graph. I pointed out the asymptote, and I asked, “What $y$ values are not on the graph?” When I felt that students understood the expectations, I sat down in the middle of the room and waited.
Some of the students asked me to check their work while I waited. In these instances, I provided feedback verbally.

When I reviewed the work from the fifth lesson’s group activity, I noticed how students explained their thinking when writing on the activity guide. All of the groups successfully recorded the correct domain for all of the transformed exponential functions. One group correctly recorded the range on 8 out of 8 functions (100% of the time), one group correctly recorded the range on 7 out of 8 functions (87.5% of the time), and two groups correctly recorded the range on 5 out of 8 functions (62.5% of the time). When responding to the question “In general, how does changing the value of $h$ affect the graph of the equation?” all of the groups responded correctly as follows:

“It has a major impact. If it’s negative ($3^{x-2}$), it moves to the right.”

“It moves the function over, depending on whether the signs are positive or negative. Depending on whether the signs are positive or negative, the function translates horizontal back and forth.”

“It moves it along the $x$-axis left to right and doesn’t change the domain and range.”

“It will shift left and right.”

When responding to the question “In general, how does changing the value of $k$ affect the graph of the equation?” three groups responded correctly as follows:

“Is moves the function up or down depending on the sign for the $k$ value, and the domain stays the same but the range goes up or down.”

“It moves up some.”

“It will shift up and down.”

When responding to the question “In general, how does changing the value of $a$ affect the graph of the equation?” four groups responded correctly as follows:

“When $a$ is positive, it will go up. When it is negative, it will go down.”
“If it changes to negative, it reflects over the x-axis.”

“The -3 makes the line go over the x-axis.”

“It can either be positive or negative. When $a$ is positive, it goes up. If it is negative, it goes down. When $a$ is greater than 0, it is still positive.”

While one of the groups was unable to make a correct generalization regarding the effect of $k$, all of the groups clearly understood that they needed to state the conclusion they made based on observations of various graphs in writing. Some groups even provided examples of specific functions to demonstrate their reasoning.

During the seventh lesson, students worked in groups to identify patterns and explore arithmetic sequences. As I circulated the room during the partner activity, I noticed that many groups were not following the directions to determine the number of circles that will be in the ninth group without making the 7th and 8th groups. I asked several groups to explain how they determined the number of circles in the ninth group, and when they indicated that they had added the common difference each time, I asked them to “think about it” and discuss how they could do it without adding the same number each time with their partner.

Following the arithmetic sequences partner activity, I led the class in a whole-group discussion and modeled note-taking using the document camera. During the whole-class discussion, three students verbally shared their own examples and non-examples of arithmetic sequences that they developed and correctly justified why their examples met the criteria, or why their non-examples did not meet the criteria, for an arithmetic sequence. When looking at the example to determine whether or not a sequence was arithmetic, I intentionally provided a short period of silence to provide adequate time for students to think about the question. I asked students to raise their
hands to vote yes or no. Then, I asked them to explain their reasoning. Two students were willing to argue their points in front of the class, and one of the students specifically used the definition of an arithmetic sequence to justify his reasoning. When I noticed that two students did not vote, so I asked them individually. They said no, and one of them justified the response with the definition. After providing the group with feedback regarding the example, I made sure to point out that students were not allowed to just say yes or no. If a sequence was identified as arithmetic, they had to provide the common difference. If it was not arithmetic, students had to say why it was not arithmetic. When I reviewed the students’ work on the practice problems in the notetaking guide, all but one of the students that were present during the lesson provided the common difference for the sequences they identified as arithmetic. Four of the students present did not justify their reasoning when determining that a sequence was not arithmetic when practicing, but they did correctly state that it was not arithmetic.

In summary, the data regarding academic expectations indicated that students understood the expectation to show work to demonstrate thinking, but students were resistant to verbally share or discuss their mathematical thinking when they were unsure about whether or not they were correct. To increase the number of students that discussed their reasoning and explained their thinking as they learned, I revised handouts and activity guides so that students were required to explain, describe specific details, and draw conclusions in writing. I also worked to scaffold my support during activities to allow time for students to think deeply about concepts and discuss with their peers. As a result, students improved in explaining their thinking, providing examples, and justifying their responses. However, academic expectations communicated
effectively can only guide student learning when behavioral expectations are also communicated. In the following section, I will illustrate how behavioral expectations were communicated and enacted in the classroom.

**Behavior Expectations**

**Communicating behavior expectations.** During this unit, I analyzed how behavioral expectations were communicated. My goals were to ensure that expectations were made clear through both verbal and non-verbal strategies and to shift my focus to changes needed in my own practice to ensure student success rather than focusing on student characteristics and shortcomings (Bondy & Ross, 2008; Ladson-Billings, 1995). I wanted to create a task-focused learning environment in which students were able to self-direct through varied learning activities. I wanted my role to be focused on facilitating activities and generating discussion (Bonner, 2014).

During the interviews, several students mentioned my behavior expectations. When reviewing the video data, I noted that I used both verbal and non-verbal communication to make expectations clearer. I modeled and explained what I wanted students to do. When I noticed that students were off task, repeated requests verbally or moved closer to students to encourage more focus on assignments. As I circulated the room, I frequently pointed with my finger to where students should be writing or to the question that groups should be discussing. If I needed the attention of the entire class and multiple students were off task, I would stop instruction, use a verbal cue, and wait for students to indicate that they were on task by looking at me or discontinuing off task behaviors.

**Following through with consequences for inappropriate behaviors.** Some of the students in the class continued inappropriate behaviors, such as talking about
non-math topics or not working, even when I attempted to intervene. In instances in which verbal and physical cues were not effective, I followed through with consequences by removing students that were not behaving appropriately from the classroom. For example, during the third lesson, I reminded a student several times to get on task and complete the assignment. When he refused by shaking his head no after the final reminder, I asked him to go to the hallway. I called an administrator, and the administrator counseled with the student. When these instances occurred, I reflected on what happened and what I could do to avoid similar situations in the future.

One of the biggest challenges I faced during this unit was resistance from four particular students when I randomly assigned partners for group activities. When I pressed to find out the reason for the resistance to working with randomly assigned partners, two students argued that they worked best together. I told them that the pairings would not be permanent. They then complied with my request to work with their randomly assigned partner. The other two students refused to provide a reason for being unable to work with their randomly assigned partners. They resisted even after sitting in the group and became very disruptive. One student insisted that she could not do the work, saying she could not even count to two. Another verbally refused to work multiple times, hit her partner on the arm, and repeatedly raised her voice when talking, disrupting the class. After multiple warnings, I asked both of the disruptive students to leave the room and had an administrator counsel with them. After those two students were removed from the class, the other students finished the activity. The next day, I personally spoke to the students who were removed before class to explain my reasoning for randomly assigning groups. I explained that I wanted them to step
outside of their comfort zones and learn how to work with people that they may not normally work with. I asked for their cooperation, and they agreed. As I reflected on this experience, I realized the importance of listening to the students’ complaints, explaining my reasoning if needed, and respectfully insisting that students meet expectations.

In summary, interview data indicated that students were aware of behavior expectations, and video data indicated that I used both verbal and non-verbal communication to make expectations clearer. However, in instances in which verbal and physical cues were not effective in stopping inappropriate behaviors among students, I followed through with consequences by removing students that were not behaving appropriately. I also learned that reflection is critical in figuring out how to best prevent and change classroom behaviors that are not desirable. For example, after following through with consequences for students that resisted working with randomly assigned partners, it was important that I consider reasons for the misbehavior, work on building relationships, and communicate my expectations better. I needed to consider how to better prevent student resistance to working with randomly assigned partners in the future and possible alternative consequences when students refuse to work together.

Answering Question 2: Communicating High Expectations

Communicating high expectations regarding academics and behavior is an ongoing process in which I must be intentional about making sure students understand. While there was evidence that students understood the expectation to show work to demonstrate thinking, I was challenged to ensure that students understood the expectation to engage in deep levels of thinking and to communicate their reasoning.
regarding mathematical concepts. In addition to revising written directions so that students were required to explain, describe specific details, and draw conclusions in writing, I learned that I needed to be intentional about talking to students about their thinking and scaffolding my support during activities. It was important that I allow time for students to think deeply about concepts and discuss with their peers. While I used both verbal and non-verbal communication to make expectations clear, and I also needed to model and explain what I wanted students to do without doing the work or thinking for them. When I noticed that students are off task, repeating requests verbally, moving closer to students, and pointing to where students should be writing or to the question that groups should be discussing were useful strategies. Finally, while following through with consequences for inappropriate behaviors may be necessary, it was also important for me to work to understand students’ positions and possible reasons for the misbehaviors.

Thus far, I have discussed the findings regarding classroom relationships and the communication of high expectations. As expected, both classroom relationships and the communication of high expectations impacted the ways in which students engaged in learning. In the next section, I will illustrate how students engaged in learning activities in my Algebra I class and how I attempted to negotiate student engagement.

How do Students Engage in Learning Activities in my Algebra I Class, and How Might Student Engagement be Negotiated Depending on their Individual Backgrounds and Prior Experiences?

This section focuses on student engagement and how I attempted to negotiate student engagement. Using illustrations of actual classroom interactions and student learning from the data, I will illustrate incidences of student engagement, student disengagement, and how I intervened or adjusted my practice in order to increase
student engagement. The section will be organized to focus on two different kinds of activities: collaborative group work and teacher led activities, notetaking, and independent practice. I will close this section with a summary to answer the Research Question 3.

**Engagement in Collaborative Group Work**

When I interviewed students prior to the unit, three of the seven students indicated that they preferred hands-on learning. Two students specifically indicated that they liked working with other students in groups or as a team during the interviews. Based on the interview data and observations throughout the unit, I anticipated that students would be engaged in hands-on activities. For instance, I noted that all students immediately jumped in to folding the paper during the first lesson. During my observation of the second lesson, I noticed students working together to complete the initial hands-on part of the activity when they had to record data from the M&M™ lab on the table and find the percent change and equation by hand. In my researcher journal, I noted that the hands-on portion of the activity in the third lesson went quickly and that students appeared to have a prior understanding of what to do from the previous day.

Despite the initial engagement in the hands-on learning portions of activities, I frequently recorded off task behaviors and students not working together when they proceeded to analyze what happened during the hands-on parts of activities or practice applying concepts. For instance, students seemed to have more difficulty staying on task and working together when they proceeded to the calculator portion of the activities in the second and third lessons. In general, the data suggested that the frequency of small group discussion regarding mathematics increased when the physical classroom arrangement was set up prior to class, the activity required deep mathematical thought
and input from multiple students, and the expectations for group processes were explicit, presented in multiple formats, and frequently addressed.

During the first lesson, when exponential growth was initially introduced, I verbally asked students to work in pairs for the paper folding activity and in small groups after the whole class discussion. When planning the lesson, I assumed that students sitting side by side would work as partners and that the pairs would join the pair behind them for the small group activity. I did not alter the arrangement of the desks prior to the lesson, and students were seated in their usual seats. As I observed students working, I noticed very little to no discussion. While students appeared to begin working to fold the paper immediately, students primarily completed the activity alone. When it came time to practice after the whole class discussion, many students requested my support instead of seeking support from their peers. Some students did not work at all until I went to their group to assist. I wondered how changing the desk arrangement would assist students in working together, and I wrote the following in my researcher journal:

Perhaps changing the desk arrangement would increase math talk among students and also increase the number of students starting tasks sooner/staying on task. Tomorrow, I will arrange the desks so that students are facing each other in pairs.

For the next lesson, I decided to arrange the desks so that group members would be physically closer and facing each other. While student-to-student discussion increased during the second and third lessons, students did not necessarily work together to solve problems for the entire group activity even after I verbally reminded them that they should be working together. One student appeared to be doing nothing and watching his partner complete the activity.
After the guided notetaking activity during the fourth lesson, I directed students to work in groups to identify data and graphs as exponential growth, exponential decay, or neither. Then, I directed the groups to work together on practice problems. After the lesson, I reflected on the dialogue that occurred among students in my researcher journal:

When students had to identify data and graphs as exponential growth, exponential decay, or neither, students engaged in meaningful discussion only after coming to their own conclusions. In general, students wrote their own answers, compared answers with the group, and then discussed reasoning (after I prompted them) . . . During the practice, the students appeared to be mostly working independently and talking about non-math topics. While some were helping each other with understanding particular problems, they were not working together to solve problems in general . . . When using group work, I need to ensure that the task requires input from all of the students in the group.

After the fourth lesson, I referred to literature for guidance on collaborative learning in secondary mathematics. I realized that some of the activities that I asked students to complete in groups were not really group worthy. According to Horn (2012):

Cognitively demanding tasks, of which group worthy tasks are a subset, require students to do more than just apply previously learned procedures. Such tasks require high-level mathematical thinking, forcing students to make connections to the underlying mathematical ideas and engaging students in disciplinary activities of explaining, justification, and generalization. (p. 61)

I realized that students were not always engaging in meaningful discussions about mathematics because the activities that I chose did not require them to think deeply or require input from more than one person. I revised some of the activities for future lessons to eliminate the directive for students to work in groups or to be more cognitively demanding by requiring students to make connections and draw conclusions.
For the fifth lesson, students were asked to graph multiple transformed functions and draw conclusions about changing \( h, k, \) and \( a \) based on their observations and discussion with their partner. Prior to the activity, I was more explicit about the expectations for group work. For instance, I said, “Make sure both of you are graphing the functions in the graphing calculator.” I projected and discussed the following expectations that were written on the activity guide:

- BOTH partners must work together and contribute to the discussion.
- Partners must take turns writing responses on the activity guide.
- Each partner will complete an assessment of his or her own contributions as well as the contributions of the partner at the end of the activity.

I also projected and discussed the rubric that students would use to rate themselves and their partner that I developed after the fourth lesson:

**COMPLETE THIS PORTION INDIVIDUALLY.**
1. Rate YOURSELF and YOUR PARTNER’S group work participation on the following scale (1 is the lowest, 5 is the highest). **These ratings WILL impact the grade.**

<table>
<thead>
<tr>
<th>Group Participation Criteria</th>
<th>YOU</th>
<th>YOUR PARTNER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shared ideas and answers with the group</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Stayed on task during the assignment</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Asked relevant questions when needed to increase understanding</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

I circulated the room during the activity, intervening when needed and encouraging peer support. Following the lesson, I reflected on how these changes improved engagement in discussion during the group activity and questioned how I could improve further in my researcher journal:

The students were more on task and working together than in the group activities in the previous lessons . . . It appeared that they were more aware of the behavioral expectations . . . I wonder if changing up the groups so that students are working with classmates that they do not normally work with would have similar outcomes. For the next group activity, I will use random group assignments.
For the seventh and eighth lessons, I used random assignment to organize students into pairs for group activities. As I described in detail previously, some students resisted at first. However, by the eighth lesson, students were more willing to work with different partners. During the lesson, I noticed students writing, talking about math, using the materials appropriately, and solving problems.

In summary, as anticipated, students were generally engaged in hands-on activities during collaborative group work. However, the data indicated that the number of off task behaviors and students not working together increased when students proceeded to analyze what happened during the hands-on parts of activities or practice applying concepts. While changing the desk arrangement so that group members would be physically closer and facing each other increased student-to-student discussion, students did not necessarily work together to solve problems for the entire group activity unless the activity required students to think deeply or require input from more than one person. In addition, my role as the facilitator was critical in that I needed to be explicit regarding the expectations for the activity by providing directions in multiple formats, modeling, and circulating the room to intervene when needed and encourage peer support. I learned that all activities are not group worthy and should be designed so that students are working independently. In the next section, I will describe the findings related to student engagement in teacher-led discussions, notetaking, and independent practice.

**Engagement in Teacher-Led Discussions, Notetaking, and Independent Practice**

On-task behaviors observed during teacher-led discussions, notetaking, and independent practice included students writing in their notebooks, verbally responding questions, and watching me as I modeled activities. In general, students responded to
questions, but some students only responded to questions when I called on them if at all. Students also generally wrote down notes when I modeled note-taking using a copy of the note-taking guide and the document camera.

Off task-behaviors occurred more frequently when students had to formulate their own notes or practice problems independently. In these instances, some students did not write at all. I frequently felt as if I had to remind students to either get started or to stop disturbing their classmates during the lesson. For instance, during the sixth lesson, I documented students talking before beginning to work on problems and another student singing and walking around the room once he completed a problem in my field notes. When watching the recording of the lesson, I wrote the following in my researcher journal:

When multiple students were talking, I said, “Enough . . . What I want right now is your attention.” One student asked a question, but I said, “Hang on one second. Right now, I’m waiting for everyone’s attention.” Then, the students stopped talking and became more focused on me. When we discussed the problem, students wrote on their papers and looked at the board, correcting their work as needed . . . It seems that explicit statements of behavior expectations are needed every day, along with reminders and me constantly looking over students’ shoulders to check their work and make sure that they are on task.

Throughout the course of the unit, I noted that certain students frequently responded when I did not call on individual students to answer questions, others only responded when I called on them, and a couple of students sometimes did not respond to questions at all. Some students also resisted responding to questions in writing. For instance, when I asked students to write their own definitions in the final lesson, only five students wrote a definition in their own words. After I circulated the room, I asked for volunteers to share their definitions with the class. Three students shared their definitions, but some students did not write a definition until I wrote a definition on my
Some students are still reluctant to speak in front of the whole class. Others seem more comfortable, confident, and more willing to take risks. Since students are reluctant to ask questions, it is necessary for me to walk around the room, look at students' work as they are working, and provide feedback and support, even when it is not solicited by the student.

**Answering Question 3: Student Engagement**

Based on the data collected for this study, student engagement is heavily dependent on the instructional design of the lesson, the appeal of the activity to students' individual learning styles and needs, and how well the teacher facilitates the lesson. For instance, students were not always engaging in meaningful discussions about mathematics initially because, in some instances, the activities that I chose to be done in groups did not force them to think deeply or require input from more than one person. The physical classroom arrangement, whether or not the activity required deep mathematical thought and input from multiple students, and the communication of expectations impacted student engagement and needed to be carefully considered prior to instruction. While students generally appeared to be on-task during teacher-led discussions, off-task behaviors occurred when students had to formulate their own notes or practice problems independently. In addition, the frequency of verbal responses to questions varied from student to student, suggesting that some students may have felt more comfortable taking risks when responding to questions than others.

**Summary**

In this chapter, I discussed my findings related to what it means to be a culturally responsive teacher in the context of an Algebra I class for repeating ninth graders based on data collected during this study, according to the three sub-questions I
developed related to central research question. In the next chapter, I will discuss reflections of my own learning as a practitioner researcher.
CHAPTER 5
PRACTITIONER REFLECTIONS

As a white female mathematics instructor teaching in an inclusion classroom and an entire class of repeating ninth graders for the first time, I recognized the need to alter my teaching practices to better support students in my new context. Even before starting this research project, I was aware that in addition to understanding my students and the communities they were coming from, I would need to become more aware of my own biases and prejudices and change them to increase my cultural responsiveness and equity in my classroom. Hence, I designed this research study to learn more about what it means to be a culturally responsive teacher for students enrolled in an Algebra I course for repeating ninth graders at TL Hanna High School in Anderson, South Carolina.

As I reflect on my own learning and the findings of this study described in the previous chapter, I realize that becoming a more culturally responsive teacher in the context of my Algebra I class for repeating ninth graders meant becoming more aware of how my students’ prior experiences related to their academic failure influenced how they engaged in learning. I identify my primary learning as becoming aware of how my students, having been previously unsuccessful in mathematics, did not engage with mathematics in open and authentic manners. This manifested in ways that they did not 1) discuss mathematical ideas with their peers, 2) share mathematical ideas in whole-group discussions, nor 3) write down their own ideas until the correct answer was confirmed. In short, the students were unwilling to make their thinking public. This chapter addresses reflections of my own learning as a practitioner researcher. Specifically, I will describe actions that I plan to take as an educator to alleviate this
phenomenon and increase student discourse about their thinking, first in terms of self-reflection and changes within my own classrooms, then more broadly about changes outside of the classroom.

**Continued Self-Reflection and Change within my Classroom**

It is possible that my students’ resistance to share their mathematical thinking was due to them having negative perceptions of my beliefs about students who struggle academically. Therefore, I believe that my first initiative should be to identify my own possible negative perceptions and work to change them. It is true that, in many ways, I believe that I changed my own biases and prejudices as a result of this study. For example, I became aware that I unintentionally spent less time with students that asked fewer questions, and I intentionally worked to increase equity regarding the time I spent with each student individually. However, although I realized that I needed to improve the learning environment so that students were more comfortable and confident in sharing their ideas, there were still incidences in which I felt that I could have done better despite my attempts to use a variety of strategies to improve the situation.

One incident was when I removed two students from the classroom when they became disruptive and resisted working with an assigned partner. While I believe that it is necessary to follow through with consequences for misbehaviors, I also wonder if the misbehaviors could have been avoided or if there was a way to assign a consequence and stop the misbehaviors without removing the students from the classroom. Surely there are other strategies that I could have used that would have been more effective in improving the particular student behaviors, but they did not come to mind as the incident was occurring.
Prior to this study, similar incidents had occurred with the same two students. I had previously attempted to move the students to another part of the room, and they continued to be defiant, refuse to work, and speak loudly across the classroom. On another prior occasion, I moved the students to the hallway to work. By moving students to the hallway and leaving the door open, they still had access to the lesson and me, but they could no longer disrupt the rest of the class. On this occasion, the students completed their work quietly, and I felt that I found a quick solution. However, I was told by my administrator that I could not use this strategy anymore due to supervision rules. In short, I realize that I do not always know the best way to respond to student behaviors in the moment that the behaviors are occurring. Most importantly, I realize my failure in establishing the kind of relationship that would prevent certain behaviors with these particular students.

Looking back, I see the cultural barriers between my students and me, and I am saddened by how difficult it was to break through these barriers. While I initially thought that my personal background of being a low income student from a single parent family would help me relate to my students, I overlooked the differences in our academic backgrounds. Growing up, I, too, was part of a curricular tracking program, but, unlike my students, I was placed in an honors track. In contrast to my students, I had never in my life experienced failing a course. I was always interested in school, I performed well academically, and I was motivated by academic success. Despite my sincere desire and belief that I could establish positive relationships with each and every student, it was difficult for me to understand and relate to all of the students in my class.
As a high school student, I remember thinking that anyone could make straight A’s if they truly wanted to. After all, I had overcome my own personal obstacles of being raised by a single parent with low income. It wasn’t until I became an adult that I became aware of the intersectionality of a person’s social identities and the possibility that my academic success, while earned through hard work, was also partly due to my social position. I am still working to consider all the factors beyond a student’s control that could lead to academic failure and combat my own deficit thinking. Rather than making assumptions about students’ weaknesses, I need to consider contextual factors outside of the students’ control and try to imagine how their experiences in my classroom are unique.

Prior to this study, I thought that I had already worked to improve my own perceptions and biases. While I do see improvements, I regret that there were instances in which I blamed incidences that occurred while teaching this course on my students. For instance, knowing that my students had previously been unsuccessful, my mind would sometimes blame students for their lack of engagement rather than considering the possibility that there were other invisible factors at work that prevented students from engaging in the lesson. When students did not attend school, I would sometimes think about potential negative aspects of students’ home lives rather than my own relationship with students and their families.

I realize that these thoughts stem from my own background and upbringing, as well as from the messages sent through cultural patterns and dominant cultural norms in the U.S. society as a whole. I remember standing in the hallway after class was dismissed, feeling frustrated and annoyed. I did not understand my students’ behaviors,
and, despite my efforts, I was not always successful in changing student behaviors, thus I took the outcome personally instead of objectively. At times, I would confide in other teachers regarding situations that occurred in my classroom. Frequently, my colleagues would tell me something about how these problems are the nature of the repeater group. At these times, it was difficult to focus on students’ assets rather than deficits and take responsibility for my own shortcomings as their teacher. Putting myself in their shoes, but as a teacher, I realize that I need to be cognizant about how my experiences teaching this repeater Algebra class may influence my future teaching. For example, as my students had a hard time engaging with mathematics content in an authentic manner due to their prior negative experiences and academic failure, I see the need to self-check my own thoughts and feelings when I face a challenging student in the future. I will strive to continue to be open and engaging with all of my students and continue to work on my own negative perceptions so that I can better assess what changes are needed within my classroom.

I have learned that there is a fine line between understanding students’ backgrounds and experiences in order to inform my practice and using students’ backgrounds, or my perceptions of their backgrounds, as a reason for my own lack of success as a teacher. It is easy to continue current practices with the mindset that all students should conform and adjust to learn in the ways that I teach. However, if I continue the use of traditional teaching practices, I will also continue to marginalize particular students. If I am to do my part to close the achievement gap and increase equity in education, I must accept responsibility for what happens within the classroom when students are not engaged or fail, even when I do not know what I could have done
differently, and seek ways in which I can improve. If I do not immediately see a student’s assets in learning, then I need to do a better job of looking and utilizing those assets as soon as possible to assist my students.

In addition to changing my own thoughts to hold students in a more positive regard, as a practical approach, I must shift my tendency to reuse lessons that I found successful with former students without thinking. Rather, I must focus on how each student is unique and learns differently. Moving forward, I will carefully construct and modify lessons to match the unique learning styles and preferences of the students that I am currently teaching.

Looking back on this study, I realize that, while I provided a large variety of activities in order to appeal to multiple learning styles, I did not provide many choices in activities or assessments. Although students frequently had choices regarding their own role within group work, perhaps I could increase student interest in learning by providing choices in the problems to be solved or how students will demonstrate their learning. I also realize that some students may benefit from the option to work alone and that I may have placed too much emphasis on the goal for students to work together.

Since I realize now that all activities are not group-worthy and some students may not yet feel comfortable sharing their thinking, I will also take more care to consider how students will collaborate during lessons. I need to be more conscientious of how trust and relationships influence students and their willingness to work together. I now realize that some of my students may have resisted working together because they were trying to protect themselves from the embarrassment of being incorrect. This fear
of making mistakes publicly could be an aspect of the culture of repeaters that I did not anticipate. Since the resistance to share ideas countered my vision of a collaborative learning environment, I tried even harder to enforce my expectations for students to make their thinking public, but that effort further created a gap in my relationships with particular students. Providing options regarding how students will collaborate or the option to work alone might have helped to alleviate this phenomenon. In addition, I need to create activities that place less emphasis on correct answers and more emphasis on the thinking process.

Finally, I will continue to take notes regarding my observations when I am teaching and reflect upon how I can improve upon future lessons. My notes will document both successes and areas of need. This way, I can record my thoughts about what steps I should take next to improve my instructional practices. As part of my decision making process, I will collaborate with other teachers in addition to using literature to get ideas for lessons and how I can improve my teaching.

Advocating for Changes Outside of my Classroom

While making changes regarding my own biases and classroom practices has potential to benefit my students in the classroom, I am afraid it will not be enough to empower all students’ to feel comfortable enough to share their thinking in all courses throughout their schooling. It is possible that in the current educational climate of accountability and high-stakes testing, most teachers within my context focus on right answers and individual work, potentially leading to students being unwilling to collaborate in other classes. It is also possible that teachers hold more or less negative perceptions about students that inform their instructional practices. In order to do my part in helping close the achievement gap among students, I now realize that I need to
do a *better* job of advocating for changes to benefit all students and promoting the idea that all students are capable of learning and achieving at high levels. Therefore, it is important for me to work on not only increasing, but improving, my communication skills and influence in order to effectively promote changes within my context that will increase student discourse about their thinking and overall engagement in learning.

With my colleagues, in both formal and informal conversations, I can bring up problems and encourage supporting students in collaborating and sharing their thinking. For example, as issues arise in our classrooms, my colleagues and I might discuss how to improve situations through informal conversations in the hallway or during our common break times. I might also bring up issues as I collaborate with my colleagues during more formal conversations, such as professional development opportunities or faculty meetings. Initiating professional study groups among teachers to discuss common issues may help us to establish a common set of expectations regarding how students should be sharing their thinking and working together. By sharing about my own experiences, perhaps I can also learn from other teachers what students’ experiences are like outside of my classroom, to inform my understanding of their behaviors in my classroom, ultimately to better myself as a teacher while also helping other teachers.

As a teacher with the intent to promote changes to increase equity in learning, I also realize that I need to work to build trusting relationships with my colleagues. I need to be a better listener so that my fellow teachers feel comfortable sharing their concerns with me. I need to remember to express empathy when others complain or seem frustrated and to frame my constructive feedback so that it is perceived as supportive
rather than judgmental. When receiving feedback, I need to be open to criticism and the opportunity to learn rather than defensive. I must be more aware of the unique perspectives of others in order to better understand how to work with them. As we share, I will not only seek to learn how to improve upon my own practice, I will also seek ways I can assist in their improvement efforts (Katzenmeyer & Moller, 2009).

I will work with my colleagues to overcome challenges and celebrate small successes towards our larger goals. For example, I have already worked with other teachers to advocate for changes in the way we track students. We opposed the traditional view that students with failing grades should be assigned to a "repeater" course the following year. By working with allies and like-minded colleagues, my school administrators have agreed to make a change to include repeating Algebra 1 students in classes that contain students taking Algebra 1 for the first time next year. I believe that this change is important as it will allow students to not feel excluded because of their academic failure while encouraging teachers to have higher expectations for students that have been previously unsuccessful in Algebra 1. Through both formal and informal conversations with my colleagues, I believe we have increased capacity for change, and I think this particular change will have positive outcomes for both students and teachers.

I also realize that my role as an advocate will increase as I advance in years of teaching experience and leadership roles within my context. Over time, my relationship with my colleagues may change. For instance, if I eventually obtain a more formal leadership role, my relationship with teachers may become more distant. If this occurs, I will need to be even more cognizant of my own position and the positions of others
when communicating, making sure that everyone has a chance to be heard. I realize that I will need to focus further on contextual and cultural changes that promote the development of learning communities in which teachers work together to solve problems. Through shared decision making processes and small steps toward changes to my school's culture, I will empower teachers and increase the likelihood of successful changes.

**Summary**

In this chapter, I reflected on my own learning as a practitioner researcher as a result of this study. I focused this chapter on the phenomenon of how students in my class, as students that had been previously unsuccessful in mathematics, hesitated to engage with mathematics in authentic and open manners, being very much unwilling to make their thinking public. I described my reflection of this phenomenon along with actions that I plan to take as an educator to alleviate this phenomenon and increase student discourse about their mathematical thinking. Specifically, I discussed my plans for continued self-reflection, self-change, and advocating for changes to benefit all students outside of the classroom. In the next chapter, I will address conclusions, along with limitations and possible implications of this study.
In the previous chapter, I discussed how, through this study, I became aware that my students, as students who had previously been unsuccessful in mathematics, did not engage with mathematics in open and authentic manners and reflected on my own learning as a practitioner researcher. I also outlined actions that I plan to take as an educator to increase student discourse about their thinking within my context. This chapter addresses possible implications of this study beyond my own classroom. I will end this chapter with a conclusion to summarize my final thoughts regarding this study and what it means to be a culturally responsive teacher.

**Implications**

Although this study was framed in practitioner research as I studied my own practice, there are potential implications beyond my context. I will focus on implications specifically for teachers, as this study provided valuable examples for teachers to consider when attempting to increase their cultural responsiveness in teaching mathematics. I will organize implications for teachers according to three critical elements of culturally responsive teaching (relationship building, high expectations, and engaging lessons) and mathematics teaching. I will end this section with implications for future research.

**Implications for Teachers**

**Relationship building.** Building relationships and understanding students’ backgrounds and experiences are the foundation of culturally responsive teaching. Strategies to foster relationships with students include talking with students and their families, observing students both in and outside of the classroom, and reflecting on
one’s own background and experiences to uncover potential biases. It is important for teachers to understand that students’ trust of their teacher and peers is heavily influenced by their backgrounds and experiences. Developing a deep understanding of students’ individual backgrounds, daily life experiences, and learning styles is critical to building relationships and positively impacting student interest and motivation to learn.

In other words, by building relationships with students, a teacher is better able to align learning experiences to students, and students feel valued for where they come from when teachers match instruction to students in this way.

Having been previously unsuccessful in mathematics, my students resisted discussing mathematical ideas with their peers in public, sharing in whole-group discussions, or even writing down their own ideas until the correct answer was confirmed. It is possible that my students were unwilling to make their thinking public due to negative prior experiences or fear of being judged by myself or their peers. Perhaps in the past, or even in my classroom without my intention or noticing, some of my students might have been ignored or had their questions disregarded due to dominant cultural norms or individual biases and prejudices. Therefore, teachers must be conscientious of students’ backgrounds and prior experiences when scaffolding support and utilizing strategies to encourage more peer interaction.

It is important for teachers to be aware that some students may require more assistance than others, and some students may solicit support more than others. However, a student not soliciting support does not necessarily mean that support is not needed. For instance, particular students in my class rarely asked questions, and I discovered that I needed to be more intentional about spending time with them
individually to review their work and ask them specific questions regarding their thinking. Likewise, a student that frequently solicits teacher support may actually need to be encouraged to work more independently or to seek support from his or her peers. It is difficult, but important, for teachers to maintain the balance of helping students engage their thinking without doing the thinking for them (Horn, 2012). Getting to know students individually can assist teachers in maintaining that balance and knowing when to push, when to assist, and when to step back.

**High expectations.** Communicating detailed directions in multiple formats and modeling can increase student on-task behaviors and success in explaining their thinking, providing examples, and justifying their responses. Multiple formats, including verbal, written, and physical cues, are necessary to appeal to a variety of learning styles and to assure that students understand expectations. When students do not meet the expectations, teachers should consider all possible factors that led to undesirable outcomes. For instance, a teacher might think about his or her own relationship with individual students, relationships between students, and the events that occurred in students’ lives prior to the event. While it is necessary to follow through with consequences, teacher reflection is also critical in figuring out how best to prevent and change classroom behaviors and other outcomes that are not desirable.

**Student engagement.** Engaging students in learning means creating opportunities for meaningful participation. Teachers must be aware that routes to student engagement may be social and/or academic, including opportunities to develop interpersonal relationships and participate in intellectual endeavors (Fredricks, Brumenfeld, & Paris, 2004). Consistent with literature, the findings of this study
indicated that student engagement was heavily dependent on the instructional design of the lesson, the perceived appeal of the activity to students' individual learning styles and needs, and how well I facilitated the lesson.

In teaching, one lesson does not fit all learners. Rather, lessons should be carefully designed and adapted with individual students and learning styles in mind. When planning lessons, teachers should consider whether or not activities require deep levels of thought and input from multiple students before determining whether an activity should be completed collaboratively or independently. Some students may feel more or less comfortable working with other students as a result of their individual backgrounds. It is important for teachers to consider how students may respond in advance so that alternative options or additional support can be provided if needed. Teachers should also think about how to facilitate the lesson prior to instruction, such as what he or she needs to say and do and how materials should be used.

In addition to thinking deeply when planning lessons, it is also important that teachers develop observational insights and skills to determine how students are engaging during lessons, reflect on areas that may need improvement, and consider making changes to impact future lessons. For instance, through my observation and reflection I became aware of the need to adjust multiple factors, such as the physical classroom arrangement and how I communicated expectations. Through reflection and intentionally seeking new strategies and ways to improve, teachers can positively impact student engagement in learning.

**Mathematics teaching.** The findings of this study shed light on how some students, and particularly students with prior academic failure, have difficulty engaging
with mathematics in open and authentic manners and were in many ways unwilling to make their thinking public, stemming from different reasons. Student discourse about mathematical concepts is essential for learning, as it allows students to reflect on their own thinking and critique others’ ideas. It is important that teachers create and sustain a collaborative and supportive learning environment, while also increasing student use of higher order thinking skills. Teachers need to be able to recognize and design cognitively demanding tasks that work well for collaborative learning, while also providing support for students that may not feel comfortable collaborating with others. Specifically, cognitively demanding tasks require students to make connections to the underlying mathematical ideas, explain their thinking, justify their reasoning, and make generalizations (Horn, 2012; Stein & Smith, 1998). However, more emphasis should be placed on thinking and problem solving than on obtaining the correct answer. Through discourse, students can also make mathematical conjectures, refine their work, and take ownership of their mathematical knowledge.

**Implications for Future Research**

This study is significant in that it adds to the existing body of research regarding social justice, equity, culturally responsive teaching, and mathematics education in that it is a practitioner research study focusing on Algebra I students in an inclusion classroom who are repeating ninth grade. However, culturally responsive teaching is a broad topic needing to be studied from different viewpoints and contexts. Future research is needed to explore culturally responsive teaching in other mathematics classrooms as well as in classrooms for other subject areas and for grade levels. It would be beneficial for other teachers to engage in practitioner research regarding culturally responsive teaching in their specific contexts. In addition, research studies
conducted over longer periods of time would be helpful in capturing the growth of students and teachers over time.

One aspect of culturally responsive teaching that I believe can be generalized across content areas and contexts is that it requires several shifts in thinking amongst teachers. For example, I needed to view students’ backgrounds in terms of their assets as opposed to deficits and reject the tendency to use traditional methods when working with remedial students (Dray & Wisneski, 2011; Gorski, 2013; Gay, 2010; Kose & Lim, 2011; Schillwer, 2008; Ullucci & Howard, 2015). Explicit focus on the classroom environment and cultural connectedness are necessary to ensure students feel comfortable and safe to take risks in learning (Bonner, 2014). In supporting teachers to make changes in both their thinking and instructional practices, research to inform professional development needs and to evaluate existing professional development regarding culturally responsive teaching may be necessary.

**Conclusion**

Despite improvements and efforts to achieve equity through various reforms and litigation, there is a persistent disparity in educational performance among subgroups of U.S. students. In my quest to promote equity in my classroom, I designed this practitioner research study to learn more about what it means to be a culturally responsive teacher for students enrolled in an Algebra I course for repeating ninth graders. In many ways, this study confirmed what literature suggests as challenges teachers face when working with diverse groups of students who have previously been unsuccessful in mathematics courses. The students enrolled in my Algebra 1 course were assigned to a particular section and class period due to curricular tracking based on their prior academic performance in Algebra 1. Compared to the larger school
population, there was a disproportionate number of poor students and students of color in my course, suggesting the need to create more equitable opportunities in mathematics education for my students. There is evidence to suggest that my students may have held negative perceptions about their own academic identities and abilities, the abilities of their peers, or their peers’ and teachers’ beliefs about them. However, this study also suggests that teachers have the potential to overcome these challenges by becoming more culturally responsive in their instructional practices, particularly by becoming more aware of how students’ academic backgrounds and prior experiences impacts their engagement in learning.

Through this study, I have grown both personally and professionally. I became more aware of my own biases, thought deeply about my instructional practices and how I could better impact students, and adjusted my practices in an effort to improve student outcomes. I realize the power culturally responsive teaching has to positively impact students, as I have experienced stronger relationships with my students and observed how student behaviors and engagement changed as I made adjustments to my practice. While I still may not know all of the answers of how I could have done better in instances in which I felt unsuccessful in reaching every student, I take responsibility for both the successes and areas that need improvement within my classroom.

After this study was concluded, my students’ learning was assessed through the South Carolina Algebra 1 End of Course Examination Program (EOCEP). Statewide, the mean score was 69.4%, and 74.7% of the 62,655 students tested passed the exam. The mean score for students in poverty was 64.9%, and 64.7% of the 32,973 students in South Carolina in this group passed the exam. For the 12 students who participated
in this study, the mean score on the Algebra 1 EOCEP was 60.75% and 66.7% (8 of the 12) passed the exam. Of students who participated in this study (10 of the 12), 83% earned credit for Algebra 1.

On the morning of May 31, 2017, as I was in my classroom preparing for students to arrive, a voice came over the intercom calling all teachers to report to the cafeteria immediately. When I arrived to the cafeteria, I saw multiple students on the floor and other students talking to police, administrators, and teachers. When I noticed that two of the students were mine, I immediately went to them, concerned that they were either hurt or in trouble. It was two of the girls in my Algebra 1 repeater class, with whom I had in many ways failed to make a connection. After they had arrived to school that morning, they were involved in a large fight in the cafeteria. They were arrested and charged with disturbing schools along with nine of their peers who were also involved in the fight. Before they were taken away, I told them that they had passed the Algebra 1 EOCEP and earned credit for Algebra 1. I told them that they were smart, and I asked them to promise me that they would graduate from high school. That was the last time I saw them.

Today, I celebrate my students who succeeded, but I feel sad for my students who did not succeed and for those who were expelled from school for discipline issues. I feel responsible for the failure of the students who did not pass the class. I wonder how I could have done a better job in relating to particular students and preventing behaviors that resulted in them no longer being able to be in school. I worry about all of them. I know that those who passed the course are currently in classrooms filled with students who have not experienced failure in the same ways as my students did before,
and I hope that their teachers are conscientious of how their status as former repeaters impacts their learning. I hope that their new teachers do not assume that they do not want to learn because of their history of failure and/or somewhat confusing behaviors of disengagement in learning settings. For those who did not succeed or were expelled, I hope that someone can reach them sooner than later.

For me, culturally responsive teaching is a process of constant improvement based on a sincere desire to help students of any background grow personally and academically. In the context of my Algebra 1 class for repeating ninth graders, becoming more culturally responsive meant realizing how my students’ prior experiences of academic failure impacted their classroom behavior and engagement. It meant that I needed to be aware of and work hard to overcome the barriers that existed between my students and me. While content knowledge was important, becoming a more culturally responsive teacher additionally required me to shift my mindset more towards teaching students and relationships while maintaining my view towards teaching mathematics. Culturally responsive teaching in the context of this study meant being intentionally focused and concerned about building caring and trusting relationships with and among students, even when it seemed impossible or difficult. It was loving students, even when their attitudes and behaviors made it difficult. It was allowing that constant awareness of relationships to refine my instructional practices, challenge my perceptions, and alter my thinking. It was extremely difficult, and I learned that being culturally responsive does not mean seeking a level of perfection. Rather I will always be making progress in becoming
more culturally responsive. Looking back, I realize my growth, but I also realize that I still have much to learn. My journey continues.
APPENDIX
LESSON PLANS FOR UNIT 10: EXPONENTIAL FUNCTIONS

Day 1 Lesson Title: Introduction to Exponential Growth

Lesson Objectives: Students will (1) evaluate and graph exponential functions (Anderson School District 5, 2016).

Materials Needed: activity guides; 2 large rectangular sheets of paper for each student

Instructional Procedures:

I will distribute a large rectangular piece of paper and activity guide to all students. Using one of the large rectangular pieces of paper, I will demonstrate the procedure, providing oral directions and modeling each step. Students will fold the paper in half and record how many sections are formed by the creases in a table. Students refold the paper, fold the paper in half again, and record how many sections are formed by the creases. I will instruct the students to work in pairs and continue folding the paper in half and recording the number of sections until the paper cannot be folded any more. Using the activity guide and working with a partner, students will record answers to the following questions:

- How many folds could you make?
- How many sections were formed?
- What function/equation is modeled by the folds and sections created?
- How did you come up with that equation?
- What was the pattern you noticed?

As students work in pairs, I will circulate the room, redirecting off task behaviors, assisting pairs and answering questions.

Once each pair has successfully completing the first activity, I will provide a second piece of large rectangular paper and instruct the pair to use the piece of paper to model the equation \( y = 3^x \). I will provide the clue that the students will need to fold the paper into thirds. The students will once again record how many sections are formed by the creases on the activity guide and continue folding the paper in thirds and recording the number of sections until the paper cannot be folded any more. Students will record answers to the following questions on the activity guide:

- How many folds could you make this time?
- How many sections were formed?
- What was the pattern you noticed this time?
What function/equation is modeled by the folds and sections created?

Upon successful completion of the final activity, students will turn in their work to be checked by the instructor. I will verify that the pair obtained correct answers, answer questions, and respond to any concerns the students have.

I will then direct student attention to the front of the room, where the general form of the exponential equation will be displayed. I will describe/explain the parts of the general exponential equation, and how the paper folding activities were examples and equations of exponential functions. I will tell the students that there are 2 types of exponential functions: exponential growth and exponential decay and ask whether the students would describe the activity and data they collected as exponential growth or decay. I will lead the class in a discussion about how the activity models an equation of the form \( y = ab^x \), where \( a \) is a nonzero constant, \( b \) is greater than 0 and not equal to 1, and \( x \) is a real number.

Specifically, I will show how \( a \) represents the starting number/initial value, \( b \) represents the growth or decay factor, \( x \) is the number of periods (or folds of the paper in the activity), and \( y \) is the ending number /value (number of sections in the paper activity).

After the whole class discussion, students will work in groups of 3-4 to evaluate and apply exponential functions as practice. For example, students will evaluate the exponential function \( y = 5^x \) for \( x = 2, 3, 4 \) and write an exponential function given a word problem scenario (Anderson School District 5, 2016).

Elements of Culturally Responsive Pedagogy:

In this lesson I will attend to students’ individual learning styles to enhance academic success (Gay, 2010; Morrison, Robbins, & Rose, 2008). I chose the paper folding activity to introduce exponential growth because it allows students opportunities for collaboration, movement, and hands-on learning. I hope to promote engagement with the paper folding activity, and I believe that the activity will provide students with opportunities for meaningful participation in learning. In this lesson, the paper is used as a representative tool to support student thinking (National Council of Teachers of Mathematics, 2014). In addition, the lesson incorporates experiential learning and group processes, which are researched based strategies to increase equity (Bondy et al., 2007).

To determine whether or not the paper folding activity is effective in implementing elements of culturally responsive pedagogy to better engage students, I will carefully monitor how each student participates in the activity during the lesson. I will document discussions with my students and students’ affective reactions in the classroom and to my instructional practices (Fredricks, Brumenfeld, & Paris, 2004). My note-taking will take place both during the lesson and as I write reflections in my researcher journal. In addition, as I watch the recorded videos of lessons, I will make additional notes about the discussions and activities that take place during the lesson. For example, I will document which students are following the directions for the activity, which students ask for
teacher and/or peer support, who takes the initiatives in group processes while working with a partner, and who provides assistance to peers.

*Anticipated Response from Students:*

I anticipate that the students will respond positively to the activity and be engaged in meaningful discussions. However, I also anticipate that students will struggle with writing the exponential functions and need lots of assistance. I anticipate that some of the students will complain that they have too much work, but I hope that they will demonstrate persistence though the challenging parts of the activity, particularly when I ask them to model \( y=3^x \).

**Days 2-3 Lesson Title: Exploring Exponential Growth and Decay using Regression Equations**

**Lesson Objectives:** Students will (1) evaluate and graph exponential functions (Anderson School District 5, 2016).

**Materials Needed:** activity guides; graphing calculators, M&M™’s, paper plates, cups

**Instructional Procedures:**

I will organize the class into pairs and distribute an activity guide, a graphing calculator, a bag of M&M™’s, a paper plate, and a cup to each student. Once all the materials are distributed, I will guide the students through the activity, providing oral directions and answering questions while circulating the room.

To model exponential growth, students will place two M&M™’s in a cup/plate, dump out the M&M™’s, and add another M&M™ for every M&M™ with the “M” showing. This process will be repeated 15 times. For each trial, the new population will be recorded in a table and graphed on a coordinate plane. The students will work together to respond to questions on their activity guides regarding the asymptote, calculate the percent change for each trial, and write an exponential growth function that models the data. They will also use the exponential growth model to make predictions.

To model exponential decay, students will count the total number of M&M™’s in their bag and record this number in trial # 0. They will dump out the M&M™’s and remove the M&M™’s with the “M” showing. Once again, the M&M™ population will be recorded in a table and graphed on a coordinate plane. The students will repeat this process until they have completed 10 phases—OR—when the M&M™ population gets below 4, taking care to not record 0 as the population. The students will work together to respond to questions on their activity guides why the number of M&M™’s cannot be reduced to zero, write the exponential regression equation and compare values using the exponential decay model they found to their actual data (M&M™ lab (Exponential growth and decay, n.d.).
Elements of Culturally Responsive Pedagogy:

I chose the M&M™ activity to model exponential growth and decay because it allows students opportunities for collaboration and experiential, hands on learning, while helping them to construct their own knowledge about exponential functions (Bondy et al., 2007; Morrison, Robbins, & Rose, 2008). The M&M™ model provides students with an opportunity to think critically and at higher levels. This lesson is an intentional attempt to connect students with the problems encountered in the real world (Buckley, 2010; Ross & Adams, 2010; Gorski, 2013; Hill, 2010; National Council of Teachers of Mathematics, 2014). By using the M&M™ candy, I hope to increase student interest and participation in learning.

To analyze the effectiveness in implementing elements of culturally responsive pedagogy to better engage students through the M&M™ activity, I will carefully monitor how each student participates in the activity. I will document discussions with and among my students, particularly noting the presence or absence of positive conduct, the level of involvement in the learning task, and contributions to the group discussions in my field notes. I will also document students’ affective reactions to the M&M™ activity (Fredricks, Brumfeld, & Paris, 2004). For instance, I will make notes about how the students are using the M&M™’s and how much time is spent during the lesson on off task behaviors, such as playing with or eating the M&M™’s. My note-taking will take place both during and after the lesson. I will watch the recorded videos of lessons and document details about which students are following directions, which students ask for teacher and/or peer support, who takes the initiatives in group processes, and who provides assistance to peers in my field notes.

Anticipated Response from Students:

I anticipate a positive response to this lesson. I expect that the students will love this activity because it involves M&M™’s and hands on learning. Some of the students may try to eat the M&M™’s prior to completing the activity. I will have to be sure to remind them to wait. I also anticipate students needing additional help using the calculators to find a regression equation since this will be their first experience using that particular calculator function.

Day 4 Lesson Title: Exponential Growth and Decay (continued)

Lesson Objectives: Students will (1) evaluate and graph exponential functions (Anderson School District 5, 2016).

Materials Needed: interactive notebooks; note-taking guides

Instructional Procedures:

All students will receive a copy of the note-taking guide, which will include a foldable to review exponential growth and decay models and the general equations discussed in the previous day’s lesson. The foldable will also include a word problem to demonstrate each model. Students will individually complete the note-taking guide while participating in a whole-class discussion led by me.
For the word problems, I will demonstrate how to use highlighting/underlining to help students select important information that they will need to solve problems. Then, students will work together in small groups to practice exponential growth and decay word problems. The questions will be adapted from the practice section of the Interactive Student Guide on lesson 7.6 Growth and Decay (McGraw Hill, 2010). During the discussion, I will circulate the room, redirecting when students become off task. As the students practice, I will continue circulating the room, providing feedback, and answering questions.

Elements of Culturally Responsive Pedagogy:

In this lesson, I will model metacognitive activities such as thinking aloud, scaffold instruction, and provide clarification of the concepts that were introduced in the previous lesson. I will also model highlighting and underlining text, which is a reading strategy that assists students with comprehension by organizing information. The class will utilize interactive notebooks as a tool to assist students in meeting academic expectations for concept knowledge/application. I will also take care to promote the use of precise mathematical language that reflects mathematical structures within problems (What Works Clearinghouse, 2015). During the discussion and note-taking, I will take care to communicate high standards for both academics and behavior and encourage students to take risks. For instance, during the whole group discussion and note-taking I will randomly call on students to respond and encourage all students to view mistakes as learning opportunities rather than failures (Bonner, 2014). During the practice, students will work together to solve problems, collaborate and model thinking and utilizing the highlighting/underlining text strategy for each other (Gay, 2010; Ladson-Billings, 1995; Morrison, Robbins, & Rose, 2008). I will circulate the room during the group practice to intervene when needed and encourage peer support (Bonner, 2014; Morrison, Robbins, & Rose, 2008).

Both during and after the lesson, I will document how each student participates in the interactive notebook activity. I will document details about which students are following directions, writing notes, and utilizing the highlighting/underlining text strategy as well as students who resist completing the notetaking activity. I will also make notes about which students ask for teacher and/or peer support, what is said during the whole group discussion, and how students respond when I randomly call on them in my field notes. During the group work, I will note which students take leadership roles within their groups and which students ask for teacher and/or peer support.

Anticipated Response from Students:

I anticipate an overall positive response to this lesson, as I think that the underlining/highlighting the text strategy will assist students with word problems. I hope that students will utilize their interactive notebooks to review and study for assessments.
Day 5 Lesson Title: Exploration and Inquiry - Transforming Exponential Functions using the form $y = ab^{x-h} + k$

Lesson Objectives: Students will (1) evaluate and graph exponential functions and (2) sketch the graph of a function from a verbal description showing key features (Anderson School District 5, 2016).

Materials Needed: graphing calculators; activity guides

Instructional Procedures:

I will introduce the activity and organize students into groups of 2. Prior to distributing the materials, I will discuss the following expectations for group work: (1) BOTH partners must work together and contribute to the discussion for this activity. (2) Partners must take turns writing responses on the activity guide. (3) Each partner will complete an assessment of his or her own contributions as well as the contributions of the partner at the end of the activity.

Each pair will receive a copy of the activity guide, and all students will receive a graphing calculator. Students will follow the directions on the activity guide and work together in pairs to respond to the discussion questions. During the activity, I will circulate the room, redirecting when students become off task, providing feedback, and answering questions.

The activity guide questions are below:

RECALL: Exponential functions are functions that can be written in the form $y = ab^x$, where $a \neq 0$, $b > 0$, and $b \neq 1$. In this lesson, you will be exploring the graphs of exponential functions as the equations are transformed by

a. Adding or subtracting a constant $h$ to the exponent: $y = ab^{x+h}$ and $y = ab^{x-h}$

b. Adding or subtracting a constant $k$ to the function: $y = ab^x + k$ and $y = ab^x - k$

c. Changing the constant $a$ that is being multiplied in the function: $y = ab^x$

The Effect of $h$: Graph the following functions on the same coordinate plane by using $y_1$, $y_2$, and $y_3$ in your graphing calculator. Then, discuss and answer the questions with your group.

$y = 3^x$

$y = 3^{x+2}$

$y = 3^{x-2}$

1. Describe the shape and position of each graph. Include in your description the domain and range, whether the function is increasing or decreasing, and whether the function is positive or negative.

$y = 3^x$: 

$y = 3^{x+2}$:
2. In general, how does changing the value of \( h \) affect the graph of the equation?

**The Effect of \( k \):** Graph the following functions on the same coordinate plane by using \( y_1, y_2, \) and \( y_3 \) in your graphing calculator. Then, discuss and answer the questions with your group.

\[
\begin{align*}
y &= 3^x \\
y &= 3^x + 2 \\
y &= 3^x - 2
\end{align*}
\]

1. Describe the shape and position of each graph. Include in your description the domain and range, whether the function is increasing or decreasing, and whether the function is positive or negative.

\[
\begin{align*}
y &= 3^x: \\
y &= 3^x + 2: \\
y &= 3^x - 2:
\end{align*}
\]

2. In general, how does changing the value of \( k \) affect the graph of the equation?

**The Effect of \( a \):** Graph the following functions on the same coordinate plane by using \( y_1, y_2, \) and \( y_3 \) in your graphing calculator. Then, discuss and answer the questions with your group.

\[
\begin{align*}
y &= 3^x \\
y &= 2(3)^x \\
y &= -(3)^x \\
y &= (1/2)3^x
\end{align*}
\]

1. Describe the shape and position of each graph. Include in your description the domain and range, whether the function is increasing or decreasing, and whether the function is positive or negative.

\[
\begin{align*}
y &= 3^x: \\
y &= 2(3)^x: \\
y &= -(3)^x: \\
y &= (1/2)3^x:
\end{align*}
\]

2. In general, how does changing the value of \( a \) affect the graph of the equation? Be sure to include what happens when \( a \) is positive vs. negative, when \( a \) is greater than 0, and when \( a \) is between 0 and 1.

**Putting it all together:** Work with your group to answer the questions below.
1. By looking at the equations, work with your group to predict the transformations used to obtain the graph of \( g \) from the graph of \( f \). Write down your predictions.

\[ f(x) = 3x \quad g(x) = -3x+2 - 2 \]

2. Graph both equations using \( y_1 \) and \( y_2 \) in the graphing calculator. Put a check by the predictions you made that were correct. Put an \( x \) by the predictions you made that were incorrect. Write down any transformations that were missed by your group and why you think they occurred.

3. Write an equation that would transform the function \( f(x) = 2x \) by shifting the function up 3 units and right 1 unit. Check your answer by graphing both functions in the graphing calculator.

4. Write an equation that would transform the function \( f(x) = 2x \) reflecting the graph across the \( x \)-axis. Check your answer by graphing both functions in the graphing calculator.

Elements of Culturally Responsive Pedagogy:

This lesson activity is designed such that students are working in pairs. The purpose of the partner work is to assist students to get to know and connect with other students and establish an atmosphere in which students respect and are kind to one another (Bondy et al., 2007; Gay, 2010; Nieto, 2013). In this activity, students are expected to work closely together to construct their own knowledge about exponential functions. I expect students to use their prior knowledge and make sense of transformations during this activity (National Council of Teachers of Mathematics, 2014). I will circulate the room during the activity to intervene when needed and encourage peer support (Bonner, 2014; Morrison, Robbins, & Rose, 2008). To increase student motivation, the activity guide is carefully constructed so that students build upon prior knowledge about graphing and key features of graphs. The activity is designed to progress from easy to more complex tasks and thinking to ensure that students have positive first encounters with content before moving to the more challenging parts of the lesson (Gay, 2010; Morrison, Robbins, & Rose, 2008).

To analyze the effectiveness in implementing elements of culturally responsive pedagogy to better engage students through the graphing calculator activity, I will carefully monitor how each student participates in the activity. I will document discussions with and among my students and students’ affective reactions to the activity (Fredricks, Brumenfeld, & Paris, 2004). My note-taking will take place both during and after the lesson as I watch the recorded video. I will document details about which students are following directions, using the calculator, and writing responses as well as students who resist completing the activity. I will also make notes about which students ask for teacher and/or peer support, who takes the initiatives in group processes, and who provides assistance to peers in my field notes.
Anticipated Response from Students:

I anticipate an overall positive response to this lesson, but I also anticipate some resistance to using the calculators. Some students may also want to leave the section about putting it all together blank. If this occurs, I will need to work to communicate high expectations for them to persist through the entire activity.

Day 6 Lesson Title: Graphing Exponential Functions (continued)

Lesson Objectives: Students will (1) evaluate and graph exponential functions and (2) sketch the graph of a function from a verbal description showing key features (Anderson School District 5, 2016).

Materials Needed: interactive notebooks; note-taking guides

Instructional Procedures:

All students will receive a copy of the note-taking guide, which will include an Exponential Functions foldable to review and practice transformations discussed in the previous day’s lesson. Students will individually complete the note-taking guide while participating in a whole-class discussion led by me. Then, students will work independently to practice evaluating and graphing exponential functions. The questions will be adapted from the practice section of the Interactive Student Guide on lesson 7.5 Transforming Exponential Functions (McGraw Hill, 2010). During the discussion, I will focus on the use of precise mathematical language and recognizing and generating strategies to solve problems (What Works Clearinghouse, 2015). I will also circulate the room, redirecting when students become off task. As the students practice, I will continue circulating the room, providing feedback, and answering questions.

Elements of Culturally Responsive Pedagogy:

In this lesson, I will model metacognitive activities such as thinking aloud, scaffold instruction, and provide clarification of the concepts that were introduced in the previous lesson. The class will utilize interactive notebooks as a tool to assist students in meeting academic expectations for vocabulary and concept knowledge/application (Ross & Adams, 2010; What Works Clearinghouse, 2015). During the discussion and note-taking, I will take care to communicate high standards for both academics and behavior and encourage students to take risks. For instance, during the whole group discussion and note-taking I will randomly call on students to respond and encourage all students to view mistakes as learning opportunities rather than failures (Bonner, 2014).

Both during and after the lesson, I will document how each student participates in the interactive notebook activity. I will document details about which students are following directions and writing notes as well as students who resist completing the notetaking activity. I will also make notes about which students ask for teacher and/or peer support, what is said during the whole group discussion, and how students respond when I randomly call on them in my field notes.
Anticipated Response from Students:

I anticipate an overall positive response to this lesson, even though I know that this will not be the most enjoyable lesson in the unit. I hope that students will utilize their interactive notebooks to organize their thinking and study for assessments.

Day 7 Lesson Title: Arithmetic Sequences

Lesson Objectives: Students will write and use recursive and explicit formulas for arithmetic sequences (Anderson School District 5, 2016).

Materials Needed: counting objects, activity guides, interactive notebooks; notetaking guides

Instructional Procedures:

Students will be organized into pairs using random assignment. Each group will be given some objects that are all the same size and shape and an activity guide. I will be sure to verbally describe the expectation for partners to work together and encourage students to work together. The activity guide will instruct students to form a pattern using groups of 2, 5, and 8 objects and to find the number of objects in the next three groups. Once the groups have a solution, they will be asked to write a statement to defend their answer. Students should discover to add 3 to each group. During the activity, I will circulate the room, redirecting off task students, answering questions, intervening when needed, and encouraging peer support (Bonner, 2014; Morrison, Robbins, & Rose, 2008). Upon writing the statement to defend their answer, the activity guide directs the students to ask their teacher to check their work. Once students have correctly completed the first part of the activity, they will proceed to the second part of the group activity, which will include determining the number of items that will be in the ninth group without making the 7th and 8th groups. Students will create a new pattern that seems to follow the same rules as the previous pattern. If needed, I will recommend starting with a different number of items or adding a different number each time. Each group will justify in writing why the new pattern is similar to the original rule. Then, students will find the number of items in the 6th group if the first group has 2, and the number that is added each time if the first group has 3 and the 5th group has 11. Once again, the students will ask me to check their work, and I will provide feedback. Upon successfully completing the second part of the activity and justifying their responses, the students will be instructed to put away their materials and get their notebooks.

Once all the students have completed the partner activity, I will lead that class in a discussion using a notetaking guide. The notetaking guide will include a Frayer Model and practice problems. A Frayer Model is a graphic organizer used to assist students in building vocabulary. The Frayer Model in this lesson will require students to define an arithmetic sequence, generate examples and non-examples of arithmetic sequences, give characteristics of arithmetic sequences, and/or draw a picture to illustrate an arithmetic sequence (The Teacher Toolkit, n.d.). Students will individually complete the note-taking guide
while participating in a whole-class discussion led by me. Then, students will work independently to practice. The questions will be adapted from the practice section of the Interactive Student Guide on lesson 3.5 Arithmetic Sequences as Linear Functions (McGraw Hill, 2010). During the discussion, I will circulate the room, redirecting when students become off task. As the students practice, I will continue circulating the room, providing feedback, and answering questions.

*Elements of Culturally Responsive Pedagogy:*

In this lesson, the concept of arithmetic sequences will be introduced using a hands-on partner activity. The purpose of the partner work with random assignment to groups is to assist students to get to know and connect with other students and establish an atmosphere in which students respect and are kind to one another (Bondy et al., 2007; Gay, 2010; Nieto, 2013). In this activity, students are expected to work closely together to construct their own knowledge about arithmetic sequences (National Council of Teachers of Mathematics, 2014). I will circulate the room during the activity to intervene when needed and encourage peer support (Bonner, 2014; Morrison, Robbins, & Rose, 2008). To increase student motivation, the activity guide is carefully constructed so that students move from easy to more complex tasks and thinking to ensure that students have positive first encounters with content before moving to the more challenging parts of the lesson (Gay, 2010; Morrison, Robbins, & Rose, 2008).

Upon completing the hands-on activity, I will model metacognitive activities such as thinking aloud, scaffold instruction, and provide clarification of the concepts that were introduced in the hands-on activity. The class will utilize interactive notebooks as a tool to assist students in meeting academic expectations for vocabulary and concept knowledge/application (Ross & Adams, 2010). During the discussion and note-taking, I will take care to communicate high standards for both academics and behavior and encourage students to take risks. For instance, during the whole group discussion and note-taking I will randomly call on students to respond and encourage all students to view mistakes as learning opportunities rather than failures (Bonner, 2014). I will circulate the room during the independent practice to redirect off task behavior and assist students.

Both during and after the lesson, I will document how each student participates in the hands-on activity as well as the interactive notebook activity. I will document details about which students are following directions, communicating with peers, taking risks in the group process. I will also document details about which students are taking notes as well as students who resist completing the notetaking activity. I will also make notes about which students ask for teacher and/or peer support, what is said during the whole group discussion, and how students respond when I randomly call on them in my field notes.
Anticipated Response from Students:

I anticipate an overall positive response to this lesson, but I expect resistance to working with different students from who students normally work with. I hope that I will be able to effectively deal with the resistance from students to working with others and that students will feel more comfortable working with students that they do not normally work with.

Day 8 Lesson Title: Geometric Sequences

Lesson Objectives: Students will write and use recursive and explicit formulas for geometric sequences (Anderson School District 5, 2016).

Materials Needed: balls, activity guides, smart phones, measurement tools

Instructional Procedures:

Students will be organized into pairs. Each group will be given a ball, a measurement tool, and an activity guide (adapted from Drop and Catch; Hyde, Canzone, & Galasso, 2016). I will first model the activity steps, making sure to verbally describe the expectation for partners to work together and that BOTH partners are expected to contribute to the discussion for this activity. The activity guide will instruct students to practice dropping the ball 3 times from the same height and recording the rebound height using video. Prior to recording the data, students will predict whether or not the data (Bounce #, rebound height) will represent a function, state why or why not, and, if they think it will be a function, predict what type of function and why. Students will approximate how high on average the ball goes on each bounce for 4 bounces and record the data on a table. Students will review the rebound height data and describe the patterns they see using a complete sentence. During the activity, I will circulate the room, redirecting off task students, answering questions, intervening when needed, and encouraging peer support (Bonner, 2014; Morrison, Robbins, & Rose, 2008). Once all students have their data recorded on a table and described the pattern, students will use a graphing calculator to create a scatter plot. Students will be asked to determine whether or linear or exponential model is appropriate to model the data, and defend their answer. The students will be asked to use their theory and ratio to predict the height of the ball on the 7th bounce. The activity guide will instruct students to ask me to check their work at this point, and I will provide feedback. Once the groups come to a decision, they will follow the steps on the activity guide to obtain a regression equation. Students will predict the height of the ball on the 7th bounce using the regression equation and compare the answer to their prediction. Then, continuing to work in pairs, students find the common ratio and write an equation for the nth term of the geometric sequence 2, 6, 18, 54, . . . given the formula for a geometric sequence. Then, they will use the formula to find the thirteenth term of the sequence.

Once all the students have completed the partner activity, I will lead that class in a discussion of how geometric sequences are related to exponential functions. Students will be given a few problems to practice independently at the end of the lesson.
In this lesson, the concept of geometric sequences will be introduced using a hands-on partner activity. The purpose of the partner work is to assist students to get to know and connect with other students and establish an atmosphere in which students respect and are kind to one another (Bondy et al., 2007; Gay, 2010; Nieto, 2013). In this activity, students are expected to work closely together to construct their own knowledge about geometric sequences. I will circulate the room during the activity to intervene when needed and encourage peer support (Bonner, 2014; Morrison, Robbins, & Rose, 2008). To increase student motivation, the activity guide is carefully constructed so that students move from easy to more complex tasks and thinking to ensure that students have positive first encounters with content before moving to the more challenging parts of the lesson (Gay, 2010; Morrison, Robbins, & Rose, 2008).

Upon completing the hands-on activity, I will provide clarification of the concepts that were introduced in the hands-on activity. During the discussion, I will take care to communicate high standards for both academics and behavior and encourage students to take risks. For instance, during the whole group discussion, I will randomly call on students to respond and encourage all students to view mistakes as learning opportunities rather than failures (Bonner, 2014). I will circulate the room during the independent practice to redirect off task behavior and assist students.

*Anticipated Response from Students:*

I anticipate an overall positive response to this lesson, but I expect some continued resistance to working with different students from who students normally work with.

**Day 9 Lesson Title: Geometric Sequences (continued)**

**Lesson Objectives:** Students will write and use recursive and explicit formulas for geometric sequences (Anderson School District 5, 2016).

**Materials Needed:** notetaking guides, interactive notebooks

In this lesson, I will lead that class in a discussion using a notetaking guide. The notetaking guide will include a Frayer Model and practice problems. A Frayer Model is a graphic organizer used to assist students in building vocabulary. The Frayer Model in this lesson will require students to define a geometric sequence, generate examples and non-examples of geometric sequences, give characteristics of geometric sequences, and/or draw a picture to illustrate a geometric sequence (The Teacher Toolkit, n.d.). Students will individually complete the note-taking guide while participating in a whole-class discussion led by me. Then, students will work independently to practice. The questions will be adapted from the practice section of the Interactive Student Guide on lesson 7.7 Geometric Sequences as Exponential Functions (McGraw Hill, 2010). During the discussion, I will circulate the room, redirecting when
students become off task. As the students practice, I will continue circulating the room, providing feedback, and answering questions.

Elements of Culturally Responsive Pedagogy:

During this activity, the class will utilize interactive notebooks as a tool to assist students in meeting academic expectations for vocabulary and concept knowledge/application (Ross & Adams, 2010; What Works Clearinghouse, 2015). During the discussion and note-taking, I will take care to communicate high standards for both academics and behavior and encourage students to take risks. For instance, I will randomly call on students to respond and encourage all students to view mistakes as learning opportunities rather than failures (Bonner, 2014). I will circulate the room during the independent practice to redirect off task behavior and assist students.

Anticipated Response from Students:

I anticipate an overall positive response to this lesson, as it is the last lesson of unit prior to the review and unit test. I hope that students will utilize their interactive notebooks to organize their thinking and study for assessments.
LIST OF REFERENCES


116


BIOGRAPHICAL SKETCH

Jenny Lott Van Buren graduated Summa Cum Laude from the University of New Orleans in New Orleans, Louisiana, in 2006 with her Bachelor of Science in secondary mathematics education with university honors and honors in her major. She earned her master’s degree in educational leadership from the University of North Florida in 2010. She earned her Doctorate of Education in curriculum and instruction from the University of Florida in 2017.

Jenny began her teaching career in Orange Park, Florida, where she taught high school mathematics before moving to South Carolina. Her current position is teaching high school mathematics in Greenville, South Carolina. Jenny currently resides in Williamston, South Carolina, with her husband and children. Her interests include mathematics instruction, culturally responsive teaching, teacher leadership, and teacher inquiry as a form of job embedded professional learning.