2017

Cultural Sensitivity in the Performance-Based Learning Environment

Monique Matleen Hazzard-Robinson
Walden University

Walden University

College of Education

This is to certify that the doctoral study by

Monique Matleen Robinson

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

Review Committee
Dr. Peter Kiriakidis, Committee Chairperson, Education Faculty
Dr. Maryanne Longo, Committee Member, Education Faculty
Dr. Michael Brunn, University Reviewer, Education Faculty

Chief Academic Officer
Eric Riedel, Ph.D.

Walden University
2017

Abstract

Cultural Sensitivity in the Performance-Based Learning Environment

by

Monique Matleen Hazzard-Robinson

MA, Armstrong State University, 2003

BS, Savannah State University, 1995

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Education

Walden University

December 2017

Abstract

The Georgia Department of Education requires students to earn 4 course credits in the area of mathematics in order to graduate from high school. Academic success for mathematics students in a school district in southern Georgia has been encumbered because teachers lack cultural competency in mathematics instruction, which has hindered minority students from developing reasoning, critical analysis, and problem-solving skills needed to earn these required math credits. The purpose of this project study was to examine teachers' perceptions of using culturally relevant teaching strategies to influence the academic performance of minority students in the mathematics classroom. The conceptual framework was Dewey's progressive education theory. Six high school math teachers were purposefully selected for face-to-face interviews. Interview transcripts were coded using the Coding Analysis Toolkit and analyzed using thematic analysis. The findings showed that culturally competent mathematics instruction is important when teaching minority students; however, math teachers were not adequately prepared to teach minority students. Based on the findings, a professional development program was developed for secondary math teachers. Implications for positive social change include increasing math teachers' cultural awareness during instruction to help minority students increase academic proficiency in mathematics.

Cultural Sensitivity in the Performance-Based Learning Environment

by

Monique Matleen Hazzard-Robinson

MA, Armstrong State University, 2003

BS, Savannah State University, 1995

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Education

Walden University

December 2017

Dedication

This doctoral project study is dedicated to my Redeemer, the Lord Jesus Christ, without whom I can do nothing. I also dedicate this project study to the loving memories of my grandmothers, Matleen Williams Burnett and Gertrude Coffee Hazzard.

Acknowledgments

I want to express my gratitude to those who supported and encouraged me to complete this doctoral study. First, I want to thank my husband, Omar, for being supportive during this process. Second, to my sons, Henry Michael and William Gabrael Robinson, thank you for your support during this laborious process. Third, I want to thank my committee chair, Dr. Peter Kiriakidis, for helping me complete this doctoral study. Fourth, I extend thanks to my second committee member, Dr. Maryanne Longo. Fifth, I want to thank my parents, William and Maryann Hazzard, and my sisters, Marquita Freeman, Wakisha Hazzard, and Dominique Hazzard. Thank you for your prayers, support, and encouragement. Sixth, I want to thank the participants for their honest responses to the interview questions. Finally, to my friends and extended family, thank you for your encouragement and support.

Table of Contents

Section 1: The Problem

Introduction

"Mathematics is the most widely used subject in the world" (Shao, 2014, p. 22) because it helps the mind rationalize, reason, and organize complex situations by using logical steps. Mathematical skills are important for students to compete in the technological global environment (Star & Stylianides, 2013). A gap in practice in the consistent and efficient use of culturally relevant instructional strategies has helped to maintain a gap in mathematics performance between minority students, namely African-American and Hispanic learners, and their White-American counterparts (Gay, 2013; McKown, 2013; Nieto, 2017). Addressing this performance gap necessitates that educators heighten their cultural awareness for these learners and increase the use of culturally sensitive instructional strategies to encourage development of the well-balanced student (Arreguin-Anderson & Ruiz, 2013; Martin, 2012; Milner, 2014; Nasir & de Royston, 2013; Nasir, Snyder, Shah, & Ross, 2012). Creating and sustaining cultural connections, while strengthening teacher-pupil relationships, are crucial to making learning relevant and meaningful to minority students (Martin, 2012; Milner, 2014; Nasir, Snyder, Shah, & Ross, 2012; Petty, Wang, & Harbaugh, 2013). In order for minority students to reach their maximum learning potential, math teachers need to understand students' cultural experiences (Arreguin-Anderson & Ruiz, 2013; Barton, 1996; Glass & Rud, 2012; Martin, 2012; Nasir & de Royston, 2013; Nasir, Snyder, Shah, & Ross, 2012). Deficiencies in the application of mathematical concepts impact students' academic success and global economies (Permuth & Dalzell, 2013). In this section I discuss the

local problem and its significance. Additionally, I discuss the origins of the educational achievement gap between secondary schools' student populations, and the cultural, environmental, and socioeconomic factors that impact its existence in the literature review.

Definition of the Local Problem

The local school district where I conducted my study is a mid-sized district in southeastern Georgia. The district serves over 37,000 students and employs over 3,000 educators. The district includes 57 K-12 schools, including 26 elementary schools, eight K-8 schools, nine middle schools, 10 high schools, and 12 additional educational centers and specialty programs (Georgia Department of Education, 2017a). The district offers students a traditional academic curriculum guided by the Georgia Standards of Excellence and supports a variety of other educational program strategies, such as Montessori, visual and performing arts, Core Knowledge, International Baccalaureate, and vocational studies (Georgia Department of Education, 2017b). Even though several of the local district schools have received top academic accolades from the Georgia State Department of Education, such as being classified as schools of excellence, the overall student performance in local schools continues to fall short of the adequate yearly progress (AYP) standards outlined in the No Child Left Behind legislation and the Every Student Succeeds Act (Peterson, 2016).

The 2016-2017 ethnic demographics of the district included 27.7% European American, 57% African American, 7.4% Hispanic American, 2.1% Asian American, 0.4% Native American, 0.1% Pacific American, and 5.3% Multicultural American.

Approximately 67% of students qualified for free/reduced lunch. A small number of students were also classified as English language learners (ELL). Approximately 250 students of the Hispanic American population in the district received ELL services. Correspondingly, the high school population was approximately 8500 students, and the ethnic make-up included 26.5% European American, 62.5% African American, 5.2% Hispanic American, 1.8% Asian American, and 4% Multicultural American (Georgia Department of Education, 2017a).

Despite the school district's efforts to provide continuous professional development and innovative technology and teaching resources for secondary math teachers, many teachers continue to follow the traditional approach to teaching mathematics based on historical ideas of learning void of culturally relevant instructional strategies, contributing to low student motivation and poor student mathematics performance (Evans, 2013). Math teachers who teach that there is only one way to process a mathematical concept or teach mathematics from a solely objective point of view do not meet the learning needs, styles, or processing methods of many minority students (Akiba & Liang, 2016). Many of the minority students attending local schools continue to underperform academically in the area of mathematics (Georgia Department of Education, 2017a). Because of the overall low academic performance of Georgia math students, the Georgia Department of Education restructured mathematics curriculum standards (Georgia Department of Education, 2017b) to include task-like activities designed to support students' learning needs (Tienken, 2013). The newly designed curriculum tasked teachers to engage students in active learning by building upon

students' existing knowledge and skills, and by increasing the use of culturally appropriate pedagogy. Like in the local district, many minority students at the state level are underperforming in mathematics as indicated on the state end-of-course assessments, even after the curriculum enhancement.

Many local teachers have not engaged students in active learning or provided students with real-life learning experiences related to their personal cultures resulting in low performance in mathematics among minority students. According to Gay (2000), when teachers do not provide culturally authentic educational experiences, students are unable to make relevant connections and struggle to succeed academically. According to Martin (2012), the job of the classroom teacher is to facilitate student learning, making relevant connections between students' cultural experiences and the curriculum. The lack and inconsistent use of culturally relevant teaching practices in local mathematics classrooms hinders the accomplishment of this goal (Martin, 2012). Thus, I conducted this project study to understand math teachers' perceptions of using culturally relevant teaching strategies to influence the academic performance of minority students in the mathematics classroom.

Rationale

Evidence of the Local Problem

The region of Georgia where I conducted this study is often described as the "Low Country" for its long history of rice plantations and slavery. The area has a 26% poverty rate, which increases to 50% in some of its predominately African-American communities (Step Up Savannah, 2016). The Low Country is located on the southeast

coast of Georgia. There are eight municipalities in the county where I conducted my study, with a total population of 289,082, 40% of which is African American (US Census, 2016). The county public school system has 57 learning facilities ranging from traditional elementary, middle, and high schools, to K-2, K-8, alternative, and charter schools. The public school district has over 37,000 students and 3,200 certified teachers, of whom 38% are non-white. In this study, I examined teachers' perceptions of using culturally relevant teaching strategies to influence the academic performance of minority students in the mathematics classroom.

Across the school district, many students are performing below grade level as indicated on state developed end-of grade assessments and end-of-course assessments in mathematics. According to a math coach who works in the district, mathematics teachers need to collaborate to identify effective strategies to teach students the problem-based mathematics curriculum (math coach, personal communication, January 23, 2014). Nieto (2017) noted that teachers must answer questions about their personal identities and motives to find more effective ways to reach their students in the learning environment. More than 80% of African-American student population and more than 60% of Hispanic high school student population in the district did not meet the targeted goal in the Coordinate Algebra area of mathematics; however, 58% of the White-American students also did not meet the math benchmark (Georgia Department of Education, 2017a). The assessment data highlight the need for teacher enhancement of classroom pedagogy with regards to mathematics. As one district math coach noted, the absence of culturally-sensitive problem-based learning tasks is a problem that affects minority students across

the school district because the implementation of the current mathematics curriculum places a large emphasis on problem solving, reasoning, representation, connections, and communication in context. The math performance-based learning activities provided in the current math curriculum do not consider the experiences of minority students (math coach, personal communication, January 23, 2014). Additionally, the math coach implied that the lack of cultural diversity awareness among educators and the limited views of instructional and student productivity are among the possible contributing factors (math coach, personal communication, January 23, 2014).

Additionally, according to the 2016 Georgia K-12 Teacher and Leader Workforce Status Report (Governor's Office of Student Achievement [GOSA], 2017), 10% of the educator candidates in Georgia enrolled in alternative preparation programs to prepare themselves to meet the needs of Georgia's students (Georgia Department of Labor, 2017). While these alternative teacher preparation programs help to fill classroom vacancies across the state, these programs tend to concentrate on the science of teaching rather than the art, often neglecting to address the role that acknowledging culture plays in providing an equitable learning experience for all students (Evans, 2013) and creating an additional contributing factor to the problem. As teachers enter classrooms populated with African-American and Latino students, they are challenged to provide their students with a rich, rigorous mathematical learning experience that provides students with a chance to understand and use math in their personal environment (Evans, 2013). While content knowledge and teacher efficacy are important attributes of a productive classroom, Evans (2013), Gay (2013), and Ladson-Billings (2007) suggested that social

justice orientations, cultural responsiveness, and creating real-world connections in the classroom are also necessary for quality teaching to occur. For these reasons, I determined that an examination of teachers' perceptions of cultural competency in mathematics curriculum was needed to understand how they impact their teaching practices.

The local school district serves a diverse group of students, the majority of whom are African-American. According to the Georgia Department of Education Teacher Keys Effectiveness System Handbook's (Georgia Department of Education, 2017c) Standard 3 on instructional strategies, teachers are to engage students in authentic learning by providing real-world problem-based inquiry and interdisciplinary connections (Georgia Department of Education, 2017c). This Teacher Keys Effectiveness System (TKES) standard may be more attainable if teachers were provided with culturally relevant teaching strategies (Gay, 2013; Ladson-Billings, 2007).

The Georgia State Department of Education indicated that the local school district's mathematics data on state assessments are behind the state average (Georgia Department of Education, 2017a). The assessment data indicate the need to increase teacher proficiency in the area of authentic secondary mathematics instruction. Math performance-based learning activities historically have not included the experiences of minority students (Brooks & Dietz, 2013). Aronson and Laughter (2016) further suggested that recent adjustments to academic curricula have marginalized culturally relevant education in the classroom environment, supporting negative student outcomes across multiple content areas. As such, in order for mathematics teachers to fulfill their

professional obligation to their students, they must become more culturally competent (Pantin, 2014). Culturally responsive teacher professional development will provide opportunities to improve the math teachers' consistent use and effectiveness of instructional strategies for working with minority students.

According to a local school district mathematics coach, a number of classroom teachers across the school district experience difficulty in creating a positive, productive learning environment for minority students. Most teachers are not using instructional strategies that meet the needs of the large number of minority students in their classrooms. While the success of each student is important to local school district leadership and many initiatives and strategic plans have been created and implemented to support this goal, there is no plan to change the curricula to include culturally relevant materials for students, or culturally relevant training for teachers.

The purpose of this qualitative project study was to examine teachers' perceptions of using culturally relevant teaching strategies to influence the academic performance of minority students in the mathematics classroom. Using the Coding Analysis Toolkit resource, I analyzed the data to identify themes. The qualitative approach provided me the opportunity to examine teachers' perceptions of cultural competency in mathematics instruction.

Evidence of the Problem in the Professional Literature

Primary, secondary, and collegiate education throughout the United States have economic, technological, and social challenges (Arseven, Kilic, & Sahin, 2016; Hatcher & Bowles, 2014). Educational initiatives such as Race to the Top, the Elementary and

Secondary Education Act (ESEA), and School Improvement Grants (SIG), are evidence of the critical state of education and the need for educators to assume an atypical stance on education (Rickman, 2016). Kosutic (2017) stated that the continuation of the United States as an international superpower depends on its ability to nurture scholars with the adaptability, creativity, and persistence to solve global issues from the practical, economical, technological, and humanitarian standpoints. Today's rapidly changing cultural environment demands that education prepares students to embrace and understand the various cultural traditions and mores of the people around them (Ebersole, Kanahele-Mossman, and Kawakami, 2016). Ebersole et al. (2016) indicated that educators should balance knowledge and culture as the classroom environment continues to diversify.

I examined teachers' perceptions of using culturally relevant teaching strategies to influence the academic performance of minority students in the mathematics classroom. The results of this project study could be used to develop professional development programs to help educators increase their students' academic performance in mathematics by attending to their cultural identities.

Definitions

Annual measurable objectives (AMOs): In accordance with the No Child Left Behind and Every Student Succeeds Acts, Annual Measurable Objects must be set forth by the Department of Education of each state outlining the objectives that each local educational agency or school must achieve every year to show that progress is being made toward the 100% student academic proficiency goal (Peterson, 2016).

Common core curriculum: A set of curriculum standards purported to provide students, parents, and educators with a clear and consistent view of what they need to learn in order to be successful in college and career (Olson, Olson, & Capen, 2014).

Cross-cultural communication: Understanding the way members of other cultures interact with others by the use of verbal and non-verbal cues. Cross-cultural communication is based on the knowledge of cultural values, perceptions, manners, social structure, and decision-making practices. Effective cross-cultural communication respects members of diverse cultures and makes consistent and honest attempts to understand their perspectives while welcoming new learning opportunities with open-minded and flexible attitudes (Savva, 2017).

Culture: Culture refers to the integrated patterns of human behavior associated with a particular group of people. These patterns can be seen in language, thoughts, communications, actions, customs, beliefs, values, and institutions (Xu & Hampden-Thompson, 2012).

Cultural capital: The non-monetary, educational or intellectual social assets that promote social mobility beyond economic restrictions (Dixon-Roman, 2013).

Cultural competency: The United States Department of Health and Human Services (Savva, 2016) defined cultural competency as a set of invariable behaviors, attitudes, and policies that intersect in a system, agency, or among professionals that support effective work scenarios in various cultural situations.

Culturally relevant education: An educational system that values the cultural knowledge and experiences of all students regardless of the cultural system of which they

are a member. For all its members, this system advocates intellectually, emotionally, politically, and socially using cultural references that encompass student attitudes, knowledge, and skills within the learning environment (Gay, 2000).

Ethnomathematics: Ethnomathematics refers to the interrelationship between culture and the learning of mathematics. Ethnomathematics surveys alternative and innovative ways to provide culturally-resonant academics to students in efforts to create meaningful connections that ensure depth of learning (Ju, Moon, & Song, 2016).

Georgia High School Graduation Tests (GHSGT): A set of state-mandated tests designed to assess students' proficiency in the areas of writing, reading, mathematics, social studies, and science. The purpose of the assessments is to ensure that students seeking a high school diploma endorsed by the state of Georgia have mastered essential core academic content and skills (Peterson, 2016).

Georgia Performance Standards (GPS): Introduced in 2005, the Georgia Performance Standards replaced the Quality Core Curriculum matriculation sequence used to educate students in the state of Georgia. According to the Georgia Department of Education (2017c), the Georgia Performance Standards curriculum "provides clear expectations for assessment, instruction, and student work…[and] isolate and identify skills needed to problem-solve, reason, communicate and make connections with other information."

Georgia Quality Core Curriculum (GA QCCs): Based on the 1986 Quality Basic Education Act, the Georgia Quality Core Curriculum was established as the primary educational delivery system for students matriculating across the state. In 2001 Georgia

called for an audit of the curriculum by Phi Delta Kappa. Phi Delta Kappa deemed the curriculum to be shallow, low in rigor, and inconsistent in assuring consistent academic success for all students ("Georgia Performance Standards," n.d.).

Performance-based learning: Performance-based learning is a collection of educational strategies used to help students acquire and apply knowledge, skills, and work habits by performing meaning and engaging academic tasks (Cydis, 2015).

Problem-based learning (PBL): Problem-based learning is a student-centered, curriculum delivery system designed to educate students by using real-world problems. Students use active prior knowledge and other self-directed learning strategies to resolve problems while constructing and applying new knowledge (Scott, 2014).

Significance

Increasing the consistent and efficient use of culturally relevant instructional strategies to influence the academic success of minority students in mathematics is important because it is essential for all students to receive an equitable high-quality education (Petty, Wang, & Harbaugh, 2013). According to Crawford (2013) and Hogan (2012), rapid technological advances demand that people be progressively numerate. Numbers are used to characterize and assess everyday happenings and students must be able to metaphrase abstract information into relevant, contextual knowledge (Crawford, 2013; Hogan, 2012). Despite the more than $600 billion in federal and local funds allotted to education, many students, locally and nationally, are receiving a less than adequate math education and are underprepared to meet the current demands of globalization. No Child Left Behind and Every Student Succeeds Act legislations were

implemented to deal with this issue (Peterson, 2016).

The exclusion of the experiences of any particular cultural group from the structure of the educational environment creates a deficit in the society's ability to produce citizens who can add value to their community and assist in the resolution of its problems (Ladson-Billings, 2006). According to Ladson-Billings (2007), diminished cultural awareness and sensitivity are at the root of the issue that affects the American educational system, and particularly the local school district. The findings of this study can contribute to filling the gap in practice regarding the consistent and efficient use of culturally relevant instructional strategies to support student learning among minority students in mathematics. My findings may provide information teachers can use explore and discuss the variety of cultures that exist in their classrooms, the ways these cultures manifest within the mathematics classroom, and possible means to address them using culturally responsive instructional strategies.

The creation of professional development courses dedicated to the imbedding of culturally relevant instructional strategies and the creation of culturally relevant instructional resources will be the original contribution this study will make in the local school district. Secondary math teachers will benefit by having (a) an opportunity to explore research-based evidence on how culture impacts the academic success of students; (b) an opportunity to discover how their own culture affects the success of their secondary math students; and (c) guidance as to how to respect, acknowledge, and incorporate culture in their classroom so that it positively impacts learning.

Guiding Research Question

The purpose of this project study was to examine teachers' perceptions of using culturally relevant teaching strategies to influence the academic performance of minority students. Dewey (1910, 1938) believed that education, as a social and cultural construct, should reflect the culture of the community of learners. While some local teachers in today's performance-based classrooms have adhered to Dewey's progressive ideal, many local teachers have not provided students with real-life, personalized learning experiences related to their personal culture. According to Gay (2000), when teachers do not provide culturally authentic educational experiences, students are unable to make relevant connections and struggle to succeed academically. According to Martin (2012), the job of the classroom teacher is to facilitate student learning, making relevant connections between students' cultural experiences and the curriculum. The lack and inconsistency of culturally relevant teaching practices in local mathematics classrooms hinders the accomplishment of these goals (Martin, 2012). Therefore, it is important to understand math teachers' perceptions of the role culture plays in the learning environment to support them in creating effective facilitating learning for all their students. The research question I developed for qualitative analysis was: What are teachers' perceptions of cultural competency in teaching mathematics to minority students?

In the project study's findings and data analysis, I described (a) teachers' perceptions of culturally appropriate pedagogy in teaching mathematics to diverse students, (b) the reasons that culturally competent mathematics instruction is important when teaching diverse students, and (c) concerns with math teacher preparation for teaching diverse students.

Review of the Literature

Educators invariably seek ways to ensure that students are learning, comprehending, and applying the information presented to them because student achievement and academic success are the central concerns of educational professionals. Even though standardized test data are reportedly on the rise across the nation, the variation between the data of minority students and White-American students continues to be vast (Lauren & Gaddis, 2016). Because of the general public's dissatisfaction with the current educational status quo, D'Andrea and Daniels (2007) suggested the radical transformation of the American public school system include the adoption of a curriculum that reflects cultural sensitivity.

Conceptual Framework

Dewey's progressive ideal of education formed the conceptual framework for this project study (Milner, 2014). I determined that this was the best conceptual framework to use because Dewey's progressive education theory places value on the experiences of the learner (Nieto, 2017). Dewey viewed schools as small communities of learning that focus on the real-life issues that students face (Dewey, 1938). Dewey (1910, 1938) believed education should reflect the culture of the community of learners. Many

challenges exist in educating multicultural students in a traditional classroom setting. While some teachers in today's performance-based classrooms have adhered to Dewey's progressive ideal, many teachers have not provided students with real-life, personalized learning experiences related to their personal culture. According to Gay (2000), when teachers do not provide culturally authentic educational experiences, students are unable to make relevant connections and struggle to succeed academically. Since the job of the classroom teacher is to facilitate student learning by making relevant connections between students' cultural experiences and the curriculum, it is important to understand teachers' perception of the role culture plays in the learning environment.

Ogbu (1992) asserted that minority students whose cultural schema are contrary to that of the United States mainstream have greater difficulty crossing cultural boundaries in academic settings, resulting in a deterioration of the teaching-learning process. Because of such cultural differences, linguistic differences, breakdowns in cross-cultural communication, and their effects on students' academic achievement, researchers have conducted a considerable amount of research addressing cultural influence on the learning environments of adolescences (Feryok, 2013). To identify and understand the connection between cultural inclusion in the classroom and the academic success of minority students, I searched academic databases using the following keywords: *achievement gap, cross-cultural communication, culture, cultural competency,* and *ethnomathematics*. Current research published in a variety of contexts has shown the connection between teachers' positive perceptions of culture and successful learning environments, especially in the case of minority students. In the literature review, I

concentrated on the central underpinnings of the achievement gap in the United States as well as the cultural, environmental, and socio-economic factors that support the perpetuation of the achievement disparity. In the literature review, I write about past attempts to narrow the achievement gap and how standards-based and problem-based learning reforms have impacted the learning and achievement among minority students. I also discuss the importance of cultural inclusiveness in the classroom.

Defining the Achievement Gap

In educational, social, and political circles, the term achievement gap became a common descriptor of the fact that, as a whole, minority students in the United States perform below their non-minority counterparts on standardized assessments used to measure academic achievement (McKown, 2013). Despite the judicial promise of equitable educational opportunities for all students regardless of color, creed, or socioeconomic status, local and national educational systems have failed to provide all the nation's students with the high-quality education needed to survive in the ever-changing world in which they live (Bagley & Portnoi, 2014). The achievement differences between minority students and their White-American counterparts not only have grave consequences within the world of academia, but also have somber implications for the futures of these students (Browne, 2012).

Origins of the Achievement Gap

While educators and researchers have not been able to arrive at a consensus as to the primary causes of the academic achievement gap, most agree there is a broad range of cultural, environmental, structural and institutional factors that affect a student's school

performance (Hand, 2012; McKown, 2013). Students who have acquired limited cultural capital and experience limited parental involvement are more likely to have lower academic achievement than their peers (Dixon-Roman, 2013; Kosutic, 2017; Xu, & Hampden-Thompson, 2012). Academic achievement is closely associated with race and socioeconomic status (DePouw, 2012; Feryok, 2013; Ladson-Billings, 2006, 2007). Because low-income families have fewer monetary resources than middle- and upper-income families, these families struggle to get basic provisions such as food, clothes, shelter, and proper health care (DePouw, 2012; Feryok, 2013; Ladson-Billings, 2006, 2007). Unable to meet the biological, physiological, and safety needs of Maslow's hierarchy, students from low-income families find little to no use in performing well in academic environments (DePouw, 2012; Feryok, 2013; Ladson-Billings, 2006, 2007).

In addition to citing low cultural capital, minimal parental involvement, and nominal finances as causes of the achievement gap, Herrnstein and Murray (1994) contended that the cognitive differences that persist between African-American and White-American students were a result of genetic variations. While they provided no scientific proof for the validity of their claims, Herrnstein and Murray maintained that a combination of DNA and environment inherently controlled a human being's personal dynamics, including financial income, job performance, socioeconomic status, and educational level (Herrnstein & Murray, 1994). The authors referred to persons who displayed elevated intelligence levels as the cognitive elite who were separating themselves from those members of society who possessed average and below-average intelligence (Herrnstein & Murray, 1994). In Herrnstein and Murray's framework, the

achievement gap would result in a societal trend revising Darwin's theory of natural selection to the survival of the intellectually fittest (Herrnstein & Murray, 1994; Kim, Chang, Singh, & Allen, 2015; McKown, 2013).

Cultural, Environmental, and Socioeconomic Factors and the Achievement Gap

The environments, cultures, and socioeconomic factors in which students are reared have influences on the achievement gap. According to Clark (2012), children performed better academically when they were primed before entering school. Income and social class drastically impact school readiness (Clark, 2012). Rapp and Duncan (2012) also found that parental involvement played a decisive role in student success throughout the educational process, indicating that wealthier, more educated parents tended to read to their children more frequently, encouraged independent reading, and spoke with their children differently, asking in-depth and probing questions. Researchers have also found that higher-income parents have elevated expectations of their children's school performance, are more comfortable challenging teachers and school personnel on curriculum issues, and are more equipped to assist their children with homework assignments (Dotterer & Wehrspann, 2016; Rapp & Duncan, 2012). This combination of behaviors tends to increase school success among school-aged children (Dotterer & Wehrspann, 2016; Rapp & Duncan, 2012).

Claessens, Engel, and Curran (2014) suggested that minority students who were born to low-income families or to single-parent homes, who lived in unstable homes, who lacked adequate nutrition, and who did not receive sufficient medical care often performed poorly in school. These researchers indicated that due to the shortage of these

basic necessities of life and because many minority parents were considered unskilled in the workplace, these caregivers often held down multiple jobs to provide for their families, leaving little time to assist their children with educational activities. As a result of these cultural, environmental, and socio-economic differences, minority children begin school with limited vocabularies and decreased linguistic proficiency that negatively affects academic success (Gay, 2013; Makarova & Birman, 2015; Martinez & Rury, 2012).

In like manner, McKown (2013) found that poor health was also a key issue that could affect school performance among minority student. Impaired vision, hearing loss, vitamin and mineral deficiencies, and respiratory problems are only a few among the wide range of ailments that affect academic performance (Kim, Chang, Singh, & Allen, 2015; McKown, 2013). Equally important in defining the causes of the achievement gap are cultural attitudes and beliefs toward standardized testing and the benefits of academic success (Permuth & Dalzell, 2013). Kruse (2016) found that minority students viewed standardized tests as culturally-biased instruments that spotlight middle-class, White-American experiences as the standard for all students. Other reseachers studying minority students and families found that because minority students did not see the immediate benefits of increased academic skills, minority parents commonly did not promote the importance and value of obtaining a solid education to their children, which resulted in unmotivated underachieving students (Dixon-Roman, 2013; Permuth & Dalzell, 2013).

Cultural and Educational Theories and the Achievement Gap

Over the past 250 years, academic ideas and theories have been influenced by a changing society and its varying climatic needs. Academic researchers are currently seeking ways to make the educational process more progressive and innovative in hopes of helping pupils attain the highest form of mental and academic acuity (Kalajdzievska, 2014). The educational paradigm has shifted many times along the path to learning equality, especially when the lanes of anthropology and academic achievement intersected. Over the last two centuries, three ideas have developed regarding the relationship between culture and academic achievement. According to Aronson and Laughter (2016), scholars developed the cultural deficit theory, the cultural difference theory, and the cultural ecological theory in hopes of explaining how environmental, societal, and ethnic mores could impact academic accomplishment.

The Cultural Deficit Theory

Following the genetic deficit theory and the Darwinian notions of genetic predestination of the latter 1800s and early 1900s, the cultural deficit theory surfaced as a socio-cultural adjunct to the geographical and environmental adaptation ideas of the previous generation. Genetic deficit theorists transformed their thoughts on "survival of the fittest" (Darwin, 1876, p. 63), incorporating notions that certain social and cultural systems produce intellectually inferior people who were incapable of scholarly deliberation. Through research and publications, popular and respected cultural deficit theorists, such as Deutsch, Bloom, Davis, and Hess, and Bereiter and Engelmann, urged

educational institutions to incorporate intelligence and scholastic achievement assessments into their academic programs (Kosutic, 2017). These intelligence and scholastic achievement ratings would go on to operate as tools to homogeneously group students within school systems (Aronson & Laughter, 2016). Students deemed to have below average or low intelligence would be placed on educational tracks to vocational occupations where they could learn a skill or trade since higher education would not be an option for these students (Aronson & Laughter, 2016). Tracking, as it was called, became the principal means of organizing students into academic cohorts in American public schools and was used by many educators to support their claims that deprived social, cultural, and economic environments of students are the cause of students' academic limitations (Aronson & Laughter, 2016). The cultural deficit theorists extend their rationale by blaming students for their victimization because of the negative stereotypes and perceptions that people outside their particular social or cultural group held (Aronson & Laughter, 2016). The ideology of the cultural deficit theory blamed students, the students' families, and their cultural conventions for any academic shortcomings, completely absolving educational facilities of any responsibilities to appropriately instruct students (Aronson & Laughter, 2016).

The cultural deficit theory ensued from generally negative suppositions regarding the abilities, the work ethics, and the desires of systematically marginalized people. The model of the cultural deficit theory asserted that members of cultures outside of the White-American mainstream failed academically because of cultural deprivation, causing students to be bankrupt with regard to the cultural models deemed necessary for scholarly

success (Aronson & Laughter, 2016). One assertion was that students of color and poor students most often entered school having gathered very little cultural capital and had not been taught the value of education because of a lack of parental or family involvement in the school environment (Aronson & Laughter, 2016; Kosutic, 2017).

As a result of the cultural deficit perception, the school environment became a subtractive experience for students of color and lower-income students, rather than an enhancing one (Aronson & Laughter, 2016). The endorsement of the cultural deficit theory among educational authorities gave rise to the over-representation of minority and low-income students in special education programs and a disproportionately high number of drop-outs among these student groups, as well (Ladson-Billings, 2006, 2007).

The Cultural Difference Theory

Labov (1969) wrote a groundbreaking article that would challenge the beliefs of the cultural deficit theory. Labov (1969) criticized the leaders of the American educational system of formulating inaccurate testing correlations through researcher bias and non-European cultural ignorance. Labov's (1969) outlined how non-standard dialects were structured systems of communication. Labov's (1969) observations prompted another instructive paradigm shift which redirected the focus of educational theorists from cultural deficiencies to cultural differences.

Behavioral psychologist Erickson (1987) became an advocate for the cultural difference theory, using the term microethnography to describe his techniques of situation-specific analysis to evaluate the natural interactions that occur between people. Because the cultural difference theory probed into the microscopic components of human

relationships, Erickson reclassified, what some view as classroom troubles, as inadvertent misunderstandings between teachers and students because of "cultural blind spots" (Erikson, 1987, p. 336).

Despite the rich and insightful work of other cultural difference theorists, such as Philips (Aronson & Laughter, 2016), Trueba and Delgado-Gaitan (Aronson & Laughter, 2016), and Phelan and Davidson (Aronson & Laughter, 2016), the theory still met with taut criticisms from authorities in the educational field. While many educational experts agreed with the theory's ideas on the micro-ethnography approach, others wanted explanations as to why some teachers worked well with students from different backgrounds and why members of some marginalized populations succeeded in spite of having cultural differences from the mainstream educational system (Permuth & Dalzell, 2013).

The Cultural Ecology Theory

Ogbu (1978) explained why particular groups are more academically successful than others on the larger scale. The cultural difference theory centers on macro-ethnographic scenarios that explain the differences in academic acuity (Ogbu, 1978). In his explanation of the cultural ecology theory, Ogbu (1978, 1998) rationalized that there are three types of minorities that he classified as autonomous, immigrant, and caste-like. Autonomous minorities possess a unique cultural identity but are not considered subordinates within their surrounding social or economic system (Ogbu, 1978, 1998). Caste-like minorities are those groups who have forcibly become a part of the Euro-American culture and experience the hardships of assimilation; one such hardship is

being academically successful (Ogbu 1978, 1998). Immigrant minorities are those groups who have integrated into the Euro-American culture voluntarily and, therefore, do not experience the hardships that members of the caste-like minority endure (Obgu, 1998). Exposed to, what Ogbu called, "secondary cultural differences" from extended interaction with the dominant Euro-American, members of the caste-like minority group culture ultimately display "cultural inversion," a kind of resistance to assimilation (Ogbu, 1998, p. 159). Cultural inversion, in turn, creates an environment where educational inequality can flourish (Ogbu, 1978).

Much like the cultural deficit theory and the cultural differences theory, the cultural ecological theory also met with resistance. Matute-Bianchi, Suarez-Orozco, and other supporters of cultural ecology were challenged to resolve the issues of particular populations stereotypically referred to as "subordinate" and the fact that the theory did not outline how the marginalized groups could find academic success since the problems were institutional (Aronson & Laughter, 2016).

Opportunity Gap

Another theory central to the underpinnings of the academic achievement gap that exists between minority students and their White-American counterparts is the opportunity gap. Closely akin to the achievement and learning gap theories, the opportunity gap refers to the denial of equal and equitable access to learning opportunities for minority students. Seen in a variety of forms, the opportunity gap peaks in the area of educational investments made with regards to services designed to support learning. According to Mayfield and Garrison-Wade (2015), the opportunity gap

materializes when poor, minority students have inexperienced and untrained teachers, attend schools with little funding, and are meet with low-performance expectation due to less academically arduous curriculums. These conditions separate students of color from the equitable learning prospects in which their White-American counterparts engage, creating educational disparity.

Narrowing the Educational Disparity

There were a multitude of efforts initiated to narrow the achievement gap over the last five decades. Between the years of 1970 and 1988, the National Assessment of Education Progress (NAEP) reported a steady and dramatic decrease in the achievement gap between African-American students and White-American students in the subject areas of reading and mathematics. The NAEP also said that more African-American students were successfully completing high school and enrolling in and graduating from colleges across the nation. Many educators attribute this drastic decline in the achievement disparity to the introduction of programs under President Johnson's Great Society initiative (Harris & Walling, 2014). Johnson's Great Society Initiative, more popularly known as the War on Poverty, spun many programs aimed at eliminating poverty and racial injustice through equality in education. Resembling President Franklin D. Roosevelt's New Deal agenda, The Great Society idea introduced legislation and major spending programs that addressed educational, medical, urbanization, and transportation issues. Three major pieces of education legislation passed during the Great Society era were the elementary and secondary education act of 1965, which included the predecessor law to the current Title One edict, the higher education act of 1965, and the

bilingual education act of 1968. Project Head Start, Upward Bound, and Job Corps were among the dozens of programs introduced during this decade devoted to equity in education.

In 1965, according to Curry and Thomas (1995), as an initiative of the War on Poverty, President Johnson and the newly formed Office of Economic Opportunity established Head Start. By providing grants to local public and private non-profit and for-profit agencies, Head Start program provides comprehensive child development services to economically disadvantaged children" between the ages of 3 and 5, who are members of low-income families" (Keys, 2015, p. 69). Offering educational, nutritional, health, cultural, and other services, Head Start promotes school readiness by enhancing the social and cognitive development of children (Lee et al., 1990; Phillips, Gormley, & Anderson, 2016). Not only is the program designed to support children, but it also aggressively involves parents in their children's education and helps them to make progress toward their own educational, literacy and employment goals (Phillips, Gormley, & Anderson, 2016).

According to the United States Department of Education (Harris & Walling, 2014), another product of President Johnson's Economic Opportunity Act of 1964 is the Upward Bound program. Like the Job Corp and Head Start programs, Upward Bound originated in response to the president's "war on poverty" (Harris & Walling, 2014). Designed to prepare low-income, high school students to enter college, the Upward Bound program provides academic instruction and support in math, laboratory sciences, composition, literature, and foreign languages (Harris & Walling, 2014). In addition to

academic instruction, the Upward Bound program also offers tutoring, counseling, mentoring, cultural enrichment, and work-study programs to students with limited English proficiency, students from underrepresented populations in postsecondary education, students with disabilities, homeless youth, and other disconnected students (Harris & Walling, 2014).

President Johnson charged the United States Department of Labor with the task of organizing the Job Corp program (Harris & Walling, 2014). Modeled after the Depression-era Civilian Conservation Corps, the Job Corp's mission was to help young people, ages between 16 and 24, improve the quality of their lives through vocational and academic training (Harris & Walling, 2014). Offering career planning, on-the-job training, job placement, room and board, driver's education, primary health and dental care, a bi-weekly allowance for clothing and basic living expenses, and childcare for single parents, when necessary, the Job Corp was the central component of the War on Poverty (Harris & Walling, 2014). The academic training division of the Job Corp program offered students assistance with basic reading and math, GED attainment, college preparatory, and sponsors Limited English Proficiency courses (Tinkler & Tinkler, 2013). In addition to the vocational and academic training, the Job Corp program also offered assistance to its participants through career counseling services and transition support services (Tinkler & Tinkler, 2013). The career counseling and transportation services were available to students for an additional year after they have graduated from the program (Tinkler & Tinkler, 2013). In essence, the Job Corp Program provided young people from various neighborhoods and cultures with

opportunities to use their individualism and cultural ideas to enrich themselves and bring prosperity to their families and communities (Harris & Walling, 2014; (Tinkler & Tinkler, 2013).

Despite the steadily decreasing academic achievement gap between African-American and White-American students, the dawning of the 1980s ushered in a heightened dissatisfaction of American society with the common practices used in the public education field. In addition to the public's discontentment, The National Commission on Excellence in Education published a national report titled A Nation at Risk in 1983. Concentrating on secondary education, A Nation at Risk outlined the many ways that the public-school system had failed to educate the students in the United States (Permuth & Dalzell, 2013). The academic curriculum used in the country's secondary schools was found to be void of a central purpose and attributed the declines in educational performance to content, expectations, time, and teaching (Permuth & Dalzell, 2013). The commission's findings indicated that during the study, 23 million public school educated American adults, were found to be functionally illiterate and approximately 13% of all 17-year-olds in the nation were functionally illiterate, as well (Permuth & Dalzell, 2013). The commission also stated that many of America's 17-year-olds did not possess 'higher order' thinking skills, could not draw appropriate references from written material, could not compose a persuasive essay, and could not solve a multi-step mathematics problem (Permuth & Dalzell, 2013). The members of the commission believed that in a country that prided itself on pluralism and individual freedoms that a high level of education for all citizens was pertinent to securing a free, democratic society

with a common culture (Permuth & Dalzell, 2013). The report spurred a school reform movement, prodding many states to pass laws requiring higher academic standards and expectations for students, teachers, and institutions of learning (Permuth & Dalzell, 2013). The report also implied the importance of cultural encompassment as a critical part of the educational process (Permuth & Dalzell, 2013).

Performance-based Education

During the 1970s, the medical school faculty of the Canadian-based McMaster University introduced an innovative idea to teach their medical students (Zhang, 2014). Understanding that the traditional approach of memorizing massive amounts of medical terms, conditions, and syndromes did not help medical students make appropriate case-by-case diagnoses, the faculty began placing its students in small groups and presenting them with medical cases or problems to solve (Zhang, 2014). With minimal guidance, according to Zhang (2014), the McMaster University medical students dissected medical dilemmas into various issues, assessing what they knew and understood about the medical cases, and making lists of diagnostic ideas needing additional exploration. The medical students resolved each medical case by combining what they learned during the preliminary inquiry process with the additional information they sought to fill the chasms of their personal medical knowledge (Zhang, 2014). Zhang (2014) suggested that the paradigm shift from rote memorization of factual information to active inquiry and conceptual integration laid the foundation for performance-based learning. Focusing on the learning experiences of the whole student, performance-based learning fosters the positive aspects of learning, integrating the prior knowledge and knowledge construction

abilities of the student (Zhang, 2014).

The approach taken by the medical faculty at McMasters was not a new concept. Decades before the McMaster's Medical School learning experiment took place, Dewey had already realized and recorded the necessary connection between knowledge acquisition and socio-cultural and life experiences (Dewey, 1938). Even more recently than Dewey's conjectures, Vygotsky's social development theory, which was largely unknown to the west until 1962, re-emphasized the foundations of constructivism (Vygotsky, 1980, 1986). Vygotsky (1980, 1986), a Russian psychologist, studied the intricate connection between learning and cultural relevance and asserted several major themes essential for learning. One of the core underpinnings of Vygotsky's (1980, 1986) theory, in concert with Dewey's theory, affirms that social interaction plays an integral role in the process of cognitive development (Vygotsky, 1980, 1986). Vygotsky's studies emphasized the connections between people and the socio-cultural context in which they behave and interact with common experiences. Vygotsky's research supported the idea that people use cultural tools, such as writing and speech, to navigate their social environments, and as time continues and the individual takes part in more experiences, these tools and experiences are internalized, leading to higher order thinking skills essential for success in mathematics (Dewey, 1938; Lantolf & Poehner, 2013; Vygotsky, 1980, 1986).

Learning Mathematics through Cultural Contexts: Ethnomathematics

According to Gay (2013), the demographics of our nation's mathematics classrooms are continually changing, becoming increasingly diverse; culturally,

ethnically, and linguistically. Math curriculum used by teachers to educate students were disconnected from the students' cultural and societal reality (Palhares, 2012). The mathematical lessons offered to many students had little to no pertinence to the world they experience on a regular basis (Gay, 2013). Because of this societal and cultural disconnection, many students underestimated the importance of the mathematical subject matter and failed to learn concepts essential for enhancing their basic and higher-order knowledge base (Palhares, 2012). For many minority students, learning mathematics through cultural connects and contexts, in relation to prior knowledge, was the only viable solution (Hand, 2012; Mirich & Cavey, 2015).

Coined in the late 1960s by D'Ambrosio, a Brazilian mathematician, the term ethnomathematics referred to the mathematical practices of identifiable cultural groups (Ju et al., 2016). While many educators saw ethnomathematics as simply the study of mathematics as it existed in various cultures, others viewed it as an approach to making mathematics more relevant to different cultural groups (Kucuk, 2013; Morrison, 2014; Rosa & Orey, 2015). Attempting to combine scientific thinking with social justice was a difficult concept for many professionals to grasp (Kucuk, 2013; Morrison, 2014; Rosa & Orey, 2015). Some educators felt that the approach reduced the legitimacy of real mathematics while others saw it as an opportunity to expound upon mathematical concepts and create true meaning for their pupils (Harding-DeKam, 2014; Morrison, 2014). Whatever their stance on the concept of ethnomathematics, all professionals and educators agreed that mathematics was a universal language and most supported the idea that any teaching approach that took into account cultural contexts was likely to be much

more effective than tradition methods (Kucuk, 2013; Rosa & Orey, 2015). The ultimate goal of ethnomathematics was to illuminate the connection between math and culture by apportioning both to the discernment of mathematics and to the awareness of culture (Harding-DeKam, 2014; Kucuk, 2013; Morrison, 2014; Rosa & Orey, 2015).

The combination of ethno and math education addresses how the inclusion of cultural values can affect the art and science of teaching and learning, as well as its effects on the social dynamic of a particular societal or cultural group (Ju et al., 2016; Harding-DeKam, 2014; Kucuk, 2013; Morrison, 2014; Rosa & Orey, 2015). While many mathematicians argued that the usefulness and practicality of mathematics often concealed its cultural constructs, they continued to agree that it is pertinent to acknowledge the cultural context of the mathematics to urge relativity and understanding (Brooks & Dietz, 2013; Palhares, 2012). Like Dewey and Vygotsky, ethnomathematics researchers conceded that cultural intuitiveness, in conjunction with prior knowledge, was essential for the procurement and retention of mathematical knowledge (Dewey, 1938; Harding-DeKam, 2014; Kucuk, 2013; Rosa & Orey, 2015; Vygotsky, 1986).

The Common Core Math Initiative

Another initiative in the Accountability Movement which developed over the last twenty years is the Common Core State Standards initiative (Olson et al., 2014). Sponsored by the National Governors Association and the Council of Chief State School Officers, the Common Core State Standards initiative was designed to orchestrate a union between diverse curricula from various states, promoting educational cohesiveness across state lines, ultimately improving student achievement through heightened academic

standards, increased graduation rates, and progressive assessments (Olson et al., 2014). In 2010, the state of Georgia joined 44 other states, the District of Columbia, two territories, and the Department of Defense Education Activity by formally adopting a set of common core learning standards for the subjects of English/Language Arts and mathematics for students in kindergarten through grade 12 and for science and social studies for students in grades six through twelve. According to the Georgia Department of Education (2017b), the Common Core Georgia Performance Standards are designed to establish a clear and consistent learning scaffold that will prepare students for success in college and the 21st-century workplace. The Common Core math curriculum is designed to put students on the path to more focused and coherent mathematical experiences leading to thorough understanding and profound achievement in the subject area ("Georgia Performance Standards," n.d.). State legislators and educators asserted that the Common Core Curriculum aspires to present clear and specific standards for parents, teachers, and students, stressing the conceptual understanding of key principles along with procedural skills that all students should know and be able to perform (Olson et al., 2014).

While the Common Core Curriculum has many supporters, it also has many persons who stand in opposition to its implementation (Brooks & Dietz, 2013; Tienken, 2013). Understanding that students are individual in culture and experiences, many naysayers believe that it is unrealistic to expect that all students can obtain a common understanding to all educational concepts (Brooks & Dietz, 2013; Tienken, 2013). Common Core State Standards promote the cookie-cutter mentality as it relates to

students and learning, forcing teachers to remove the artfulness and individual creativity from the learning environment, only to replace it with a single-minded approach to teaching and learning (Brooks & Dietz, 2013; Tienken, 2013). According to Evers (2011), President G. W. Bush's former assistant education secretary, the common core initiative is closing the door on educational innovation and ignoring the needs of many diverse learners.

Implications

The classroom is a broad frontier that unrestrictedly encompasses a vast range of contexts and components defined by numerous theories and practices. The classroom environment, unhindered by physical walls, instills notions of relationships among physical settings, role establishment, psychological contrivance, climate control, educational reform, and cultural relevancy (Milner, 2014). Regardless of how one defines a classroom, the continued growth of research in the area of cultural relevancy and student learning brings a fresh look into the changing dynamics of education and social culture within the classroom's reach (Ebersole et al., 2016; Glass & Rud, 2012).

Implications for positive social change within this project study could include an increase of the appreciation of cultural differences between students of color and educators. Implications for positive social change could also include helping teachers to learn more about factors that shape the perceptions of their students' learning process and how cultural relevancy and actions of cultural sensitivity may encourage learning, helping to create lifelong learners and proponents of social equity. Based on the anticipated findings of the data collection and analysis, the creation of a professional

learning community of educators focused on increasing math achievement among students through increased cultural infusion could address the initiative for positive social change. A professional learning community can bring resolve to the math achievement gap by uniting educators with a shared vision of amassing academic gains in mathematics for students in a committed, collaborative environment (Akiba & Liang, 2016).

Summary

The mission of education is clear: to provide young people with academic knowledge that will equip them with the necessary tools to become vital and productive members of their society. Understanding the potential of all students in a classroom to succeed is essential if educators are serious about eliminating the achievement gap among students in the area of mathematics. To help all students reach their maximum learning potential, teachers must increase their cultural awareness by incorporating prior knowledge along with personal, cultural experiences into students' learning environments as suggested by Dewey's theory of progressive education.

The purpose of this project study, the research question, and key definitions were delineated and discussed in the first section of this paper. The first section of this paper also included an explanation of the local problem, the rationale, significance of the project study and a literature review. In Section 2, I outlined the qualitative research design and approach for data collection. Additionally, I discussed the setting and participants, the pilot study, the data collection process, including ethical protections and research question. In Section 3, I outlined the project and its results, the description and goals of the project, the project rationale, and a review of the project genre. I also

discussed the implementations of the project, including potential resources and barriers, and the project evaluation. Lastly, in Section 3, I discussed the local and far-reaching implications of social change. In Section 4 of this project study, I presented the possible direction of the project, along with the project strengths, the projects potential impact on social change, and a reflection of my journey to complete the project study.

Section 2: The Methodology

Introduction

I examined teachers' perceptions of how culture and culturally relevant instructional strategies influence student performance in the secondary math classroom. Interviews, such as the census and opinion polls, have been used to collect information for centuries (Seidman, 2013). From talk shows to newscasts, and from print to electronic media, interviews are common methods used throughout modern culture to collect information and relay experiences (Seidman, 2013). Not only are personal interviews an important part of daily life, but interviews have also played a substantial role in the arena of qualitative research as a systematic data-collection technique used to gather information about intangible past phenomena and behaviors (Seidman, 2013). Whatever one may think about interviews, social and behavioral science researchers recognize that cultural mores, attitudes, and personal perceptions play a significant role in shaping mindsets and opinions (Creswell, 2013). The phenomenological approach to interview research helps researchers explore the spirit of culture (Creswell, 2013). Interviews also help researchers understand the vast range of cultural and personal experiences, offering insight into the complexities and nuances of participants' experiences and sensibilities where other qualitative designs, such as focus groups, tend to concentrate on a specific, group-dynamic perspective (Hughes & DuMont, 1993). Interviews allow researchers to gain insight into the meaning-making process of participants regarding a particular topic while gaining direct access to the language and

concepts that participants use to scaffold their experiences around the topic (Creswell, 2014; Lodico, Spaulding, & Voegtle, 2010; Stancanelli, 2010).

Qualitative Research Design and Approach

According to Garcia and Lewis (2014), the purpose of the phenomenological qualitative research design and approach is to gather a deep understanding of the experiences of an individual regarding a particular phenomenon. Phenomenological studies are based on personal knowledge and subjectivity, and emphasize the importance of personal perspective and interpretation (Garcia & Lewis, 2014). Since my goal was to understand how teachers' perceptions of culture and culturally-relevant instructional strategies influenced student performance in the secondary math classroom, I determined that a qualitative phenomenological study using formal interviews was the most efficient way to collect rich data from the experiences of individuals (Seidman, 2013). By contrast, an ethnographic study would have enabled me to uncover the common characteristics of a select group, a case study would have helped me discover the outcomes for a single instance, and a grounded study would have given me a context to generate a theory from empirical data (Glesne, 2014). None of these types of qualitative research options were appropriate for the research question at hand. The phenomenological method allowed me to advocate for change based on research outcomes (see Garcia & Lewis, 2014).

According to Seidman (2013), telling stories is a meaning-making experience because it consists of "selecting constitutive details of experience, reflecting on them, giving them order, and thereby making sense of them" (p. 7). Historically, interviews

have been the method of inquiry by which human beings make sense of their experiences (Seidman, 2013). According to Seidman (2013), the purpose of an in-depth interview is to understand the experience of others and the meaning that results from that experience. To explore the effects of culturally sensitive, performance-based mathematics curricula on the academic success and achievement of minority students in the secondary classroom, I determined that it would be important to gain insight into the thoughts and understandings of teachers who have experience in this area. Because they are powerful tools that allow people to make meaning of their experiences (Seidman, 2013), participant interviews were the sound choice of research method to explore the effects of culturally sensitive, performance-based mathematics curriculum on the academic success and achievement of minority students in the secondary classroom. The interview approach permitted me to garner a detailed understanding of the cultural norms, related experiences, and implanted values that contribute to the constructs that give rise to the correlation between culturally-relevant mathematics instruction and student success in mathematics (see Siedman, 2013). Unlike focus groups, interviews allow for the comprehensive exploration of a topic for conceptual understanding and experiential meaning, thus making the interview method the most appropriate and effective method of inquiry for this project study (Seidman, 2013).

Participants

Criteria for Selecting Participants

To take part in the study, the participants had to meet several criteria. I selected participants who were (a) state certified math teachers, (b) full-time math teachers who

taught for at least 5 years at the school district, and (c) secondary public school math teachers who used the Common Core Georgia Performance Standards Mathematics Curriculum. These criteria were important because teachers had to be familiar with the state mathematics curriculum, the characteristics of various student populations, and researched-based instructional strategies to respond to the interview questions.

Gaining Access to Participants

To gain access to the participants for this project study, I first submitted an application to conduct research to the local school district's Office of Accountability, Assessment, and Reporting. Second, I submitted an Internal Review Board (IRB) application to Walden University. After receiving approvals from the local school district's Office of Accountability, Assessment, and Reporting and the Walden University IRB (#01-12-16-0153261), I began the data collection process by contacting the lead administrators at three school sites. Each lead administrator provided me with a list of potential participants based on the selection criteria. The combined lists contained the names of 15 math teachers. Using the lists provided by the lead administrators, I contacted the participants via school district email. I invited prospective participants from the local school district to participate in individual face-to-face interviews. Prospective participants, for the pilot and the larger study, were asked to respond to the invitation within 3 days of receipt using their personal email accounts to ensure their privacy and to increase confidentiality. The first four teachers to reply to the email invitation were invited to participate in the pilot study (Appendix E). The last six respondents were invited to participate in the larger study. For participants of the larger

study, I described the purpose of the research and explained that participation was voluntary and could be terminated at any time. Lastly, I explained the risks associated with the study and obtained a signed informed consent form (including permission to audio record interview sessions for larger study participants) from each of the six persons agreeing to participate.

Population and Sample

The population for this study was all mathematics teachers in the local school district who met the selection criteria. Ritchie, Lewis, Nicholls, and Ormston (2013) identified four main reasons that small sample sizes are appropriate for qualitative studies: (a) diminishing return where increasing the sample size no longer contributes new evidence to the study, (b) statements regarding incidence or prevalence are not the primary concern of qualitative research, (c) qualitative studies should yield rich and detailed information, and (e) it is unrealistic to analyze hundreds of pieced of data thoroughly. Small sample sizes in qualitative research ensure that the sample will be rich in "characteristics, diversities, and constituencies" (Ritchie et al., 2013, p. 118). Ritchie et al. (2013) defined a small sample size as a group of 50 or fewer participants. In addition to the evidence about sample size, Mason (2010) identified and analyzed 560 dissertations where sample sizes ranged from one participant to 95 participants. Mason (2010) found that the most common sample sizes were between 20 and 30 participants. Based on the findings of Ritchie et al. (2013) and Mason (2010), the anticipated sample size for a project like mine would be 20 to 50 participants. However, because of the limited number of potential participants in the pool who met the criteria and agreed to

participate in the study, I obtained a final sample of 10 participants: four participants for the pilot study, and six participants for the larger study.

Researcher-Participant Relationship

During the study, I took the role of observer-as-participant and researcher-as-instrument. I have worked as a secondary mathematics teacher in the state of Georgia for over 15 years. As a secondary math teacher and math instructional coach, I have first-hand experience of the changes occurring in classrooms across the state resulting from the implemented Common Core and Georgia Performance Standards math sequence. My personal classroom knowledge provided strong insights that were beneficial in understanding the relationship between culturally-responsive learning activities and student achievement. I no longer work at the same school site as the participants, so I was able to maintain a degree of distance that allowed for response freedom and minimally-biased field relations (Lodico et al., 2010). In addition to promoting trust among the participants and increasing the credibility of the research process, good field relations between the participants and I minimized researcher bias (Lodico et al., 2010). I also monitored personal subjective perspectives, such as learned classroom behaviors and biases that occur when interviewing, by maintaining a journal of reflective field notes (see Lodico et al., 2010). At the time of recruitment, some of the participants were aware of my role as a professional learning academic (math) coach, and I did not recruit participants from any school site where I worked as the math coach.

As the interviewer, I was the primary instrument for gathering quality data from the study participants. I used a self-written, semi-structured question guide to assist the

interviewee in exploring important ideas and experiences pertinent to the study (see Lodico et al., 2010). The interview guide (Appendix B), was a generated list of discussion topics and questions that allowed the participants to use their experiences to probe into specific topics regarding culturally responsive mathematics and to introduce additional related issues. The interview guide facilitated more natural and fluid discussions.

Pilot Study

Before data collection, I used a pilot group to test the relevance of the interview questions. This pilot group consisted of four members of the population. These four members were the first four of the 10 participants who responded and agreed to take part in the study. Using a pilot group ensured that the interview questions allowed interviewees to provide complete and lucid responses (see Ritchie et al., 2013). The pilot research process also ensured that I was not purposely seeking discrepant cases (see Kiryak & Calik, 2017). These narrative responses generated data with the appropriate scope and depth for this project study.

I invited participants, via local school district email, to participate in individual face-to-face interviews. Participants were asked to respond within 3 days of receipt to the invitation using their personal e-mail accounts to ensure their privacy and to increase confidentiality. Individuals agreeing to participate in the pilot received a consent form via email to review, sign, and return within 5 days. To ensure that each pilot study participant met the project study selection criteria, they were given 3 days to answer and return their responses to the demographic questionnaire to me by email. Once the pilot

participants had the opportunity to email their responses to the demographic questions, I scheduled a 2-hour block of time with each pilot participant to conduct the face-to-face interview. During each pilot interview, I noted the start and end times so that I could make an estimate of the time each participant took to complete of the interview. Each pilot interview took less than 1 hour to complete.

Pilot Study Results

The first four teachers contacted me by email by using their personal e-mail accounts indicating that they were interested in participating in the study were asked to be a member of the pilot group. All four teachers accepted the invitation. Each of the pilot interviews took less than 1 hour to complete. The teachers who participated in the pilot did not recommend any modifications to the demographic or interview questions. As a result, I started the data collection process.

Data Collection

According to Seidman (2013), the purpose of an in-depth interview is to understand the experiences of others and the meaning they make of those experiences. For this project study, I conducted face-to-face interviews and collected narrative data using an interview protocol guide. I created the interview protocol guide that was used to interview each project study participant. The face-to-face interview protocol that I created included open-ended response questions which allowed me to gather comprehensive data about teachers' perceptions of using culturally relevant teaching strategies to influence the academic performance of minority students in the mathematics classroom (Creswell, 2014).

After the completion of the pilot study, the remaining six teachers from the 10 teachers who responded were invited to take part in the larger study via the invitation to participate email form (Appendix D). After attaining a signed participation consent form from each participant, I begin scheduling interviews at mutually convenient dates and times. Based on the results of the pilot study, each of the six interviews was scheduled for 1 hour.

Interviews were one-on-one and semi-structured to allow participants to speak freely and explore their experiences (Creswell, 2013; Ritchie et al., 2013; Seidman 2013). Interviews were also recorded by a voice recorder, with participant consent, and were conducted over a period of approximately 4 weeks. At the start of each interview, I established a working relationship with each participant by recapping the goals of the research. During the interview process, I observed and noted participant body language and other nonverbal cues, as these are also points of communication (Ritchie et al., 2013; Seidman, 2013). Seidman (2013) stated that the interviewee is an "equal participant" in the interview process. The conversation-style interview encouraged participants to reconstruct their experiences leading to anecdotes. I avoided making presumptions that would limit the exploration of additional topics. I also maintained focus on the participants.

Credibility

Abiding by qualitative procedures, I provided a written interview guide to each participant to assure that data collection was consistent (Creswell, 2014). Throughout the interview discussions, I reassured participants that all conversations and comments were

confidential and that their participation was voluntary. At the end of each interview, I thanked each interviewee for their participation. I transcribed the collected data after each audio-recorded interview (Appendix G). I reviewed the interview tapes several times to ensure transcription accuracy and to allow myself time to reflect on the shared experiences. I emailed a summary of the interview transcripts to each participant for accuracy. Participants had 7 days to review the summaries of their interview transcripts and to notify me of errors. I was not notified of any summary errors by the participants. To keep track of observational data, audio recording notes, and transcription notes, I kept a reflective journal. According to Leavy (2014), reflective journaling proves to be an "effective tool in understanding the processes of research," as well as the attitudes and sentiments of the researcher (p. 306).

Interview Setting

According to Creswell (2013) and Ritchie et al. (2013), participant interviews should take place at suitable times and in quiet, convenient locations where and when the participants are comfortable as these are the most conducive environments for interviewing as they promote honesty among research participants. Initially, the participants' interviews were to take place in a neutral setting, other than the participants' place of work to increase the protection of all participants from the harm of negative schoolhouse or social repercussions that may have resulted from participating in this research project study. However, due to time constraints and other school-site duties, all participants chose to have their interviews in the privacy of their classrooms after school hours. Originally scheduled for a 1-hour period, most of the interviews lasted between 25

and 35 minutes. Follow-up interviews were not necessary.

Ethical Protections

All research participants were treated with respect and were continuously informed about confidentially and research protocols throughout the research. I asked each participant to sign a consent form. The consent form was used to inform the participants that they would not be compensated for their participation in the study since their participation was voluntary. The consent form was also used to inform the participants of their protection from harm during the study and that they had the option to discontinue their participation in the study at any time. I informed participants of procedures and instructions before the collection of data. All the data collected were treated in a confidential manner. Each participant was asked to create a de-identifier to protect their identity. Each participant's de-identifier consisted of the first initial of the participant's name, the first initial of the participant's mother's name, and the last four digit of the participant's personal cell phone number. Data collected electronically were coded and stored on a password-protected USB drive and placed in a locked file cabinet within my home. I coded all hard copy data. I will destroy all collected data 5 years after the conclusion of the study.

During the opening of each participant interview, I established a working relationship and protocol with each participant by recapping the goals of the research. Additionally, I asked each participant a series of questions to determine the demographics of the project study's sample population. Included in the sample population were six female high school math teachers. Two of the six teachers classified themselves as being

of multi-racial ethnicity while the other four identified themselves as being of African-American descent. Four of the six participants indicated that they had been teachers for 6-10 years while two have been educators for 11-15 years. When asked about the types of school environments in which they have taught, four participants indicated they have taught in suburban schools, five participants reported that they have taught in urban schools, and all six participants reported that they have taught in public school settings. All six participants indicated that the majority of their classroom settings have been diverse. One of the six participants stated that they had taught secondary mathematics for 3 years, three of the six participants indicated that they had taught secondary mathematics for 6-10 years, and two of the six participants stated that they had taught secondary mathematics for 16-20 years.

Data Analysis

The data analysis process for this project study consisted of three stages. In stage one, I conducted multiple readings of participants' transcripts. In stage two, I reviewed the reflective notes (Lodico et al., 2010) and transcripts. Finally, in stage three, the Coding Analysis Toolkit (CAT) research software was used to code data and to compare the computer-generated themes to the themes I identified in the second phase of the data analysis process.

After I completed the first step of data analysis, I began the second phase, thematic coding. According to Saldana (2013), coding is a "heuristic, cyclical, data-analysis process" (p. 8). Seidman (2013) described thematic analysis as a three-stage process consisting of a descriptive coding stage, an interpretive coding stage, and an

overarching themes stage. During the descriptive coding stage, I thoroughly reviewed all interview transcripts, highlighting relevant material and made brief comments, and defined and refined descriptive codes (Seidman, 2013). During the second stage, the interpretive coding stage, I created descriptive code clusters or categories while I interpreted meaning about the research question (Seidman, 2013). Lastly, during the overarching themes stage, I derived themes for the entire data set.

I also used the Coding Analysis Toolkit (Vukanovic, 2017) resource. Using the Coding Analysis Toolkit resource, I was able to categorize and find patterns within the interview data, allowing thematic ideas to emerge. I was then able to compare the CAT-generated themes to the themes I identified in the second phase of the data analysis process. The Coding Analysis Toolkit is a free resource of the Qualitative Data Analysis Program. CAT is hosted by the University Center for Social and Urban Research at the University of Pittsburgh and the College of Social and Behavioral Sciences at the University of Massachusetts Amherst. I used the CAT resource to link explicit statement content with connotative meaning. Based on the coding process, the following themes emerged: *cultural influences*, *culturally relevant*, *problem-solving*, *teaching methods*, and *language of instruction*.

Validity

According to Creswell (2014, p. 259), data triangulation is the process of "corroborating evidence from different individuals, types of data, or methods of data collection" to increase the accuracy of the results. Data triangulation was used to in determining the validity of the results for this project study. The teacher interview data,

member checking of the interview transcripts, and notes from my reflective journal provided triangulation of the data to aid in the examination of teachers' perceptions of using culturally relevant teaching strategies to influence the academic performance of minority students in the mathematics classroom.

An additional step in validating the project study data included member checking. Member checking, according to Creswell (2014), is one way of validating the accuracy of research findings by asking participants to check the accuracy of their given responses. Research participants reviewed their interview transcripts for accuracy and then notify me of errors.

Lastly, to keep track of observational data, audio recording notes, and transcription notes, I kept a reflective journal. According to Leavy (2014), reflective journaling proves to be an "effective tool in understanding the processes of research," as well as the attitudes and sentiments of the researcher (p. 306).

Discrepant Cases

To pose a realistic presentation of the research findings, all data, supporting and contrary, must be presented. According to Creswell (2014), identifying and analyzing contrary evidence, also called discrepant data, is a key part of testing the validity of research findings. While the use of the pilot study assisted to safeguard against purposely seeking discrepant data (Kiryak & Calik, 2017), discrepant data became evident during the interview process. Supporting and discrepant data were included in the findings of the research. Both supporting and discrepant data were assessed to determine if it was plausible to revise, broaden, or confirm codes that had emerged from data analysis

(Kiryak & Calik, 2017). After analyzing the discrepant data, I failed to find strong evidence in support of the contrary data. According to Kiryak and Calik (2017), a lack of supporting evidence of contrary data increases the validity of the original findings.

Findings

During the interview process, the participants expressed their thoughts and feelings regarding their perceptions of culture and cultural relevance with regards to the academic success of minority students in math. Several participants expressed an interest in having an open forum with teachers from other academic disciplines.

Research Question

What are teachers' perceptions of cultural competency in teaching mathematics to minority students?

Perceptions of Culture

Interview Questions 1 and 2 addressed teachers' perceptions of culture. The themes that emerged were beliefs, environment, and influences. Question 1 asked participants to "define the word culture." All of the participants defined culture as having to do with a person's way of life, beliefs, and environment. Participant DM0811 said, "I would define culture as the ways, beliefs, traditions, and practices that surround, influence, and define a person as they grow up."

Question 2 asked participants about their familiarly with their students' home culture and how those external influences affect classroom learning. Five of the six participants expressed that they had a limited familiarity with their students' home lives citing the lack of parental involvement as the major contributing factor to this condition.

One of the six participants, Participant JH3732, felt she had a good grasp on the home cultures of most of her students as parents "communicated with her openly and often" about situations occurring outside of her classroom. JH3732 also said that as she was the only teacher at her site who spoke fluent Spanish, and that she was aware of many external situations that warranted school involvement because of her ability to translate between Spanish-speaking families and school administration.

All the participants perceived that external factors such as their parents' or caregivers' ideas on the importance of education and their peers' ideas on school and learning influenced their students' attitudes about learning. Participant DG1724 said, "parents tell me all the time their kid is not good at math because they were not good at math." DG1724 stated that this projection of math ability by the parent onto the student never failed to manifest in her classroom as the student "doesn't even try to learn." Additionally, all six participants were convinced that social media, along with the music and movie industries, had a significant influence on students' external classroom culture. Participant LQ0926 commented that many of her students are so inundated by social media that they "can't tell fact from fiction…they think that's how everyday people really live…you just rap a song and get rich." Like Participant LQ0926, the other five participants felt that television, social media, friends, and even parents often downplayed the importance of education making it difficult to create an engaging and productive learning environment.

Classroom Culture

Interview Questions 3, 4, 5, 6, 7, 8, and 9 addressed the teachers' perception of classroom culture and how they address culture within their teaching. The themes that emerged were inclusivity, safe learning environment, and respectful learning environment. All participants acknowledged that their classrooms' populations were composed of students from a variety of different backgrounds, including various linguistic, ethnic, racial, gender, socioeconomic, and cultural backgrounds.

Participant DM0811 said, "I believe the infusion of culture into the mathematics classroom is extremely necessary for their success … meeting them [students] where they are and exposing them to other cultural ideas [and] ways…will help them become more successful in the math class." Because of their multi-cultural backgrounds, two of the six participants admitted, that while it was difficult, they made a strong effort to include everyone in the learning process by using a variety of examples which highlighted different cultural perspectives. Additionally, the remaining four participants shared their thoughts on creating a safe and inclusive learning environment for their students, citing a culture of caring and respect as being most important because it encompassed all the classroom students. Participant PC7789 stated, "The students know you care when you take the time to know them, their likes, dislikes, hobbies…I try to use these things when I provide examples for the class…This helps create a culture of respect in my room."

All six participants felt it was important to use cultural references within their lessons to assist the students as they learn new math concepts. LQ0926 stated, "Math should be culturally connected so that it makes sense to the students. If it is not culturally

relevant, I may not be able to see if the student really has a grasp on the concept." The other five participants had similar responses to the use of culturally relevant lessons within their classrooms. However, Participant DG1724 admitted that she found it difficult to consistently include culturally relevant examples within her higher-level mathematics course. She commented, "Sometimes you just have to do the math." All six participants felt that at the very least references to the social culture of the students in their classrooms were necessary as they were relevant to the conveying and understanding of mathematical concepts. All the participants felt these references to the social culture increased student engagement in the lessons as it made students feel included.

Culture, Curriculum, and Academic Success

Interview Questions 10 and 11 addressed teachers' perceptions of how well the current secondary mathematics curriculum addresses the issue of culture and promotes academic success for minority students. Themes that emerged from these questions were relevance and association. While all the participants felt that the concepts being presented at each grade level were necessary and appropriate to develop mathematical acuity, the participants also had the common consensus that the current mathematics curriculum did not address issues of culture in a genuine and acceptable manner. All six participants mentioned that the most prominent attempt at cultural recognition they could cite within the math curricular frameworks was the replacement of eurocentric names with names traditionally associated with particular cultures, such as changing the name "Ethan" to "Hakeem" or changing the name "Sarah" to "LaQuita". Each felt this was a shallow attempt to deceive the student readers into believing that the performance task

somehow addressed their culture. Participant CB2205 said "…kids do feed to their names being in stuff…but there still needs to be something else other than their name being used in a word problem." Participant JH3732 commented "…mathematics should be culturally relevant so that students can acquire a proper understanding…they can't acquire something that they can't relate to." Participant PC7789 alluded to a current curricular task that references purchasing "[cell phone] texts per minute." Participant PC7789 commented that her students "didn't understand what that meant" as they were only aware of "unlimited talk and text." "They couldn't make the connection and that hindered me from teaching the math," participant PC7789 said. The other three participants were of a similar mindset as participants JH3732, CB2205, and PC7789, making references that the curriculum needed to be updated to acknowledge culture through the lens of authenticity and relevance in order to promote academic success. Participant DG1724 commended the curricular framework authors for attempting to address an aspect of the students' social culture by including performance tasks that referenced a popular basketball professional. Participant DG1724 also vilified the authors of one of the curricular performance tasks for using cotton bolls as the subject of a task as she felt it was offensive to her African-American students. Participant DG1724 went on to use an alternate task to teach her students how to use functions to model linear relationships. As her students were high school student, the alternate task involved earning a constant number of credits toward graduation during each of the four years of high school.

Conclusion

I examined teachers' perceptions of culture and culturally relevant instructional strategies influence student performance in the secondary math classroom. One-on-one interviews were used to gather data regarding the fundamental realities of how educators viewed the coupling of cultural respect and mathematics achievement. I endeavored to give voice to teachers about their perceptions of how students are affected when culturally competent teaching does not occur within the classroom boundaries of the mathematical landscape.

Ten teachers from the local public school system were asked to participate in a face-to-face interview about how teachers' perceptions of culture and cultural relevance impact the academic success of minority students in the area of mathematics. I conducted the interviews over a 4-week period. I then manually conducted ongoing analysis and coding of interview transcripts using the Coding Analysis Toolkit as an analysis and organizational tool. I analyzed the data until saturation was reached. I knew I had reached saturation when themes began to repeat and further coding was not necessary. The results provided the basis for the creation of a professional development program for educators which will focus on supporting teachers as they aspire toward increased student achievement in the area of mathematics with the infusion of culturally competent teaching.

Section 3: The Project

Introduction

I examined math teachers' perceptions of how culture and culturally relevant instructional strategies influence student performance in the secondary math classroom. In this section, I briefly outline the project and its goals, the rationale behind its construction and layout, and its conceptual foundation. Additionally, I discuss the plan for implementation is along with the means by which the program's effectiveness is determined.

Description and Goals

Through this project study, I concentrated on how teachers' perceptions of culture impact the academic success of minority students in the area of mathematics. Participant math teachers acknowledged that the achievement gap between minority students and their White-American counterparts is impacted by the level of attention given to students' cultural attributes. Given their interest in meeting their students' cultural, emotional, and academic needs to support the closure of the achievement gap, participants were interested in fostering cultural awareness within their learning environments. In order to understand, recognize, and maintain a culturally inclusive learning environment, teachers expressed interest in participating in a training designed to help them understand students' cultural life outside of school and to provide strategies for including that information into the learning environment, thereby promoting academic success.

I developed a professional development program based on the finding from the project study and the interests of the study participants. The National Education

Association (n.d.) has defined professional development as "a comprehensive, sustained and intensive approach to improving teachers' … effectiveness in raising student achievement" (p. 1). The faculty professional development program benefits secondary math teachers in a variety of ways. I set four goals for the workshop on increasing cultural awareness in the math classroom. The goals are to provide teachers with (a) research-based evidence on how culture impacts the academic success of students; (b) a professional forum in which to explore and discuss various cultures, cultural mores, cultural interactions, and how these manifest within the mathematics classroom; (c) an opportunity to discover how their own culture affects the success of their secondary math students; and (d) guidance as to how to respect, acknowledge, and incorporate culture in their classroom so that it positively impacts learning.

The professional development program will consistent of 3 non-consecutive, day-long, face-to-face sessions, followed by classroom support by a content-specific instructional coach. The 7-day intermission between face-to-face sessions allows teachers to introduce and implement the instructional strategies and culturally competent activities from the training into their classroom environments. The face-to-face sessions include exploration activities in the area of cultural awareness and competence, immersion activities, subject-specific instructional planning, and personal reflections.

Rationale

Using a qualitative approach, I focused on teachers' perceptions of how culture and cultural relevance impact the academic success of minority students in the area of secondary mathematics. The participants adduced a relationship between teachers'

degrees of sensitivity and awareness of the various cultures within the learning environment to the increased academic success of minority math students. I developed a multi-day professional development program to meet the learning needs of the target population. According to Lin, Cheng, and Wu (2015), ongoing and continuous professional development is a way to keep teachers abreast of educational best practices and to facilitate a positive attitude about student learning. Kelly and Cherkowski (2015) stated that professional development for teachers should be "experiential, collaborative, and connected to and derived from working with students and understanding their culture" (para. 3). The purpose of the professional development program is to enrich teachers' sensitivities regarding the various student cultures that exist within their classrooms and to provide various techniques and strategies that will allow teachers to increase student achievement in mathematics through the integration of culturally relevant classroom encounters.

I designed the *Creating Culturally Competent Mathematics Classrooms* Faculty Professional Development program to increase teachers' positive influence on minority students' math achievement and to raise cultural awareness and sensitivity in the learning environment. To address the issue of low math achievement among minority students, I designed the professional development program sessions for teachers to understand that the goal of multicultural education is for students from diverse backgrounds to experience educational equality (see Gay, 2000, 2002; Ladson-Billings, 1995). *Creating Culturally Competent Mathematics Classrooms* prepares teachers to build and incorporate culturally

relevant pedagogical practices that have relevance to students and that increase minority students' academic successes in mathematics.

Review of the Literature

The secondary math teachers who participated in this study recognized the importance of a culturally competent learning environment. I asked participants to discuss the role of culture in relation to the academic success of the minority students in their classroom environments. Participant DM0811 responded, "I believe the infusion of culture into the mathematics classroom is extremely necessary for their success... I believe this will help them become more successful in math class." Creating culturally competent learning environments where trust, acceptance, and respect are the foundational pillars is essential to the success of the students who enter today's classrooms (Gay, 2013). Educators must be prepared to meet students where they are and move them forward academically (Ebersole et al., 2016). Classroom educators who receive training and support in the development and fostering of culturally competent learning environments will be able to positively impact their students' academic successes (Gay, 2013).

Generally, I found the information for this review of the literature by searching academic databases using the following search terms: *cultural influences*, *culturally relevant teaching*, *problem-solving*, *teaching materials*, and *language of instruction*. The same terms were used to guide the literature review.

Cultural Influences and Culturally Relevant Teaching

Cultural influences refer to the experiential, historical, geographical, and familial factors that affect the learning process (Povenmire-Kirk, Bethune, Alverson, & Kahn, 2015). Culturally relevant teaching encourages teachers to employ pedagogical strategies that enable students to relate course content to their cultural contexts (Milner, 2014). While the educational achievement gap is closing, it still exists (McKown, 2013). Cultural influence, culturally relevant teaching, and academic rigor are at the forefront of the discussion on the learning process (Povenmire-Kirk, Bethune, Alverson, & Kahn, 2015). Education is an individual and collective cultural experience that impacts student engagement and academic outcomes (Milner, 2014). Using culture as the foundation for teaching and learning helps students learn more readily because prior knowledge is activated and enduring connections are formed, creating an intellectual alliance between the familiar and the new (Milner, 2014). Culturally-based pedagogy and culturally relevant teaching are deliberate attempts on the part of teachers to influence how and what students learn (Milner, 2014; Povenmire-Kirk, Bethune, Alverson, & Kahn, 2015).

Problem-Solving

Making decisions is an important part of daily life. Students' cultural experiences will determine how they see the world and initiate the decision-making or problem-solving process (Harding-DeKam, 2014). Problem-solving is thus a cultural interaction and an important part of the learning process. Problem-solving enables the student to construct deep, contextual understanding of mathematical concepts (Harding-DeKam, 2014). By providing students with problem-solving opportunities linked to their cultural

experiences, teachers provide students with a chance to create genuine and long-lasting functional, logical, and aesthetic cognitive connections (Cydis, 2015).

Language of Instruction

Marzano (2011) defined *language of instruction* as the common language that provides a framework for instructional conversation shared by everyone within an educational network. The common language of culturally responsive instruction is missing for this community of teachers. For many teachers, culturally responsive teaching appears to be an activity students complete when there is additional time available in the curriculum calendar, while other teachers are attempting to immerse themselves and their students in a culturally responsive mindset. The educators who viewed culturally responsive teaching as an activity inserted into a lesson did not see the value of being culturally responsive to their students (Ebersole et al., 2016). However, teachers who viewed culturally responsive teaching as an all-encompassing landscape considered themselves as "promoting a perspective of respect for cultural knowledge and practice" (see Ebersole et al., 2016, p. 99). Teachers need the opportunity and time to develop a cogent and uniform language of instruction to increase the equity and effectiveness of culturally responsive learning environments.

Diverse students' math proficiency is affected by cultural attitudes and beliefs toward standardized testing (Kruse, 2016). Math teachers need to be aware of cultural factors that affect student's academic achievement (McKown, 2013). Academic achievement could be affected by cultural factors (Kim et al., 2013; Makarova & Birman, 2015). Math teachers need to be comfortable to assist diverse students (Dotterer &

Wehrspann, 2016). Math teachers should help diverse students to attain the highest form of mental and academic acuity (Kalajdzievska, 2014). Math teachers can use theories such as the cultural deficit theory to help diverse students by not having negative suppositions regarding the abilities, the work ethics, and the desires of diverse students (Nieto, 2017).

Math teachers need training on how to teach minority students (Mayfield & Garrison-Wade, 2015) by using the Head Start program to provide comprehensive child development services to economically disadvantaged students (Keys, 2015). Head Start program promotes school readiness by enhancing the social and cognitive development of students (Phillips, Gormley, & Anderson, 2016). Math teachers can be mentors of disconnected students (Harris & Walling, 2014). Math teachers should expect diverse students to do well in school (Permuth & Dalzell, 2013) for performance-based learning (Zhang, 2014).

Math teachers should be aware of cultural issues and help diverse students to enhance higher-order knowledge base (Mirich & Cavey, 2015; Palhares, 2012) by making mathematics more relevant to different cultural groups (Kucuk, 2013; Morrison, 2014; Rosa & Orey, 2015). Math teachers should combine scientific thinking with social justice (Harding-DeKam, 2014; Kucuk, 2013; Morrison, 2014; Rosa & Orey, 2015). The goal of math teachers should be to educate all students (Olson et al., 2014) to obtain a common understanding to educational concepts (Tienken, 2013).

Direction of Project

A professional development program was developed to strengthen teachers' effectiveness in creating culturally responsive classrooms, leading to more engaged and academically successful students in mathematics. Increasing teachers' awareness of cultural influences, culturally relevant teaching strategies, the importance of culturally-embedded problem solving, and the importance of a uniform and effective language of instruction can be the springboard to promote student success in mathematics. Based on the findings, teachers were encouraged to participate in forums to explore the impact of culture and an opportunity to see how culturally responsive classrooms impact student achievement. The project was designed to provide teachers with the aforementioned opportunities.

Project Genre

Based on the findings, I also considered process evaluation to examine the method of delivering a program that focuses on the "relationship that exists between that program and the interventions to determine if the program's operational systems support achievement of its objectives" (Zhang & Cheng, 2012, p. 75). Presently, there are no established processes to support the development of culturally competent learning environments. Since there are no processes to evaluate, I could not employ the process evaluation genre for this project study.

In like manner, I considered, and subsequently chose, the professional development project genre. In response to the interview question "How do you feel your

cultural background affects the academic success of minority students in your mathematics classroom?" Participant LQ0926 stated, in part,

> I feel that my cultural background supports the learning of the students who are like me … but I can use some help to know how to support students from other cultures … I just don't know enough about all of my other students to make appropriate cultural references.

In response to the same questions, JH3732 responded: "I am multi-cultural, and it is still difficult to create an inclusive classroom environment for all my students…it would help to have some instructional support in this area." Interview responses such as these informed the project genre as they suggested the need for a comprehensive and sustained support program designed to assist teachers in creating and maintaining culturally competent learning environments. The findings supported the creation of an effective professional development program as outlined by The National Education Association ("Professional Development Benefits Students," n.d.).

Project Development and Theoretical Basis

Knowles' adult learning theory (Hagen & Park, 2016) known as andragogy along with the analysis of the data, informed the content and guided the development of the professional learning project. Andralogical theory of adult learning makes the following assumptions about the adult learning experience: (the need to know) adults need to know why they are learning about a topic; (the learner's self-concept) adults move from dependence to self-directedness as they mature; (motivation to learn) adults are internally motivated to learn; (the role of the learner's experiences) adults have experiences that are

important and influence their learning; (readiness to learn) adults are ready to learn when they view the topic as relevant and practical; and (orientation to learning) adults are motivated to learn as long as they perceive the learning to be helpful (Hagen & Park, 2016). Additionally, Santoro and Kennedy (2016) noted that professional development is one of the main provocations for teacher change, most notably changes in teachers' beliefs. Each of the activities included within the professional development program are in step with Knowles' andragogy theory attempting to combine scientific thinking with social justice (Hagen & Park, 2016; Kucuk, 2013; Morrison, 2014; Rosa & Orey, 2015).

Project Implementation

Potential Resources and Existing Supports

Teachers participating in the professional development program will need the following resources: mobile devices (laptop computer or electronic tablet), access to the Internet, a working knowledge of computers, a projector, and access to a google docs. The mobile devices must have an active Internet connection as participants will need to access embedded videos and hyperlinks to a variety of web resources included in the program presentation.

The school district will provide the wireless Internet connection and a central location where the professional development program will take place. The site of the program will be the meeting room at the district's professional learning complex which will provide access to a wireless Internet network and a projector. Additionally, as each participant will be a school district employee, each participant will have access to google docs through the school district's intranet system.

Potential Barriers

Potential barriers that could result are a lack of support from individual school building administrators and a lack of interest from faculty. School building administrators within the school district have a large amount of autonomy with regards to the types of professional development provided for school building instructional faculty. However, if school building administrators do not feel that this professional development program is important to their school's instructional focus, they will not grant their teachers the professional leave time necessary to attend the program. In this case, I would present the school building administrators with information on how this professional development could positively impact student achievement in their building.

Additionally, a lack of interest in the professional development program by individual instructional faculty members could result in a limited participant pool. Teachers tend to make time for and engage in professional development opportunities that directly relate to the academic content that they teach. The program will include content-specific information and activities as related to cultural competency to increase the willingness of teachers to participate in the professional development program.

Proposal for Implementation and Timetable

To create the most engaging and useful professional development experience, teachers will participate in a 3-day professional development program. The program will take place during the first quarter of the academic school year, over a 3-week period. The 3 days of the professional development program will be non-consecutive days allowing 7

school days between each day of training to permit teachers to introduce and implement the instructional strategies and culturally competent activities within their classroom environments. To initiate implementation, I will meet with the senior director of the Curriculum and Instruction Department and the director of the Professional Learning Department to create a course description to be included in the docket of training sessions for the following school year and request the specific days for the face-to-face professional development sessions. During this meeting, I will also request the use of the Professional Development Auditorium, which seats up to 75 occupants, in which to conduct the training. The professional development planning meeting takes places during the second week of June. During the week of pre-planning of the following school year, I will visit principals and teachers at school sites throughout the district to elaborate on the program and encourage participant. Pre-planning activities take place during the last week of July.

Roles and Responsibilities of Student and Others

The senior director of the Curriculum and Instruction Department, in conjunction with the director of the Professional Learning Department, coordinate the professional development training schedules and provide a docket of training sessions that will be made available for teachers and support staff throughout the academic school year. I will coordinate with both directors to determine the best dates for the *Creating Culturally Competent Mathematics Classrooms* professional development series. Teachers will be responsible for securing approval of professional leave time from their classrooms, enrolling in the professional development series, attending and participating in the

professional development class, and implementing the instructional strategies and concepts learned in the course.

As the professional development facilitator, I am responsible for developing and structuring the professional development experience, creating the presentations and materials for each session, and organizing the instructional support that is to following the professional development session. Additionally, I will provide documentation of participant attendance, an opportunity for program participants to evaluate the program through a professional development feedback form, and follow-up resources for teachers to use in the classroom. Once the participants have met the learning targets of the professional development program, each will receive a certificate of completion.

Project Evaluation

To determine the effectiveness of the professional development program, I decided to use the formative evaluation method. As there are many different types of evaluative methods from which to choose such as goal-based, outcome-based, and summative, it is important to choose an evaluation method that will provide useful feedback to key stakeholders which include students, teachers, school and district administrators, and parents. The need for an evaluation method designed to strengthen and improve the professional development series provides justification as to its use. The formative evaluation process will assist key stakeholders in examining the delivery and quality of the professional development program, as well as the impact on academic achievement.

The first goal of the professional development project was to provide teachers with an opportunity to see how culture impacts the academic success of their students. The second goal of the project was to provide teachers with a professional forum in which to explore and discuss various cultures, cultural mores, cultural interactions, and how these manifest within the mathematics classroom. The third and fourth goals of the professional development project were to provide teachers with an opportunity to discover how their culture affects the success of their secondary math students and to provide teachers with guidance as to how to respect, acknowledge, and incorporate culture in their classrooms so that it positively impacts learning. Finally, the overall goal of the formative evaluation was to provide key stakeholders with information on how the increase of culturally competent learning environments affects student success in mathematics.

After completing the project, state-certified instructional coaches conducted classroom observations of the teachers who participated in the project to determine next steps. Instructional coaches and the project participants completed at least one complete coaching cycle to determine the teacher's effectiveness with creating a culturally competent classroom environment. The coaching cycle included a pre-conference between the teacher participant and the instructional coach, a classroom observation conducted by the instructional coach, a post-observation conference between the teacher participant and the instructional coach, and a follow-up classroom observation conducted by the instructional coach. Subsequent coaching cycles occurred as the instructional

coach and teacher deem necessary as this was a reiterative evaluation process intended to provide feedback for program improvement.

Implications Including Social Change

Local Community

This project addressed the needs of the learners in the local community by providing them with an occasion to expand their personal and professional knowledge and relationships through an active and immersive educational experience. The project allowed educators a chance to create and facilitate culturally relevant lessons that manifested positive academic results. By recognizing and respecting the importance and influence of the various cultures that exist in our schools and communities, the human, social and educational conditions of students, families, educators, administrators, and community partners significantly improved through the infusion of additional cultural capital.

Far-reaching

In the larger context, the professional development project could be expanded to reach educators of other academic disciplines and could potentially impact social change by altering the way instruction is facilitated with students in K-12 classrooms across the nation. The expansion of this professional development project could increase the inclusion of culturally relevant instruction needed to increase academic engagement and success of all students in K-12 learning environments.

Conclusion

The previous section outlined the professional development project created to improve math educators' ability to set up and sustain culturally relevant and competent learning environments. I discussed the project design, goals, theoretical basis, implementation details, and effectiveness evaluation. Section 4, includes my reflections with respect to the processes leading to the culmination of this qualitative project study.

Section 4: Reflections and Conclusions

Introduction

The concluding section of this project study, Section 4, includes my reflections on the processes involved in this qualitative project study. The subsequent discussion focalizes the project's strengths and limitations. Section 4 also includes discussions of the development and evaluation of the project study, possible implications, directions for future research, and a self-analysis.

Project Strengths

One strength of the professional learning project is that it provides an occasion for math teachers to play an active role in closing the achievement gap for the students in their classrooms. Because the project provides teacher participants with an opportunity to learn and understand the cultural needs of their students, teachers have a chance to create authentic, relevant learning experiences with which to engage students that manifest in their academic success. A second strength of the professional learning project is that the strategies learned and developed during the training are practical and designed for immediate incorporation into the classroom. Lastly, the project incorporates andragogical practices that support adult learning practices and knowledge acquisition.

Recommendations for Remediation of Limitations

One of the limitations of this project is that the professional development activities mainly focus on creating culturally competent learning environments for students who are of African-American or Hispanic descent. One way to address this limitation would be to add an activity where teachers research and share information

about a culture that is not present in their classrooms. This would provide a chance for the teachers to discuss and reflect on the types of culturally relevant activities that may benefit these students.

The second limitation is that the project only included secondary math teachers. As culture is important at all levels of the learning continuum, a solution to this problem could be to invite elementary teachers to the first two days of the professional development program. This would allow them to participate in the professional development program dedicated to the foundational information while leaving the instructional planning piece to the secondary math teachers.

Scholarship

The completion of this project study required a considerable amount of dedicated time on purposeful planning. When I began this process, I had a different idea of what research was all about. As K-12 classroom educators, we are conditioned to perform quick formative evaluations of our classroom students and classroom situations in order to make immediate instructional decisions that will leave long-lasting impressions on our students. Sometimes, these quick decisions leave negative impressions on our students. This cursory process is most definitely not the process to be employed when conducting scholarly research, particularly when the ultimate goal is to promote positive social change. Completing this project study taught me that the true meaning of scholarship is the advancement of knowledge, professionalism, and social change through the intentional immersion of oneself in an idea through purposeful and dedicated research, integration, and application that positively impacts the greater good. I also

learned that, like many other processes, scholarship goes through many stages, some of which move with a nimble quickness while others move at a more glacial pace; however, the process progresses, and my experience revealed that each leg of the process opened a window of truth or discovery about me and the idea of cultural awareness.

Project Development and Evaluation

The results of this project study indicate that the creation and sustainment of culturally competent learning environments are important to teachers as they work to increase students' academic success in mathematics. As I developed the project to meet the needs of the participants, I realized that project development is an intricate and purposeful process. As the project developer, I wanted to maintain a clear focus on the learning targets while creating engaging and meaningful interactions for the teacher participants. I also gained a better understanding of the project evaluation process and its importance to the advancement of the project. Without clear and concise feedback from project participants, it would be impossible to increase the effectiveness of the project (see Marchand, Olafson, & Steaffens, 2013).

Leadership and Change

During the last several years of my teaching career, I have been asked to work in a variety of leadership capacities, but until I began working on this professional development process, I had not given much thought to the type of leadership qualities I wanted to display. However, as I worked through the project development phase of this project study, the type of leader I wanted to become became evident to me. Reflecting on the interactions between the project study participants and me, and then working to

develop a project that would lead to genuine change, made me realize that I want to be a transformational leader (Noland & Richards, 2014). I now realize that transformational leadership is one of the most powerful ways to instigate true social change among my educational peers. Just as the teachers work diligently to ignite the passion for learning and academic success among their students, leaders should ignite the passion for social change among those they are charged to lead. I have learned that true social change is positive at every level.

Analysis of Self as Scholar

While conducting the multiple phases of this project study, I learned how to mine for relative information in primary and secondary literature sources and share that information through scholarly writing. I learned how to review and analyze scholarly articles, find underlying themes, use these themes to support my current research, and present my findings in an in-depth and scholarly way. Going through this project study process taught me the importance of comprehensively analyzing academic material and educational scenarios. It also taught me the importance of engaging in purposeful dialogue with my professional colleagues where research-based information is used to support ideas and suggestions. I have developed a deep respect for the research process and those who have dedicated themselves to being true lifelong researchers.

Analysis of Self as Practitioner

This project study taught me the value of being a research-based educational practitioner. Over the course of completing this project study, I have transformed the methods by which I communicate with my professional stakeholders. When posed with a

question or being asked to provide instructional support for a teacher, I find myself searching for and referencing research that supports my response. Not only am I conducting my own research of best practices to increase instructional success in the K-12 classroom, but I am also encouraging the teachers with whom I work to do the same. As a professional learning math coach, I provide my teachers with instructional strategies that will not only help their students succeed, but also will provide them with the tools and strategies to become independent, perennial learners, and research-based practitioners.

Analysis of Self as Project Developer

As a project developer, I learned that I could create an engaging, hands-on, and effective professional development program to help teachers increase their ability to create a culturally relevant and aware classroom environment. The research skills I learned at Walden University helped me find research-based techniques and develop research-based activities designed to assist the program participants in understanding their own sense of cultural awareness and increase that awareness to support the academic achievement of their students. Additionally, through the coursework at Walden, I learned the value of using relevant and reliable data to assess the effectiveness of the program to implement improvements for future participants.

The Project's Potential Impact on Social Change

Commensurate with Walden University's deep commitment to social change, I believe that this project study holds the potential to improve the human and social conditions of the local educational community and beyond by illuminating the

importance and influence of the various cultures that exist in our schools. The research I conducted in this project study showed the value of identifying and accepting the influence of culture in the learning environment and on the academic success of minority students in the math classroom. The acknowledgment of these research findings by educators potentially impacts social change by altering the way math and other instruction is viewed and delivered to students in K-12 classrooms by increasing students' academic achievement through culturally relevant connections, locally and beyond. The scope of this project study offers educators an opportunity to increase the use of culturally relevant instructional strategies in classrooms supporting increased academic engagement and success of all students in K-12 classrooms.

Implications, Applications, and Directions for Future Research

Because secondary mathematics teachers are interested in expanding their cultural awareness and learning more about the influence of culture on academic success, I believe that it is important to consider the use of cultural awareness coaches to assist teachers in strengthening their intercultural awareness, much like instructional coaches are used to assist teachers in refining content delivery. Based on the responses to the project study interview questions, teachers have a desire to nurture and increase their positive learning environments by strengthening their cultural awareness but need support as they undertake the task. I think that having cultural awareness coaches who facilitate professional learning communities that support teachers in their efforts would be encouraged throughout the school district.

As K-12 classrooms continue to include students from a variety of intertwining cultures, it is my hope that future researchers will explore the influence of multicultural education on academic success within the K-12 classroom environment. I will explore advanced Internet-based professional development offerings as options for extension of the 3-day face-to-face program (Shaha, Glasset, & Copas, 2015). As individual communities are becoming increasingly united, understanding multicultural education could lead to a greater awareness of teachers and students in the way of global issues, cultural consciousness, and the desire to increase social justice within the global community.

Conclusion

Through this qualitative research study, I explored math teachers' perceptions of culture and how those perceptions impact the academic success of minority students in their classrooms. Through comprehensive research, face-to-face interviews, and data analysis, I learned a great deal about myself as a scholar, as a leader, as a project developer, and as an agent of social change. Not only have I engaged and ignited a passion in my colleagues to develop a panoramic view of the students that they come in contact with each day, but I have also developed the professional development program to improve social justice in my community.

References

Akiba, M., & Liang, G. (2016). Effects of teacher professional learning activities on student achievement growth. *Journal of Educational Research, 109*(1), 99-110. doi:10.1080/00220671.2014.924470

Aronson, B. & Laughter, J. (2016). The theory and practice of culturally relevant education: A synthesis of research across content areas. *Review of Educational Research, 86*(1), 163-206. doi:10.3102/0034654315582066

Arreguin-Anderson, M., & Ruiz, E. (2013). Looking for science and mathematics in all the right places: Using mobile technology as culturally-sensitive pedagogical tools to capture generative images. *Journal of the Association of Mexican American Educators, 7*(1), 17-26. Retrieved from http://amaejournal.utsa.edu/index.php/amae/article/view/129

Arseven, Z., Kilic, A., & Sahin, S. (2016). Value-eroding teacher behaviors scale: A validity and reliability study. *Universal Journal of Educational Research, 4*(6), 1378-1386. doi:10.13189/ujer.2016.040615

Bagley, S. S., & Portnoi, L. M. (2014). Setting the stage: Global competition in higher education. *New Directions for Higher Education*, *168*, 5–11. doi:10.1002 /he.20109

Brooks, J. & Dietz, M. (2013). The dangers and opportunities of the Common Core. *Educational Leadership, 70*(4), 64-67. Retrieved from http://www.ascd.org/publications/educational-leadership/ dec12/vol70/num04/The-Dangers-and-Opportunities-of-the-Common-Core.aspx

Brown, K. & Brown, A. (2012). Useful and dangerous discourse: Deconstructing racialized knowledge about African-American students. *Education Foundations, 26*(1), 11-26. Retrieved from http://intraweb.stockton.edu/eyos/page.cfm?siteID=144&pageID=10

Browne, J. (2012). *Walking the equity talk.* Thousand Oaks, CA: Corwin Publishing.

Claessens, A., Engel, M., & Curran, F. (2014). Academic content, student learning, and the persistence of preschool effects. *American Educational Research Journal, 51*(2), 403-434. doi http://dx.doi.org/10.3102/0002831213513634

Clark, J. (2012). Nine months to 9th grade. *Principal Leadership, 12*(5), 46-50. Retrieved from http://www.nassp.org/Knowledge-Center/Publications/Principal-Leadership

Crawford, L. (2013). Effects of an online mathematics curriculum for English language learners. *Computers in the Schools, 30*(3), 248-270. doi:10.1080/07380569.2013.805665

Creswell, J. (2014). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research* (5th ed.). Upper Saddle River, NJ: Pearson Education, Inc.

Creswell, J. (2013). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). Thousand Oaks, CA: Sage Publications.

Curry, J. & Thomas, D. (1995). Does Head Start make a difference? *American Economic Review, 85*(3), 341. doi:10.3386/w4406

Cydis, S. (2015). Authentic instruction and technology literacy. *Journal of Learning Design, 8*(1), 68-78. doi:http://dx.doi.org/10.5204/jld.v8i1.222

D'Andrea, M., & Daniels, J. (2007). Embracing the deep structure of multicultural counseling. *Counseling Today, 50*(3), 37-49. Retrieved from http://ct.counseling.org/2006/01/ct-online-dignity-development-diversity/

Darwin, C. (1876). *The origin of species: By means of natural selection.* New York, NY: Cambridge University Press.

DePouw, C. (2012). When culture implies deficit: Placing race at the center of Hmong American education. *Race, Ethnicity, and Education, 15*(2), 223-239. doi:10.1080/13613324.2011.624505

Dewey, J. (1910). *How we think.* Boston, MA: D. C. Heath and Company Publishers.

Dewey, J. (1938). Experience and education. *The Educational Forum*, *50*(3), 241-252. doi:10.1080/00131728609335764

Dixon-Roman, E. (2013). The forms of capital and the developed achievement of black males. *Urban Education, 48*(6), 828-862. doi:10.1177/0042085912463707

Dotterer, A., & Wehrspann, E. (2016). Parent involvement and academic outcomes among urban adolescents: Examining the role of school engagement. *Educational Psychology, 36*(4), 812-830. doi:10.1080/01443410.2015.1099617

Ebersole, M., Kanahele-Mossman, H., & Kawakami, A. (2016). Culturally responsive teaching: Examining teachers' understandings and perspectives. *Journal of Education and Training Studies, 4*(2), 97-104. doi:10.11114/jets.v4i2.1136

Erickson, F. (1987). Transformation and school success: The politics and culture of educational achievement. *Anthropology and Education Quarterly, 18*(4), 335-383. doi: 10.1525/aeq.1987.18.4.04x0023w

Evans, B. (2013). Supporting students from underrepresented groups in mathematics for alternative certification teachers. *Journal of the National Association for Alternative Certification, 8*(1), 16-26. Retrieved from http://files.eric.ed.gov/fulltext/EJ1053404.pdf

Evers, W. (2011). Closing the door on innovation. *Advancing a Free Society* [Advance online publication]. Retrieved from http://www.hoover.org/publications /advancing-free-society

Feryok, A. (2013). Teaching for learner autonomy: The teacher's role and sociocultural theory. *Innovation in Language Learning and Teaching, 7*(3), 213-225. doi:10 .1080/17501229.2013.836203

Garcia, J., & Lewis, T. (2014). Getting a grip on the classroom: From psychological to phenomenological curriculum development in teacher education programs. *Curriculum Inquiry, 44*(2), 141-168. doi:10.1111/curi.12042

Gay, G. (2000). *Culturally responsive teaching: Theory, research, and practice.* New York, NY: Teachers College Press.

Gay, G. (2002). Culturally responsive teaching in special education for ethnically diverse students: Setting the stage. *International Journal of Qualitative Studies in Education, 15*(6), 613-629. doi:10.1080/0951839022000014349

Gay, G. (2013). Cultural diversity and multicultural education. *Curriculum Inquiry, 43*(1), 48-70. doi:10.1111/curi.12002

Georgia Department of Education (2017). Data and reporting. Retrieved from http://www.gadoe.org

Georgia Department of Education (2017). Learning and curriculum. Retrieved from http://www.gadoe.org

Georgia Department of Education (2017). School improvement. Retrieved from http://www.gadoe.org

Glass, G., & Rud, A. (2012). The struggle between individualism and communitarianism. *Review of Research in Education*, *36*(1), 95–112. doi:10.3102/0091732X11422863

Glesne, C. (2014). *Becoming qualitative researchers: An introduction* (5th ed.). Boston, MA: Pearson Education.

Hagen, M., & Park, S. (2016). We knew it all along! Using cognitive science to explain how andragogy works. *European Journal of Training and Development, 40*(3), 171-190. doi:10.1108/EJTD-10-2015-0081

Hand, V. (2012). Seeing culture and power in mathematical learning: Toward a model of equitable instruction. *Educational Studies in Mathematics, 80*(1-2), 233-247. doi: 10.1007/s10649-012-9387-9

Harding-DeKam, J. (2014). Defining culturally responsive teaching: The case of mathematics. *Cognet Education, 1*(1). doi:10.1080/2331186x.2014.972676

Harris, P., & Walling, D. (2014). Policies governing educational technology practice and research. In *Handbook of research on educational communications and technology* (pp. 627-640). New York: Springer.

Hatcher, T., & Bowles, T. (2014). Bridging the gap between human resource development and adult education: Part two, the critical turn. *New Horizons in Adult Education and Human Resource Development, 26*(1), 1-12. doi:10.1002/nha3.20048

Herrnstein, R., & Murray, C. (1994). The bell curve: Intelligence and class structure in American life. New York: Free Press.

Hogan, J. (2012). Mathematics and numeracy: Has anything changed? Are we any clearer? Are we on track? *Australian Mathematics Teacher, 68*(4), 4-7. Retrieved from http://www.aamt.edu.au

Ju, M., Moon, J., & Song, R. (2016). History of mathematics in Korean mathematics textbooks: Implication for using ethnomathematics in culturally diverse school. *International Journal of Science and Mathematics Education*, *14*(7), 1321-1338. doi: 10.1007/s10763-015-9647-0

Kalajdzievska, D. (2014). Taking math students from "Blah" to "Aha": What can we do? *PRIMUS, 24*(5), 375-391. doi:10.1080/10511970.2014.893937

Kelly, J., & Cherkowski, S. (2015). Collaboration, collegiality, and collective reflection: A case study of professional development for teachers. *Canadian Journal of Educational Administration and Policy,* (169)*,* 1-27. Retrieved from http://files.eric.ed.gov/fulltext/EJ1063374.pdf

Keys, A. (2015). Family engagement in rural and urban head start families: An exploratory study. *Early Childhood Education Journal, 43*(1), 69-76. doi:10.1007/s10643-014-0643-8

Kim, S., Chang, M., Singh, K., & Allen, K. (2015). Patterns and factors of high school dropout risks of racial and linguistic groups. *Journal of Education for Students Placed at Risk, 20*(4), 336-351. doi:10.1080/10824669.2015.1047019

Kiryak, Z. & Calik, M. (2017). Improving grade 7 students' conceptual understanding of water pollution via common knowledge construction model. *International Journal of Science and Mathematics Education, 1*(3), 1-22. doi:10.1007/s10763-017-9820-8

Kosutic, I. (2017). The role of cultural capital in higher education access and institutional choice. *Center for Educational Policy Studies Journal, 7*(1), 149-169. Retrieved from http://files.eric.ed.gov/fulltext/EJ1137837.pdf

Kruse, A. (2016). Cultural bias in testing: A review of literature and implications in music education. *Update: Applications of Research in Music Education, 35*(1), 23-31. doi:10.1177/8755123315576212

Kucuk, A. (2013). Ethnomathematics in Anatolia-I (in Turkey): Geometry perception in multiculturalism. *Educational Research and Reviews, 8*(16), 1360-1368. Retrieved from http://www.academicjournals.org/journal/ERR/article-abstract/C64F2717069

Labov, W. (1969). *A study of non-standard English.* Washington, D.C.: Center for Applied Linguistics.

Ladson-Billings, G. (1995). But that's just good teaching! The case for culturally relevant pedagogy. *Theory into Practice*, 34(3), 159-165. doi:10.1080/00405849509543675

Ladson-Billings, G. (2006). From the achievement gap to the education debt: Understanding achievement in U. S. schools. *Educational Researcher, 35*(7), 3-12. Retrieved from http://ed618.pbworks.com/f/From%20Achievement%20Gap%20to%20Education%20Debt.pdf

Ladson-Billings, G. (2007). Pushing past the achievement gap: An essay on the language of Deficit. *The Journal of Negro Education, 76(*3), 316-323. Retrieved from https://www.jstor.org

Lantolf, J., & Poehner, M. (2013). The unfairness of equal treatment: Objectivity in L2 testing and dynamic assessment. *Educational Research and Evaluation, 19*(2-3), 141-157. doi:10.1080/13803611.2013.767616

Lauren, D., & Gaddis, S. (2016). Accountability pressure, academic standards, and educational triage. *Educational Evaluation and Policy Analysis, 38*(1), 127-147. doi:10.3102/0162373715598577

Leavy, P. (Ed.). (2014). *The oxford handbook of qualitative research.* New York: Oxford University Press.

Lin, S., Cheng, W., & Wu, M. (2015). Uncovering a connection between the teachers' professional development program and students' learning. *Journal of Education and Practice, 6*(23), 66-74. Retrieved from http://files.eric.ed.gov/fulltext/EJ1079018.pdf

Lodico, M., Spaulding, D., & Voegtle, K. (2010). *Methods in educational research.* San Francisco, CA: Jossey-Bass.

Makarova, E., & Birman, D. (2015). Cultural transition and academic achievement of students from ethnic minority backgrounds: A content analysis of empirical research on acculturation. *Educational Research, 57*(3), 305-330. doi:10.1080/00131881.2015.1058099

Marchand, G., Olafson, L., & Steaffens, S. (2013). Using school and university partnership resources to enhance rigor in self-assessment and evaluation at professional development schools. *School-University Partnerships, 6*(2), 7-9. Retrieved from http://www.academia.edu/5726849/

Martin, D. (2012). Learning mathematics while Black. *Educational Foundations, 26*(2), 47-66. Retrieved from http://files.eric.ed.gov/fulltext/EJ968817.pdf

Martinez, S., & Rury, J. (2012). From "culturally deprived" to "at risk": The politics of Popular expression and educational inequality in the United States, 1960-1985. *Teachers College Record, 114*(6), 1-31. Retrieved from http://www.tcrecord.org

Marzano, R. (2011). What teachers gain from deliberate practice. *Educational Leadership, 64*(4), 82-84. Retrieved from http://www.ascd.org/publications/educational-leadership/dec10/vol68/num04/What-Teachers-Gain-from-Deliberate-Practice.aspx

Mason, M. (2010). Sample size and saturation in Ph.D. studies using qualitative interviews. *Forum Qualitative Sozialforschung/Forum: Qualitative Social Research, 11*(3), Art. 8, http://nbn-resolving.de/urn:nbn:de:0114-fqs100387.

Mayfield, V., & Garrison-Wade, D. (2015). Culturally responsive practices as whole school reform. *Journal of Instructional Pedagogies, 16,* 1-17. Retrieved from http://files.eric.ed.gov/fulltext/EJ1069396.pdf

McKown, C. (2013). Social equity theory and racial-ethnic achievement gaps. *Child Development, 84*(4), 1120-1136. doi:10.1111/cdev.12033

Milner, H. (2014). Culturally relevant, purpose-driven learning & teaching in a middle school social studies classroom. *Multicultural Education, 21*(2), 9-17. Retrieved from http://files.eric.ed.gov/fulltext/EJ1045839.pdf

Mirich, D., & Cavey, L. (2015). Lacing together mathematics and culture. *Mathematics Teaching in the Middle School, 21*(1), 16-24. Retrieved from http://www.nctm.org/

Morrison, J. (2014). Finding traction for social justice practices through the student teaching socialization transition. *Journal of Urban Learning, Teaching, and Research, 10*, 73-86. Retrieved from http://files.eric.ed.gov/fulltext/EJ1044129.pdf

Nasir, N., & de Royston, M. (2013). Power, identity, and mathematical practices outside and inside school. *Journal for Research in Mathematics Education, 44*(1), 264-287. doi:10.5951/jresematheduc.44.1.0264

Nasir, N., Snyder, C., Shah, N., & Ross, K. (2012). Racial storylines and implications for learning. *Human Development, 55*(5-6), 285-301. doi:10.1159/000345318

Nieto, S. (2017). Re-imagining multicultural education: New visions, new possibilities. *Multicultural Education Review, 9*(1), 1-10. doi:10.1080/2005615X.2016.1276671

Noland, A., & Richards, K. (2014). The relationship among transformational teaching and student motivation and learning. *Journal of Effective Teaching, 14*(3), 5-20. Retrieved from http://files.eric.ed.gov/fulltext/EJ1060434.pdf

Ogbu, J. (1978). *Minority education and caste: The American system in cross-cultural perspective.* San Diego, CA: Academic Press.

Ogbu, J. (1992). Understanding cultural diversity and learning. *Educational Researcher, 21*(8), 5-14.

Ogbu, J. (1998). Voluntary and involuntary minorities: A cultural-ecological theory of school performance with some implications for education. *Anthropology & Education Quarterly, 29*(2), 155-188.

Olson, T., Olson, M., & Capen, S. (2014). The common cores standards of mathematical practice: Teachers' initial perceptions and implementation considerations. *Journal of Mathematics Education Leadership, 15*(2), 11-20.

Palhares, P. (2012). Mathematics education and ethnomathematics. A connection in need of reinforcement. *REDIMAT - Journal of Research in Mathematics Education, 1*(1), 79-92.

Pantin, C. (2014). *Sounds of black-ness: An auto-ethnographic study of the experiences of a male Carribean-born educator teaching in US urban schools* (Doctoral dissertation). Retrieved from WorldCat Union Catalog database. (OCLC No. 904617937)

Permuth, S., & Dalzell, N. (2013). Driven by history: Mathematics education reform. *International Journal of Educational Reform, 22*(3), 235-251.

Peterson, P. (2016). The end of the Bush-Obama regulatory approach to school reform. *Education Next, 16*(3), 22-32.

Petty, T., Wang, C., & Harbaugh, A. (2013). Relationships between student, teacher, and school characteristics and mathematics achievement. *School Science and Mathematics, 113*(7), 333-344. doi:10.1111/ssm.12034

Phillips, D., Gormley, W., & Anderson, S. (2016). The effects of Tulsa's CAP Head Start program in middle-school academic outcomes and progress. *Developmental Psychology, 52*(8), 1247-1261. doi:10.1037/dev0000151

Povenmire-Kirk, T., Bethune, L., Alverson, C., & Kahn, L. (2015). A journey, not a destination: Developing cultural competence in secondary transition. *TEACHING Exceptional Children, 47*(6), 319-328. doi:10.1177/0040059915587679

Professional Development Benefits Students. (n.d.). Retrieved from http://www.nea.org/

Rapp, N., & Duncan, H. (2012). Multi-dimensional parental involvement in schools: A principal's guide. *International Journal of Educational Leadership Preparation, 7*(1), 1-14. Retrieved from http://files.eric.ed.gov/fulltext/EJ971515.pdf

Rickman, D. (2016). Georgia's balancing act: Using, protecting, and legislating student data. *State Education Standard, 16*(2), 10-13. Retrieved from http://www.nasbe.org/our-resources/publications/the-state-education-standard/

Ritchie, J., Lewis, J., Nicholls, C., & Ormston, R. (Eds.). (2013). *Qualitative research practice: A guide for social science students & researchers.* London, England: Sage Publications.

Rosa, M., & Orey, D. (2015). A trivium curriculum for mathematics based on literacy, matheracy, and technoracy: An ethnomathematics perspective. *ZDM: The International Journal on Mathematics Education, 47*(4), 587-598. doi:10.1007/s11858-015-0688-1

Saldana, J. (2013). *The coding manual for qualitative researchers.* Thousand Oaks, CA: Sage Publications.

Santoro, N., & Kennedy, A. (2016). How is cultural diversity positioned in teacher professional standards? An international analysis. *Asia-Pacific Journal of Teacher Education, 44*(3), 203-223. doi:10.1080/1359866X.2015.1081674

Savva, M. (2017). Learning to teach culturally and linguistically diverse students through cross-cultural experiences. *Intercultural Education, 28*(3), 269-282. doi:10.1080/14675986.2017.1333689

Scott, K. (2014). A multilevel analysis of problem-based learning design characteristics. *Interdisciplinary Journal of Problem-based Learning, 8*(2). doi:10.7771/1541-5015.1420

Seidman, I. (2013). Interviewing as qualitative research: A guide for researchers in education and the social sciences (4th ed.). New York, NY: Teachers College Press.

Shaha, S., Glasset, K., & Copas, A. (2015). The impact of teacher observations with coordinated professional development on student performance: A 27-state program evaluation. *Journal of College Teaching & Learning, 12*(1), 55-64. doi:10.19030/tlc.v12i1.9070

Shao, D. (2014). MoMath: An innovative design of a mobile based system for supporting primary school mathematics in Tanzania. *International Journal of Computer Applications, 95*(15), 22-27. doi:10.5120/16671-6671

Star, J., & Stylianides, G. (2013). Procedural and conceptual knowledge: Exploring the Gap between knowledge type and knowledge quality. *Canadian Journal of Science, Mathematics and Technology, 13*(2), 169-181. doi: 10.1080/14926156.2013.784828

Step Up Savannah (2016). 2016 Report card. Retrieved from www.stepupsavannah.org

Tienken, C. (2013). Neoliberalism, social Darwinism, and Consumerism masquerading as school reform. *Interchange: A Quarterly Review of Education, 43*(4), 295-316. doi:10.1007/s10780-013-9178-y

Tinkler, B., & Tinkler, A. (2013). Experiencing the other: The impact of service-learning on preservice teachers' perceptions of diversity. *Teacher Education Quarterly, 40*(4), 41-62. Retrieved from http://www.teqjournal.org/

Vukanovic, M. (2017). Ethnography (and) Digital. In action. *Issues in Ethnology and Anthropology, 11*(4), 1027-1053. doi:10.21301/eap.v11i4.4

Vygotsky, L. (1980). *Mind in society: Development of higher psychological process.* V. John-Steiner, M. Cole, S. Scribner, E. Souberman, (Eds.). Boston, MA: Harvard University Press.

Vygotsky, L. (1986). *Thought and Language.* Cambridge, MA: MIT Press.

Xu, J., & Hampden-Thompson, G. (2012). Cultural reproduction, cultural mobility, cultural resources, or trivial effect? A comparative approach to cultural capital and educational performance. Comparative Education Review, 56(1), 98-124. doi:10.1086/661289

Zhang, W. (2014). Problem based learning in nursing education. *Advances in Nursing.* Advance online publication. doi: 10.1155/2014/125707.

Zhang, W., & Cheng, Y. (2012). Quality assurance in e-learning: PDPP evaluation model and its applications. *International Review of Research in Open and Distance Learning, 13*(3), 66-82. doi: 10.19173/irrodl.v13i3.1181

Appendix A: Project as Outcome

Creating Culturally Competent Mathematics Classroom
Professional Development Program

Day 1

I. Welcome and Course Introduction (Slides 1 – 3)

II. Diversity Bingo (Slide 4)
   a. Participants will play Diversity Bingo as an ice-breaker activity and to get to know the types of differences that exist within the group. Participants will also discuss their feelings after finding others with which they have commonalities and differences. The program facilitator will use this to establish the underpinning of the professional development session.

III. Session Objectives (Slide 5)
   a. The program facilitator will outline the Day 1 session objectives for the participants.
   b. Participants will complete the "K" and "W" sections of the K-W-L handout.

IV. Rationale for Culturally Competent Math Classrooms (Slides 6 – 7)
   a. The program facilitator will discuss the rationale behind culturally competent classrooms and how their academic impact on student achievement.

V. Frameworks for Culturally Responsive Teachers (Slide 8)
   a. The program facilitator will discuss the framework of culturally responsive teaching and teachers.

VI. Criteria for Culturally Relevant Pedagogy (Slide 9)
   a. The program facilitator will discuss the criteria for culturally relevant pedagogy.

VII. The Need for Culturally Competent Math Classrooms (Slides 10-13)
   a. Participants will read the article ***But That's Just Good Teaching! The Case for Culturally Relevant Pedagogy*** by Gloria Ladson-Billings. The program facilitator and participants will discuss the article and explore concepts of school and culture, culturally relevant pedagogy, and culturally relevant teaching.
   b. Participants will watch a short clip of Dr. Geneva Gay discussing multiculturalism. The program facilitator will ask participants to share their thoughts and opinions about how multiculturalism impacts their classroom environment.
   c. Using the article (***But That's Just Good Teaching!***) and video clip (Dr. Geneva Gay), the program facilitator will facilitate a discussion about the language of culturally competent classrooms. Program participants will be split into small groups (3 – 4 participants) to create an anchor chart of the top five most important words they feel support culturally competent

classrooms. Each small group will share their anchor chart with the large group.

d. After small group presentations, the program facilitator will share the terms listed below with the participants to extend the discussion on terms synonymous with Culturally Responsive Teaching and Culturally Competent Classrooms.

    i. ***Cross-Cultural Communication:*** Understanding the way members of other cultures interact with others by the use of verbal and nonverbal cues. Cross-cultural communication is based on the knowledge of cultural values, perceptions, manners, social structure, and decision-making practices. Effective cross-cultural communication respects members of diverse cultures and makes consistent and honest attempts to understand their perspectives while welcoming new learning opportunities with open-minded and flexible attitudes (Savva, 2017).
    ii. ***Culture:*** Culture refers to the integrated patterns of human behavior associated with a particular group of people. These patterns can be seen in language, thoughts, communications, actions, customs, beliefs, values, and institutions (Xu & Hampden-Thompson, 2012).
    iii. ***Cultural Capital:*** The non-monetary, educational or intellectual social assets that promote social mobility beyond economic restrictions (Dixon-Roman, 2013).
    iv. ***Cultural Competency:*** The United States Department of Health and Human Services (http://minorityhealth.hhs.gov/) defines cultural competency as a set of invariable behaviors, attitudes, and policies that intersect in a system, agency, or among professionals that support effective work scenarios in various cultural situations.
    v. ***Culturally Relevant Education:*** An educational system that values the cultural knowledge and experiences of all students regardless of the cultural system of which they are a member. For all its members, this system advocates intellectually, emotionally, politically, and socially using cultural references that encompass student attitudes, knowledge, and skills within the learning environment (Gay, 2000).
    vi. ***Ethnomathematics:*** Ethnomathematics refers to the interrelationship between culture and the learning of mathematics. Ethnomathematics surveys alternative and innovative ways to provide culturally-resonant academics to

students in efforts to create meaningful connections that ensure depth of learning (Ju et al., 2016).

VIII. "Brief Encounters" Cultural Differences Simulation and Reflection (Slide 14)
   a. Participants will play a part in the "Brief Encounters" Simulation, a simulation used by the Peace Corp to help individuals notice and appreciate the cultural differences they may encounter.
   b. After participating in the simulation, the program facilitator will facilitate a discussion about what happened in the simulation and assist participants in understanding how this relates to the many cultures that are present in their classrooms.

IX. Kolb's Model of Learning (Slide 15)
   a. As participants enter the reflective processes, the program facilitator will review the Kolb's Model of Learning to help participants understand the ideology that supports the activities of the professional development course.

X. Closing Discussion and Summary/Reflective Journal Entry (Slide 16)
   a. Participants will be encouraged to implement at least one idea or strategy that was gained from the day's professional development session. Participants will be asked to share the results of their implementation at the beginning of *Creating Culturally Competent Mathematics Classrooms - Day 2.*

Day 2

I. Welcome (Slides 17 – 18)

II. Session Objectives (Slide 19)
   a. The program facilitator will outline the Day 2 session objectives for the participants.

III. Reflection (Slide 20)
   a. Participants will share and reflect on ideas/strategies that they have implemented to create a more culturally responsive environment within their classrooms since attending ***Creating Culturally Competent Mathematics Classrooms - Day 1*.**

IV. Exploration of Pedersen's Developmental Model (Slides 21-24)
   a. Using the experiences shared by the professional development participants, an exploration of Pederson's Development Model will ensue. Participants will recognize that they have begun the cycle as they have increased their personal awareness of their own attitudes toward culture.

V. Poverty Simulation and Reflection (Slide 25)
   a. Participants will take part in a poverty simulation. At the conclusion of the poverty simulation, the participants will share their thoughts on the simulation itself and the impact this experience had on their perceptions of cultural and teaching and learning.

VI. Culturally Responsive Classroom Practices and Teaching (Slides 26-29)

a. Program Participants will read the article *Five Competencies for Culturally Competent Teaching and Learning* by Cheryl Irish and Monica Scrubb (2012)
b. The program facilitator and participants will review the "Culturally Competent Checklist of Success" and discuss other items that should be added to the list based on the needs of current students.
c. Participants will read an excerpt from ***The Role of Teacher Education Programs in Creating Culturally Competent Teachers*** by Roben W. Taylor, Multicultural Education (Spring 2010).

VII. Closing Discussion and Summary/Reflective Journal Entry (Slide 30)
a. Participants will be encouraged to implement at least one idea or strategy that was gained from the day's professional development session. Participants will be asked to share the results of their implementation at the beginning of *Creating Culturally Competent Mathematics Classrooms - Day 3.*

Day 3

I. Welcome (Slides 31 – 33)
II. Reflection (Slide 34)
a. Participants will share and reflect on ideas/strategies that they have implemented to create a more culturally responsive environment within their classrooms since attending ***Creating Culturally Competent Mathematics Classrooms - Day 2*.**
III. Session Objectives (Slide 35)
a. The program facilitator will outline the Day 3 session objectives for the participants.
IV. Instructional Issues and Needs Assessment (Slides 36 – 37)
a. Program Participants will be provided an opportunity to discuss areas of cultural and instructional need within their own classrooms
b. Standards for Mathematical Practice
V. Research-Based Strategies for Teaching and Learning in Mathematics (Slides 38 – 39)
VI. Seven Principal for Culturally Responsive Teaching and Learning (Gary Howard) (Slides 40 – 47)
a. Participants will view a short video demonstrating researched based instructional strategies that support a culturally competent and responsive classroom environment. After the video, participants will discuss what they witnessed and how to extend and adapt these strategies to secondary math classrooms.
b. Participants will view a short video introducing the seven principles for culturally responsive teaching and learning (Gary Howard)
VII. <u>*Every Kid Needs a Champion*</u> (Rita Pierson) – (Slide 48)
a. Participants will watch and discuss the TEDTalks video of Rita Pierson.

VIII. Curriculum Examples (Slide 49)
   a. The program facilitator will provide the program participants with examples of culturally competent mathematics lessons for review. Working in small groups (3 – 4 participants) participants will review the assigned lesson and present the large group with an anchor chart that includes a summary of the lesson, the culturally competent components, and suggestions for lesson development.

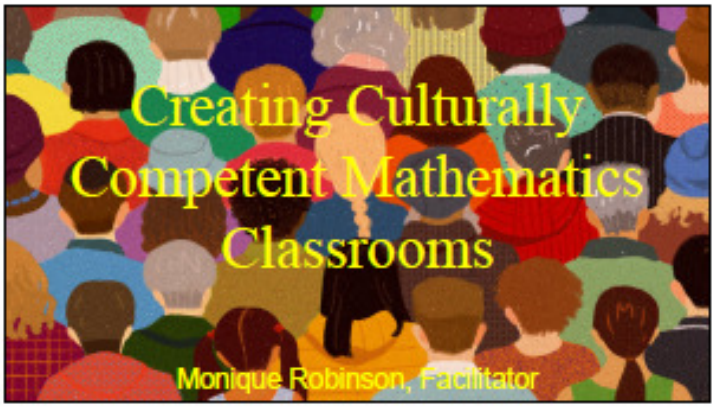
IX. Action Plans for Implementing Culturally Competence within the Mathematics Classroom (Slide 50)
   a. Individually, participants will create action plans detailing how they will create a culturally competent learning environment within their math classrooms. The program facilitator will walk throughout the room providing support and feedback to participants.
   b. Participants will share their plans with the group.

X. Instructional Planning/Group Sharing and Discussion (Slide 51)
   a. Working in small groups (3 – 4 individuals), participants will create instructional plans to be used in their culturally competent math classrooms.
   b. At the end of the planning session, groups will exchange plans and provide constructive feedback and offer suggestions for improvement to other groups.
   c. Groups will be provided with time to record feedback and make revisions/adjustments.

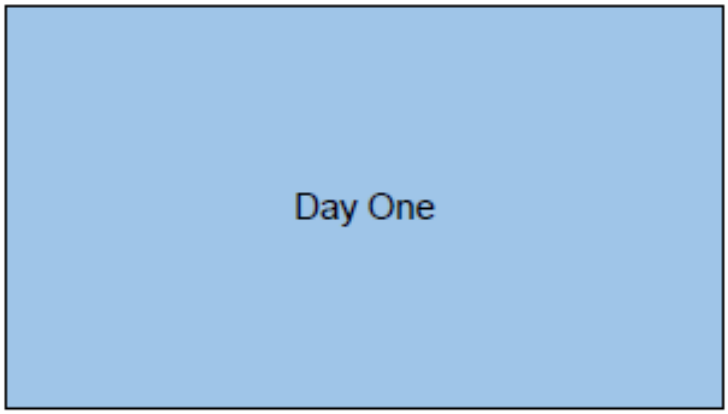
XI. Closing Discussion and Summary/Reflective Journal Entry (Slide 52)
   a. Participants will complete the "L" and "Next Steps" sections of the K-W-L handout.
   b. Participants will be encouraged to implement the action plans they created and use the lessons that were created and shared from the day's professional development session.

XII. Questions/Comments/Program Evaluation (Slide 53)
   a. The program facilitator will lead an open forum discussion to enable participants time to ask questions, make comments, and illicit feedback from other participants.
   b. Participants will complete a program evaluation form to provide feedback about the effectiveness of the professional development program.

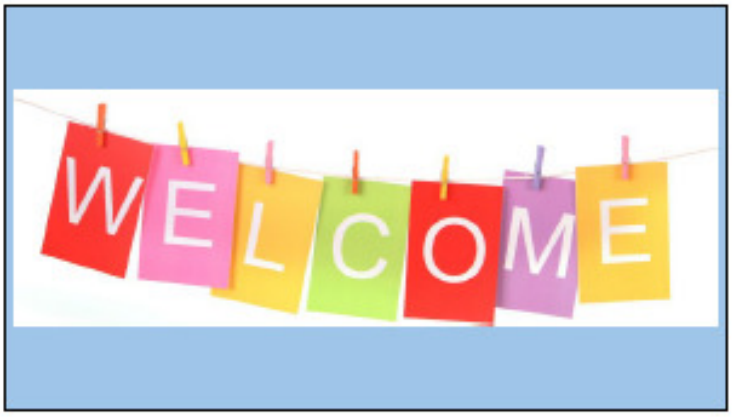
Slide 1



Slide 2



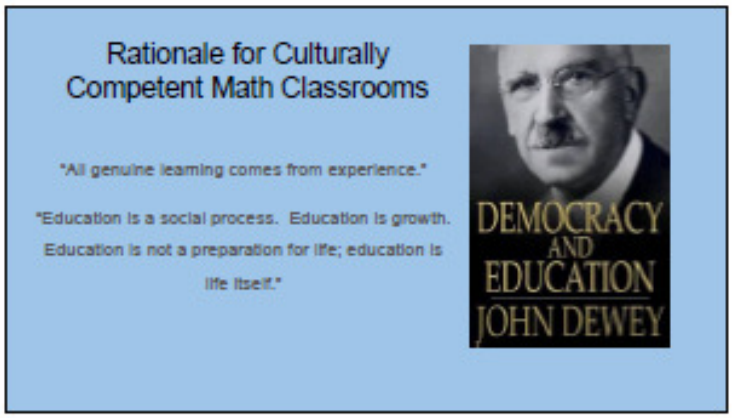
Slide 3



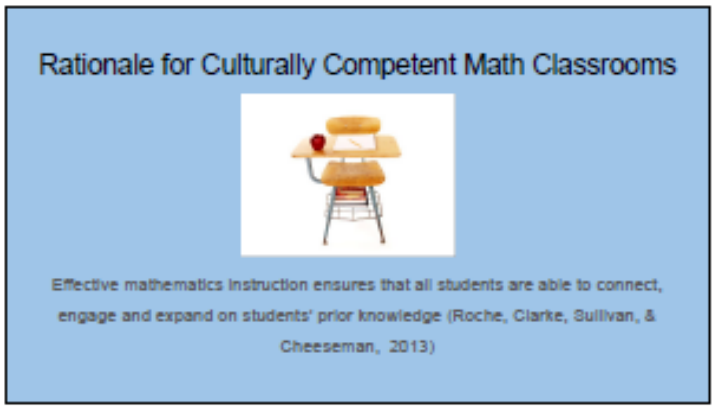
Slide 4

Slide 5

Slide 6



Slide 7



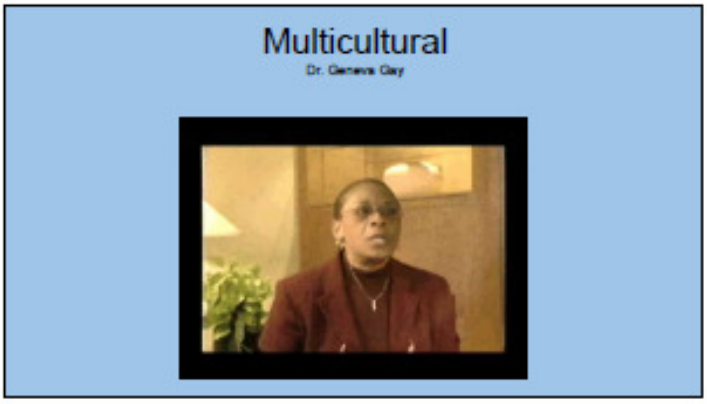
Slide 8

Slide 9

Slide 10

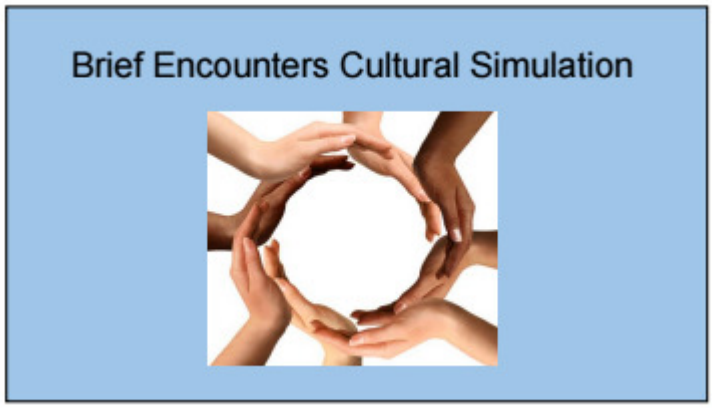
Slide 11

Slide 12

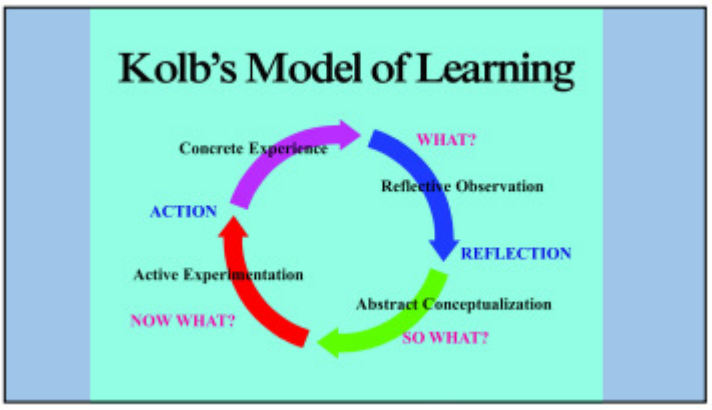


Slide 13

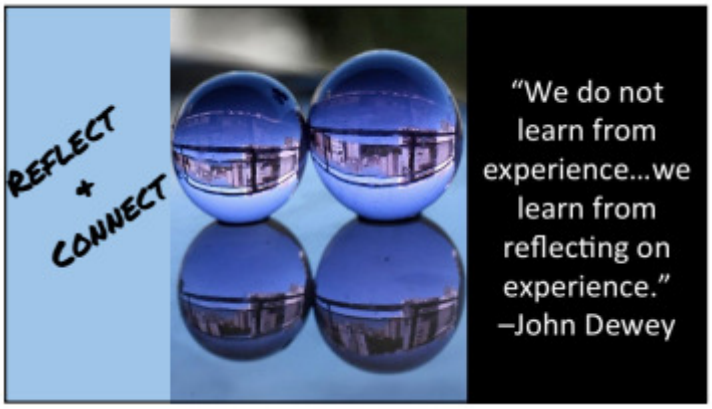
Slide 14



Slide 15



Slide 16

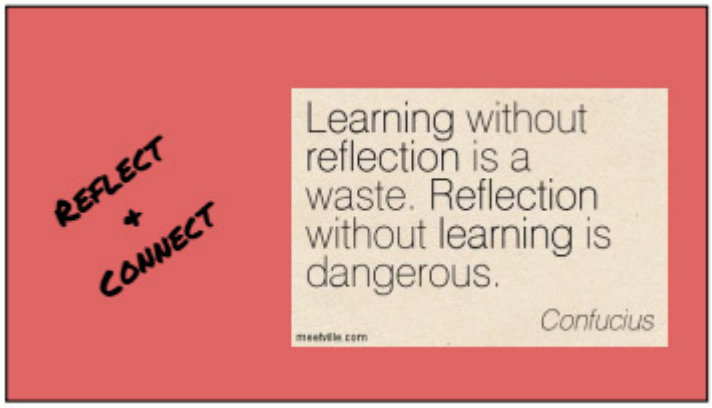


Slide 17

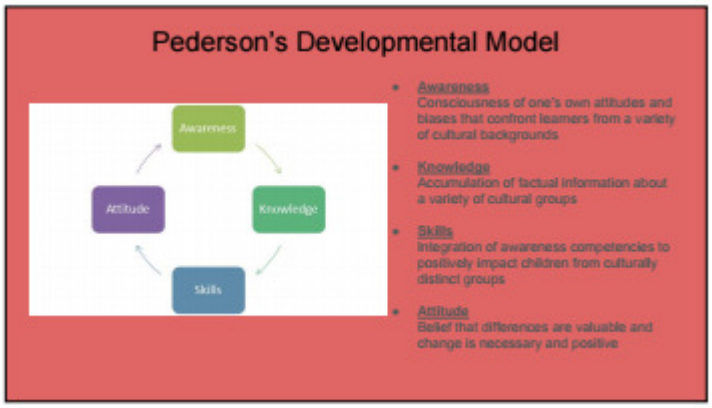
Slide 18

Slide 19

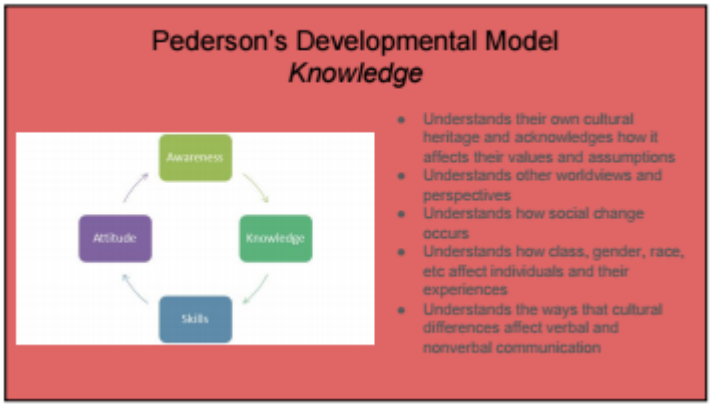
Slide 20



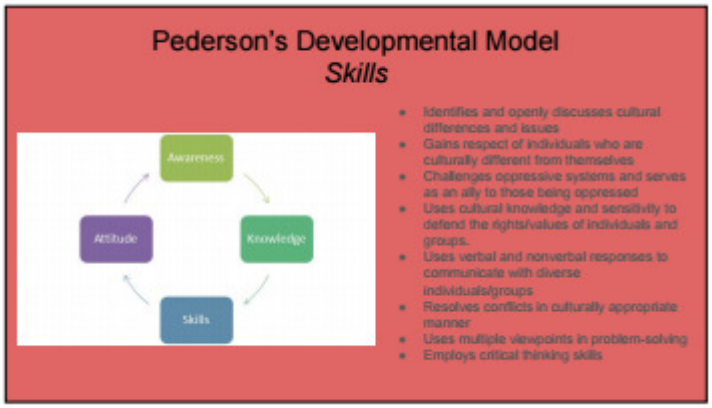
Slide 21



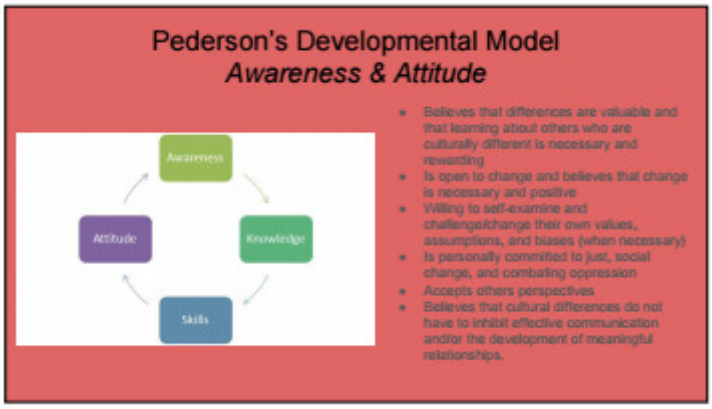
Slide 22



Slide 23



Slide 24



Slide 25

Poverty Simulation

Slide 26

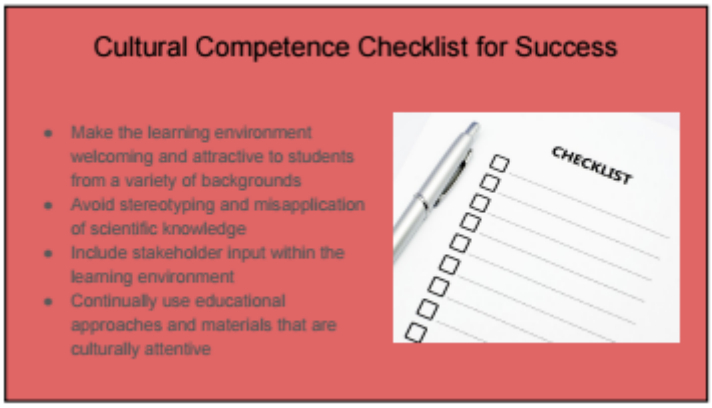
Culturally Responsive Classroom Practices

Slide 27

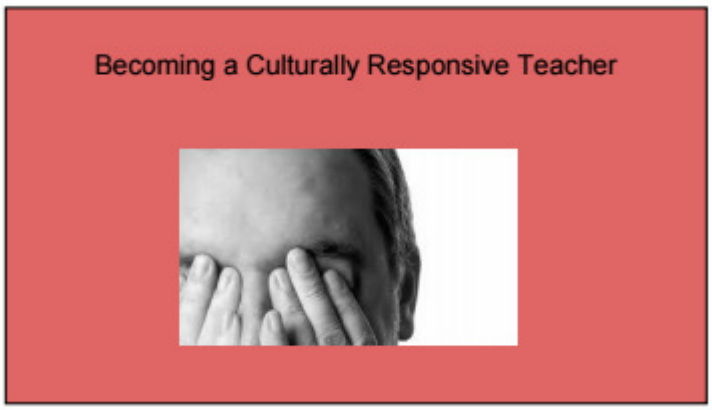
Five Competencies for Culturally Competent Teaching and Learning

- Facilitates Critical Reflection
- Demands Respect for Others
- Accommodating Individual Learners
- Requires the Use of Intercultural Communication Skills
- Focused Activities and Intentionally Structured Environments

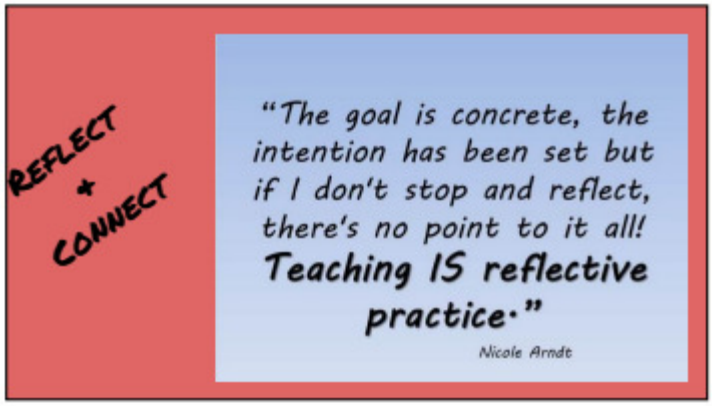
Slide 28



Slide 29



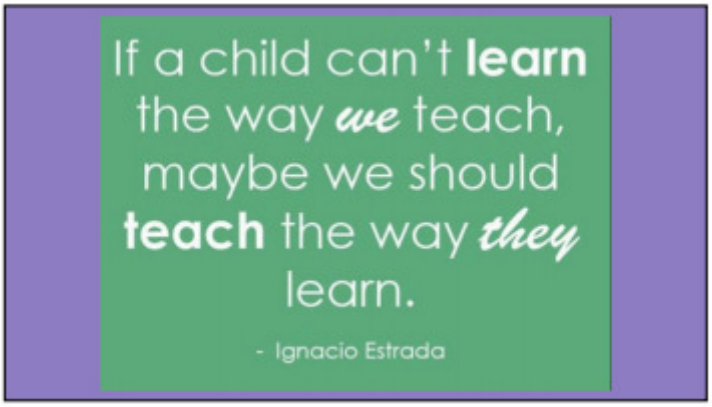
Slide 30



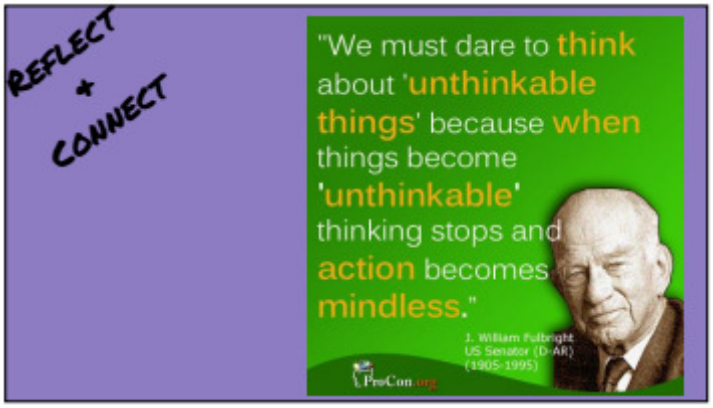
Slide 31

Slide 32

Slide 33

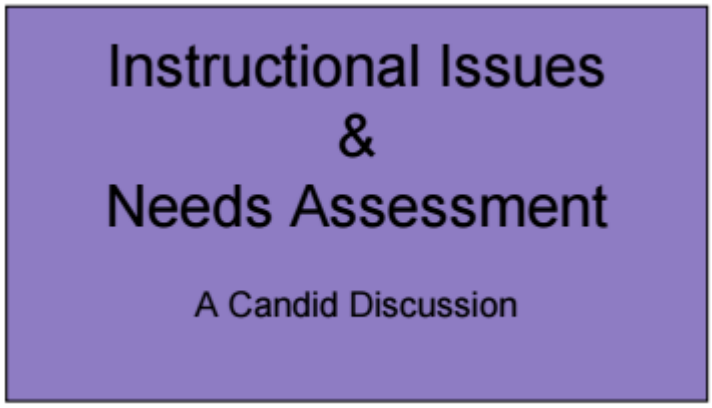


Slide 34

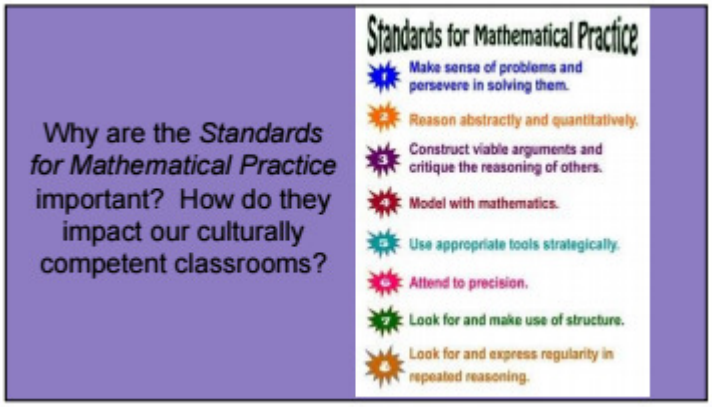


Slide 35

Slide 36



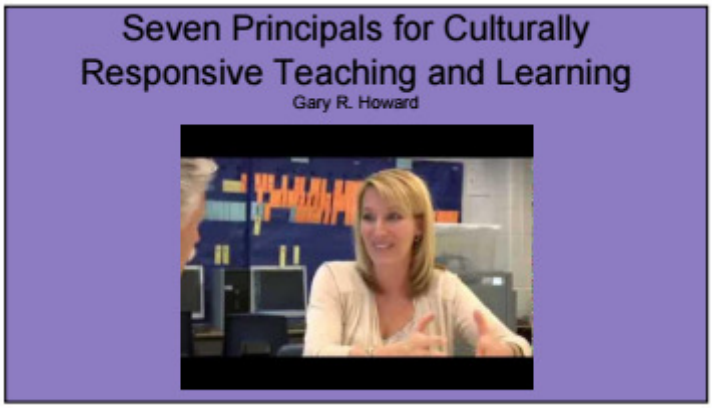
Slide 37



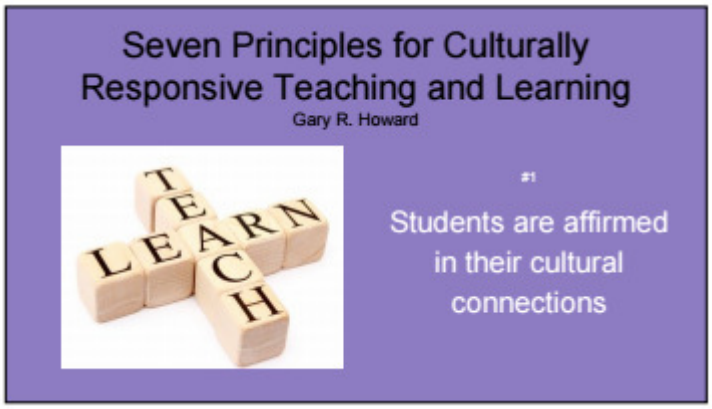
Slide 38

Slide 39

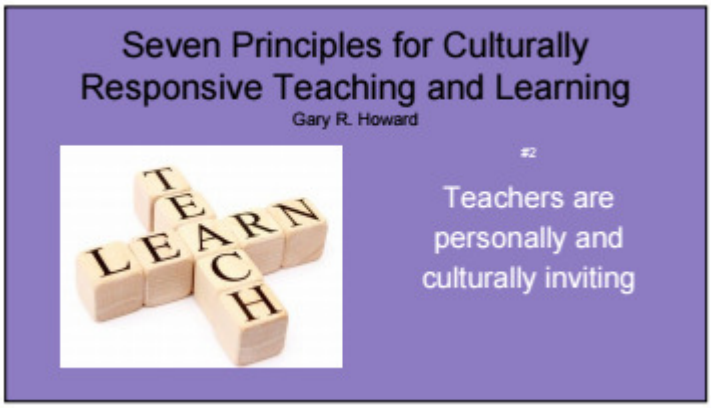
Slide 40



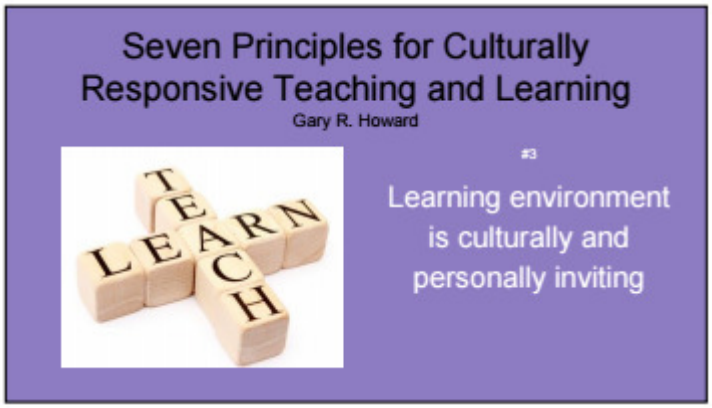
Slide 41



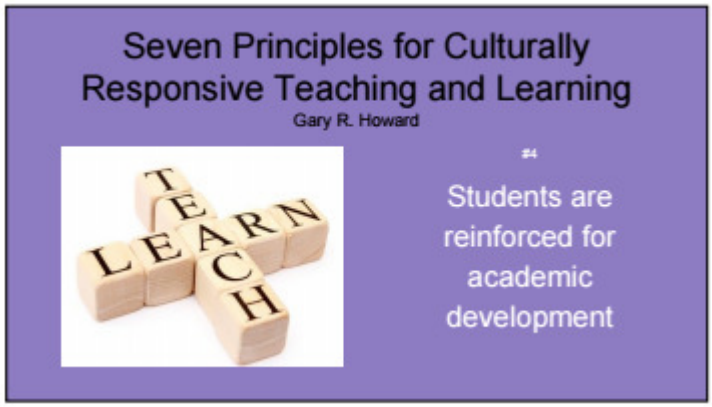
Slide 42



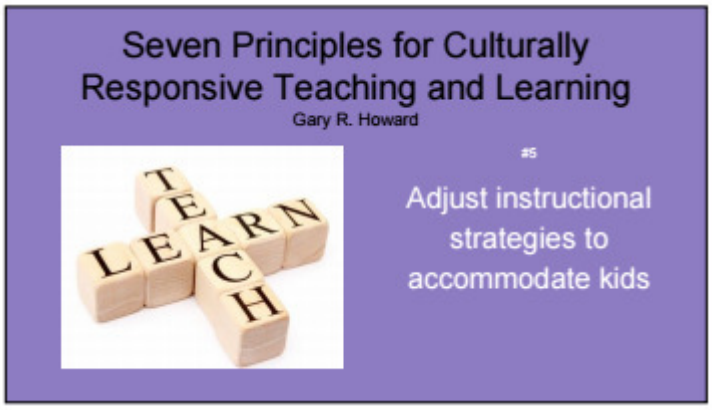
Slide 43



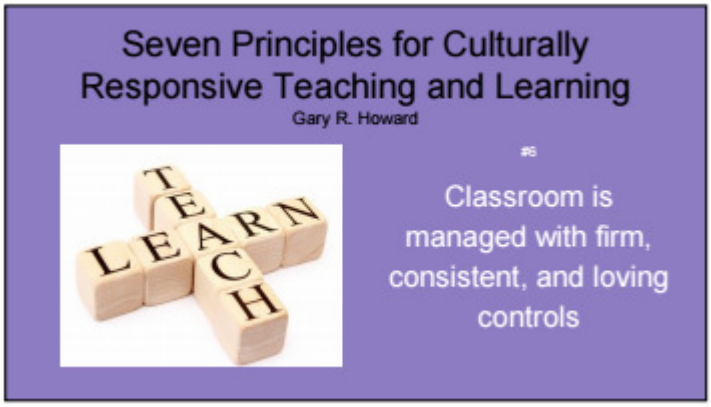
Slide 44



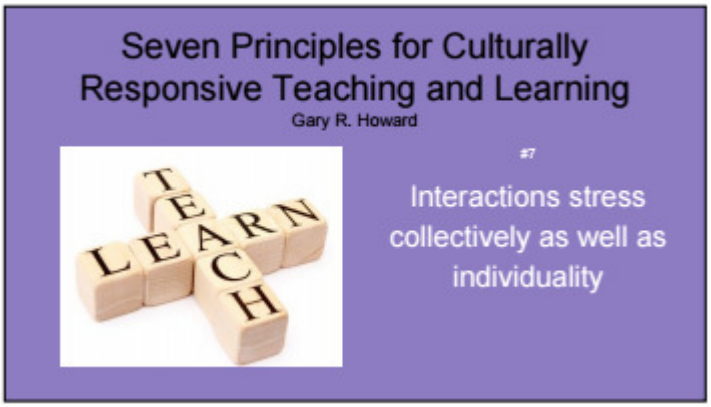
Slide 45



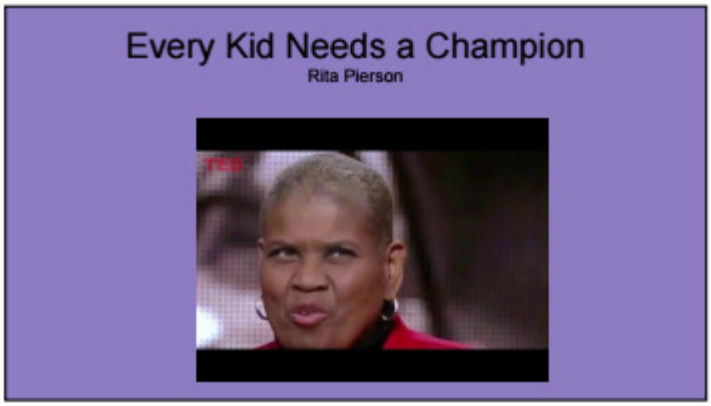
Slide 46



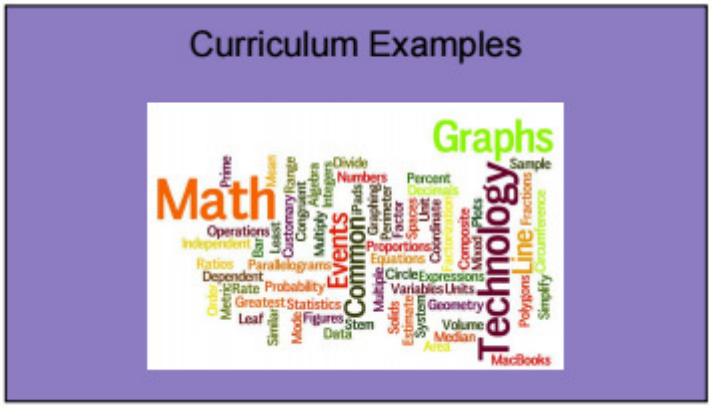
Slide 47



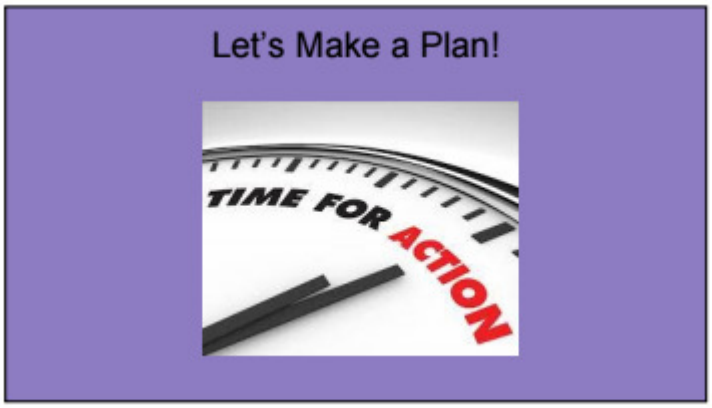
Slide 48



Slide 49



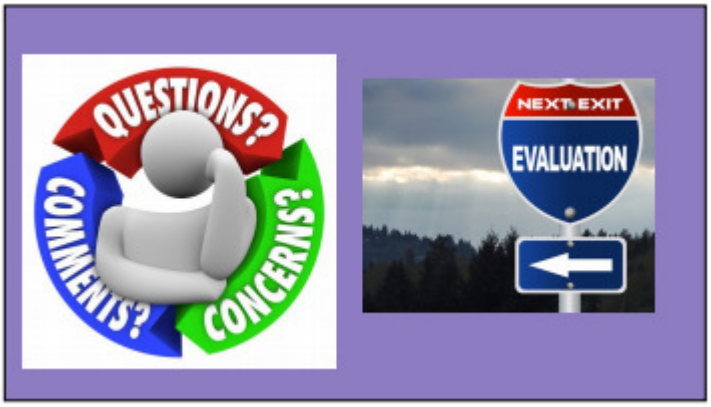
Slide 50



Slide 51

Slide 52

Slide 53



Slide 54

References

Burns, R., Keyes, M., & Kusimo, P. (2005). Closing achievement gaps by creating culturally responsive schools. *Appalachia Educational Laboratory at Edvantia (NJ1)*.

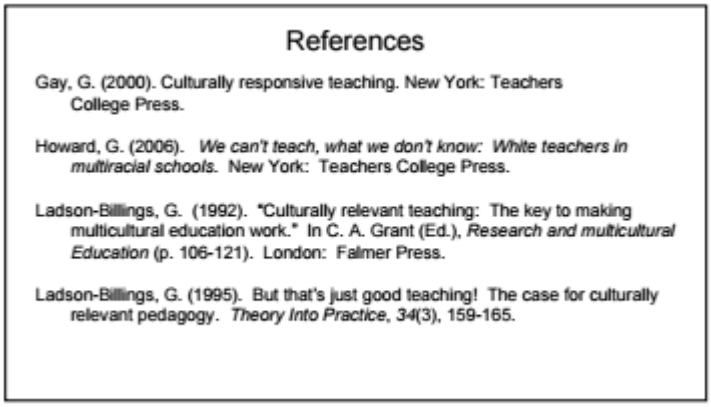
Coffey, H. (2008). Culturally relevant teaching. Retrieved June May 5, 2016, from http://www.learnnc.org/lp/pages/4474

Dewey, J. (1903). *Democracy in education*. Chicago, IL: The University of Chicago Press.

Dewey, J. (1910). *How we think*. Boston, MA: D. C. Heath and Company Publishers.

Dewey, J. (1938). Experience and education. *The Educational Forum*, *50*(3), 241-252.

Slide 55



References

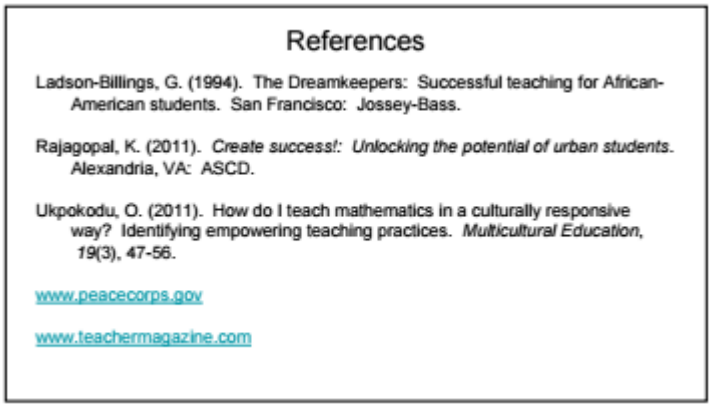
Gay, G. (2000). Culturally responsive teaching. New York: Teachers College Press.

Howard, G. (2006). *We can't teach, what we don't know: White teachers in multiracial schools.* New York: Teachers College Press.

Ladson-Billings, G. (1992). "Culturally relevant teaching: The key to making multicultural education work." In C. A. Grant (Ed.), *Research and multicultural Education* (p. 106-121). London: Falmer Press.

Ladson-Billings, G. (1995). But that's just good teaching! The case for culturally relevant pedagogy. *Theory Into Practice, 34*(3), 159-165.

Slide 56



References

Ladson-Billings, G. (1994). The Dreamkeepers: Successful teaching for African-American students. San Francisco: Jossey-Bass.

Rajagopal, K. (2011). *Create success!: Unlocking the potential of urban students.* Alexandria, VA: ASCD.

Ukpokodu, O. (2011). How do I teach mathematics in a culturally responsive way? Identifying empowering teaching practices. *Multicultural Education, 19*(3), 47-56.

www.peacecorps.gov

www.teachermagazine.com

Creating Culturally Competent Mathematics Classrooms

K – W – L

K	What I **KNOW**	**W**	What I **WANT** to Know	**L**	What I **LEARNED**	**Next Steps**

Creating Culturally Competent Mathematics Classrooms
Action Plan

Goal: Create a culturally competent learning environment where all students can learn through genuine engagement and critical reflection

Target Students	How will the goal accomplished (activities/strategies)?	Person(s) Responsible	Resources	Timeline for Implementation	Evidence of Completion

Creating Culturally Competent Mathematics Classrooms
Lesson Plan Template

Teacher: _____
Subject Area/Period/Grade Level: _____
GSE Standard(s): _____
Lesson Title: _____
Lesson Timeframe: _____

Bellringer Activity:

Lesson Opening:

Student Work Session Activities:

Lesson Closing:

Assessment (Formative/Summative) Activity/Evidence of Learning:

Acceleration/Remediation Activities:

Resources/Materials:

Infusion of Cultural Diversity:

At Home Practice:

Post Lesson Reflection:

Creating Culturally Competent Mathematics Classrooms
Reflect & Connect Journal

	Day 1	Day 2	Day 3
Describe one culturally competent activity that took place in your classroom during the past two weeks.			
Describe aspects of the activity that went well or as planned?			
Describe aspects of the activity that did not go well or could have been executed more effectively?			
Describe your students' reaction to the activity.			
What are your next steps? What is important for you to do tomorrow or in the coming weeks?			
Reflecting on today's training, provide one word or phrase that you would use to describe the session. Why would you use this word or phrase?			
Reflecting on today' training, what did you learn that you will use to make your classroom environment more culturally competent? Describe how you will incorporate this into classroom routine.			

Appendix B: Face-to-Face Interview Question Guide

Culturally Relevant Mathematics

Time:

Date:

Location:

1. In your own words, define the word culture.
2. How familiar are you with your students' home culture? Describe, if applicable, how external cultural forces affect classroom learning.
3. How do you identify the various cultures within your classroom?
4. Describe your daily interaction with students from various cultures.
5. Describe your perception of the dominant culture in your math classroom.
6. Describe how you address the culturally-based needs of students in your classroom. How do you help students in your classroom deal with various cultures within your classroom?
7. Describe how you think culture influences learning? Give examples.
8. Describe how the presence of various cultural groups impacts the learning of mathematics within your classroom. Describe the academic experience of minority students within your math classroom.
9. Describe how you incorporate and acknowledge the role of culture within your teaching.
10. What are your perceptions on how the Georgia Performance Standards and the Common Core Curriculum address culture within the math classroom? How in tune are the curricula culturally with minority students and how they learning? Provide examples.
11. How do you use the currently employed math curriculum to increase academic success among minority students? Give examples, such as strategies and techniques.

Appendix C: Demographic and Professional Information

1. Please indicate your gender.
    - Male
    - Female
2. How would you classify your ethnicity?
    - American Indian/Alaska Native
    - Asian/Asian American/Pacific Islander
    - Black/African-American
    - Hispanic/Latino/Latin American
    - Mexican/Mexican-American
    - Multi-Racial
    - Puerto Rican
    - White
    - Other
3. How many years have you been an educator?
    - 1 – 5 years
    - 6 – 10 years
    - 11 – 15 years
    - 16 – 20 years
    - Over 20 years
4. How would you classify the school environment(s) in which you have worked? Indicate all that apply.
    - Private
    - Public
    - Rural
    - Suburban
    - Urban

5. Thinking back over your teaching career, how would you describe the majority of your classroom setting(s)?
    - Diverse
    - Not diverse
    - Somewhat diverse
6. How many years have your taught secondary mathematics courses?
    - 1 – 5 years
    - 6 – 10 years
    - 11 – 15 years
    - 16 – 20 years
    - Over 20 years
7. How many years have you taught secondary mathematics courses using the performance-based learning model?
    - I have never taught a secondary mathematics course using the performance-based learning model.
    - 1 – 5 years
    - 6 – 10 years
    - 11 – 15 years
    - 16 – 20 years
    - Over 20 years

Appendix D: Research Invitation Letter

Dear Educator,

You are invited to participate in a research study conducted through Walden University. Walden University's approval number for this study is 01-12-16-0153261 and it expires on January 11, 2017. The primary researcher in this study is Monique Robinson, a doctoral study at Walden University. You are being invited to participate in the study because you are a secondary, public school mathematics teacher who has experience working with performance-based mathematics curricula and learning tasks, namely the Georgia Performance Standards and/or the Common Core Georgia Performance Standards.

The purpose of this project study was to examine teachers' perceptions of using culturally relevant teaching strategies to influence the academic performance of minority students in the mathematics classroom. The results of the study will be used to assist teachers in understanding the role of cultural and its influence on the academic success of minority students in the secondary math classroom.

Approximately ten participants will be enrolled in this study. Participants should expect to dedicate about two hours to the data collection process which will be completed through face-to-face interviews. Participation in the study is completely voluntary and may be terminated at any time without consequence. Interview responses will be kept completely confidential.

If you do not wish to participate, merely disregard this invitation. You may keep a copy of this invitation for your records.

Appendix E**:** Pilot Research Invitation Letter

Dear Educator,

You are invited to participate in a pilot research study conducted through Walden University. Walden University's approval number for this study is 01-12-16-0153261 and it expires on January 11, 2017. The primary researcher in this study is Monique Robinson, a doctoral study at Walden University. You are being invited to participated in the pilot study because you are a secondary, public school mathematics teacher who has experience working with performance-based mathematics curricula and learning tasks, namely the Georgia Performance Standards and/or the Common Core Georgia Performance Standards.

The purpose of this project study was to examine teachers' perceptions of using culturally relevant teaching strategies to influence the academic performance of minority students in the mathematics classroom. The purpose of the pilot study is to determine if the interview questions that will be used during the data collection process of the formal study will elicit responses that will allow the researcher to address the research questions. The results of the pilot study will be used to determine if the interview questions need to be revised prior to the conducting the formal research study. Results of the study will be used to assist teachers in understanding the role of cultural and its influence on the academic success of minority students in the secondary math classroom.

Pilot participants should expect to dedicate about two hours to the pilot study data collection process, which will be completed through face-to-face interviews. Participation in the pilot study is completely voluntary and may be terminated at any time without consequence. Interview responses will be kept completely confidential.

If you do not wish to participate, merely disregard this invitation. You may keep a copy of this invitation for your records.

Appendix F: Sample Interview Transcript

Interview question	Responses from Participant DM0811
In your own words, define the word culture.	I would define culture as the ways, beliefs, traditions, and practices that surround, influence, and define a person as they grow up.
How familiar are you with your students' home culture? Describe, if applicable, how external cultural forces affect classroom learning.	My focus as a teacher is to get to know my students. I feel like the better I know them, the more impact I am able to have on their education. I am typically able to familiarize myself with my students' home culture. Home cultural forces can have a huge effect on classroom learning. If a student comes from a home where education is a priority, then typically these students work hard to do well and are often afraid to disappoint their parent(s). If the parent(s) is not involved with school, often times these students are less likely to get needed support from home and even lessen their efforts in the classroom.
How do you identify the various cultures within your classroom?	By getting to know the child and communicating with home.
Describe your daily interaction with students from various cultures.	As far as the curriculum, I differentiate according to learning needs. I build a classroom culture of acceptance and family. I often share about myself. I tell stories about my life and family, which opens up a dialogue where students also share or ask questions.
Describe your perception of the dominant culture in your math classroom.	The dominant culture in my math class is a culture of expectation/entitlement. Students have the impression that things should be given to them or made easier for them. A personal drive of achievement and self-improvement is scarce.
Describe how you address the culturally-based needs of students in your classroom. How do you help	I try to develop an atmosphere of understanding. I think it is important for students to know that everyone isn't like they are nor do they do things the same. Different households are raised with different beliefs. It is alright to disagree, but it doesn't have to lead to conflict. They need to learn how to tolerate the differences. I try to help my students with this

students in your classroom deal with various cultures within your classroom?	using every day, teachable moments. I also address things directly with them if needed. (For example, racial slurs) I believe culturally-relevant mathematics, in conjunction with grade-level norm mathematics skills, are relevant. Students benefit from learning when they can identify with the context of the mathematics (how it is relevant to their lives) and how it's being taught.
Describe how you think culture influences learning? Give examples.	Culture has an impact on learning in different ways. Some people believe learning only happens at school and that is the best type of education to have, while some believe that true learning comes through life experience and application. They believe success isn't hinged on receiving a diploma or degree. Textbook knowledge vs. life experience I believe the infusion of culture into the mathematics classroom is extremely necessary for their success. And not just relating things to their cultures, but meeting them where they are and exposing them to other cultural ideas/ways. I believe this will help them become more successful in the math class, but also more prepared for the world that exists outside of the classroom and their community.
Describe how the presence of various cultural groups impacts the learning of mathematics within your classroom. Describe the academic plight of minority students within your math classroom.	As a teacher, various cultural groups can be a hindrance to success. If teachers don't take the time to learn about the various cultural groups represented, then they can't meet the learning needs of the students. I can't make my class relevant to you if I don't understand where you come from. It is the job of a teacher to use the benefits of each culture to create an enriching experience for every student. Often times, the curriculum is geared toward Middle America. Minority students, especially boys, don't tend to do well in straight rows, faced forward, sitting still and quietly. They tend to be more tactile and kinesthetic learners. They need the 'experience' with them math. Unfortunately, this is often ignored. The students get labeled as discipline problems when all they needed was a different outlet for learning.
Describe how you incorporate and acknowledge the	I meet them where they are. I try to make it relevant to the things they are interested in. With statistics, I may talk about some of the famous athletes (or music) and show some

role of culture within your teaching.	videos and intertwine it with my lessons. I also try to learn them as learners and provide opportunities for them to become successful that way. I have culture parties with my class. I have had students bring a dish that is a family favorite. This leads to great conversation, and I have also seen some racial tension healed through this activity between two of my male students.
What are your perceptions on how the Georgia Performance Standards and the Common Core Curriculum address culture within the math classroom? How in tune are the curricula culturally with minority students and how they learning? Provide examples.	No. And as I think about it, I'm not sure if any curriculum has that capability. That is why our roles as educators are so important. I think it addresses a variety of modalities, and in some ways, it is more culturally diverse. I still think it is tailored to the middle class, average math performing students. The majority of the students in our district do not fall into these two categories. That is when the teacher has the responsibility of knowing their students and making the necessary adjustments to the context, not the level of the math so that the students can relate.
How do you think the currently employed curriculum could be sharpened to increase academic success among minority students? Give examples.	As I said, I'm not sure if any curricula have the capability to meet all students' needed, but I think the best way to sharpen the curriculum is to increase the variety of relevant tasks included within the curriculum so that teachers have tools to use to differentiate for their student population. For example, I would include multiple versions of the same task to represent different cultural areas of the state. I believe the infusion of culture into the mathematics classroom is extremely necessary for their success. And not just relating things to their cultures, but meeting them where they are and exposing them to other cultural ideas/ways. I believe this will help them become more successful in the math class, but also more prepared for the world that exists outside of the classroom and their community.