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Closing the Opportunity Gap in Mathematics Education

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CLOSING THE OPPORTUNITY GAP IN MATHEMATICS EDUCATION

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ABSTRACT

Shifting our attention from the achievement gap (standardized test results) to the opportunity gap (unequal opportunities and experiences among students of differing socioeconomic and racial backgrounds) is necessary to shrink gaps in the American educational system. Although previous studies have focused on the achievement gap in terms of students' success on standardized tests, there has been limited research on the missed opportunities experienced by Black, Indigenous, and people of color (BIPOC) in high school mathematics classrooms. This qualitative study revealed the lived experiences of BIPOC students as participating in college and career mathematics readiness activities in a single high school in a southern state during the 2021-2022 school year. The researcher conducted 12 individual interviews in a reserved area in Hope High School. The participants were freshmen and sophomores whose ages ranged between 13- 16 years old. A seven-question instrument was used as guiding questions and each session was recorded via Zoom for transcription purposes. The researcher generated and analyzed data from student interviews as well as a reflection journal. Results of the study presented factors identified by BIPOC students as encouraging or hindering their participation in college and career mathematics readiness activities. Further, the study showed students' relationships with their teachers, relationships with the content, and relationships with their peers significantly influenced their participation and success in college and career mathematics readiness activities.

DEDICATION

To the love of my life, Jeremy,
For showing me what it means to be loved.

To my beloved family and friends,
For believing in me.

To my nieces, nephews, and god-children,
For being the reasons why I work so diligently.

To my students,
For confirming, to me, representation in classrooms across the country matters.

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CHAPTER I

INTRODUCTION

> *We know that students learn more mathematics when given the opportunity to study more mathematics and not be tracked out of high-quality mathematics content… We know that students can achieve much more when much more is expected of them*.
> (Stiff, 2001, para. 4)

Every student deserves an opportunity for an equal and just education so they can become productive citizens who make comparable wages, are socio-politically conscious, and contribute to making the world a better place. Bob Moses, the civil rights leader and mathematics education activist, even equated learning algebra to having the ability to vote; positioning them both as providing access to all that society has to offer (Moses & Cobb, 2001). One of our goals as a society is to live abundant and full lives; furthermore, obtaining a high-quality mathematics education helps people access and live a more substantive life.

Evidence from the U.S. Bureau of Labor Statistics (2020) shows that, on average, students who complete high-quality programs in high school earn increased wages, live in safe neighborhoods, and have better job opportunities. All these factors contribute to a quality of life that allows for active citizenship and meaningful participation in society. However, there is compelling evidence that suggests "children who are identified as Black, Latinx, Indigenous… do not have the same opportunities as their peers to access and learn mathematics in powerful spaces" (National Council of Teachers of Mathematics [NCTM], 2020, p.1). These inequities

in opportunities can contribute to inequitable access to economic and academic opportunities.

In the United States, much evidence shows there are challenges in education when it comes to equity, access, and opportunity among differing student groups. Countless issues impact student achievement and success in Mississippi's schools. Many of the circumstances students face are far beyond their locus of control. Pupils cannot control the environments they are born into, the neighborhoods their parents choose, the socioeconomic statuses they inherit or the missed opportunities their environments may have created. The experience of missing out on opportunities because of uncontrollable elements is a reality for numerous students. Thus, in this case, the *opportunity gap* will be generally defined as unequal opportunities and learning experiences that cause disparity among students of differing socioeconomic and racial backgrounds. Research by Welner and Carter (2013) supports, "The opportunity gap…shifts our attention from outcomes to inputs—to the deficiencies in the foundational components of societies, schools, and communities that produce a significant difference in educational—and ultimately socioeconomic—outcomes" (p. 3). Thus, the question becomes, how do we minimize, even eliminate, the opportunity gaps?

While many opportunity gaps exist based on factors outside of students' control, such as socioeconomic status and the school districts students attend, some opportunity gaps are linked to determinants that students can make choices about, such as courses they enroll in based on the course offerings at their high school. Mathematics readiness experiences may involve enrollment in or completion of advanced placement (AP) mathematics, dual enrollment, and dual credit programs, and/or career and technical education (CTE) courses.

Black, Indigenous, and people of color (BIPOC) are severely underrepresented in college and career readiness mathematics courses/programs. For example, BIPOC students make up

approximately 56% of high school students in Mississippi, but for the 2018-2019 school term, statistics showed 38.6% of them participated in mathematics readiness course offerings (MS Department of Education [MDE], 2021).

Given the well-documented impact these courses can have on a student's future, it is imperative that we identify and work to remove whatever obstacles may stand in the way of equitable participation in college and career readiness mathematics experiences that can foster academic and economic opportunities available.

Background of Study

All students can learn and should be given equal access to all aspects of learning. In 2016, Hope High School (a pseudonym) was rated number one in its state for outstanding academic performance. However, the same school simultaneously held the state's largest achievement gap among its students. How could both of these facts be true for the same group of students at the same time? To make the greatest impact on this issue, our focus needs to be on the cause– lived experiences of students and their participation in college and career mathematics readiness courses.

This focus shifts our attention from outcomes (assessment results) to inputs (college and career mathematics readiness experiences). The opportunity gap causes us to look at unequal opportunities and experiences among students of differing socioeconomic and racial backgrounds which in turn points to the cause and not the symptom. My research topic will be "What are the lived experiences of students identified as BIPOC participating in college and career mathematics readiness activities?"

This study will be situated at Hope high school in a district that is unique in that it is located in a small town, that is the home to a large public university, with abundant resources

and provides its students with a plethora of college and career mathematics readiness activities. At this high school, all students have the freedom to choose which courses they wish to enroll in.

Personal Background

As a first-generation college graduate who has taken advanced mathematics courses in both high school and college in the state of Mississippi, I bring to the research my experiences as both an educator and a student. Furthermore, I have immediate family members, such as young nieces, nephews, and godchildren, who are all currently students in public schools. Without a doubt, equity, access, identity, and power will influence their mathematics education and the courses in which they enroll in their future high schools, their job and/or career pathways, and ultimately their level of self-proclaimed success. I'm borrowing Gutiérrez's (2012) definition of equity that includes the four dimensions of "access, achievement, identity, and power," (p.19). I wish for the young scholars in my family to flourish without ignoring any of those dimensions.

Due to my experiences as a female student and mathematics educator who identifies as a person of color, I believe this research is invaluable to the field. The proposed study is designed to amplify the voices of other students who identify as BIPOC in their attempts at developing their relationship with mathematics and all the opportunities that follow.

Professional Background

I have a vested interest in improving the quality of education through access and equity in mathematics for *all* students, which is my reason for pursuing a Ph.D. in elementary education. In addition, I plan to positively influence student enrollment in advanced placement courses, dual enrollment courses, dual credit programs, as well as career and technical education courses in high school settings in Mississippi and beyond.

Statement of the Problem

According to the National Council of Teachers of Mathematics (NCTM, 2018), high school mathematics has three empowering purposes, which include: 1) expand professional opportunities, 2) understand and critique the world; and 3) experience wonder, joy, and beauty. However, in mathematics education, fewer BIPOC students are enrolled in college and career mathematics readiness activities than their peers. Data reflected in a 2018-2019 survey by the *U.S. News and World Report*, ranked Mississippi schools based on factors including participation in advanced placement courses. The data showed low participation of BIPOC students in these mathematics courses; thus, we can conclude, fewer BIPOC students experienced the three most empowering aspects of high school mathematics. If the purposes of high school mathematics are fulfilled by participation in these mathematics readiness activities, then we need to identify the lived experiences as identified by BIPOC students' participation.

Further, this qualitative research study will explore the lived mathematics-learning experiences identified by Hope High School freshmen and sophomores who identify themselves as Black, Indigenous, and people of color (BIPOC) and how those experiences encourage or inhibit their participation in college and career mathematics readiness activities. Several issues impact student achievement and success in Mississippi's schools. For Example, in 2016, Hope School District ranked number one in the state for academic excellence according to their accountability results from the state department. Simultaneously the district ranked number one in the state with the achievement gap. Due to this problematic issue, Hope School District looked for strategies to combat the achievement gap; however, after much exploration, a significant concern revealed the opportunity gap among students.

The *achievement gap* is defined as the deficiency in academic performance on standardized tests among various student groups (Welner & Carter, 2013). While both expose inequities within the educational setting, the *opportunity gap* is somewhat different from the achievement gap in that it is the root cause of academic disparities between students of color and their White, differently-advantaged peers (Welner & Carter, 2013). Educators' focus must shift from academic outcomes (assessment results) to missed opportunities that manifest as lower performance scores in a formal educational setting.

It has become clear that both students and educators should give mathematics education high priority in one's educational experiences. Educators can do so by making sure their students are aware of and prepared for college and career mathematics readiness opportunities. Concurrently, students should take more challenging mathematics courses if available at their high schools. "More than any other subject, mathematics affects students' college and career opportunities" (Yeh et al., 2017, p. vii). Therefore, it is important that all students are given equitable access to every mathematics course offered in their K-12 setting. With this in mind, the focus needs to shift toward addressing the missed opportunities that lead to mathematics education gaps.

Purpose of the Study

The purpose of this qualitative research study is to reveal the lived experiences of students identified as BIPOC participating in college and career mathematics readiness activities in Hope High School. "We aim to change mathematics from a barrier to a pathway toward greater opportunity for all students" (Launch Years A New Vision Report, 2018, p.1). This goal will be achieved through storytelling since "stories provide the necessary context for understanding, feeling, and interpreting" (Ladson-Billings, 1998, p.13).

Positionality

In this section, I will discuss my positionality and reflexivity as it relates to critical research concerning the opportunity gap in mathematics education. Merriam and Tisdell (2016) note, critical research "covers a number of orientations to research all of which seek to not just understand what is going on, but also to critique the way things are in the hopes of bringing about a more just society (p. 60). Considering my own experiences, values, and perspectives helped me develop a positionality statement based on Merriam and Tisdell's framework. The authors emphasize three issues related to "the relationship the researcher has with participants: insider/outsider issues; positionality issues; and, as a result of both these intersecting factors, the importance of research reflexivity (p. 63). I will address each of these issues below.

Insider/Outsider Issues

I acknowledge that I am working from an insider perspective as I have been in education for 17 years and employed within the Hope School District for 17 years. Currently, I am an elementary instructional mathematics coach and previously taught mathematics in third, fifth, and sixth grades. I anticipate the administrators will be open to the data results of this study and readily available to discuss any recommendations and/or information gathered that will positively impact the mathematics learning environment for the students in this high school.

Positionality Issues

I recognize the importance of this study as an African American female educator who is passionate about closing the opportunity gap among students in this state and my community. Ladson-Billings (1995) suggested that academic success involves students attaining proficiency in their academic abilities, which leads me to believe this issue of missed opportunities is fixable if we train ourselves to inform students of their mathematics opportunities within the educational

system. Inevitably, identifying how the lived experiences of BIPOC students encourage and/or inhibit their participation in college and career mathematics readiness activities will address the opportunity gap among students.

Importance of Reflexivity

Probst and Berenson (2014) indicate that "Reflexivity is...awareness of the influence the researcher has on what is being studied and, simultaneously, of how the research process affects the researcher." (p. 814). I acknowledge that as the insider - researcher, I am acquainted with the students, teachers, and administrators in the school district. Therefore, I believe students will be forthcoming in their lived experiences and willing to respond to the interview questions without hesitation. As an educator and researcher of this study, I may potentially interview high school students I taught in elementary school.

As someone who is familiar with the students, teachers, and administrators there may be a desire to please. In other words, they may feel compelled to give the answers that I am seeking. Thus, I need to ensure that my questions are not leading but seek to reveal, and not lead, to the lived experiences of the participants.

Research Question

The research question that guides this study is:

1. What are the lived experiences of students identified as BIPOC participating in college and career mathematics readiness activities?

Limitations and Delimitations

There are several limitations to this study. The study will take place over a two-month time period and is designed to identify the lived experiences of BIPOC freshmen and sophomore students as encouraging or inhibiting their participation in mathematics readiness activities. This

duration may restrict the claims when compared to students in a longitudinal study, who may be more reflective of their experiences.

Since the study will be conducted in the midst of a pandemic, I recognize the main limitation will be the student interview process. If students have to quarantine, the interviews will be conducted via Zoom instead of face-to-face interactions, which may limit the nonverbal communication. Other limitations include the sample population and number of school districts within the study. Nonetheless, if the study is replicated in the future, the researcher should consider increasing the number of participants to include middle school students, if applicable, in addition to including other sample groups to interview such as the participants' parents, teachers, and/or counselors. Or simply replicate the study in similar school settings.

Using the outcomes of this study, educators will have the opportunity to compare and adjust their mathematical teaching practices and ideologies as it relates to engaging this population of students in mathematics readiness activities. "Doors of opportunity are either opened or closed based upon decisions about courses that will be taken or not taken" (Stiff & Harvey, 1988). To that end, the exploration will not result in a list of dos and don'ts; rather it will bring awareness to the lived experiences of BIPOC students and how their identity impacts engagement in mathematics readiness activities. Thus, this study is designed to fill important gaps in the literature.

Significance of the Study

Over the past decade, the enrollment opportunities for college and career mathematics readiness courses in Mississippi have grown. At present, there are 35 courses statewide in which students can choose to enroll. In 2018, the College Board reported that 22.3% of Mississippi students took at least one AP exam. Currently, over 500 high schools in Mississippi have

students who are enrolled in college and career readiness mathematics courses/programs; however, not all students are taking advantage of the opportunity.

Table 1

State - Advanced Course Participation Information 2018-2019 School Term

Group	State	State Count
All	48.2%	30,751
Female	52.8%	16,961
Male	43.6%	13, 790
Black or African American	38.6%	12,009
White	58.3%	16, 809
Alaskan Native or Native	38.8%	58
American Asian	81.5%	708
Hispanic or Latino	42.7%	875
Native Hawaiian or Pacific Islander	63.8%	20
Two or More Races	40.5%	271

AP courses are designed for high school students to study specific content areas in depth at the collegiate level and possibly receive college credit. According to the Mississippi Department of Education, CTE course offerings "help students develop marketable job skills and earn national industry certifications needed to achieve their occupational goals" (Career and Technical Education, para. 2). Dual enrollment and dual credit programs account for students who are enrolled in a postsecondary course offered by a state institution of higher learning or

community/junior college, and upon successful completion, qualify for academic credit in both a postsecondary institution and public high school. Thus, these enrollment opportunities offered at high schools can significantly impact students' chances of obtaining a successful career and, ultimately, liberty and the pursuit of happiness in the global society.

Mississippi Department of Education accountability data from the 2018-2019 school term showed fewer BIPOC students participated in advanced mathematics courses at Hope High School than their peers.

Table 2

Hope High School - Advanced Course Participation Information 2018-2019 School Term

Group	**State**
All	71.4%
Female	72.5%
Male	70.3%
Black or African American	43.0%
White	84.3%
Non-English Learners	72.3%

Since missed opportunities and racial identity, to be sure, are not within students' control, the focus, in turn, should be on closing the opportunity gap in mathematics education, not on standardized assessment results; thus, there is a significant need for this study.

Summary

As stated earlier, the National Council of Teachers of Mathematics (NCTM, 2018), high school mathematics has three empowering purposes, which include: 1) expand professional opportunities, 2) understand and critique the world; and 3) experience wonder, joy, and beauty. It is important that all students are given the opportunity to succeed in mathematics courses regardless of their racial background, socioeconomic status, or zip code. “A nationwide movement to shift mindsets, structures, and policies around mathematics education can significantly improve outcomes for all students…” (Launch Years, n.d. p1). Research shows students who participate in mathematics readiness activities have an increased chance of obtaining jobs and careers that lead to comparable wages, sociopolitical consciousness, and making the world a better place. “Mathematical understanding can empower us to understand, critique, and play an active role in the world in which we live” (Launch Years, 2018, p.24). Thus, this study will fill an important gap in the literature by highlighting students' experiences. Ultimately, I want this study to reveal factors for BIPOC students’ participation in mathematics readiness and lead students to an abundant and full life.

CHAPTER II

REVIEW OF LITERATURE

I believe that education is the civil rights issue of our generation. And if you care about promoting opportunity and reducing inequality, the classroom is the place to start.
(Duncan, 2001, para. 10)

The purpose of this review of literature is to inform the audience about research that addresses the historical and current research findings on mathematics educational experiences for students who identify as Black, Indigenous, and people of color (BIPOC). In this section, the researcher presents literature related to closing the opportunity gap in mathematics education, which includes but is not limited to identifying the lived experiences of students identified as BIPOC participating in college and career mathematics readiness activities. The literature will identify themes in mathematics education in high schools. There are several sub-themes pointed out that include how students perform academically, in general, how BIPOC students perform overall, and how racialized school settings can be.

This chapter discusses relevant theories to begin from a historical perspective to support closing the opportunity gap in mathematics education. Researchers have studied the construct of the achievement gap and factors that contribute to this ever-growing issue within the framework of student achievement and school reform. This study will seek to build upon the body of knowledge, with a focus on the opportunity gap and students' experiences. The researcher compares the achievement and opportunity gaps for similarities and differences from the perspectives of students and educators. The critical elements of equity, identity, and power from the students' perspectives have become a more recent focus for educational researchers with

regard to their impact on the opportunity gap (Gutierrez, 2012). In the context of creating more equitable opportunities for students who identify as BIPOC participating in college and career readiness mathematics activities, equity within schools has become more important than ever.

Chapter II is organized into 4 sections: 1) Definitions of terms, 2) Conceptual Framework, 3) Opportunity Gap, and 4) the Summary.

Definition of Terms

Achievement Gap - the discrepancy in measurable educational outcomes (i.e., standardized test scores) between various student groups based on measured outcomes such as test scores and graduation rates (Welner & Carter, 2013, p.2)

Opportunity Gap - unequal opportunities and experiences among students of differing socioeconomic and racial backgrounds (Welner & Carter, 2013, p.9)

Reality Pedagogy - a teaching approach that appreciates and gives voice to students and their experiences from everyday life by allowing appropriate elements of the experiences to be brought into the classroom (Emdin, 2016, p.27)

BIPOC- individuals who identify themselves as Black, Indigenous, and people of color (Merriam Webster, 2021, para.1)

College and career mathematics readiness activities- enrollment or completion of advanced placement (AP) mathematics, dual enrollment, and dual credit programs, and/or career and technical education (CTE) courses

Dual enrollment and dual credit programs- account for enrollment in postsecondary courses offered by a state institution of higher learning or community/junior college, and upon successful completion, qualify for academic credit in both a postsecondary institution and public high school (Mississippi Department of Education, 2021).

Career and technical education (CTE) - provides students of all ages with the academic and technical skills, knowledge, and training necessary to succeed in future careers and to become lifelong learners (Advance CTE: State Leaders Connecting Learning to Work, 2021).

Conceptual Framework

For the conceptual framework, the Pragmatism perspective is employed as several theories will be utilized. "Pragmatists believe that multiple paradigms can be used to address research problems" (Creswell & Clark, 2011, p. 26). The conceptual framework will encompass Critical Race Theory, Cultural-Historical Theory, and Culturally Relevant Pedagogy, which will be elaborated on below.

This conceptual framework will be used as "A structure for organizing and supporting ideas; a mechanism for systematically arranging abstractions; sometimes revolutionary or original, and usually rigid" (Weaver-Hart, 1988, p.11).

This section will discuss mathematics education, the lived experiences of BIPOC students in mathematics education, and finally, college and career mathematics readiness activities. The study is about the lived experiences identified by BIPOC students as encouraging or inhibiting their participation in college and career mathematics readiness activities. Therefore, the conceptual framework has the following elements: mathematics education, the lived experiences of BIPOC students in mathematics education, and college and career mathematics readiness activities. Lastly, this section will describe each of these elements and how each part will be used in the study.

Critical Race Theory

Critical Race Theory (CRT) is used to frame the review of literature below because scholars utilize it to "understand, analyze, and critique the existence and impact of race, racism

and power in institutions, systems and societies" (Delgado, R. & Stefanic, 2001). Critical Race Theory is centered around the following tenets: 1) "racism is normal" (Ladson-Billings, 1998, p.7), 2) "Whites have been the primary beneficiary of civil rights legislation" (Ladson-Billings, 1998, p.7), 3) "swift change needs to come quickly through storytelling" (Ladson-Billings, 1998), and 4) story-telling "provides a way to communicate the experience and realities of the oppressed..." (Ladson-Billings, 1998, p.14). Considering these tenets, I am using this theory to show storytelling will reveal BIPOC students' lived mathematical experiences within their school setting. Ultimately, Critical Race Theory "can be a powerful explanatory tool for sustained inequity that people of color experience" (Ladson-Billings, 1998, p.18).

Racism is Normal. African American soldiers who fought in wars that were considered victories outside of the United States thought "Racism is normal in American society" (Ladson-Billings, 1998, p.7) when their rights at home became shamefully diminished after their return. Thus, "separate but equal" laws held in place policies and procedures that widely precluded equality between people of color and their White counterparts.

The 1954 Supreme Court landmark proceedings *Brown v. Board of Education of Topeka* was a monumental lawsuit that had a major impact on education in the United States. The Supreme Court ruled "separate but equal" policies unconstitutional. However, this historic decision failed to immediately bring about significant change in the educational opportunities afforded to children of color.

In the mid-1970s, scholars and activists alike recognized that the rights of people of color had been reverted, and they joined forces to seek change. As an avenue to combat racist policies, Critical Race Theory (CRT) was initially formed by legal experts Derrick Bell and Alan

Freeman, and laws were used as a guiding principle for change (Delgado & Stefanic, 2001, p.18).

"The strategy of critical race theorists is one of unmasking and exposing racism in its various permutations" (Ladson-Billings, 1998). Critical Race Theory (CRT) as an explanatory tool (Delgado & Stefanic, 2001) sheds light on the missed opportunities students of color experienced primarily based on their skin color and the neighborhoods in which their schools existed. Critical Race Theory is used as the foundation that suggests racism is woven within society, policies, and systems of education particularly mathematics education.

Whites Have Benefited Most from Civil Rights Legislation. Historically, BIPOC students did not begin at the same starting line as their classmates, which led to gaps academically in the Prek-12 environments. In fact, the landmark *Brown v. Board of Education of Topeka* case which was "considered a great triumph of civil rights litigation- may have resulted more from the self-interest of elite Whites than from a desire to help blacks" (Delgado & Stefanic, 2001, p.21). Publicized separate but equal schools for White students were largely distinguished by newer buildings, books, and resources available for advancement in education. A blaring determination factor for one's opportunity to enroll in advanced courses in PreK-12 settings or the lack thereof was skin color. Students of color were not given the same resources as their White peers. W.E.B Du Bois pointed out, "...White schoolhouses were the best in the community, and conspicuously placed, and they cost anywhere from twice to ten times as much as per capita as the colored schools" (1935, p.701).

Because of segregation, Jim Crow Laws, and redlining, African Americans and their White peers did not live in the same neighborhoods. The transparent lines of separation were created to show where lenders would not allow people of color to buy homes and ultimately

affected the community's cultural wealth. The aforementioned practices perpetuated segregated schools; meanwhile, educational institutions who collected additional monies based on ad valorem taxes offered more advanced academic programs and progressive facilities. Critical Race Theory "takes to task school reformers who fail to recognize that property is a powerful determinant of academic advantage" (Ladson-Billings, 1998, p.21). White students whose parents paid property taxes toward schools attended better learning environments and were afforded opportunities to enroll in a plethora of advanced placement courses, which provided better curricula and resources.

On the other hand, as a result of desegregation and the closing of African American schools, Black teachers lost their jobs and thus, "the dominant logic is that a model desegregation program is one that ensures that Whites are happy (and do not leave the system altogether) (Ladson-Billings, 1998, p. 21).

This combination of prejudice practices, unjust housing policies with school funding models tied to the financial resources of the community meant that students of color who lived in disadvantaged neighborhoods still did not have a comparable education to that of their peers.

Change Needs to Come Quickly. Racism is embedded in the system. "The historical, economic, sociopolitical, and moral decisions and policies that characterize our society have created an educational debt" (Ladson-Billings, 2006, p.5). To accelerate the move toward a more just society, scholars demanded the principle of equal opportunity for all students. Despite the changes brought about by their efforts, the effects of these historical inequities in education still persist in the form of the opportunity gap.

Since then, the opportunity gap is noted as experiences or limited progress among students, which correlate to gaps in academic performance between groups characterized by race,

ethnicity, and socioeconomic status. “Thinking in terms of ‘achievement gaps’ emphasizes the symptoms; thinking about unequal opportunity highlights the causes” (Welner & Carter, 2013, p. 3). Unequal opportunities among students of differing socioeconomic and racial backgrounds have been a primary attribute by which researchers frame the disparities in achievement among students. Opportunity gaps have led to achievement gaps; therefore, students are disadvantageously positioned as early as PreK by virtue of missed opportunities. Children who grow up in poverty experience a greater disadvantage than their counterparts (Rothsetin, 2013). The experiences students have greatly impacted their perception of life and learning. Therefore, the focus must shift.

Storytelling as a Primary and Necessary Tool. Scholars believe “that they [storytelling] add necessary contextual contours to the seeming ‘objectivity’ of positivist perspectives” (Ladson-Billings, 1998, p. 11). This is an important characteristic of Critical Race Theory that is used within culturally relevant pedagogy, as it gives meaning to learning. “The use of voice or ‘naming your reality’ is a way that CRT links form and substance in scholarship…” (Ladson-Billings, 1998, p.13). Storytelling opens opportunities to see others’ perspectives that may otherwise never be seen or heard and provides “the necessary context for understanding, feeling, and interpreting” (Ladson-Billings, 1998). Bringing stories into the classroom is a way to establish bonds and connections among students and educators. Shared experiences provide the possibility for unity and familiarity between academic content and real-world accounts. Ultimately, storytelling lays out the background knowledge needed to understand an individual’s experiences.

According to Delgado and Stefancic (2017), “...storytelling and narrative analysis are clear-cut advances that the movement can claim”. Stories allow students to insert their

experiences into the educational setting and make meaning of the world around them. When students are able to add their own cultural narratives to the classroom, teaching is significantly more impactful. “Stories and lived experiences of people who have been historically silenced have value” (Delgado and Stefancic, 2001).

Cultural-Historical Theory

The Cultural-Historical Theory came about in an effort to alleviate inequities and the lack of adequate schooling for BIPOC students during the early 1960s. With this theory “individuals’ and groups’ experiences in activities—not their traits- become the focus” (Gutierrez & Rogoff, 2003, p. 19). Many researchers looked for better ways to view students and leave behind their deficit perspectives. Moving history forward, Gutierrez & Rogoff (2003) submit, this theory characterized “...cultural ways of different groups in terms that are respectful attempting to describe them without making value judgments..." (p. 19). This theory will further support the conceptual framework to draw awareness to inequities in mathematics education for BIPOC students and report findings of the data to mitigate these inequities. “A cultural-historical approach assumes that individual development and disposition must be understood in (not separated from) cultural and historical context” (Gutiérrez & Rogoff, 2003, p. 22). Understanding students’ cultural experiences on an individual level can help researchers better understand the choices they make within the school setting. Personal cultural accounts, coupled with curriculum content, are necessary “to characterize a child’s repertoire and dexterity in moving between approaches appropriate to varying activity settings" (p. 22).

Culturally Relevant Pedagogy

Critical Race Theory, Cultural-Historical Theory, and Culturally Relevant Pedagogy are all successful interactions among the foundational concepts of this research. The Dreamkeepers

authored by Ladson-Billings (1994) is an exceptional explanatory model of Culturally Relevant Pedagogy; however, for a more recent example, Dr. Christopher Emdin's use of hip-hop in the science classroom is valuable because it allows students to bring their own interests, and ways of interacting with the world, into the classroom and make connections with subject matter taught. In order for this to happen, educators must engage in "privileging the voice of the student" (Emdin, 2016, p.). Just like science benefits from the expanded participation in science facilitated by Emdin's teaching practice, mathematics education needs BIPOC students as much as BIPOC students need mathematics to experience successful opportunities.

Dr. Emdin's (2016) *reality pedagogy* can be categorized as culturally relevant pedagogy. The goal of reality pedagogy is to "meet each student on his or her own cultural and emotional turf" (Emdin, 2016, p.27), which aligns with "cultural competence" as defined by Ladson-Billings (1995) in culturally relevant pedagogy. Emdin equips students with knowledge through their experiences and understanding of the world. When students link new content to previously stored information, connections of neurons are made in the brain, and the new information is retained. Interest in the subject matter increases if educators realize that non-academic incidents greatly affect their pupils' perceptions within schools. The practice of sharing anecdotes piques students' curiosity in content. Emdin's teaching practices allow real-world experiences through cultural practices to be brought into the classroom to help students better comprehend how content affects their everyday lives.

Culturally relevant pedagogy has three tenets: "(a) Students must experience academic success; (b) students must develop and/or maintain cultural competence, and (c) students must develop a critical consciousness through which they challenge the status quo of the current social order" (Ladson-Billings,1995, p. 160). Academic success involves students attaining proficiency

in their academic abilities. Cultural competence means students hold fast to their identities even within the mathematics classroom. Maintaining critical consciousness asserts that students develop their sociopolitical awareness by analyzing how cultural norms, values, and places can enforce social inequalities. Culturally Relevant Pedagogy, also known as *reality pedagogy*, appreciates giving a voice to students and their experiences from every day and contemporaneous life by allowing appropriate elements of their experiences to be brought into the classroom. This pedagogy equips students with knowledge through their understanding of the world and experiences. Further, Culturally Relevant pedagogy should be as natural to teachers as the content taught (Ladson-Billings).

Including this theory in the framework of this study will affirm its significance within the educational field. Thus, this study seeks to fill a gap in the literature that uncovers experiences of BIPOC students' participation in mathematics readiness activities.

"If we are serious about solving these problems in schools...we have to be serious about intense study and careful thinking of race and education" (Ladson-Billings, 1998, 22). In the next section an analysis of the literature that is relevant to my research question is presented through my established conceptual framework. The areas of focus within the framework are mathematics education, BIPOC students' lived experiences, and college and career mathematics readiness activities. I will describe and discuss how each element is relevant to this study.

Mathematics Education

"In today's world, economic access and full citizenship depend crucially on math…" (Moses & Cobb, 2001, p.5). Each states' constitution grants some type of provision for an institution of public education. Nonetheless, America's educational system has not always met its obligation to uphold equal rights in *all* schools for *all* students. According to this framework,

mathematics education is a pathway to full citizenship through access and equity that will lead to economic opportunities. However, for many BIPOC students' mathematics education is a property that has been denied much like voting rights were for minority Americans in previous decades. Educational institutions' purpose is multi-dimensional in that they are compelled to motivate students to become free, productive citizens who contribute to building up society. In doing so, these institutions urge students to develop in the areas of life, college, and/or career mathematics readiness. Thus, "Math literacy and economic access are how we are going to give hope to the young generation" (Moses & Cobb, 2001, p. 12).

Equity and Access. All students should have access to an equitable education regardless of race, socioeconomic status, or religious affiliation. Students should be held to high expectations and given the tools needed for their individual success. In 2014, the National Council of Teachers of Mathematics (NCTM) published guiding principles to improve mathematics teaching. These Principles to Actions were a step toward ensuring mathematical success for all students. More specifically, the guiding principle for Access and Equity (2014) states, "An excellent mathematics program requires that all students have access to a high-quality mathematics curriculum, effective teaching and learning, high expectations, and the support and resources needed to maximize their learning potential" (p. 5). Further, Aguirre et al. (2013) contend, "Equity does not mean that every student should receive identical instruction. Instead, equity demands that responsive accommodations be made as needed to promote equitable access, attainment, and advancement in mathematics education for each student" (p. 9). This means students should be provided appropriate environments and resources to reach their full potential for learning. Through this lens, students are given opportunities and support to develop as doers of mathematics and the ability to fully participate in society with necessary prowess.

Consequently, students will be equipped with 21st Century skills such as sociopolitical awareness, problem-solving abilities, critical thinking, collaboration, and communication competence. A guaranteed and viable education is a right of all students; thus, no student should experience missed opportunities in educational settings based on factors beyond their control. Students ought to have the opportunity to become confident in themselves and encouraged to strive for their potential regardless of their community, socioeconomic, racial, or religious backgrounds. "I wish to suggest that the point of education is that students learn *something* that they learn it for a *reason*, and that they learn it from *someone*" (Biesta, p. 76). With that being said, students need opportunities from their teachers to actively construct knowledge through collaborative real-world experiences within the classroom. There are many methods by which students can acquire or access knowledge. To tap into students' funds of knowledge to make learning meaningful and relevant, educators can incorporate students' personal interests, experiences, and background knowledge into the lessons within the curriculum.

To be sure BIPOC students have access and equity into mathematics education, their lived experiences as participation in college and career mathematics readiness should be identified. This will be a second element of the conceptual framework of this study.

BIPOC Students' Lived Experiences

"Changing the way in which the disparity of performance in mathematics among different groups of students in our schools is framed as a problem can lead to a productive investigation into understanding the causes for these disparities and how to address them" (Flores, 2007, p.29). Scholars have emphasized that the achievement gap is manifested by an underlying cause referred to as the opportunity gap. Without noting the underlying cause of the achievement gap, prejudices and stereotypes are reinforced. Often, these premature judgments

about students' lives, particularly BIPOC, affect their lived experiences within the mathematics classroom. Several experiences include lack of high-quality mathematics instruction and representation of educators who identify as BIPOC, funding, and resources, as well as low teacher expectations. To mitigate these negative experiences, students need options to participate in college and career readiness activities.

"Students need the opportunity to take more advanced level courses in mathematics. However, participation in more advanced mathematics courses in high school is uneven among groups of different ethnic backgrounds" (Flores, 2007, p. 38). Finding solutions to help close this opportunity gap is the responsibility of the collective educational system and can be done by revealing the lived experiences of students identified as BIPOC participating in college and career mathematics readiness activities. Ladson Billings & Tate (1995) "contend that the voice of people of color is required for a complete analysis of the educational system". Additionally, representation in the classroom matters and students need to see people who look like themselves in the classroom. This will have an impact on students' experiences further in society. To that end, gaining a better understanding of culturally relevant pedagogy and best teaching practices influences educators to positively impact the learning experiences of BIPOC students in mathematics classrooms.

Since the early 2000s, culturally responsive pedagogy has been amplified in education. Howard (2010) declares this pedagogy, "embodies a professional, political, cultural, ethical, and ideological disposition that supersedes mundane teaching acts; it is centered in fundamental beliefs about teaching, learning, students, their families, and their communities, and an unyielding commitment to see student success become… more of a reality" (p. 67). Reimagining the mathematics classroom with respect to teaching and learning requires that educators become

culturally competent with diverse populations of students. “For too many students, mathematics stands as a barrier for postsecondary and career success” (Launch Years, n.d. p1); therefore, access to college and career mathematics readiness opportunities for BIPOC students must be addressed.

College and Career Mathematics Readiness Activities

With regard to college and career mathematics readiness activities and their effect on students’ “upward social mobility and increased informed engagement in a democratic society,” the Launch Years Initiative, 2018 through the University of Texas at Austin with the Charles A. Dana Center will be the body of work that supports this section. I will further address college and career mathematics readiness activities, what they are, and how I plan to use them in this study.

For many years, mathematics has been held as the gatekeeper to college and career entry programs. However, a large body of research has documented the inequities in mathematics education baked into both state and local educational institutions. Scholars have argued that “access to advanced courses is too often influenced by race or family income,” (Launch Years A New Vision Report, 2018, p.12). This body of work supports the change I will work to bring about for all students particularly, BIPOC students, in mathematics education. This revision of high school mathematics will “transform the mathematics they need for college, career, and full participation in society” (Launch Years A New Vision Report, 2018, p.1). This body of literature will be the final element to support this research study.

Opportunity Gap

What is being identified is termed by the field as the opportunity gap. This gap is defined as “unequal opportunities and experiences among students of differing socioeconomic and racial backgrounds” (Welner & Carter, 2013, p.9) There is a large body of literature that argues shifting

the focus from achievement gaps– standardized test results that promote deficit views of subgroups of students–to opportunity gaps forces educators to look at systemic issues. These missed opportunities to experience learning and other major issues BIPOC students face in education were referred to as the "educational debt" (Ladson-Billings, 2006). This debt encompasses historical, economic, moral, and sociopolitical debts. Excessively concentrating on achievement gaps leads to specific groups of students being "positioned through conceptual deficits in the minds, practices, and designs of analysts such as researchers, theorists, and practitioners" (Milner, 2012, 697).

The opportunity gap exists because of events students experience disproportionately both within and beyond the school setting. Such happenings outside of school include a lack of participation in common developmental experiences that lead to learning opportunities and building of self-assurance. "Access to quality daycare, child and maternal health services…all contribute to children starting school academically and socially ready" (Hammond, 2015, p.30).

For many reasons, including arduous work schedules, countless parents find it difficult to allow students to participate in extracurricular activities before the start of formal school. Making time for participation and the affordability of activities that require fees are other deterrents. Within the school setting, the scarcity of students of color enrolled in advanced placement courses, lowered teacher expectations, and a lack of strong pre-k and daycare programs, among other elements, create further opportunity gaps. Scholars such as Hammond (2015) have expounded on many different experiences that affect brain development. Even when students arrive at school with opportunity gaps already formed, these do not have to inevitably evolve into achievement gaps.

The next section addresses how the opportunity gap materializes, efforts to shrink the gap, and ways that expand the gap.

How the Opportunity Gap Materializes

The opportunity gap manifests in ways that initially look like an achievement gap such as low performance on standardized mathematics assessments. The achievement gap is a symptom of the problematic imbalance between students of color and their peers. However, the drastic variations in test scores in reading and mathematics are a result of the opportunity gap. Howard (2010) defines the achievement gap as:

> The discrepancy in educational outcomes between various student groups, namely, African American, Native American, certain Asian American, and Latino students on the low end of the performance scale, and primarily White and various Asian American students at the high end of the academic performance scale. (p.10)

Much like the opportunity gap, the achievement gap originates amid the infant developmental stages. During the early nurturing years, children's brains are expanding, and neurons are making connections based on experiences and learned skills. For example, children of parents who dialogue with them in complete sentences, utilizing a wide range of vocabulary, and frequently read to them, develop into individuals with an extensive vocabulary, in contrast to those whose parents do not take part in the aforementioned activities. When students whose parents engaged with them at an early age enter school, they will more often perform at higher reading and math levels than their peers (Rothstein, 2013). Considering students enter school at various learning levels, those who are disadvantaged have more difficult educational experiences

for reasons beyond their control. Therefore, educators must employ best practices that shrink the gap and lead to student success regardless of racial and/or socioeconomic status.

Efforts to Shrink the Opportunity Gap in Mathematics

Implementation of four best practices for shrinking the opportunity gap addressed here include: high teacher expectations, making learning relevant, student engagement, and strong home/school connections.

High Teacher Expectations. Studies show teacher expectations have moderate treatment effects on student success in the classroom. John Hattie (2015) researched a method for resolving effect size using Cohen's d to determine influences on student learning. Results from Hattie's meta-analysis revealed teacher expectations had a compelling effect size of 0.43 on student achievement. In broad terms, students perform at high levels when teachers express raised, yet achievable, expectations of student performance.

Making Learning Relevant. When students see themselves as well as understand the relevance and context of subject matter, they are engaged in the lesson and work to complete the given task, generally with a sense of urgency. "All good teachers focus on context" (Gutiérrez, 2012, p. 17). At the same time, students need to see from their own perspective the objective of the lesson and how a topic can affect their daily lives. "A window/mirror metaphor is useful...students need to have opportunities to see themselves in the curriculum (mirror)…" (Gutiérrez, 2012, p. 20). At the moment students see themselves and understand how a mathematical topic relates to their real-world experiences, the importance of the topic becomes more significant to the child. For this reason, making personal connections and relevancy to tasks adds value to learning.

Student Engagement. Student engagement is a significant factor in the classroom. According to John Hattie's research, (2015), student engagement yielded an effect size of 0.48. While Hattie's meta-analysis rendered a moderate effect size, teachers can certainly strive to be sure pupils are committed to completing the work given by showing some sense of involvement in the task. The researcher encourages educators to plan activities which allow students to engage in hands-on performance tasks to build critical thinking and problem-solving skills.

Strong Home/School Connection. Strong home/school connections are a valuable best practice for student success. When children know parents and educators are of one accord, possessing the same goal of working toward students' success, students become more likely to perform well in the classroom. "Parents were not seen as opponents…but were viewed and treated as equal partners working in collaboration with school officials to create optimal learning environments for students at home and school" (Howard, 2010, p.145-146). As soon as teachers build firm positive interactions with parents, pupils have a propensity to finish tasks to their highest potential.

Finally, the next section will focus on ways that expand the opportunity gap.

Ways that Expand the Opportunity Gap

There are several ways that expand the opportunity gap in mathematics education, such as low expectations, minimal interest in content areas for students, a decrease or stagnant enrollment in advanced placement courses, weak home/school connections, and little to no student/teacher relationships or student engagement. Because these actions expand the opportunity gap, we want to avoid such activity.

Consequently, there has been much research in the field about BIPOC students and educational issues, more specifically mathematics, that include the opportunity gap, achievement

gap, issues that exacerbate these gaps, and specific factors that expand the gap. Additionally, factors that contribute to BIPOC students' mathematics success have been recorded. Indeed, the opportunity gap exists so what will educators do about it? Students' lived experiences in mathematics readiness activities seem to be missing from this large body of work.

As such, there is a great need for BIPOC students' perspectives which account for their lived experiences as participation in mathematics readiness activities. These revealed lived experiences will help add perspective to closing the opportunity gap for BIPOC students. To bridge this gap and engage in work to fulfill three empowering purposes of mathematics success opportunities: wonder, joy, and beauty, this study must be conducted.

Summary

This study uses various bodies of research such as the Critical Race Theory (Bell), Culturally Relevant Pedagogy (Ladson-Billings, Emdin, & Hammond), and the Cultural-Historical Theory (Gutierrez & Rogoff) as foundational supports for understanding the opportunity gap as it relates to college and career mathematics readiness activities. The Launch Years Initiative (2018) provides resources to better understand how the experiences, pathways, and opportunities of BIPOC students can lead to college and career mathematics readiness, but understanding the gaps in opportunities, or the root cause, can help make these resources more effective. Taking into account my review of this literature through the lens of the conceptual framework, it is saying a study that reveals the lived experiences of students identified as BIPOC participating in college and career mathematics readiness activities needs to be conducted.

CHAPTER III

METHODOLOGY

We need more research on effective/successful teaching and learning environments for Black, Latina/o, First Nations, English language learner and working-class students. More rich descriptions of these contexts… are necessary.
(Gutierrez, R., 2002)

The purpose of this qualitative research study was to reveal the lived experiences of students who identified as Black, Indigenous, and people of color (BIPOC) participating in college and career mathematics readiness activities. What follows is a description and justification for the research study.

Research Design

The researcher conducted a qualitative research method. Its methodology included three interests, as noted by Merriam & Tisdell (2016), "(1) how people interpret their experiences, (2) how they construct their worlds, and (3) what meaning they attribute to their experiences. The overall purpose was to *understand* how people make sense of their lives and their experiences" (p. 24). To that end, the primary goal of this study was to discover and interpret the meanings of the BIPOC participants' experiences navigating college and career readiness mathematics activities.

Purpose of the Research

The purpose of this qualitative research study was to reveal the lived experiences of students who identified as BIPOC participating in college and career mathematics readiness activities in Hope High School (a pseudonym), a diverse and high-performing district in a southern state. As with all other high school mathematics, the goals for Hope High School

mathematics education courses are to “1) expand professional opportunities, 2) understand and critique the world; and 3) experience wonder, joy, and beauty” (NCTM, 2018). The design of the study, described below, provided insight into how to minimize the opportunity gap experienced by BIPOC students as participating in college and career mathematics readiness activities.

Research Question

The research question that guided this study was: What are the lived experiences of students identified as BIPOC participating in college and career mathematics readiness activities?

Setting

Hope High School in Hope School District a diverse and high-performing school district was the setting for this study. This high school, according to certain polls, ranked in the top 30% of high schools for overall test results (Public High School Reviews, 2021) in its respective state with about 1,230 students enrolled in ninth-twelfth grades. To gather information-rich cases, a convenient sample was necessary for access and participation in this study. This district presented itself as an excellent site for this study due to the abundance of mathematics readiness course offerings and resources available to its students. This high school was the optimal choice with the ideal characteristics and academic potential. If not Hope School district, then where? Further, this district was a place with an evident opportunity gap which presented itself with a convenient sample of diverse and high performing students.

Table 3

Hope High School - Advanced Course Participation by Percentage 2018-2019 School Term

Group	Percent (%) of School Population
All	71.4%
Female	72.5%
Male	70.3%
Black or African American	43.0%
White	84.3%
Non-English Learners	72.3%

Note. This table displays the demographic and student information for Hope High School.

Table 4

Hope High School-Student Body Demographics 2018-2019 School Term

Group Name	Group Number	Group Percent (%)
Female	2094	48.44%
Male	2229	51.56%
Asian	153	3.54%
Black or African American	1443	33.38%
Hispanic or Latino or Spanish	246	5.69%

Note. This table displays the demographic and student information for Hope High School.

Participants

Freshman and sophomore students whose ages ranged from 13-to-16 years old and identified as BIPOC at Hope High school, were selected for participation in this study. The researcher used purposeful sampling "based on the assumption that the investigator wants to discover, understand, and gain insight and therefore must select a sample from which the most can be learned" (Merriam & Tisdell, 2016, p. 96). Next, a random purposive sample of participants who identified as BIPOC were desired to engage in the interview process. A random purposive sample is "selecting by random means participants who were purposively selected and who are too numerous to include all in the sample…" (Lunenburg & Irby, 2008, p. 177). The sample population was based on the students who completed the initial survey and met the qualifications for the study. While the researcher attempted to recruit BIPOC participants, there were no students who identified as Indigenous Peoples. Given the participants in the study, the researcher can only represent the stories presented. Therefore, moving forward, the stories told in this study are from participants who are described as people of color.

Data Generation

This study employed a qualitative methodology of data collection and analysis. In-person and Zoom interviews were incorporated to use open-ended questions from the 7-question instrument. Initially, a survey was administered to students from different college and career mathematics readiness courses at Hope High School. These courses were selected because they had both freshmen and sophomore participants enrolled, as students had the freedom to choose which classes they wished to take.

Interviews

The semi-structured interviews were conducted in-person and recorded via Zoom, for transcription purposes. Each interview was held in a reserved area at Hope High School. The instrument included 7 interview questions; additionally, time was allotted for further probing questions, when needed. During the data collection, saturation was reached; therefore, no further interviews were scheduled. Saturation occurred "when continued data collection produces no new information or insights into the phenomenon you are studying" (Merriam & Tisdell, 2016).

Instrumentation. The instrument in my study was semi-structured, open-ended interviews with 12 respondents from the pool of participants. Merriam & Tisdell (2016) defined semi-structured interviews as "either all of the questions are more flexibly worded or the interview is a mix of more and less structured questions" (p.193). This type of interview approach allowed me the fluidity to probe answers more deeply than with structured interview questions (Merriam & Tisdell). A set of questions were developed and allowed participants to reflect on their experiences as encouraging or inhibiting their participation in college and career mathematics readiness (SEE APPENDIX A FOR INTERVIEW QUESTIONS).

Research Journal

An electronic research journal (APPENDIX B) was kept for initial notes after each interview and included memos. The journaled notes were included in the analysis and codes were described within the Results section of this project. The researcher used Google documents for this journal documentation. In addition, a codebook was inserted (APPENDIX C) to the study.

Ethical Considerations

To counteract threats to credibility, I conducted interrater reliability checks. This strategy as confirmed by Merriam & Tisdell (2016), "…is the single most important way of ruling out the possibility of misinterpreting the meaning of what participants say and do..." (p. 246). Further, data and emergent findings felt saturated, which is to say, I began "to see and hear the same things over and over again, and no new information surfaced" (Merriam & Tisdell, 2016, p. 248).

Procedures

After successfully defending and submitting final edits of the prospectus, I immediately submitted the appropriate documents to the Institutional Review Board at the University of Mississippi. The following steps were followed to conduct the study:

1. A recruitment email was sent to teachers of mathematics readiness courses at Hope High School. Those courses included advanced placement (AP), dual enrollment, dual credit, Career and Technical Education (CTE), Algebra I, and geometry courses. Eleven teachers agreed to send an initial survey to the students in their classes.
2. The eleven mathematics readiness courses teachers were asked to forward a recruitment email and initial survey questions (APPENDIX D) to their students. Scripts were provided to teachers to read to their students.
3. All students in the courses filled out the initial survey that included demographics and their willingness to talk about their mathematics experiences. However, those who self- identified as people of color freshman or sophomore whose age ranged

from 13- 16 years old were selected as participants of the study. As a result, 12 students agreed to be participants of this study.

4. Upon agreeing to talk about their math experiences, the participants were physically provided a packet with a parent/guardian permission slip/consent form, information sheet (APPENDIX E), and assent form (APPENDIX F) from the principal investigator.

5. The students filled out the forms and return them to their teacher. Then, the researcher collected the forms from the teachers.

6. A virtual and in-person information session was held for participants and their parent/guardian to answer any questions about the study.

7. Students received an email to select a convenient date to participate in the interviews. Each interview was conducted during the class period/time frame of the teacher's class from whom they received the initial participation email or another time during the school day when available and not missing instructional time.

8. Each interview was held in a reserved office in Hope High School. The sessions were recorded via Zoom for transcription purposes and kept on a password protected storage electronic file platform. Only the researcher and committee chairperson had access to the interviews.

9. A seven-question instrument was used to guide the interview sessions.

Table 5

Research Timeline

Task	Date	Contact
Submit proposal to IRB	September 28, 2021	Committee chair & IRB
Approval from IRB	November 1, 2021	Committee chair
Recruit participants	November 2-5, 2021	Contact high school teachers & administrators
Conduct interviews	November 15-19, 2021	Contact students & teachers
Begin transcribing interviews & analysis	November 20- January 31, 2021	Contact committee members to share in progress status
Write chapter 4-Findings	February 1 - 28, 2022	Submit to committee chair and member
Write chapter 5- Summary	March 1- March 12, 2022	Discuss with committee chair
Submit Dissertation to committee	March 20, 2022	Email dissertation to committee members
Defend Dissertation	March 30, 2022	Committee members

Note. This table displays the timeline for this research.

Qualitative Data Analysis

The data was collected using multiple sources of documentation: survey, interview questions, and recordings via Zoom. These pieces of evidence best capture the experiences of students. Prior to collecting the data, consent from Hope High School administration and the Institutional Review Board (IRB) at the University of Mississippi was granted to conduct the study. Afterwards, interviews were administered, and a research journal (APPENDIX B) for anecdotal note taking was utilized. Finally, the data was carefully analyzed using In Vivo coding, more specifically, the "splitting" coding method for the initial analysis to capture "…more

nuanced analysis from the start" (Saldaña, 2016, p. 23). Then, for cycle 1 of coding, pattern coding was used to establish themes and categories that emerged. The phases are listed below.

0 Cycle

The data was analyzed using In Vivo coding, more specifically, the "splitting" coding method for the initial analysis (Saldaña, 2016). Since this was the earliest coding stage, this type of finely-grained coding created "individually coded segments" (Saldaña, 2016, p. 55). During this coding cycle, the researcher coded each participant's interview which encouraged "careful scrutiny of social action represented in the data" (Saldaña, 2016, p. 24). Codes such as wow and interesting later emerged into more refined codes that are identified in the coding cycles to follow.

1 Cycle

Pattern coding, or inferential coding (Saldaña, 2016, p. 236) was employed to establish emergent themes and categories within the data. This method was used as a way to "group the summaries into a smaller number of categories, or themes" (Saldaña, 2016). To establish more meaningful codes that described the students' experiences as facilitating or inhibiting successful mathematics experiences, codes were consolidated into four dyad codes to include: 1) caring/harmful, 2) agency/apathy, 3) resourced/unresourced, and 4) engaging/disengaging. The two codes that occurred most frequently were agency and engaging experiences; however, agency ranked number one in total occurrences. As a result of this thematic analysis, the data was strengthened to show descriptions and examples for each of the parallel codes.

2 Cycle

Lastly, anecdotal note discoveries from the research journal about the recorded experiences were incorporated. For one subtheme within the data set, there were no examples of apathy and unresourced experiences within the student interviews. Nevertheless, the researcher offered examples for consideration drawn from her experiences as an educator. This cycle provided a possibility to see how initial thoughts and intuition were seen in the data and analysis.

Scope and Limitations

Results were reported as chapters within this dissertation, as well as disseminated to the local school district's superintendent, administrators, and stakeholders for considerations and recommendations. As summarized by Saldaña (2016), "the process as well as the end product will reflect the uniqueness, peculiarities, and idiosyncrasies of the research situation" (p. 291). For this reason, the researcher plans to publish in educational journals and present at conferences and professional development sessions for educators.

The limitations such as how the findings impacted districts' practices, policies, or subsequent research were addressed. In conclusion, these limitations were identified along with the parameters of the study.

Summary

Finally, the researcher's attention was drawn to identifying missed opportunities for people of color in order to improve their mathematics education experiences. As an African American female educator herself, the researcher was inquisitive about narrowing the opportunity gap across the board so as to promote success for *all* students and improve the quality of education in America. To achieve this goal, this study argued that educators' concerns must shift from the achievement gap to the opportunity gap to better build students' funds of

knowledge. In accordance with Kendi (2019) who states, “Lack of resources leads directly to diminished opportunities for learning. In other words, the racial problem is the opportunity gap, as antiracist reformers call it, not the achievement gap” (p. 103). Thus, the study design described above provided evidence to fill a gap in the literature, and provided insight on how to minimize, or eliminate, opportunity gaps in the area of college and career readiness mathematics activities.

CHAPTER IV

RESULTS

Every child deserves a champion: an adult who will never give up on them, who understands the power of connection and insists they become the best they can possibly be."
-Rita Pearson

This qualitative study sought to recognize the lived experiences of high school students who identified as people of color while participating in college and career mathematics readiness activities at Hope High School in an affluent county in a southern state. This chapter will discuss the data and findings that emerged from this study. An analysis of student interviews was used to generate data.

As a result of the analysis, four coding dyads emerged to include caring/harmful, agency/apathy, engaging/disengaging, and resourced/unresourced. One overarching theme that emerged from this study's data collection was "relationships influence students' experiences". Further, nested within this theme were three refined subthemes which are outlined in this presentation as follows: 1) students' relationships with teachers, 2) students' relationships with content, and 3) students' relationships with peers.

First, the chapter will discuss, how generally speaking, the connections or lack thereof established between students and their teachers highly impacted students' success in the mathematics classroom. In the section to follow, Table 6 is presented to display the demographics of the student population interviewed in this project. Secondly, the data subthemes will be presented. Within each of these refined subthemes, one of two influential phenomena were revealed about the relationships. Each relationship, more specifically, either facilitated the

student's success or hindered it. Finally, the chapter concludes with a description within each subtheme by presenting the dyad codes along with examples from students' interviews as facilitating and/or hindering students' successful mathematics experiences.

Table 6

Participants' Pseudonyms with Self-Identified Descriptors

Participant	**Grade**	**Age**	**Gender**	**Race/Ethnicity**
Suman	10th	14 y/o	Male	Asian/Indian
Imani	10th	15 y/o	Female	African American
Nia	9th	14 y/o	Female	African American
Tiara	10th	16 y/o	Female	African American
Jayla	10th	15 y/o	Female	African American
Wilma	10th	16 y/o	Female	African American
Elena	10th	15 y/o	Female	Hispanic/ Latino
Ida	10th	15 y/o	Female	African American
Viola	10th	15 y/o	Female	African American
Carter	10th	15 y/o	Male	African American
Hannah	10th	16 y/o	Female	African American
Sofia	9th	14 y/o	Female	Hispanic/ Latino
	9th graders = 2		14 y/o= 3	African American=
	10th graders = 10		15 y/o= 6	9
			16 y/o= 3	Asian/Indian= 1
				Hispanic=2

Figure 1

Theme: Relationships Influence Students' Experiences

Theme: Relationships Influence Students' Experiences						
	Relationships with Teachers (Subtheme A)		**Relationships with Content** (Subtheme B)		**Relationships with Peers** (Subtheme C)	
Facilitate Successful Experiences	Agency experiences	Caring experiences	Agency experiences	Caring experiences	Agency experiences	Caring experiences
	Engaging experiences	Resourced experiences	Engaging experiences	Resourced experiences	Engaging experiences	Resourced experiences
	Relationships with Teachers (Subtheme A)		**Relationships with Content** (Subtheme B)		**Relationships with Peers** (Subtheme C)	
Hinder Successful Experiences	Apathy experiences	Harmful experiences	Apathy experiences	Harmful experiences	Apathy experiences	Harmful experiences
	Disengaging experiences	Unresourced experiences	Disengaging experiences	Unresourced experiences	Disengaging experiences	Unresourced experiences

Relationships Influence Students' Experiences

A common theme among the people of color participants in this project was gathered from the research question: *What are the lived experiences of students identified as BIPOC participating in college and career mathematics readiness activities*? The overarching theme was "relationships influence students' experiences," and the data collected supported this point. This theme is significant because educators' relationships with students impact the students' learning of content in each subject area and ultimately their mathematical experiences both inside and outside of the classroom. The researcher consolidated the codes into three refined subthemes that stood for the types of relationships that revealed an influence on students' success in the mathematics classroom. These include 1) students' relationships with teachers, 2) students' relationships with content, and 3) students' relationships with peers. Each relationship was

parallel in nature in that it either facilitated or hindered student success. Within the polished subthemes, there were four main codes that exhibited parallel antonyms to describe students' experiences: 1) agency/apathy, 2) caring/harmful, 3) engaging/disengaging, and 4) resourced/unresourced. The next section will discuss the generated data as subthemes with examples for each of the codes that were revealed within the student interviews.

Figure 2

Relationships with Teachers

Theme: Relationships Influence Students' Experiences		
	Relationships with Teachers (Subtheme A)	
Facilitate Successful Experiences	Agency Experiences	Caring Experiences
	Engaging Experiences	Resourced Experiences
	Relationships with Teachers (Subtheme A)	
Hindering Successful Experiences	Apathy Experiences	Harmful Experiences
	Disengaging Experiences	Resourced Experiences

Students' Relationships with Teachers

The final data of this study revealed that the most influential aspect of students' success in the mathematics classroom was the students' relationships with their teachers. There were four codes within this category that described students' experiences indicative of success. These codes encompass 1) agency/apathy, 2) caring/harmful, 3) engaging/disengaging, and 4) resourced/unresourced. The rest of this section provides definitions of these four codes and examples from students' interviews to support them.

Facilitate Successful Experiences. Facilitating successful experiences for students conveys certain characteristics and strategies teachers employ with ease and intent, and these actions are meant to lead students toward a goal. To facilitate successful experiences in the high school mathematics classroom, a teacher must be aware of, and/or promote at least one of the four characteristics listed: 1) agency, 2) caring, 3) engaging, and/or 4) resourced.

Agency. Experiences of agency involving students' relationships with their teacher are described here as moments, expressions, or statements in which a student's demonstration of self-initiation on their own behalf is guided by, or made available by the teacher. For example, Tiara, a sophomore at Hope High School demonstrated agency when she stated to her teacher, "For me, that looked like *strategies* that teachers did was a little bit too hard for me to comprehend sometimes. So, I had to figure out…different ways to the different solutions." Tiara demonstrated agency at this moment because she had to admit how to figure out a way to be heard by her teacher in order to indicate that she was not comprehending the teacher's method of teaching. It is also worth noting that Tiara especially felt comfortable in this situation because the teacher who supports her students' agency in the classroom encourage such dialogue as this. Such open exchanges as this one facilitated Tiara's learning in the mathematics classroom and strengthened her relationship with the teacher.

Caring. Experiences of caring involving students' relationships with their teacher could also be described as moments of encouragement from the teacher, where exhibitions of positive belief in the student or motivation are generated on behalf of the student. Experiences of caring also encourage moments where the student puts forth the best effort, asks questions, and talks about their lived experiences both inside and outside of school. An example of a caring experience took place when Tiara, a 10th-grade student stated:

> I believe it would help students [to] get better if they have someone to talk to and talk out their mental problems first so they can focus on school because like school is important but so is your mental health. They could ask if everything is ok because kids sometimes just generally be tired from…athletics after practicing during the day. Some kids' parents argue all day…*but* they still have to go to school. Another question they [teachers] could ask is, "Do you need to take a break?" Or, "Is there anything I can do to help?"

Tiara felt that her teachers cared when they asked questions that would help her put forth her best effort and provided encouragement. In a similar fashion, Elena, another 10th-grade student, was asked to share a story about people who have influenced her success in mathematics. Elena exclaimed:

> It was my 6th-grade teacher, Ms. Buford. She was the best teacher I had had in all my years…It was the ways she taught that was really good for me. She was really interactive with everybody, and she was that teacher that I could go and talk to not just about math but also about other stuff.

It is clear from these statements, then, that a caring environment is important because students thrive in spaces where they feel safe and cared for.

Engaging. Experiences of engaging involving students' relationships with their teachers could also be described here as moments of mutual active participation in activities and tasks between the student and teacher where both parties feel comfortable and interact in a respectful manner. Suman, a 10th-grade student, asserted he liked educators who used engaging strategies in the mathematics classroom. He said, "...their method of teaching was involving the class in discussions about the topic with several people answering questions, and umm, I don't know, I just like them as teachers." Another student, Tiara, also described an educator who has made a

positive influence on her academic success was one who used "...hands-on learning activities, was positive, mature, and energetic in nature." This teacher required the students to actively engage in assignments and projects using problem-solving skills collaboratively.

Resourced. Experiences of resourced learning strategies involving students' relationships with their teachers may also be described as interactions between the teachers and students that may include tutoring, sharing notes and/or instructional materials, discussions, small group instruction, and collaborative events. For example, Nia, a 10th-grade student, stated:

> I would say my teachers help me if they are good teachers. They kind of helped me get my help, you know, like get where I am supposed to be. And, if I don't understand, they can explain something thoroughly. They help me get back on track and that kind of influenced me to get…everything.

Another example of the resourced trait occurred when Tiara, a 10th grader, said:

> I think things like Kahoot and Blooket [interactive online games] are good for kids to learn. I like this way of interacting…sometimes you might get questions wrong but at the end of the day…your teacher can see the results in a fun way to show who needs help and who does not.

Integrating technology such as these interactive sites in the classroom is a use of resources that many students are already familiar with.

Hinder Successful Experiences. Hindering successful experiences in the classroom hint at teachers' implementation of the above characteristics insufficiently. To hinder successful experiences in the mathematics classroom, a teacher may display at least one or more of the characteristics listed: 1) apathy 2) harmful, 3) disengaging, and/or 4) unresourced. Each

descriptive characteristic listed will be accompanied by an example from student interviews in this research project.

Apathy. Experiences of apathy involving students' relationships with their teachers may also be described as moments, expressions, or statements made by the student where there was a lack of demonstration from the teacher and/or interest or concern shown between the student and teacher. When asked to share a story about someone who has influenced her mathematics experience, Elena, a 10th-grader, recounted an incident during her fourth-grade school term in her advanced math class. She recalled the teacher making her mathematics experiences difficult during the school year. She stated:

> Overall, being in a very advanced math class, was, like, very complicated…because I wasn't as caught up as everyone else…I was a little behind and was stuck in fourth-grade math. If the teacher is able to explain it well…then I do better.

Elena also expressed that when she asked questions for clarity, the teacher became frustrated that she still didn't comprehend the information. This experience negatively impacted Elena's relationship with the teacher and impaired her interest in mathematics altogether.

Harmful. Experiences with a harmful instructional trait involving students' relationships with their teachers may also be described as moments of discouragement between student and teacher, exhibition of a negative belief in students' abilities to learn, or a lack of belief in them. A harmful trait may also occur when a teacher is unsupportive of students' experiences both inside and outside of school. Case in point: one day Elena described a harmful experience with one of her past teachers which the teacher exhibited biased behaviors toward her. She stated, "I'm Hispanic, so...the general standard for us is that we don't get that much of an education. So I feel with some people it's been helpful [when someone lets me know] I'm trying harder than

other family members". It doesn't help Elena, then, if a teacher were ever to deny her this kind of help. Or worse, stereotype Elena before fully getting to know her. As Elena puts it, it's harmful whenever a teacher assumes, "Oh I'm Hispanic, I'm not going to try. So, if you're from this background then people will treat you like [a stereotyped version of yourself]. But if you are from another background, they will treat you differently." Thus, in this data set, these harmful experiences for these particular teachers and students clearly hindered successful experiences for these particular students because their teachers conveyed to them either a lack of belief in their abilities to learn or discouraged them from wanting to build a healthy relationship with them. In either case, harmful traits between teachers and students inevitably damages the learning experience.

Disengaging. Experiences characterized as disengaging involving students' relationships with their teachers could also be described as moments of inactive participation in activities and tasks between the student and teacher so much so neither party feels comfortable and/or does not want to interact with each other in a respectful manner. In one scenario, a ninth-grader, Nia, was asked to share a story about her math experience so far; in detail, she described an incident from eighth-grade in which she felt confused and disconnected from the class because of her teacher's lack of engagement. Nia asserted:

> I did good in eighth-grade but…unfortunately…it [felt] like she [the teacher] would spit out the words at you. But she never gave you time to comprehend. She never like fully explained it. I had to kind of learn on my own if that makes sense. She would let you ask questions, but she wouldn't answer the questions.

Elsewhere, Nia further recalled how difficult it was to take notes in class and required her to work double time to understand the content. As she later puts it, "I was trying to process and

write stuff down, you know…it just wasn't working." This disengaging experience for Nia inhibited her success in the mathematics classroom during her eighth-grade school term and ultimately negatively impacted her relationship with the teacher. Additionally, as another student—Carter, a 10th-grader—puts it, disengaging experiences with a teacher get in the way of a good learning experience. "Some don't care to have relationships. They just teach. Some are not active…[They are] dry and unenergetic when they teach." Carter's disengaging experiences in this math class made for a difficult situation.

Unresourced. Experiences characterized as unresourced moments between students and their teacher could be described as a lack of interchange between the teachers and students involving such additional teaching opportunities as tutoring, sharing notes and/or instructional materials, discourse, small group instruction, and/or collaborative events. Tiara recalled an experience from her ninth-grade year while facing the Covid-19 pandemic. She expressed how her mathematics teacher did not offer any resources beyond class notes while many other teachers provided resources such as teacher-made videos explaining the content, tutoring sessions, and other interactive websites. Another 10th-grade student, Imani, offered a suggestion to possibly mitigate unresourced experiences which suggested students give teachers periodical feedback on their classroom instructional practices. Imani stated, "Maybe teachers should have their students give positive feedback or constructive criticism" about their teaching practices. These unresourced experiences during a pandemic added to students' anxiety during an already challenging mathematical experience.

Figure 3

Relationships with Content

Theme: Relationships Influence Students' Experiences		
	Relationships with Content (Subtheme B)	
Facilitate Successful Experiences	Agency Experiences	Caring Experiences
	Engaging Experiences	Resourced Experiences
	Relationships with Content (Subtheme B)	
Hindering Successful Experiences	Apathy Experiences	Harmful Experiences
	Disengaging Experiences	Unresourced Experiences

Students' Relationships with Content

A second influential aspect of the study's data was students' relationships with the content. Again, four codes used within this category described students' experiences as indicative of success: 1) agency/apathy, 2) caring/harmful, 3) engaging/disengaging, and 4) resourced/unresourced. The rest of this section will also provide definitions of these four codes and examples from students' interviews.

Facilitate Successful Experiences. Facilitating successful experiences with students' relationships with content conveys certain characteristics and strategies that teachers employ to make students at ease and happy to learn. Carried out diligently, these actions can lead students toward a goal. To facilitate successful experiences in the high school mathematics classroom, students must be aware of, and/or promote at least one of the four characteristics listed: 1) agency, 2) caring, 3) engaging, and/or 4) resourced.

Agency. Experiences of agency involving students' relationships with content are described here as moments, expressions, or statements made by the student where a demonstration of self-initiation on the student's behalf was achieved by appropriate guidance from the teacher. Take for example the following moment of agency discovered by Tiara, a 10th-grader, who asserted:

> School is like very good for me...I really had to sit myself down and say, "Hey you have to do more of your [math] work. Like really talk to the teachers and...see what I can do to do better." Sometimes we as humans get off focus, but in the end, I'm always [going to] pull through.

Another 10th-grade student, Carter, explained his sense of agency for learning the content when he stated:

> There are obstacles I have just being a man of color that I have to push over [overcome]. I try to give 120% on everything I do and just have the best attitude, attendance, and everything that I can do.

As a student of color, Carter is already keenly aware of the challenges and stereotypes that may come along with his mathematics experiences that some of his peers may never experience. Thus, his agency and urgency to learn the content is a demonstration of self-initiation.

Caring. Experiences of caring involving students' relationships with their classroom's content could also be described as moments of encouragement by the teacher, where exhibitions of positive self-belief by students or motivational occurrences are engendered for students. Carter a 10th-grader stated:

> I enjoy math because of the way it helps me with problem-solving more than just math. [It] pushes you to keep going, keep using new strategies, and just overall [a] mindset of

> ‘keep going’ if you get it right...just doing math builds something that my teachers build.

For Carter, math was about honing his critical thinking skills and challenging himself to thinking outside of the box. He not only enjoyed working math problems, but he talked about becoming a doer of mathematics by using the skills used in class to help solve real-world problems. Carter’s teacher encouraged him to think about math outside of the classroom, which increased Carter’s belief in himself regarding math.

From another student- Imani- another example was exhibited:

> When I first started taking math, I instantly knew I liked math. I like the numbers. And, you know, I want to do something with it. When I got to Algebra, they kind of showed me a new branch of math. It showed me [I] can do math.

Imani’s self-belief to do well in math was highly influenced by her teacher’s intent to instill motivation into her students. Consequently, this teacher’s actions resulted in Imani’s confidence and inquisitiveness for Algebra.

For both of these students, then, moments of caring toward their classroom content improved Imani and Carter’s experiences with content while increasing their motivation during one of the most difficult school years.

Engaging. Experiences of students’ engagement with the mathematics classroom could also be described here as moments of excitement towards and active participation in activities and tasks where the student feels comfortable and competent in mathematics. For example, Imani recalled:

> I remember the first time I [was] learning [about] money and I went to the store the next day. [My mom] let me put the money on the counter. I was so excited because we were

> learning about it. She gave me, like two extra dollars and ten cents more to see if I was going to count the exact change. I accidently put five cents more [on the counter] but I still like [that] I got the experience and got to do what I learned in the real-world.

Imani's excitement for learning about money and real-world application was exactly what she needed in order to help her see that learning math is fun. When students begin to actively participate in classroom tasks facilitated by the teacher, the bridge between classroom content and real-world application results in excitement for learning and should be counted as a huge success.

Resourced. Experiences of students' relationships with resourced content may also be described as moments in which students' interactions with the content lead to the students creating their resources in the classroom or discovering others: writing efficient notes to themselves and/or recognizing the value of instructional materials such as videos and games to show self-guided interactions with the content. Ida and Imani, both 10th-graders, discussed difficult times during the Pandemic where they utilized Khan Academy videos and created their own notes based on the content taught in class. These students learned to be innovative and used technology to assist their learning during the pandemic.

Hinder Successful Experiences. Hindering successful experiences here signifies students having negative experiences involving mathematics content. To hinder successful experiences in the mathematics classroom, at least one or more of the characteristics listed are experienced: 1) apathy, 2) harmfulness, 3) disengagement, and/or 4) unresourced. Each descriptive characteristic listed will be accompanied by an example from student interviews in this research project.

Apathy. Experiences of apathy involving students' relationships with the content may also be described as moments, expressions, or statements validated from the teacher that contribute to students' lack of interest or concern for the content where questions go unanswered, and the students' experiences both inside and outside of school are unsupported. While I did not have any students at Hope High School describe experiences for this category; consider, the following example as an experience for this code. In some instances, students display apathetic characteristics toward mathematics when they do not see the relevance of a specific skill or topic. Case in point, if students are learning about statistics in class and are merely solving computational problems with no context to the numbers and there is a lack of in-depth discourse about the significance of statistics in their daily lives, these exercises can then become mundane algorithmic problems which leads to passivity and boredom. On the contrary, suppose that, students are able to use statistics to understand the world around them such as how it can be used in everyday life, then their experiences involving statistics changes their relationship with the content.

Harmful. Experiences with a harmful trait involving students' relationships with the content may also be described as discouraging, and/or a negative belief in the students' ability to learn. Consider this example: Nia, a 9th-grade student recollected an experience from a previous school year. She shared a story about someone who made her experiences more difficult in mathematics and stated:

> I was very critical of myself and feel like I start to stress myself out sometimes, just trying to like, just trying to make it. If that makes sense. But I wouldn't say I made it horrible for myself. Sometimes I feel like I was doing too much in a sense. I'm trying to

> please myself...because making good grades [in math] is important to me and I put stress on myself.

Sometimes students' negative belief in their ability to learn can come from self-induced stress. Pressure to perform well is sometimes a burden individuals put on themselves because they feel it is an expectation. However, at some point, every student will struggle, thus, showing harmful instead of a caring characteristic was a hinderance for this student.

Hannah, a 10th-grader, suspects that although she did not struggle as a student of color enrolled in an advance level mathematics course, she emphasized the lack of diversity in her mathematics classes in previous years as a possible reason many Black female students may be thought to have difficulties in advanced mathematics courses. She stated:

> I honestly don't feel like they [those who assist with scheduling] do a really good job when it comes to scheduling to push people of color to be in AP classes when they fully have the capability to.

Hannah inferred, due to historical barriers, students of color did not have access to high level mathematics courses. She believed this possibly caused an unspoken hesitance for African American female students to enroll in such courses. Unspoken or non-verbal communication can be just as harmful to students as blatant verbal communication. Educators who use colorblindness and silence as solutions to this matter are in reality perpetuating the issue by casting a blind eye to these unfair biases.

Disengaging. Experiences characterized as disengaging for students in the classroom may also be described as moments of inactive participation on either the teacher's part or the student's part in activities and tasks where neither party feels comfortable and/or does not interact in a respectful manner. Nia recalled her 2019-2020 school year, for instance, when the

entire nation was impacted by the Covid-19 pandemic. She became disconnected from mathematics content, ultimately disengaging with the content because her school transitioned to completely virtual schooling. Nia stated:

> I was trying to ...keep up with her [the teacher] talking and ...writing notes... I feel like it was ...the classroom environment that was missing. I feel like she was trying to like teach at the time but there was never enough time to ask questions.

For many students, the 2019-2020 school year was most difficult due to the Covid-19 Pandemic. The lack of interactions between students and their teachers negatively impacted learning. The pandemic not only forced everyone to go virtual for a year, but it also gave a lot of them, both teachers and students alike, opportunities to disengage with each other even more. As mentioned by Nia, essentially, the lack of classroom community was missing. Therefore, students became disconnected and less committed to building relationships for gaining an in-dept understanding of the content. Lastly, disengaging characteristics such as inactive participation in classroom discussions and problem-solving activities can hinder students conceptual understanding of skills and comprehension.

Unresourced. Experiences characterized as unresourced involving students' relationships with the content may also be described as a student's lack of gathering resources such as notes and/or instructional materials, forming small group sessions, and/or other collaborative events. Tiara, a 10th-grade student, recalled a time during her middle school pandemic year experience. She had difficulty comprehending a math teacher's instructional strategies and described this as a "rocky time." For anyone well versed in the high school mathematics classroom, many of the things Tiara is saying here are bad signs of an unresourced classroom. As a student, she experienced being unresourced in mathematics class. After much dialogue, Tiara made clear that

her teacher did not provide extra resources beyond the class notes, and vice versa, Tiara did not gather other instructional materials to engage in any collaborative efforts. Tiara's relationship with the mathematics content showed to hinder her success with mathematics during that point in the school term. However, she resolved, "...eighth-grade was kind of rocky at the beginning but then I got the hang of it." Initially, being unresourced caused excessive stress for Tiara; however, she later changed her behavior in the course to get materials needed to help her be successful.

Figure 4

Relationships with Peers

Theme: Relationships Influence Students' Experiences		
	Relationships with Peers (Subtheme C)	
Facilitate Successful Experiences	Agency Experiences	Caring Experiences
	Engaging Experiences	Resourced Experiences
	Relationships with Peers (Subtheme C)	
Hindering Successful Experiences	Apathy Experiences	Harmful Experiences
	Disengaging Experiences	Unresourced Experiences

Students' Relationships with Peers

Lastly, the final data of this study revealed that students' success in the mathematics classroom was influenced by their relationships with their peers. There were four codes within this category that described students' experiences as successful. The codes encompass: 1) agency/apathy, 2) caring/harmful, 3) engaging/disengaging, and 4) resourced/unresourced. The rest of this section, like the ones before it, provides definitions and examples of these four codes to support them.

Facilitate Successful Experiences. Facilitating successful experiences conveys certain characteristics and strategies students employ with ease and intent, and these actions are meant to lead students toward a goal. To facilitate successful experiences in the high school mathematics classroom, students must be aware of, and/or promote at least one of the four characteristics listed: 1) agency, 2) caring, 3) engaging, and/or 4) resourced.

Agency. Experiences of agency involving students' relationships with their peers takes place when a student demonstrates self-initiation with his or her peers to comprehend that day's mathematics lesson. For example, Imani, a 10th-grader, stated, "I feel like I can help...other people [classmates]. If they need the help, I will try to help them. And, if they got it [understood the content] they will help me. So I feel we can feed off of each other." Imani's example here was a moment of agency and reciprocity. She learned the importance of an ecosystem of positive interactions within her peer group. Imani believed that if she helped someone else, they would return the favor when she needed it.

Caring. Experiences of caring between students and their peers are exhibitions of positive self-belief by students or motivational occurrences is engendered. If the teacher ever witnesses such displays, he or she could also reward the behavior. An example of a caring experience that took place between peers occurred when Sofia, a 9th-grade student, stated:

> I feel safe at school. I just enjoy coming because of my friends, and stuff [the bonds students share], even though class is kind of boring sometimes. It's like there's a reason that we're here and we need stuff [mathematics content] for the future.

At this moment, Sofia recognized the value of community in the classroom among her peers. She spoke of its importance as being the foundation of a rich school experience. This instance

provides further evidence to confirm students' relationships with peers influence their overall academic experience.

Engaging. Engaging experiences between students' and their peers could also be described here as moments of active participation in activities and tasks between the student and teacher where both parties feel comfortable and interact in a respectful manner. An instance of engaging experiences involving a student's relationship with one of her peers took place when Nia, a ninth-grader, was asked to share an impactful mathematics experience from her past. She stated, "[I believe it's] how I perceive what's going on around me...I try to take notes and comprehend, like [for example], listening to the teacher and ask[ing] questions. [Along with] using my peers sometimes, if we work in a group." Nia's experiences of actively engaging with peers was important because she used these moments not only to enhance her own learning but also to assist her peers when she could.

Resourced. Experiences of students' resourced relationships with their peers may also be described as interactions in which the students and peers come up with a way to solve problems on their own by relying on other methods to learn such as tutoring, sharing notes and/or instructional materials, discussions, small group instruction, and collaborative events. For example, Imani, a 10th-grader, recalled a time during her eighth-grade school year in 2020, when the Covid-19 Pandemic set in. To gain an understanding of her classroom's math lessons, she had to take the initiative to find videos on the Internet on her own and create guided notes from those videos. As she recalls it, "I would just try to find something [videos or other learning materials on the Internet] or do practice problems." Additionally, she collaborated in group discussions and shared notes. Ultimately, this action helped Imani gain a better understanding of

math. Since she was able to explain the work and give step by step instructions to her peers through collaborative efforts, Imani mastered the content.

Hinder Successful Experiences. Hindering successful experiences here signifies students having negative experiences with their peers. For successful experiences in the mathematics classroom to be hindered, at least one or more of the following characteristics listed are usually experienced: 1) apathy 2) harmful, 3) disengaging, and/or 4) unresourced. Each descriptive characteristic listed will be accompanied by an example from student interviews in this research project.

Apathy. Experiences of apathy involving students' relationships with their peers may also be described here as moments, expressions, or statements made by the student where a lack of demonstration and/or interest or concern from other students was shown. Consider this example: Elena, a 10th-grade student who identified as Hispanic, divulged a troubling time from her past in middle school. She stated:

> I noticed that with Hispanics at our school, my experience with some, has not been the greatest. Especially because most of the Spanish here are a very tight knit group. So if you didn't grow up with them, it's like, "What are you doing [here]?" Everyone has their own hardships, but they're like, "If you didn't [grow up here around us] then your life is like this [better] and you can't be a part of mine [my life].

Elena described this experience as a tough time during middle school. Given that she was new to the community at the start of the academic term, this daunting set of circumstances hindered her experience in the mathematics classroom and lead to negative feelings involving her peers.

Harmful. Harmful experiences with other students could be described here as discouraging, exhibiting moments in which a negative or disbelieving attitude toward the

student's ability to learn takes place where questions go unanswered, and the students' experiences both inside and outside of school are unsupported. For example, Hannah, a 10th-grade student, articulated that some peers are unkind to others. She voiced that she wished the school would do a better job of dealing with the disrespectful behavior of some students toward their peers. She explained:

> Some people tend to judge or say things that are offensive, and some don't even realize it's offensive probably because of the households that they're raised in. But others know full well that it's offensive and do it any way. I don't know what is up with that, but it's more guys who do it.

Hannah, genuinely concerned about her peers' behavior and their lack of care for one another, believes this kind of harmful behavior can clearly negatively impact students' academic experiences in the long run. Both teachers and students alike should work to mitigate these incidents.

Disengaging. Disengaging experiences involving students' relationships with their peers may also be described as moments of inactive participation in activities and tasks where students and their peers neither feels comfortable with each other and/or does not interact in a respectful manner. For example, Elena, a 10th-grader, shared a disengaging mathematics experience along with recommendations for ways to improve experiences for students at Hope High School. She believes interactions among peers, which are facilitated by the teacher, should be more "active in class [collaborative in nature]...not just taking notes every day. [Teaching strategies] like hands-on [activities]...individually or as a group [will permit more engagement among students]. For me, working with other people and talking about what we do has also helped a lot." Elena longed for more opportunities to engage with peers because students themselves, especially when put off

by an assignment, can disengage with it and each other as a result. Studies have shown that students learn more from their peers than any other group. Therefore, teachers should work to eliminate disengaging actions in the mathematics classroom.

Unresourced. Experiences characterized as unresourced in the mathematics classroom involving students' relationships with their peers may also be described as lack of interchange between students and their peers in order to complete assignments to their best ability. For example, such additional learning strategies as tutoring, exchanging notes and/or instructional materials, small group instruction, and/or collaborative events can and should be considered among students when need be. While I did not have any students at Hope High School describe experiences for this category, the following hypothetical example may serve as an experience for this code. Sometimes due to a school's lack of funding, low parental involvement, and high teacher turnover students may sometimes encounter unresourced experiences in mathematics. For this reason, educators and stakeholders should work to establish more equitable experiences for all students regardless of their neighborhoods and/or zip codes.

Summary

This chapter discussed the findings for this qualitative study revealing details such as students' reactions to and thoughts about their lived experiences in the college and career mathematics readiness classrooms. The data generated from the posed research question for this study showed the experiences of students of color at Hope High School in a southern state. Within this chapter, the researcher presented the data and shared a number of findings. The analysis identified relationships influence students' experiences the most remarkably. Then, embedded within that overarching theme were three refined subthemes presented as follows: 1) students' relationships with teachers, 2) students' relationships with content, and 3) students'

relationships with peers. The data that emerged showed students thought about relationships across those subthemes and the researcher used four coding dyads to include caring/harmful, agency/apathy, engaging/disengaging, and resourced/unresourced to describe characteristics of the relationships. Additionally, connections or lack thereof established between students and their teachers were shown to highly impact students' success in the mathematics classroom. Students' awareness about the course offerings at Hope High School was shown to need more attention. Finally, aspects about BIPOC students' experiences were discussed as encouraging or inhibiting their participation in college and career mathematics readiness using data from their interviews.

In the next and final chapter, Chapter V, the researcher will offer details about the implications and future recommendations of this study.

CHAPTER V

DISCUSSION

Your story is what you have, what you will always have. It is something to own.
-Michelle Obama

This qualitative study revealed the lived experiences of students identified as people of color participating in college and career mathematics readiness activities in a single high school in a southern state during the 2021-2022 school year. Early on in this chapter, the findings will be discussed based on the research question of this study. The research question for this study was: *What are the lived experiences of students identified as BIPOC participating in college and career mathematics readiness activities*? Next, themes that emerged from this study will be linked to earlier literature regarding students of colors' experiences in the classroom, and application points involving teaching and learning will be considered. Ultimately, this chapter aims to lay out the findings of this study, their implications, connections between the findings and previous literature on the subject, and finally, recommendations for future research. In sum, as the findings of this study suggest, the purpose of this study was to fill a gap in the literature regarding students of color lived experiences as participating in college and career mathematics readiness activities.

Interpretation of Results

The focus of this study was on the opportunity gap in mathematics education and students' experiences. Calling attention to students' perspectives was underscored in this study because storytelling affords "the necessary context for understanding, feeling, and interpreting"

(Ladson-Billings, 1998) perspectives. This study was first conducted in large part to address why the number of BIPOC students in the college and career readiness mathematics classrooms has been known for being "perennially low" (Flores, 2007). The researcher's attention shifted from the achievement gap (standardized test results) to the opportunity gap (unequal opportunities and experiences among students of differing socioeconomic and racial backgrounds). This study informs its audience about research that addressed the historical perspectives and current findings of students of color experiences as participating in mathematics readiness activities. The 12 participants were high school freshman and sophomores whose ages ranged from 13 to 16 years old during the 2021-2022 academic school year. To collect data regarding these students' experiences, individual interviews were conducted using a seven-question instrument in a reserved area in Hope High School. All of these interviews were also conducted through Zoom the week of November 15-19, 2021.

The intent behind this study was to approach students of color not as a struggling subgroup but to provide a rationale, from the students' narratives or storytelling perspectives, regarding their enrollment in college and career mathematics readiness courses. The results of this study showed that there needs to be an increase in students' awareness concerning the courses available to them at Hope High School. This increase in awareness can be via teachers, counselors, and/or building administrators. In addition, a student course sheet can be created for each grade level to inform the students of the courses available to them.

The major result of this study, according to the research conducted, was this: one does not seek to examine students of color as a struggling subgroup but rather to explore the factors identified by these students as encouraging or hindering their participation in college and career

mathematics readiness activities. With that in mind, “Little research has been done to examine academic success among African American students” (Ladson-Billings, 1995, p. 475). Therefore, students’ lived experiences were examined to understand why they did or did not participate in college and career mathematics readiness activities when the options were readily available. Further, the following paragraphs discuss the themes that emerged, each will be linked to literature, and application points are considered.

Utilizing Gutierrez & Rogoff’s (2012) Cultural-Historic theory to highlight identity, within this study, one participant felt students of color racial identities impacted enrollment in the college and career mathematics readiness activities. Hannah, a 10th-grade participant, felt many more students of color would take the courses if they were encouraged and aware of the options to enroll. She expressed that more should be done to encourage students of color to enroll in these course offerings when she stated:

> I’m not going to say it’s anybody’s fault but in AP classes you don’t see black people much. I feel like, for me [and I’m black], because I'm in AP classes a lot, I'm mostly surrounded by white people. It's not like racial [discriminatory intent] or anything like because the teachers all care about us equally. But I'm always like one or few. As I remember, in my classes last year back when I came back to school my freshman year, I was probably the only black girl within all my classes.

While identity was not confessed as a hindrance for students enrolling in college and career mathematics readiness activities, per se, it was definitely an observation. Students need to be explicitly made aware of course offerings at their schools. In addition, the theme “relationships influence students’ experiences,” was supported here with Dr. Gloria Ladson-Billings (1995)

framework of culturally relevant pedagogy. With this frame of reference, students' experiences, their ways of interacting with the world, and connections to the content were analyzed. The relationships that were taken into account involve: 1) students' relationships with teachers, 2) students' relationships with content, and 3) students' relationship with peers. The research question and implications of each of these relationships will be discussed in the paragraphs to follow.

Research Question

The research question for this study was *What are the lived experiences of students identified as BIPOC participating in college and career mathematics readiness activities*? Twelve students were examined to elevate the voices of this population and better understand their rationale for participation or non-participation in college and career mathematics readiness activities. Since we know students who involve themselves in these activities tend to have more successful outcomes in mathematics, the researcher sought to understand the students' perspectives that either encouraged or hindered their enrollment in the courses.

Implications of the Study

Some of the most significant indicators of students' success in mathematics were their relationships with teachers, relationships with content, and relationships with their peers. Students' experiences with the following parallel codes either encouraged or inhibited these influential relationships: 1) agency/apathy, 2) caring/harmful, 3) engaging/disengaging, and 4) resourced/unresourced. The literature used to support this study suggests students thrive in environments where they feel safe, cared for, and comfortable. Many students from marginalized

groups have to deal with stresses that come along with their experiences as members of these groups. Therefore:

> We have to understand their safety-threat detection system is already cued to be on the alert for social and psychological threats based on past experiences. It becomes imperative to understand how to build positive social relationships that signal to the brain a sense of physical, psychological, and social safety so that learning is possible. (Hammond, 2015, p.45)

The purpose of this study was to uncover the lived experiences of students of color as encouraging or hindering their participation in college and career mathematics readiness courses. This qualitative data revealed relationships to be significantly important to these students' success.

Relationships Influence Students' Experiences

It is important to note that relationships were remarkably influential to students of color mathematics success in this study. As confirmed by Hammond (2015), students of color "need to feel affirmed and included as members of a learning community" (p. 47). When students felt cared for and affirmed, their relationships with their teachers were strengthened.

Students' Relationships with Teachers

Students of color in this study who both enrolled in college and career mathematics readiness courses and had teachers with the traits of agency, caring, engaging, and/or resourced showed high levels of success in mathematics. Indeed, teachers who had strong positive relationships with their students of color exhibited effective levels of culturally relevant pedagogy. With that being said, "Culturally relevant pedagogy must provide a way for students

to maintain their cultural integrity while succeeding academically" (Ladson-Billings, 1995, p. 476). That being the case, students' identities were affirmed, and academic success at the students' achievement level was an expectation set forth by the teacher. These successful experiences required that students receive "structured interactions, in which teachers set high standards, clear expectations, and reasonable limits for students' behaviors and performance and consistently follow through on their demands" (Furrer et al. 2014, p.105). As stated by Zaretta Hammond (2015), teachers became "warm demanders" (p.106) and students rose to the expectancy.

Students' Relationships with Content

Students' connections with the content as being relevant to their everyday lives was impactful. Emdin (2016) stated, "Students have to first connect to a classroom/school that welcomes their brilliance, celebrates it, and make them realize that they have a natural ability (by virtue of their neoindigineity) to be academically successful" (p.176). In this study, successful relationships with the content became evident when students were given the opportunity to collaborate in discourse and engage in challenging hands on tasks. These tasks allowed students to make meaning of the content by creating and constructing products as evidence of their learning. Further, students who interacted with their peers consistently experienced success in the mathematics classroom.

Students' Relationships with Peers

Demonstrations of successful relationships among their peers were extremely supportive of one another. "When students have opportunities to talk and listen to each other, provide emotional support, share learning experiences, and develop respect they are more likely to feel

that they belong and are understood and cared for by their peers" (Furrer, Skinner, Pitzer, 2014, p.106). Implementations of agency, caring, engaging, and/or resourced characteristics lead to successful mathematics experiences for the students in this study. When students can rely on each other and gain a sense of competence and confidence from one another the classroom community flourishes.

Limitations of the Study

Due to the challenges brought about with the Covid-19 pandemic, such as social distancing, restrictions on the number of people in particular spaces, limited interactions between the researcher and students, along with other protocol issues, students were interviewed individually rather than in a group setting. This brought about limitations to the number of participants, which were 12, who were interviewed in-person and recorded through Zoom. Additionally, the interviews were restricted to a specific time during the school day.

Recommendations for Future Research

All things considered, if the study is replicated in the future, some suggested recommendations include the following:

- Increase the population of students of color in the study to include eighth-graders, freshmen, sophomores, and high school juniors.
- Expand to a larger geographic area.
- Use teachers and counselors as avenues to educate students on all college and career mathematics readiness activities options available to them.
- Unravel ways to diversify mathematics readiness courses and be sure all students are aware of the changes.

- Encourage small, focused study groups that are led by educators and students alike within the content areas.
- Inspire teachers to increase or balance assignments to be hands-on or project-based in the classrooms.

With these recommendations, the researcher aims to increase successful experiences for students of color in college and career mathematics readiness activities.

Summary

All in all, this study discovered themes in mathematics education high school classrooms by pointing out characteristics that encouraged and/or inhibited students of colors' participation in college and career mathematics readiness activities in Hope High School. Rather than focusing on the achievement gap (that is, standardized test results) this study focused on the opportunity gap (unequal opportunities and experiences among students of differing socioeconomic and racial backgrounds). As such, students of colors' lived experiences were examined by way of storytelling which provided the "necessary context for understanding, feeling, and interpreting" students' perspectives (Ladson-Billings, 1998). These stories add value to the body of literature that exists regarding students of colors' lived experiences. The results of this study signify that further emphasis is necessary on the positive influence of students' relationships with their teacher, their classroom's content, and their peers in the mathematics classroom.

The initial claims of this study expressed the importance of mathematics education and its well documented impact on students' lives beyond the classroom. The focus of the study was on the lived experiences of students of color as participating in college and career mathematics

readiness activities. Subsequently, an analysis and discussion about the factors that encouraged or inhibited their participation in certain courses was examined.

As a researcher and first generation African American female college graduate, the author of this study was not surprised by the results of this study. The researcher intends to continue the work of this study to promote the National Council of Teachers of Mathematics' (NCTM) three empowering purposes that include: 1) expand professional opportunities, 2) understand and critique the world; and 3) experience the wonder, joy, and beauty that a mathematics education can provide. The researcher wishes to continue to expand mathematics as mirrors, windows, and sliding glass doors (Bishop, 1990) for both students of color and educators alike.

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LIST OF APPENDICES

APPENDIX A

TEACHER INTERVIEW PROTOCOL

Guiding Research Question: What are the lived experiences of students identified as BIPOC participating in college and career mathematics readiness activities?

Semi-structured interview: "either all of the questions are more flexibly worded or the interview is a mix of more and less structured questions" (Merriam & Tisdell, 2016, p.193).

Opening

- Welcome
- Content
- Appreciation

Script

Thank you for agreeing to participate in my study. During this interview, I will ask a series of questions regarding your experiences as participating in college and career mathematics readiness activities. These activities include enrollment or completion of advanced placement (AP) mathematics, dual enrollment, and dual credit programs, and/or career and technical education (CTE) courses. There are no right or wrong answers, and I encourage you to answer as you will about your experiences. If at any point during the interview, you no longer wish to participate, please feel free to inform me of your concerns and we will immediately discontinue the interview. If you decide after the interview that you do not wish for me to include your responses in the results, please let me know. Are there any specific questions before we begin?

Questions for the students:

1. Verify for me your name, current grade, and course enrollment.

2. Can you tell me about the math courses you have taken?
3. How would you describe your math experiences so far? Tell me a story about your experiences with mathematics in school.
4. Do you have any stories about people who have influenced your success in mathematics? If so, tell me more. Do you have any stories about people who have made your experiences more difficult in mathematics? If so, tell me about it.
5. Do you feel any factors supporting your success or factors hindering your success have been related in any way to your identity? If so, how? (Probing question)
6. Thinking about the details and experiences you've shared with me; do you have any recommendations for your school on how it might help improve the experiences and support students who identify as members of people of color community?
7. Is there anything else you would like to share with me related to your academic experience and/or school regarding your mathematical experiences?

Closing

- Thank you again for your time and participation.
- Summarize next steps
- Questions/comments

APPENDIX B

RESEARCH JOURNAL EXAMPLE

Date: **Participant Code:** **Open notes:**
Experiences that created barriers: **Experiences that created pathways:** **Other notes:**

APPENDIX C

CODE BOOK

Theme: Relationships Influence Students' Experiences		
	Relationships with Teachers (Subtheme A)	
Facilitate Successful Experiences	**Agency Experiences**: moments, expressions, or statements in which a student's demonstration of self-initiation on their own behalf is guided by, or made available by the teacher	**Caring Experiences**: moments of encouragement from the teacher, where exhibitions of positive belief in the students or motivation are generated on behalf of the student
	Engaging Experiences: moments of mutual active participation in activities and tasks between the student and teacher where both parties feel comfortable and interact in a respectful manner	**Resourced Experiences**: interactions between the teachers and students that may include tutoring, sharing notes and/or instructional materials, discussions, small group instruction, and collaborative events
Hindering Successful Experiences	**Apathy Experiences**: moments, expressions, or statements made by the student where there was a lack of demonstration from the teacher and/or interest or concern shown between the student and teacher	**Harmful Experiences**: moments of discouragement between student and teacher, exhibition of a negative belief in students' abilities to learn, or a lack of belief in them
	Disengaging Experiences: moments of inactive participation in activities and tasks between the student and teacher, so much so neither party feels comfortable and/or does not want to interact with each other in a respectful manner	**Unresourced Experiences**: moments between students and their teacher could be described as lack of interchange between the teachers and students involving such additional teaching opportunities as tutoring, sharing notes and/or instructional materials, discourse, small group instruction and/or collaborative events

Page Break

Theme: Relationships Influence Students' Experiences		
	Relationships with Content (Subtheme B)	
Facilitate Successful Experiences	**Agency Experiences**: moments, expressions, or statements made by the student where a demonstration of self-initiation on the student's behalf was achieved by appropriate guidance from the teacher	**Caring Experiences**: moments of encouragement by the teacher, where exhibitions of positive self-belief by students or motivational occurrences are engendered for students
	Engaging Experiences: moments of excitement towards and active participation in activities and tasks where the student feels comfortable and competent in mathematics	**Resourced Experiences**: moments in which students' interactions with the content lead to the students creating their resources in the classroom or discovering others: writing efficient note to themselves and/or recognizing the value of instructional materials such as videos and games to show self-guided interactions with the content
Hindering Successful Experiences	**Apathy Experiences**: moments, expressions, or statements made by the student where there was a lack of demonstration and/or interest or concern shown from the student regarding the content	**Harmful Experiences**: discouraging, exhibiting a negative or lack of belief in the student's ability to learn, where questions are unanswered, and the students' experiences both inside and outside of school are unsupported
	Disengaging Experiences: moments of inactive participation in activities and tasks between the student and teacher where neither party feels comfortable and/or does not interact in a respectful manner	**Unresourced Experiences**: student's lack of gathering resources such as notes and/or instructional materials, forming small group sessions, and/or other collaborative events

Theme: Relationships Influence Students' Experiences		
	Relationships with Peers (Subtheme C)	
Facilitate Successful Experiences	**Agency Experiences**: moments, expressions, or statements in which a student demonstrates self-initiation to reach out to peers to comprehend the mathematics content	**Caring Experiences**: encouraging, exhibiting a positive belief in the student where motivation is generated on behalf of the student, where the student puts forth the best effort, asks questions, and talks about their lived experiences both inside and outside of school
	Engaging Experiences: moments of active participation in activities and tasks between the student and teacher were both parties feel comfortable and interact in a respectful manner	**Resourced Experiences**: interactions between the student and peers that may include tutoring, sharing notes and/or instructional materials, discussions, small group instruction, and collaborative events
Hindering Successful Experiences	**Apathy Experiences**: moments, expressions, or statements made by the student where there was a lack of demonstration and/or interest or concern shown from the student	**Harmful Experiences**: discouraging, exhibiting a negative or lack of belief in the student's ability to learn, where questions are unanswered, and the students' experiences both inside and outside of school are unsupported
	Disengaging Experiences: moments of inactive participation in activities and tasks between students and their peers where neither party feels comfortable and/or does not interact in a respectful manner	**Unresourced Experiences**: lack of interchange between students and their peers such as tutoring, exchanging notes and/or instructional materials, small group instruction, and/or collaborative events

APPENDIX D

DEMOGRAPHIC AND INFORMATION SURVEY/INTERVIEW QUESTIONS 2021

Survey Questions:

1. Age
2. Grade/classification
3. Do you identify as Black, Indigenous of People of Color?
4. Race/Ethnicity
5. Which mathematics classes have you participated in?
6. What mathematics classes are you currently taking?
7. Are you currently enrolled in enrollment or have completed any advanced placement (AP) mathematics, dual enrollment, and dual credit programs, and/or career and technical education (CTE) courses? If so, which classes?

APPENDIX E

INFORMATION SHEET

Title: Closing the Opportunity Gap in Mathematics Education

Description
The purpose of this qualitative research study is to identify the lived experiences of students identified as Black, Ingenious, and/or people of color (BIPOC) students participating in college and career mathematics readiness activities. I would like to ask a few questions about students' experiences regarding their participation or nonparticipation in mathematics readiness courses. Students' names nor other identifiable information will be revealed.

Cost and Payments
It will take approximately one hour to complete the interview sessions.

Risks and Benefits
Students may feel uncomfortable when recalling experiences that inhibit their participation in college and career mathematics readiness activities. Benefits include but are not limited to identifying experiences that encourage BIPOC students to enroll in mathematics readiness courses.

Confidentiality
The collected information will be kept confidential. It will not be possible for anyone, even researchers, to associate responses to students. No identifiable information will be linked to any responses; therefore, we do not think anyone can be identified from this study.

Right to Withdraw
Students do not have to take part in this study and may stop participation at any time. If students start the study and decide they do not want to finish, all one must do is inform Mrs. Cook in person, by letter, or by telephone (contact information listed above). Students may skip any questions they prefer not to answer.

IRB Approval *****must be included as written*****
This study has been reviewed by The University of Mississippi's Institutional Review Board (IRB). If you have any questions, concerns, or reports regarding your rights as a participant of research, please contact the IRB at (662) 915-7482 or irb@olemiss.edu.

Statement of Consent
I have read and understand the above information. By completing the survey/interview I consent to my student(s) participating in the study.

Signature:_____ Date: _____

APPENDIX F

CHILD ASSENT FORM

Dear (*Participant*):

I would like to invite you to help me with a project that I am doing at The University of Mississippi.

The purpose of this project is to help me learn more about "Closing the Opportunity Gap in Mathematics Education". No one will see your answers except my advisor and me, and I won't use your name in any reports.

If you take part in my research, you should have filled out an initial survey. Please return this assent from to me, and then I will set up a time for you to participate in an interview. It will take you about 1 hour to finish.

You are free to quit this research at any time and I won't be upset with you. If you have any questions or concerns, please ask me, email, or call me. We will protect confidentiality by coding and then physically separating information that identifies your responses (which is even safer than how medical records are stored today).

This study has been reviewed by the Institutional Review Board and has been approved as a good study. Members of the Institutional Review Board (IRB) – the committee responsible for reviewing the ethics of, approving, and monitoring all research with humans – have authority to access all records. However, the IRB will request identifiers only when necessary. We will not release identifiable results of the study to anyone else without your written consent unless required by law. Thank you for your help.

Sincerely,

I agree to help with this research project. ❑ YES ❑ NO

Name: _____ Date: _____

VITA

Candies Winfun-Cook

Facilitator of learning for both students and teachers

EDUCATION

Ph.D. University of Mississippi — May 2022
Elementary Education
Advisor: Dr. Joel Amidon

Ed.S. University of Mississippi — May 2008
Special Education
Advisor: Dr. James S. Payne

M.Ed. University of Mississippi — May 2006
Curriculum and Instruction
Advisor: Dr. Kaye Pepper

B.A. University of Mississippi — May 2004
Elementary Education

A.A. Itawamba Community College — May 2001
Elementary Education

TEACHING EXPERIENCE

Oxford School District, Oxford, MS — July 2019- present
Mathematics Coach/Specialist

- Create and develop instructional resources for teachers and students
- Facilitate professional development and follow up coaching to support teachers
- Work with mathematics PLC and administrators to determine and support teacher needs
- Use, model, and research effective research based instructional strategies
- Measure and analyze data to improve instructional strategies and student growth

University of Mississippi, University, MS — August 2008-2019
School of Education Clinical Instructor

- Demonstrate and model appropriate teacher behaviors to prepare student teacher candidates for classroom experience.

Oxford Intermediate School, Oxford, MS August 2014- 2018
Mathematics Teacher

- Taught 5th grade and 6th grade mathematics teacher, covering College and Career Readiness Standards
- Develop hands on tasks, quizzes, exams, and homework
- Incorporate use of technology within the classroom
- Coordinate assessments and grading with a team of 3 colleagues
- Clinical Instructor for student teacher candidates from The University of MS

Della Davidson Elementary School, Oxford, MS Aug 2008 to May 2014
5th Grade Math & Science Teacher, 5th Grade Department

- Taught 5th grade mathematics, averaging 50 students per year, covering 5th grade Common Core State Standards
- Developed hands on tasks, quizzes, exams, and homework
- Incorporated use of technology within the classroom
- Coordinated assessments and grading with a team of 3 colleagues
- Clinical Instructor for student teacher candidates at The University of MS

Quitman County Elementary School, Lambert, MS Aug 2004 to May 2008
3rd Grade Math & Science Teacher, 3rd Grade Department

- Taught 3rd grade mathematics, averaging 50 students per year, covering 3rd grade Mississippi State Standards
- Developed hands on tasks, quizzes, exams, and homework
- Coordinated assessments and grading with a team of colleagues and teacher assistants
- Grade chairperson

RESEARCH EXPERIENCE

Manuscript in Progress

Amidon, J., Cook, C., & Monroe, A. (Under Review). Equity in Mathematics Education.

Monroe, A., Amidon, J., & Cook, C. (Under Review). Mathematics and Shame.

What is Autism Spectrum Disorder? University of Mississippi, Oxford 2008
Advisor: James S. Payne
Submitted manuscript to the Journal of Autism entitled “What is Autism Spectrum Disorder?”

Scholarly Presentation

Research Conferences

Amidon, J., Cook, C., & Monroe, A. (February, 2022). *Promoting a Productive Disposition Toward Teaching Mathematics by Examining Mathematics Autobiographies and Teacher Efficacy*. Poster at annual conference of the Association of Mathematics Teacher Educators. Las Vegas, NV.

Cook, C., Amidon, J., & Monroe, A. (February, 2022). *Redesigning Struggle in the Classroom to Foster Doers of Mathematics*. Session at the National Council of Teachers of Mathematics Regional Conference. New Orleans, LA.

Amidon, J., Monroe, A., & Cook, C. (September 2021). *Shame, shame, go away: Leading teachers to promote productive struggle in fostering doers of mathematics.* Session at the annual meeting of the National Council of Supervisors of Mathematics. Atlanta, GA.

Cook, C., Amidon, J., & Monroe, A. (October, 2019). *Productive v. Destructive Struggle in Mathematics Classrooms*. Session at the National Council of Teachers of Mathematics Regional Conference. Nashville, TN.

Cook, C., Monroe, A., & Amidon, J. (October, 2018). *Productive v. Destructive Struggle in Mathematics Classrooms*. Session at the fall meeting of the Mississippi Council of Teachers of Mathematics. Columbus, MS.

Cook, C., Monroe, A., & Amidon, J. (October, 2017). *Productive v. Destructive Struggle in Mathematics Classrooms*. Session at the annual Mathematics Specialist Conference of the Center for Mathematics and Science Education. Oxford, MS.

Audio Presentations

Cook, C. Contributor. (2020, August 4). Steve Barkley Ponders Out Loud: Promoting Students Being Doers of Mathematics. Retrieved from https://barkleypd.com/blog/podcast-for-teachers-promoting-students-being-doers-of-mathematics/

Amidon, J. Contributor. (2020, June 30). Steve Barkley Ponders Out Loud: Avoiding Shame and Encouraging Productive Struggle in Math. Retrieved from https://barkleypd.com/blog/podcast-for-parents-avoiding-shame-and-encouraging-productive-struggle-in-math-part-19/

Cook, C. Guest. (2020, April 28). Amidon Planet Podcast E022: Celebrating the Struggle with Candies Cook and Ann Monroe [Audio podcast]. Retrieved from https://amidonplanet.com/episode22/

Cook, C. & Buckhalter, B. Guest. (2020, February 27). Teaching Math Teaching Podcast Episode 3: Becoming a Math Coach in a School District [Audio podcast]. Retrieved from https://www.teachingmathteachingpodcast.com/3

Item Writing Experience

Mississippi Assessment Program Item Writer 2015 - 2019

Created, reviewed, and/or edited assessment items on a sizable scale.

· Item Writer for Math MAP October 2015
· Item Writer for Math MAP June 2016
· Item Writer for Math MAP July 2016
· Super group member for Math MAP September 2016
· Super group member for Math MAP October 2016
· Super group member for Math MAP January 2017
· Super group member for Math MAP March 2017- 2019

Presentations and Guest Lectures

Keynote Address, "Classroom Management," Invited Lecture, 2011.

Keynote Address, "Reading and Arithmetic," Summer Professional Development for Oxford School District, June 2013.

Workshop, "What is Schoology?", Schoology Workshop, September 9, 2015.

Workshop, "AVID- Math Strategies," AVID Workshop, November 28, 2018.

Workshop, "AVID- Inquiry," AVID Workshop, January 15, 2019.

Keynote Address, "Culturally Responsive Teaching & the Brain," Invited Lecture, 2020.

Professional Training

Item Writer for Questar 2015-present
Actively designed questions during Questar Item Writer's Workshop for grades three-six grade band in Mathematics.

Mississippi Assessment Program Item Writer 2015
Mississippi Department of Education, Jackson, MS, October 6-8, 2015.
Wrote assessment items for Questar for grade bands 3-5 in mathematics.

Professional Learning Community Training 2015
Solution Tree, St. Louis, Missouri July 2015.
Gained valuable knowledge for implementing and leading professional learning communities.

NCTM Conference Attendee 2014
St. Louis, Missouri November 2014.
Learned informative strategies to help actively engage students in hands on tasks in mathematics.

Item Writer for PARCC 2013
Pearson, Princeton, New Jersey, November 2013.
Analyzed and wrote items for PARCC assessment.

Professional Affiliations

Mississippi Professional Educators, 2004-Present.
Active member of MPE since 2004.

Mississippi Council of Teachers of Mathematics, 2017-present
Active member of MCTM since 2017.

National Council of Teachers of Mathematics, 2017-present
Active member since 2017.

Association for Supervision and Curriculum Development, 2018-Present.
Active member of ASCD since 2018.

Mississippi Association of Mathematics Teacher Educators, 2020-Present.
Active member of MAMTE since May of 2020.

Association of Mathematics Teacher Educators, 2020-Present.
Active member of AMTE since May of 2020.

SERVICE

Inaugural Mississippi Teacher Council 2016-Present
Provide feedback on initiatives of the Mississippi Department of Education and the Mississippi State board.

Faculty Advisory Council for Oxford Intermediate School 2015**,** 2017-present
Represent the math teachers within the school. Communicate and facilitate professional development opportunities on AVID strategies and best practices while enhancing the culture of Oxford Intermediate School by upholding its motto, vision, and goals.

Faculty Advisory Council for Oxford School District 2015
Represented Oxford Intermediate School on the district faculty council. I am a voice for faculty, staff, and students in the 5th and 6th grade building.

Director of Camp Invention 2015
Direct contact person between the school, administration, and community for the Camp Invention Summer program at Oxford Intermediate School. I organized and supervised all staff as well as program activities for the camp. The position required me to schedule, implement, and lead orientation along with staff meetings.

Faculty Advisory Council for Oxford School District 2014
Represented Della Davidson Elementary School on the district faculty council. I was the voice for faculty, staff, and students in the 4th and 5th grade building.

Faculty Advisory Council for Della Davidson Elementary School 2014
Represented the 5th grade teachers within the school. I promoted the school's vision and mission within our building.

Project Prime Participant 2013
Received "Highly Qualified" status through Project Prime program, which was offered by Mississippi Department of Education at The University of Mississippi. It allowed mathematics teachers to collaborate, engage, and gain a deeper understanding of the mathematical standards. Finished this four-year program and obtained knowledge to become an exceptional highly qualified teacher.

Honors and Awards

Outstanding Doctoral Student in Elementary Education Award 2021
The University of MS, School of Education

Mississippi Council of Teachers of Mathematics Middle School Teacher of the Year 2019
Recipient of this award from the MCTM conference.

Griffin Family Impact Award 2018
The University of MS, School of Education

MS Professional Educators Scholarship Recipient 2018
The University of MS, School of Education

Presidential Awards for Excellence in Mathematics and Science Teaching Nominee
2016/2010
Nominated by a colleague for this award. It was a great reflection experience for me. This award is the highest honor given to the nation's teachers in mathematics and science education. Teachers who receive the award inspire the community with their service and are role models to people in the profession.

Teacher of the Year 2014
Voted teacher of the year by colleagues at Della Davidson Elementary School.

OPEPE Grant Recipient 2014
I am a recipient of several OEPE grants offered by Oxford School District. I have written and received several grants for curriculum enhancement tools such as math manipulatives for my students and cohorts.

MS Teacher Fellowship Program 2014
Program at the University of Mississippi designed to attract qualified teachers in critical needs areas within the state. With the indicated program, I obtained a Master's degree in Curriculum and Instruction. It allowed for ongoing support and mentorship.