Culturally Responsive Mentoring and Instruction for Middle School Black Boys in STEM Programs

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Black boys and men are underrepresented in science, technology, engineering, and mathematics (STEM) fields of study and careers. In response to this problem, scholars and practitioners have created programs with same-race and same-gender mentoring components to increase Black men's presence in STEM fields. Most of the research on culturally responsive mentoring for Black boys have focused on programs in school settings. Drawing from a larger mixed-methods study, we use culturally responsive pedagogy and a youth mentoring theory to study out-of-school STEM programs for Black boys. Findings show that building meaningful relationships and interconnected culturally responsive mentoring and instruction are two important themes in successful STEM mentoring programs for Black boys. The study results expand the existing literature by providing insight into culturally responsive mentoring programs for Black boys in out-of-school settings and STEM spaces.

Keywords: Black males, culturally responsive, mentoring, STEM program

Over the last twenty-five years, culturally relevant and responsive practices have gained traction in classrooms, schools, and mentoring programs (Gay, 2010; Hall, 2015; Ladson-Billings, 2009; Watson, Sealey-Ruiz, & Jackson, 2016*)*. Scholars often use the terms *culturally relevant* and *culturally responsive* synonymously. Some scholars have distinguished between the two terms by noting that relevance refers to the degree that instruction reflects Black male students' experiences, while responsive denotes an instructor's ability to adapt professional behaviors to ensure Black male students' knowledge and experiences are valued (Wright & Counsell, 2018). We contend that culturally relevant and culturally responsive approaches are similar, and both are effective with African American students, especially in enhancing academic performance and cultural competence. However, there is limited research on culturally responsive methods for Black male students in classrooms and schools.

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Successive lines of research continue to examine the experiences of Black males across important In recent years, scholars have conceptualized culturally relevant and responsive practices in mentoring programs for Black male students (Gordon, Iwamoto, Ward, Potts, & Boyd, 2009; Jackson, Sealey-Ruiz, & Watson, 2014; Watson et al., 2016). Most of the available research has focused on mentoring programs for Black male high school and college students. There is little research on culturally responsive instructional and mentoring practices for Black male middle school students, especially in STEM programs. Given how quickly Black boys are adultified within society (Dumas & Nelson, 2016), it is crucial to examine their educational experiences along the pipeline, not just in the later years of high school and college.

In this article, we review the literature on Black male educators' culturally responsive pedagogical practices and mentoring programs for Black boys. We also provide an overview of our culturally responsive framework and describe the research methods used. Lastly, we report the study findings and discuss the implications.

Literature Review

Culturally Responsive Black Male Educators

A small body of scholarship focuses on culturally responsive Black male educators (Brockenbrough, 2008; Broughton, 2016; Brown, 2009; Bryan, 2016; Bryan & Milton Williams, 2017; Lynn, 2006; Milner, 2016). Much of the research has been qualitative and focused on Black males in elementary and middle schools in urban settings. Specifically, researchers have used autoethnography, ethnography, case study, and portraiture qualitative methods. Bryan and Milton Williams (2017) have provided conceptual perspectives of Black male educators' culturally relevant early childhood education practices.

Lynn (2006) has provided one of the seminal works on Black male educators and culturally relevant practices. He notes that more research is needed because most of the existing research focuses on female teachers. Using portraiture, Lynn examined the culturally relevant pedagogical practices of three Black male teachers in public elementary, middle, and high schools with large African American student populations. He found that these Black men used their lived experiences and intimate knowledge of Black history, culture, communities, students, and daily struggles with race and class oppression to reach and teach Black youth. Black male educators' culturally relevant practices demonstrated that they cared deeply about Black students and were committed to helping them become successful not only in the classroom but also in their lives. The Black male teachers possessed cultural competence that allowed the students to gain a cultural foundation and develop pride in their heritage.

Brown (2006, 2009), another foundational and leading researcher of Black male teachers, has also provided insight into their culturally relevant pedagogy. While Brown did not use a culturally relevant framework to describe Black men's pedagogy, he reviewed relevant literature about culturally relevant pedagogy. He identified limitations of the framework as it relates to performance, teachers' philosophical beliefs, and the intermingling of the two. The school, the Black male educators, taught at was working on designing and implementing an African-centered curriculum with culturally relevant pedagogy. For example, the Black male teachers in the study were called Baba, a common practice in African-centered schools (see Shockley, 2007, 2011). Brown also identified gaps related to Black male educators' performance concerning Black boys.

In a nine-month ethnographic study, Brown (2009) studied nine Black male educators' pedagogy in an urban setting with a large Black student population. He used a performance-based theoretical lens to focus on the outcome's Black male educators' pedagogy, which he encapsulated in vignettes displaying three performance styles: enforcer, negotiator, and playful. Brown describes the enforcer as a teacher with high standards and expectations. Enforcers place a high value on discipline and want Black boys to take responsibility for their behavior. The negotiator is more likely to listen to students' perspectives, ask questions, probe for answers, resolve conflict, and provide motivation. Brown describes playful teachers as those who develop relationships with Black male students through joking, debating ideas, and sharing personal experiences in informal spaces.

Using counterstories as the research methodology, Bryan (2016) used culturally relevant pedagogy as one of the theoretical frameworks to study three Southern Black male kindergarten teachers in urban, suburban, and rural schools. He found that Black male teachers viewed themselves as fictive brothers/fathers who operate in solidarity with the broader Black community to support Black male students academically and socially. Bryan (2016) also found that Black male kindergarten teachers used many culturally relevant practices such as hip-hop, sports, and classroom management to reach and teach Black male youth. In the broader community context, Black family members viewed Black male teachers as role models and positive influences on their young sons and their budding sense of manhood.

In an autoethnography, Broughton (2016) studied the culturally relevant pedagogical dimensions of his use of hip-hop pedagogy in a kindergarten and first-grade classroom. In Ladson-Billings' 2014 remix of culturally relevant pedagogy, she discusses deeper connections to hip-hop. Broughton found that his conceptualization of hip-hop pedagogy evolved over his yearlong study. He became aware of the importance of positioning himself as both a teacher and a learner. He realized he could entrust the students to lead hip-hop activities without sacrificing curriculum learning outcomes. Broughton identified the conceptions of self and others, knowledge, and social relations as key culturally relevant pedagogical dimensions. He stressed the importance of engaging in self-reflection and interrogating one's culturally relevant pedagogy, especially beliefs, strategies, methods, and research.

Broughton (2016) is not the only researcher to report Black male educators' use of hip-hop pedagogy. Both Bridges (2009) and Brockenbrough (2008) describe the culturally relevant pedagogical elements of Black male educators. Bridges (2009, 2011) used critical race theory to study nine Black male teachers from the hip-hop generation. He used the qualitative research approaches of life history and critical race methodologies to examine their beliefs and perceptions about teaching and learning. Bridges also sought to better understand how Black male educators' practices informed their beliefs and approaches to meeting Black male students' academic and social needs.

Bridges (2009, 2011) found that most of the Black men in his study assumed collective responsibility for Black families, communities, and youth. They cultivated positive, personalized, and caring teacher-student relationships. According to Bridges, Black men viewed their students as dynamic, multidimensional, and filled with promise. This positive assessment of the students guided their relationships, interactions, and teaching. He also found that Black male educators used hip-hop to challenge the limited curricular scope, incorporating Black people's histories and contributions to teach and engage students and transform their negative feelings about school. Bridges described how Black men used hip-hop to develop students' character and expand their

beliefs, perspectives, and actions toward challenging topics. They used politically conscious hip-hop to appeal to students' interests while also shaping their sociopolitical consciousness.

Brockenbrough (2008) investigated 11 Black male educators in urban middle and high schools. Three taught in either mathematics or science disciplines, and the other eight taught in humanities disciplines. Brockenbrough used Black masculine studies, critical educational theory, and life history narrative inquiry to ground the research theoretically and methodologically. In his research, he used culturally mediated factors to describe Black male teachers' pedagogies influenced by different cultural elements. Brockenbrough explained how Black male educators used Black history topics (e.g., Black Power), films (e.g., *Roots*), cultural symbols (e.g., Black fist), curriculum modifications, lessons, discussions, classroom management (e.g., instill disciplined behavior) and decor (e.g., posters representing Black history), communication patterns, style of dress, and hairstyle as culturally mediated factors to build rapport. Ultimately, he found that some Black men viewed teaching as a higher calling to not only impart educational information but also serve the Black community, specifically Black boys.

Milner (2016) studied a Black male educator's culturally responsive pedagogy in a case study of Mr. Jackson, an urban middle school mathematics and science teacher. He possessed a strong knowledge of his students and knew how to use the school social structure to shape their learning. For instance, Mr. Jackson first engaged his toughest, strongest, and most popular students, recruiting them to use their power and influence to shape the entire class's learning. Mr. Jackson strongly believed it was important for his students to have a positive image of him and the classroom environment. Therefore, he used his style of dress to connect with his students. Brockenbrough (2008) reports that Black male educators tend to use their style of dress to connect with students on a cultural level. Milner explained that Mr. Jackson also used music (e.g., jazz, R&B, hip-hop) as a tool to engage students in the learning process.

Taken together, this body of research provides insight into Black male educators' culturally relevant pedagogical practices. However, most of this research has taken place in schools at all educational levels. There is a need for more research on Black men using culturally responsive practices in out-of-school learning spaces.

Culturally Responsive Mentoring

Gordon et al. (2009) studied Black eighth grade boys participating in an all-male culturally responsive intervention that operated during school hours at a co-ed urban middle school. The program used an Afrocentric and pro-social model that emphasized positive male role models, male instructors, community and business leader engagement, cultural strengths and pride, and single-sex instruction. To determine the program impact, they studied 29 Black eighth-grade students who participated in the program and 32 non-participating Black male eighth-graders. All 61 boys were administered demographics questionnaires, racial identity attitudes scales, and identification with academics' scales. The researchers also collected and examined students' grade point averages and statewide standardized test scores in mathematics and reading.

Gordon et al. (2009) found that the boys who participated in the program had higher GPAs and higher standardized test scores in mathematics than those who did not. There were no differences between participants and non-participants' standardized test scores in reading. They also found that the Black boys who participated identified with academics more than those who did not. Unfortunately, the young men who did not participate experienced a steady decline in their academic performance. However, the participants had a higher endorsement of internalized racial

identity attitudes, higher standardized test scores in mathematics and higher GPAs overall. Additionally, Black males who hold higher internalized racial attitudes and lower immersion/emersion attitudes tend to score higher on standardized reading tests. This study demonstrated that Afrocentric mentoring programs were effective and positively impacted the participants' academic success and achievement.

Other researchers studied how an Afrocentric school-based mentoring program impacted Black male high school students (Jackson et al., 2014; Watson et al., 2016). Jackson et al. (2014) conducted a phenomenological study of seven Black males and seven Latino males who participated in an all-male, in-school mentoring program at an alternative high school. They found three salient themes: a) brotherhood and collective responsibility; b) trust and open dialogue; and c) broadened sense of capacity and personal aspirations. Their findings illustrate the importance of relationship-building and being guided by an ethos of care, trust, and love for Black male students. In a subsequent article of the Afrocentric mentoring program, Watson et al. (2016) report the following themes: a) mutual trust: developing the openness to share experiences; b) warm demanding; and c) culturally relevant care as a humanizing pedagogy. Overall, the program impacted the Black males' interpersonal relationships, desires, and academic and life goals.

Because these studies center school-based mentoring programs, the research findings and insights can only apply to other school-based programs. The reported research has not focused on Black male students at the middle school level participating in non-school-based programs. Based on this information, there is a need for research on out-of-school STEM mentoring programs for Black boys in middle school.

Theoretical Framework

Theoretical perspectives of culturally relevant pedagogy (CRP) originate from the seminal research of Gloria Ladson-Billings' (2009) study on successful teachers of Black children. She argues that CRP is an orientation toward teaching, not just a set of practices. Ladson-Billings (2009) conceptualized CRP to ensure that Black students are academically successful and able to build critical consciousness to disrupt the status quo. Ultimately, they should be able to develop, maintain, and expand cultural competence. She identified four critical aspects of CRP: a) conceptions of self and others; b) social relations; c) conceptions of knowledge; and d) critiques of the system. Geneva Gay, a leading scholar, built on Ladson-Billing's CRP foundation by developing a culturally responsive teaching (CRT) framework. She defines CRT as

> the cultural knowledge, prior experiences, frames of reference, and performance styles of ethnically diverse students to make learning more relevant to and effective [for students] … It teaches to and through the strengths of these students. It is culturally validating and affirming (Gay, 2010, p. 31).

Culturally responsive approaches operate from a strengths-based perspective that seeks to optimize the gifts, talents, knowledge, and skills of Black male students. We use these scholars' conceptualization of CRP and CRT to theorize culturally responsive instruction and mentoring for middle school Black male students in a STEM program.

CRP and CRT are often used to describe the culturally informed praxis of teachers. While scholars recognize differences in what it means to be culturally relevant and responsive, we contend that they are more alike than incompatible. The similarities and synergy outweigh the nuanced differences. Culturally relevant and responsive teachers both recognize the importance of high expectations. They also increase engagement by creating instructional materials, assignments, and environments that reflect students' backgrounds and experiences. Irvine (2010) articulates

similar features of culturally relevant and responsive teachers and discusses the importance of knowing students, building a caring relationship, and learning from their experiences.

Gay (2010) identifies the power of caring as one of the most essential components of CRT. Jackson et al. (2014) assert that caring is a salient aspect of mentoring because it helps build relationships and permits the examinations of race, ethnicity, and gender. Additionally, the act of mentoring is enhanced by culturally relevant care contributions of reciprocity between caregivers and those who are cared for, thus acknowledging the agency children and youth have within mentoring relationships. They state further that authentic care involves mentors and educators seeking to understand students personally and culturally. Culturally relevant care (Parsons, 2005; Watson et al., 2016) and political care (De Royston, Vakil, Nasir, Ross, Givens, & Holman, 2017) are two approaches to engaging Black male youth that have been offered within existing research. We focus on the notion of care as an essential component of mentoring given the extent to which Black children and youth, particularly boys and young men, are not cared for within educational spaces (Howard, 2014).

In the *Guide to Mentoring Boys and Young Men of Color*, the authors use Ladson-Billings' (2009) culturally relevant pedagogy to ground cultural competence in mentoring. Rhodes (2005) provides a theoretical model for mentoring youth that rests on the belief that mentoring relationships can promote positive outcomes through a range of processes, including social-emotional, cognitive development, and identity development. These components work in concert with one another over time. Utilizing more than one of the components increases the outcomes and impact on youth. This model hinges on the belief that the mentoring relationship requires the mentor and mentee to form a strong connection. Trust, empathy, and mutuality are foundational components of the relationship, which is impacted by individuals, family, context, and relationship length. Unfortunately, scholars know little about how gender, age, ethnicity, and race affect the mentoring relationship (Rhodes, 2005).

Culturally relevant and responsive frameworks have not been used to better understand the instruction and mentoring of middle school Black boys' experiences in an out of school STEM program.

Methodology

The research presented in this article is from a larger mixed-methods study of middle school Black boys participating in STEM programs at four Historically Black Colleges and Universities (HBCUs). We only use the qualitative research portion from three of the four research sites to describe the culturally responsive mentoring and instructional components in the study.

Research Sites

For this study, there are four research sites (RS) at HBCUs in the Mid-Atlantic and Southern regions that host STEM programs for middle school Black boys. All the programs are grant-funded and free to the participants. The programs' common elements were mobile app development, 3D modeling, and printing, engineering, computer science, robotics, coding, and augmented reality. Some STEM programs incorporate mathematics to help students better understand computer science and engineering topics. In many programs, college professors facilitated instruction and played a major role in determining the content. The STEM instructors for RS 1 were both college students and professors. Instructors at RS 2 were college students majoring in STEM.

The mentoring structure and instruction were different at each site. Most of the programs intentionally sought to recruit Black male college students to serve as mentors. However, RS 2 had female mentors. Mentors at RSs 1 and 3 were not all STEM majors, but RS 2 used only STEM majors. Black men served as mentors and instructors for RS 3. Each research site had one or more program directors.

Table 1

Research Site Mentoring Structure and STEM Instructors

Research Site	Program Duration	Mentors/Structure	STEM Instructors
RS 1	Two weeks	• College Students • Mentoring Course	• College Professors • College Students
RS 2	Four weeks	• College Student Mentors	• College Students
RS 3	Four 1-week	• College Students	• College Students

Participants

The participants for the larger mixed-methods study were college professors, Black college students, and Black male middle school students. The college professors were primarily males who represent diverse racial and ethnic groups in STEM disciplines, but this study only reports Black males' findings. This article uses research data to illustrate instructors' and mentors' culturally responsive practices that supported the Black boys in the programs.

Data Collection and Analysis

Surveys and interviews (individual and focus group) were the primary data source for the study. At the research sites, surveys and interviews were administered and conducted with the mentees, their instructors, and mentors in the program. The data collection yielded 191 pre/post STEM attitude surveys, 174 student instructional surveys, 40 instructors/mentors instructional surveys, 16 individual instructor interviews, four middle school liaison individual interviews, 18 individual mentor interviews, 24 focus group interviews (122 students), and 18 classroom observations. The research site leadership administered the pre/post STEM attitude surveys. A research team traveled to each site to conduct interviews and administer surveys electronically.

The research team engaged in peer debriefing sessions to discuss the data and initial findings. They prepared a preliminary presentation of the data and findings and presented it to the STEM program leadership. Later, the interview audio was transcribed via an online transcription service and reviewed by the research team and graduate student assistants for accuracy. The survey data was downloaded from the electronic database and then uploaded and analyzed in SPSS.

Both the qualitative and quantitative data were uploaded into a web-based system for data analysis. The qualitative data were reviewed several times in the web-based system and transcripts.

Codes were created, words and phrases were highlighted, and notes, thoughts, or ideas were written about the data. The codes were then used to help develop themes. Using the culturally responsive framework, two salient themes emerged that encompassed the mentors' and instructors' practices, thoughts, experiences with teaching STEM content to Black middle school boys.

Findings

The findings illustrate how Black male mentors and instructors prioritized relationship-building to teach their students in culturally responsive ways. Two main themes arose: a) building meaningful relationships with Black boys, and b) interconnected culturally responsive mentoring and instruction.

Building Meaningful Relationships with Black Boys

The Black male mentors and instructors recognized the importance of getting to know, relating to, and building caring relationships with Black boys. Their personal experiences played a significant role in how they sought to connect with their students. The mentors and instructors used a variety of approaches to get to know the boys. One participant, Travis, explained how he tried to be relatable. He stated,

> My biggest approach that I try to focus on is just being relatable. When teachers tend to teach, we miss that lack of connection. And being an African-American male, I don't want the students to think they can't relate to me. So, what I try to find out is to get on their level, be relatable and make them understand that, hey, I was once in your shoes. So, I'm just trying to guide you, tell you at least about some of the mistakes that I made, and then make better decisions going forward. (RS 1 Interview)

Travis's statement illustrates his belief that teachers and mentors need to develop relationships with Black boys. He elaborated on specific strategies he used to connect with students:

> We first start [by] introducing each other. We start talking general basics about who you are, what you do, what certain things stand out to me that I know I can engage the students with like sports, specific movies, or things that they enjoy. I instantly engaged in it, and I tried to show them that I like that stuff too. So, when they start seeing that they start opening up more, then they start asking me questions... We had a whole debate talking about the newest movie... Incredibles 2. So being relatable and talking to them about that and making jokes with them like, "Hey, some of you weren't even born when the movie came out. Incredibles 2 is not for you; it's for me," right? I'm just joking around with them; they start to open up and be more friendly and be more open, like, "Okay, he's a human being. I can actually sit and talk to him." No, I just try to be as relatable as possible. (RS 1 Interview)

> The interview dialogue above demonstrates how a Black male college student instructor gets to know his Black male students and draws on personal experiences to teach them. He builds relationships by discussing their interests and including them in the instruction. Another instructor, Brendan, also thought it was important to be relatable to the students. He stated,

> My approach... it's to be more relatable. I know every kid by name. It's so weird. The way I do it, I know that I'm a mentor. I try to relate to it as a little brother, big brother type of relationship. They can refer to me as Mr. Brendan or whatever the case may be. If they call me Brendan, I don't say, "Hey, no. It's Mr. Brendan." I used to do that when I was teaching. Here I try to be more relatable because you never know. (RS 3 Interview)

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Brendan further elaborated on his views about building a relationship with Black boys:

> To have a relationship with each of them is not bad. You try to have talks with them, be relatable on certain things that they like. Movies, games, and everything like that. You try to talk to their parents. For the most part, I do actually talk to every single one of their parents. When they get dropped off and leave, I try to make myself well known to the parents... I brought who I am and who they are to this experience. I ask them questions. Every time I see them, especially during the school year, I ask them, "Hey, how's school?" Or "Oh yeah, your birthday is coming up." Stuff like that. You try to make sure you know the general information about the kid. (RS 3 Interview)

Because of his dedication to Black boys, Brendan expanded his knowledge base to serve his students better. He explained how he invested in his education:

> I started reading a lot. I started teaching me things that are outside of my major. Even though I am going to school to be an electrical engineer, I study philosophy and psychology because even though we're in a STEM program, you should know how to read the kids from a mile away. You don't want to assume and not be relatable because you may scare the child off or be like, "I just really don't want to be here, because Mr. So-and-so is just yelling at me." I just try to make sure that I understand from a different aspect. (RS 3 Interview)

Steve, another mentor, explained how he develops relationships with the students in his program.

> I can relate to them... a lot honestly... I grew up like a lot of them... I remember when I was their age... You see who brings them [to the program] and what they're driving, then I heard one of the kid's conversations where he came in mad, he was just mad and the boys, they're gonna go through some things. I remember when I was their age. Daddy was supposed to pick me up last night. I didn't see daddy. So, one of the strategies here is with these kids; he's starting off slow. I'm not gonna say much to him; I pull him to the side. Hey man, just talk about football, the school he goes to, and the stuff he likes to talk about. Let's talk about that before I even tell him to get to work cause they're gonna have bad days, so it's important to build those relationship… We hold each other accountable. I pull a kid off to the side and just talk to him, so to me, it's back to the relationships. (RS 3 Interview)

Steve expounded on the importance of building relationships with Black boys. He stated, "We eat with the guys at lunch, so we sit down and chat with them about their day and the schools and the sports they do and schools they attend and all that" (RS 3 Interview). Another mentor, Kofi, shared similar thoughts about using lunchtime and class time to connect with the boys. His relationships with the students help him stay aware of changes in their behavior and classroom participation. He uses his connection to them and his own experiences to guide them. He explained his approach:

> If I have an activity going or something where I can pull one guy to the side and be like, "Man, I've noticed a different change from you today and yesterday, what's going on?" They face a lot; it's 11-14 [years old], so that's like that transition. You realize more, so what's important? Life's not so much play anymore. You're adapting; you're getting older. I still remember when I was in middle school. If I would have had somebody listen to what I got going on in my life. I've had some positive people, that's how I got to where I am now, but it always helps, so being able to just give other people what they need. (RS 3 Interview)

Aside from being relatable, the mentors and instructors also used music to connect with students. Kofi explained,

> If they tell me they like this artist, I got to listen to them in my free time… They listen to some good artists, some people that I probably would listen to. It's not going to hurt me to expose myself to something different; that way, I can break that barrier. That's why I try to do that. (RS 3 Interview)

The theme of building meaningful relationships was evident across the research sites and supported the idea that Black male mentors and instructors take their position seriously and see it as more than just a job.

Interconnected Culturally Responsive Mentoring and Instruction

Black men lead STEM instruction in sessions at program sites. Black male mentors supported and helped Black boys learn STEM content in-class sessions. The mentoring and instructional components were inextricably linked in the STEM programs. Kofi shared his views of the different learning styles of the Black boys he worked with in the program. He stated,

> I'm not just appealing to one crowd. I got some athletes here. I got some people that can see it and pick it up quickly, and I got people that work a little bit differently. They're more hands-on. I got some visual people. I got some people that are highflyers; they pick up fast. Other people I gotta pull them to the side, and the big thing is, I'm very active in my classroom, so I'm moving around. I expect them to be fidgety and... so being able to redirect and for the guys that might need that extra help. (RS 3 Interview)

Kofi's quote describes how he addressed the diverse student needs in his class. Travis shared a similar sentiment when he explained how he worked with students who were considered non-successful. He stated,

> We're gonna say it like a successful and non-successful student inside of a class. How to engage both of them at the same time, and not make one seem they're moving slower or faster than the other, so it's pretty much evening their playing field. So, the student that's not as successful as the successful student won't give up, so pretty much keeping them engaged inside of the lesson. (RS 1 Interview)

The mentors and instructors in these programs recognized the varying needs of the boys they teach. They did not employ a one-size-fits-all approach but instead learned to become flexible in their teaching to adapt to the boys' needs. These mentors and instructors discussed how they take into consideration differences in Black boys' personalities and backgrounds. Kofi reported,

> My style is, I try… You got a good amount of students, so with that being said, you got a vast amount of personalities, different backgrounds, so you gotta be able to learn how to hit people differently and what different people need. Not everybody is gonna need me, okay, calling you to the back of the classroom. "Hey, come sit with me. Come work with me. You got any questions, just let me know." We are going through a video, initially, that way if we do that on the first day then I know who to deal with, who to pull, who to redirect, and who to kind of get a conversation going in my class that we break the barriers for other people. (RS 3 Interview)

Kofi stated, "[I can relate] to the different personalities [of students] that are [in the program]. These are different people I know, and I can relate because I have lots of friends like them. So that's where the barrier gets broken down" (RS 3 Interview). The mentors' and instructors' ability to relate to their students and see themselves in the boys helped them connect with them without harsh judgment. Travis, too, shared his approach to mentoring and teaching:

> Communication, being able to give directions and then listen to what they need to do, and processing how they need to go about it is really what helps the class move, and keep it happy, and also giving them something that they enjoy. I know in one of our classes we talk to them about what do you wanna do? So, what would you want to do in this mentoring class? And some of it is already tied into what we wanted to do within our lesson plan, but just taking a piece here and there, adding it, and making the actual lesson plan that we made, tailored to what they wanna learn, makes it more interesting to them. So, make it interesting to them. (RS 1 Interview)

Travis's quote exemplifies how he incorporates the students' ideas into his lesson plans. His classes are interactive and representative of his students' interests, which results in better outcomes and higher engagement.

The mentors and instructors also used video games to connect with the students while simultaneously teaching them STEM concepts. Kofi elaborated,

> I have this running joke with this game they love; it's called Fortnite. I guess that's the new thing, I still don't understand it completely, but I let them teach me. A big thing is Fortnite. It's a lot of technology that goes into making a game like Fortnite, and there's a lot of opportunities available, but if they know they are there, they got something to shoot for. It's different interests, so I try to hit a little bit of something… I've played it [Fortnite] once or twice (laughing), but not like them. They do the dances and all of that. I think they really do enjoy it. That's really fun, just seeing them. They love that game. It's great to see them. (RS 3 Interview).

This quote shows how Kofi allowed the boys to relax and have fun without sacrificing the learning environment.

Amir, another mentor, shared how he teaches his students the technology behind the video games they like to play. He stated,

> They love playing Fortnite. All the kids are into Fortnite…We'll show them… we'll break it down, like show them little clips of how they actually code. How many people does it take to make one game? The process it takes to make one game. And this is a long process. It's not... what they're doing right now, it's kind of quick. They kind of see it. I think they made a little box maybe last summer, just something simple and maybe in the winter, but I say this is a long process to bigger stuff. It's not that quick. It takes some time. (RS 1 Interview)

Amir shared how he helped students learn the technology behind the Fortnite video game and slowly introduced them to STEM concepts they can build on later. He shared more on how he uses their interests to teach STEM content:

> They're doing coding now. They have Xbox and PlayStation at home. What are they doing on their Xbox? How does that relate to your class? You're coding. They're playing a game that has already been coded. 3D design. How their Xbox was made, is basically 3D design. They don't know that. They just have the system. I said, "How are the controllers made? Everything was made in 3D design." If they would just go on YouTube, which we tell them, "Go on YouTube. Watch it! You have it." Most kids will say, "I want to take my Xbox apart and put it back together." I said, "You can! Every part you need for your Xbox is there. Take it apart, put it back together. There's a YouTube video that'll show you how to do that." (RS 2 Interview)

Amir used his students' interest in video games and YouTube to give them the confidence they needed to dismantle and reassemble their game consoles. This is a powerful lesson in 3D design

and self-efficacy. It shows how the mentors take regular teaching moments and turn them into opportunities to boost the boys' self-image.

Amir also explained that he teaches his students with their career interests in mind. He learns what they want to pursue and then teaches them how to do that. Amir explained,

> I use the kids as a strategy. I have to teach them, cause if I know them, and know what they're interested in and know their careers, and now that they know how to get there, I can turn around and teach them a way that they understand it. Because if I don't know anything about the kids or how they learn, they're not going to be as engaged. (RS 2 Interview)

This quote shows the mentor's deep investment in his students. He wants to give them the tools to be successful in his class and their careers and life.

Amir discussed how he structures his classes to make room for conversation and connection. He explained,

> They come to me excited, "What are we going to learn today? What are we doing today? What are you going to teach us today?" It's every question they ask, every time they come into my room. Then we just have a regular conversation in the first 10-15 minutes. They can laugh, joke, regular conversations will come out. (RS 2 Interview)

Amir's willingness to allow "regular conversation" in the beginning of class shows that he cares about the boys' feelings and interests. He gives them time to express themselves because he knows the information will be valuable and help him better understand their needs and wants.

Kofi shared how he incorporates group activities to give the students a chance to collaborate and learn from each other. He stated,

> My role on the technology side. I'm teaching augmented reality. So, it's a lot of things these guys already know. They're really bright, and they just don't know the labels… Sometimes I like to do activities. Group things are good to build on. I like individual thoughts too. I do the individual thought to kind of see where everybody's at. To get comfortable with writing stuff down. In my class, I don't have to do it too heavily because you know, I like it because I get to let them do their hands-on. I'll get the individual discussion and kind of get them to bring it together… Sometimes I want them to pay attention to the video, so I'll cut back on the talking, and say okay, this is where I want your attention. I'm gonna give you time to talk, so I'll give them time to talk and kind of do hands-on, I get more participation. (RS 3 Interview)

By alternating individual work and group work, the students get a chance to work autonomously and learn how to cooperate with others and work collectively.

Steve shared similar thoughts on the value of group work. He found that using peers as instructors helps students learn:

> If one of my peers is helping me, basically, I take that as a challenge. I say, well, if my peers understand it, are there to help me, you know, that means I have to do something about my work, about my skills, or whatever. So what I do, I use students who are already, who are catching on very well, who are catching up with what I'm doing, helping those students who are not moving as fast, you know, hoping that that will also motivate them, you know, motivate them to want to learn how to do the stuff. Because I'm feeling that, if they see their friends helping them out, as opposed to a mentor or me, that will give them even more inspiration to want to work, work even harder, you know? (RS 1 Interview)

Steve realized that peers could motivate each other in a way that adults' instructors cannot. By allowing the students to teach each other, the quick learners get an opportunity to hone their skills and get leadership practice. The slower learners get motivated by the example the other students

set. This symbiotic relationship enriches the learning environment and allows all parties involved, mentors and mentees alike, to learn lessons that extend far beyond academics.

Discussion

This study's findings expand the knowledge base of Black male students' experiences in out-of-school mentoring programs beyond school settings (Gordon et al., 2009; Jackson et al., 2014; Watson et al., 2016). The findings provide insight into how Black men build relationships, mentor, and instruct Black boys in culturally responsive ways in out-of-school STEM programs at HBCUs. A salient finding in both school-based and out-of-school mentoring programs is the amount of care put into developing meaningful relationships. The mentors and instructors worked to establish mutual trust with the Black boys by engaging them personally and culturally. As Rhodes (2005) youth mentoring model highlights, and this study confirms, mentors and mentees must form strong connections with one another and are impacted by individuals, context, and relationship length. This connection is important for Black boys, who are less likely to feel connected and cared for in school.

As Black men, the mentors and instructors possess insider cultural knowledge on what it means to be Black and male. They draw on personal, family, and communal experiences to mentor and instruct middle school Black boys in a way that is authentic and beneficial to their life circumstances. Similar to existing research outcomes (Brockenbrough, 2008; Lynn, 2001; Milner, 2016), Black men in these STEM programs possessed strong knowledge of their students. They demonstrated a strong connection to the boys in the program because the young men reminded them of younger versions of themselves and their friends. Some mentors assumed the role of fictive big brothers, taking on the responsibility of not only teaching them but also offering guidance in other areas of life. These results align with Bryan's (2016) findings of Black male educators in early childhood settings and expand this culturally responsive practice to out-of-school STEM programs and middle school Black boys. The research results build on Rhodes (2005) call for more insight into how race, gender, and ethnicity impact mentoring relationships.

The mentors and instructors in this study did not receive formal preparation to teach. Instead, they drew on their personal experiences and knowledge to find ways to reach and relate to their students in culturally responsive ways. They used the students' interests, videos, hands-on activities, sports, music, and humor to tailor the content specifically to Black boys. These results align with existing research outcomes about Black male educators' culturally responsive practices and extend those findings to out-of-school STEM programs. The mentors and instructors utilized Brown's (2009) negotiator and playful pedagogical performance styles because of their approach to developing relationships, listening to students, asking questions, motivating, joking, and debating. While existing literature provides insight into Black male educators' use of hip-hop pedagogy (Broughton, 2016; Bridges, 2009), most of the men in this study did not utilize this approach. Though they expressed general interest in the boys' musical tastes, they did not report the use of hip-hop as a pedagogical tool.

The STEM programs at the participating HBCUs were designed to prioritize the needs of Black male students. Using mostly Black men as mentors and instructors was an intentional part of the design to get Black boys prepared and interested in this field of study. The STEM programs have become a safe space for Black boys and men to be themselves in culturally validating and affirming ways. This type of space is particularly important, given the many negative experiences Black boys have in most schools and classrooms. Black boys need to feel cared for and appreciated.

They need to be taught by instructors and mentors who see them clearly and recognize their multidimensionality, without deficits and bias (Hall, 2015). It is a natural part of what it means to be Black and male. These mentorship programs give Black boys invaluable experience, space, and work to positively impact their life and STEM trajectory. More programs are needed to help Black boys in this way.

Acknowledgement

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