

Bridging Theory and Practice: Using Hip-Hop Pedagogy As A Culturally Relevant
Approach In The Urban Science Classroom

By

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ABSTRACT

Bridging Theory and Practice: Using Hip-Hop Pedagogy As A Culturally Relevant Approach In The Urban Science Classroom

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This dissertation explores the context of urban science education as it relates to the achievement and engagement of urban youth. This study provides a framework for Hip-Hop Pedagogy, an approach to teaching and learning anchored in the creative elements of Hip-Hop culture, in STEM as an innovative approach to teaching and learning demonstrates the effect that Hip-Hop Pedagogy, as a culturally relevant approach to teaching has on teaching and learning in an urban science classroom. This study establishes practical tools and approaches, which were formed from by theory and research that transcend the traditional monolithic approaches to teaching science. Participants in this study are middle school students who attend an urban school in one of the largest school systems in the country. This research showed that as result of utilizing Hip-Hop pedagogical practices, students reported that they developed a deeper understanding of science content, students were more likely to identify as scientists, and students were provided a space and opportunities to deconstruct traditional classroom spaces and structures.

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DEDICATION

To the youth who have been marginalized by systems of oppression. To the youth who are not allowed to express their true selves within school walls. To all the youth in the struggle. Lastly, to the youth who have been indoctrinated to believe that science is not a discipline in which they can identify, master and study, this study is respectfully dedicated.

Chapter I

INTRODUCTION

In my experience as a science educator in the same school system where I obtained both my primary and secondary education, I have noticed a significant lack of engagement and what has been described in the literature by Christopher Emdin (2010) as an aversion for learning science among African-American and Latinx students. As a result of my reflections and observations as a student and educator in New York City public schools, I argue that there are many reasons why students of color, who largely populate urban schools, may not be interested in science and “envision the field of science as distant and inaccessible” (Basu & Barton, 2007, p. 467).

Upon returning home to the Bronx, NY to teach after leaving to obtain college degrees and state certifications in science and science education, I noticed (in my community where I teach) that students have a very similar connection to Hip-Hop culture as I had as an adolescent. Students sing along to Hip-Hop music that they hear blaring from speakers from cars driving past the school and constantly tap their pencils on the desk replicating popular Hip-Hop beats, just to name a few obvious connections. In addition, students’ mannerisms from the way that they talk, dress, and walk are a direct correlation with that of Hip-Hop culture. Students’ interest in freestyle battle rap, drawing and dance also draw very similar and direct connections to Hip-Hop culture.

In this study, I use a critical autoethnographic lens to study the effects that the implementation of Hip-Hop pedagogy has on urban middle school students in the science classroom. Moreover, I explore my personal experiences as it relates to public schooling and Hip-Hop culture to accentuate, draw parallels, and most importantly make meaning

of the phenomenon of the utilization of Hip-Hop pedagogy in the urban science middle school classroom. I also utilize traditional qualitative research methods to conduct this study as well as a manuscript style format to present additional context for this study. In conducting and presenting this research, I find it imperative to make use of three (autoethnography, traditional qualitative methods & manuscript style) methods to make sense of Hip-Hop Pedagogy as a phenomenon in an urban science classroom that has not been studied before. For this reason, I identify myself as a bricoleur and the multiple methodologies as a bricolage. Claude Levi-Strauss (1962/1996) describes a bricoleur as a “Jack of all trades” or a do-it-yourself professional and bricolage, which is produced by the bricoleur, as a strategically set of practices that provide solutions to a problem in a concrete situation. “The solution (bricolage) which is a result of the bricoleur's method is an [emergent] construction,” as I use multiple research methodologies to make sense of the context of which the study takes place and the data collected from conducting the study (Weinstein & Weinstein, 1991, p. 161). Ultimately, the goal of employing multiple methods in this study is to attempt to secure an in-depth understanding of the phenomena of Hip-Hop Pedagogy and how its implementation in the urban science classroom affects teaching and learning.

Reflection on Hip Hop Identity

To many, Hip-Hop is simply a genre of music. To me, Hip-Hop is a lifestyle. As a young man of color growing up in New York City, arguably one of the most culturally diverse cities in the world, Hip-Hop has and still plays a significant role in my life, including my education. I was seven years old when I memorized my first rap song, "All about the Benjamin's" by Puff Daddy (now known as Diddy). It was the summer after the

Hip-Hop icon, The Notorious BIG, also known as Biggie Smalls, was murdered in California, and the Hip-Hop community was still collectively recovering from his tragic death. The song “All about the Benjamin’s” was literally played everywhere. It peaked at number one on both Billboard’s Hot Rap Singles and Hot R&B/Hip-Hop singles list and number two on Billboard’s Hot 100’s list. I remembered when my radio alarm alerted me to wake up for school, to the chorus of the song, *“It’s all about the Benjamin’s baby/ uhh, uh-huh, yeah.”*

As a seven-year-old elementary school student, Puff Daddy’s song, “All about the Benjamin’s,” made me realize how empowering Hip-Hop was. I noticed how successful Hip-Hop artists were and I wanted to emulate that success. At a young age, Hip-Hop artists’ flashy chains and luxurious cars caught my attention. But moreover, it was the drive and ambition that these Hip-Hop artists possessed that spoke to me. Their drive to defy all odds, the oppressive social and systemic constructs to reach worldwide stardom spoke to me. A majority of Hip-Hop artists share a similar narrative of being raised in an urban community, many dropping out of secondary school and few graduating from institutions of higher education. Growing up and idolizing these Hip-Hop artists made me believe that I can be successful by being Hip-Hop and identifying with its culture. At such a young age, success to me meant having things that I desired such as clothing, sneakers, and games which my parents couldn’t afford to get me, a more comfortable living space, and a career that allowed me to support my family. This was when I realized I was deeply in love with the culture of Hip-Hop. It was the only path I know that could get me what I felt was a success.

Growing up, Hip-Hop was everywhere in my urban community. I lived directly

across the street from the largest park in my neighborhood. During the summer months, I would hear older “throwback” Hip-Hop songs booming from the large speakers from the park into my apartment window. Cars in my neighborhood drove by blasting the latest and most popular Hip-Hop songs so loudly you could hear, and sometimes see the car rattling. When playing basketball in the park across the street from my apartment complex, there was always a chance that a cypher could begin at any moment. Everyone dressed to reflect the most popular Hip-Hop clothing trends—fresh all white Nike ‘Uptown’ sneakers and crisp white tees were imperative for every young man’s summer wardrobe.

The five elements of Hip-Hop, deejaying, emceeing, [break]dancing, graffiti art, and knowledge of self were everywhere in my neighborhood as an adolescent. Local graffiti artist spray painted and tagged their alias’ on the gates of convenience stores that were complemented by a beautiful spray painted murals of community members who were victims of violence. At the playground across the street from my childhood home, girls incorporated dance moves in their double-dutch jump rope routines. Rarely did a day go by when there was not a cypher where all of the neighborhood emcees had a chance to freestyle or rap their latest bars with hypemen, engaging spectators, and a beatboxer in control of the rhythm. Even though it was always impromptu, it felt like an orchestrated event every time. .

Everyone in the community enjoyed these authentic Hip-Hop moments, especially the youth who embodied the culture. I embodied the basic elements of Hip-Hop as a youngster, I rapped for a period of time, retired, then got involved in production and beat making. I was inspired by graffiti artists for their form of expression and picked up a

nickname (also my tag name) in high school. In his song, entitled “Anything,” Jay-Z rapped, “but these streets raised me crazy / product of my environment, nothing can save me.” In this rap lyric, Jay-Z referred to his environment, Marcy Projects, located in Brooklyn, NY. Through Jay-Z sharing that he is the product of his environment, he was expressing that he identified himself as a product of his urban community. As I reflect on Jay-Z’s lyric, I realize that I too am a product of my environment. I am a product of the elements of Hip-Hop. Since the age of 7, I’ve been thoroughly engaged in Hip-Hop culture – in fact; it schooled me.

A great majority of students in urban public schools share the exact or very similar experience as it relates to Hip-Hop culture. Teaching in an urban school, I notice that my students and I are products of the same environment and are, therefore, collectively a part of what Kitwana (2002) calls the Hip-Hop generation.

Reflections on Science Identity

As I reflect on my childhood educational experiences, I recall always being as interested and intrigued by science and the wonders of the natural world as I was with Hip-Hop. My interest in science was cemented in the 4th grade when I participated in a life cycle lab. The lab involved caterpillars metamorphosing into butterflies, therefore it took us a few weeks to complete. Throughout the course of the lab, we observed the caterpillars, cocoons, and butterflies and documented any changes that we noticed. At the end of the lab, we released the butterflies from their cages in the schools’ playground. At that moment, watching the butterflies that I had observed for weeks fly into their natural habitat. I realized that I, too, could spread my wings and successfully engage in science content. Even further, I could be a scientist. My experience participating in the

metamorphosis lab was engaging, interactive and it established my passion for science.

Unfortunately, participating in the metamorphosis lab, which I found to be life altering, would be my last engaging and positive science experience for years to come. When I reached middle school, I attended a school for gifted students outside of my immediate community, where the racial demographic of students and teachers did not reflect my own. At this new school, my interest in science changed drastically. My science courses weren't taught in an engaging fashion, and the content was not connected or related to my reality and everyday experiences. I did not have the opportunity to see many demos of experiments or have hands-on experiences with labs. As a visual and kinesthetic learner, having more hands-on science experiences in my middle school would have allowed for a more fruitful science experiences.

More importantly, I sensed that my teachers, who were predominantly White, did not understand or try to understand my lived experiences and therefore could not relate to me in terms of delivering content and building positive relationships. As a result, I spent most of my time in middle school guarded and closed off to content, especially science content. There was no space in my school for me to be my authentic Hip-Hop self and as a result, I was not successful academically.

Towards the end of my 6th-grade year, I decided to participate in the annual science fair as I always had an interest in science and was curious about the natural world. I decided to put every ounce of energy into that science fair project to show those around me that I too can do science. Despite my negative experiences in middle school, I still had the love for science from the grade buried inside. In my experiment, I tested the effect that orange juice had on the growth of a plant. I remember watering a plant with

orange juice, putting it in my closet and my mom being frustrated with me because of the odor that the plant exuded. Nonetheless, I was practicing science, so I was not worried about my mom. The day before the science fair, I stayed up all night finishing my trifold board, printing and gluing pieces of paper onto the board until I was completely satisfied. I remember traveling on the crowded public bus for about forty-five minutes with this large and difficult to carry the trifold board. I got to school, eager to show my science teacher my completed project. She reviewed the project, shook her head and explained that I could not present my project at the science fair because it was incomplete. I failed to include a control group in my experiment and therefore had no group to compare my experimental group to. I was devastated, and for the rest of my middle school career, I disengaged in science. It was at that very moment when I started to believe that I could not be successful in science.

My middle school experience as a disengaged student in urban schools is not a unique experience for urban youth. Many studies (Linn, et. al., 2000; Teale, et. al., 2007) suggest that urban students begin to fall behind their White counterparts in the 4th grade in science, literacy, and math due to limited instruction time, socioeconomic factors and failure to use students' context to anchor instruction (Lieberman & Hoody, 1998).

It was not until I got to High School where I met my 9th-grade physics teacher who used Hip-Hop as a tool to engage the class in science that my passion was reignited. Not only would we listen to Hip-Hop songs in class, but he also used analogies and references to Hip-Hop artists when he taught science. That experience reminded me that I could be Hip-Hop and a successful scientist too.

Rationale for the Study

In this study, I suggest that engaging students, especially urban students and students of underrepresented ethnic groups, to learn science, educators must utilize an alternative approach to teaching, which includes considering the realities and cultural backgrounds of students. I focus on middle school because this is where my initial love for science was lost.

It is difficult to ignore achievement gaps as they relate to students of color, who predominantly populate the urban communities where they attend school. Educators are aware of the persistent achievement gaps, or as Gloria Ladson-Billings (2006) refers to “educational debts,” that exist between minority students and their counterparts of less diverse social settings. Evidence shows that in relation to Caucasian students, minority youth earn lower grades and score lower on standardized tests of academic ability (National Center for Education Statistics, 2000). In addition, researchers reveal the significance of the achievement gap between the test scores of both low-income and minority students as compared to others (Jencks & Phillips, 1998; Bohrnstedt, et. al. 2015). Education policy makers have noticed that over the past few decades, in spite of proposed education reform intended to improve minority, student achievement goals have not been met (Boyd & Shouse, 1997; Zernike, 2001). It is significant to note that no intervention by education reformers has been successful in closing the seemingly perpetual achievement gap.

Similar educational debts persist in science and STEM (Science, Technology, Engineering, and Mathematic) education as it relates to urban youth (National Governors’ Association, 2005). I agree, there has been a monocultural approach to teaching science, which stems from the standards for college preparedness, dating back to the turn of the

20th century. Science curricula and instructional practices have historically benefited middle-class White students, and have failed to provide quality instruction for students who have been traditionally marginalized coming from culturally diverse backgrounds, largely urban students (Melnick & Zeichner, 1998; Tyack & Cuban, 1995). Primarily, because when standards for college preparedness were initially established, schools across the country were segregated, and it was unimaginable for students of color and White students to attend the same schools. As per the Brown v. Board of Education Supreme Court ruling, schools across the nation were desegregated; but no form of action was taken to integrate the curriculum or instructional practices to support students of color.

Research suggests that students from underrepresented ethnic groups traditionally fall behind their counterparts of less diverse backgrounds in major content areas (National Governors' Association, 2005). In addition, urban students are less likely to be interested in the sciences partially because educators misunderstand the realities and experiences of urban students and as a result, they are not able to demonstrate the relevance of science (Kahle, Meece, & Scantlebury, 2000; Seiler, 2001). The lyrics of Hip Hop artists who have also attended urban schools provide insight and illustrate their experiences as it relates to public schooling. Hip-Hop is the authentic voice of urban youth. Morrell and Duncan-Andrade (2002) explain, that "[Hip-Hop] represents a resistant voice of urban youth through its articulation of problems that this generation and all Americans face on a daily basis" (p. 88). In his lyrics, multi-Grammy award winner Kanye West states,

Back to school, and I hate it there, I hate it there / everything you want you
got to wait a year, wait a year / This n**** graduated at the top of the

class, I went for cheesecake he was the motherf*****g waiter there

In these lyrics, Kanye West describes his experience of seeing a student who graduated at the top of his class but is currently working as a waiter. Through these lyrics, West criticizes the school system and questions the importance of excelling and succeeding academically when they see many professionals in careers such as STEM, who do not resemble them. Kanye West says, “I hate it there, I hate it there,” he is expressing his disdain for a school system that did not consider his realities in instruction and that has not acknowledged his Hip-Hop identity. Furthermore, contributing to his ability to see the importance of excelling in school.

Jay-Z shares similar sentiments as Kanye West regarding school when he said:

I felt so inspired by what my teacher said / said I'd either be dead or be a reefer head / not sure if that's how adults should speak to kids / especially when the only thing I did was speak in class.

In these lyrics, Jay-Z reflects on a negative experience with a teacher that he encountered while in school. Jay-Z shares, “my teacher said I'd either be dead or be a reefer head.” In this lyric, he is expressing the perspective that teachers in his school had of students, which consisted of students dying, possibly from gang violence, or ultimately becoming addicted to drugs. What concerns Jay-Z is the fact that he did nothing to warrant the way teachers viewed him, except speak in class. As a result, Jay-Z was never inspired by teachers or interested in formal education because of how they perceived him and his peers. Teachers were too caught up in their negative perceptions of urban students without actually taking the time to learn about the realities and experiences of students.

According to Munce and Fraser (2012), African-American students' interest in STEM has decreased significantly over time, is now lower than any other ethnic group,

and is expected to remain low in upcoming years. Additionally, there is an achievement gap in science between African-American and Latinx urban students relative to their counterparts of other ethnic groups, including those in rural settings. Yet, there continues to be an ongoing misunderstanding about, and lack appreciation of, the experiences and realities of African-American and Latinx students who predominantly populate urban settings (Kahle, Meece, & Scantlebury, 2000; Seiler, 2001). As such, scholars such as Gloria Ladson-Billings (1995a) and most recently Django Paris and Samy Alim (2012) have argued for culturally relevant and sustaining pedagogies. In Science Education, scholars like Mary Atwater (1996) and Christopher Emdin (2006) speak directly to the ways that culture may be a powerful aspect of science teaching and learning when appropriately aligned with the prevailing social and aesthetic interests of urban students. In order to gain insight into urban students' experiences as a way to better engage them in the science classroom, I argue that it is the time that science education researchers develop and suggest innovative approaches. Among these are culturally relevant approaches that "focus[es] explicitly on understanding the realities of youth within urban classrooms and supports the teacher in utilizing an understanding of these realities as an anchor for instruction delivery," thus moving away from oppressive pedagogies and practices, which are known to disengage urban students from science (Emdin, 2011, p. 5). In this study, I plan to capture how urban middle school students engage and respond to the implementation of Hip-Hop pedagogy, a culturally relevant approach to teaching and learning, in the science classroom.

Organization of the Thesis

This dissertation is presented in a manuscript format as it includes two

publications that have been submitted to journals. Chapter I of this dissertation provides an introduction and rationale for this study. Chapter II provides a literature review, which discusses the context of urban science education, the makeup of urban communities, and culturally relevant pedagogies. Chapter III provides the historical context of Hip-Hop culture beginning with its conception and a description of the Hip-Hop generation. Chapter IV describes the methods used to conduct this research, which includes autoethnography and traditional qualitative methods. Chapter V is composed of a journal article entitled *Rethinking Pedagogy in Urban Spaces: Implementing Hip-Hop Pedagogy in The Urban Science Classroom*, which was published in the *Journal for Urban Learning and Teaching Research*. Chapter VI is composed of a journal article entitled *Bridging Theory and Practice in The Urban Science Classroom: A Framework for Hip-Hop Pedagogy in STEM* that has been submitted to the *Journal of Critical Education* for review. The results of this study are presented as two publishable papers (Chapters V and VI) and also other Findings (Chapter VII) not published in the two papers. Lastly, Chapter VIII provides a discussion of the findings as well as implications and limitations of this study.

Chapter II

LITERATURE REVIEW

This literature review covers much relevant research and scholarship that provided a strong background for the supporting theoretical frameworks for this study. In this chapter, the review of the literature includes an overview of three foci: 1) urban science education (Blanchett, Mumford & Beachum, 2005; Lippman, Burns & McArthur, 1996; Freedman & Appleman, 2009; Munce & Fraser, 2012), 2) culturally relevant pedagogy and practices (Ladson-Billings, 1995a; Ladson-Billings, 1995b; Emdin, 2011; Barton & Tan, 2009), and 3) Hip-Hop education (Hill & Perchauer, 2013; Morrell, 2002; Morrell & Duncan-Andrade 2002; Seidel, 2011; Emdin's 2010). Finally, I present a sociocultural conceptual framework as a lens to guide the development of this study.

Urban Science Education

The Makeup of Urban Communities. The U.S. Census Bureau (2010) estimated that about 81% of the population of the United States resides in an urban area. This estimate increased from 76% according to the U.S. Census Bureau's (2000) reports from a decade prior. There are many key factors that characterize urban areas. The Census Bureau (2010) identifies an urban area as a community with over 50,000 people. Urban areas are the home to large numbers of ethnic minorities, especially those who belong to underrepresented ethnic groups. Currently, in New York City, the largest city in the United States, there is a minority population of about 65%. This number is up from 62%, which was estimated in 2010 (U.S. Census Bureau, 2010). In Los Angeles, the second largest city in the United States, there is a minority population of about 58% and in Chicago the third largest city in the United States, there is a minority population of about

55% (U.S. Census Bureau, 2010). Not only do minorities make up the majority of urban populations, but they are concentrated to specific geographic areas where frequently poverty disproportionately affects urban minorities. Poverty is a major urban issue. Twenty-one percent of all urban children in the United States live in poverty. Thirty-nine percent of urban youth live in poverty, while they only make up 26% of the total population. Moreover, about 40% of urban youth attend “high-poverty schools” (U.S. Department of Education, 1996).

America’s Schools in a Post-Brown Era. While poverty continues to present itself as a significant issue in urban communities, I argue that educators have yet to truly understand the nuanced experiences of urban youth who are affected by poverty, especially as it relates to education. It has been over 50 years since the Supreme Court’s *Brown v. Board of Education* ruling, which made it illegal to segregate students of color from White students in America’s public schools. The Supreme Court identified that the “segregation of white and colored children in public schools has a detrimental effect upon the colored children” (*Brown v. Board of Education*, n.d.).

However, there still continues to be notable inequalities in urban schooling and practices that have detrimental effects that education policy makers have yet to overcome significantly. In the article, *Urban School Failure and Disproportionality in a Post-Brown Era*, Blanchett et al. provide insight into the state of urban schools in America in a post-Brown (Civil Rights) era (Blanchett, Mumford, Beachum, 2005). They describe urban schools as a microcosm of urban communities, known to be occupied by many people of color who are seeking better jobs and opportunities for themselves and their families. Consequently, with the decline of industrialization, urban communities began to

deteriorate, and many Whites have fled to live in the suburbs (Blanchett et al., 2005).

Through the research by Blanchett et. al. on the status of urban schools in a post-Brown era they found that,

“[urban] schools attended primarily by African American or Hispanic students, are often deemed high-poverty schools and have a high turnover of teaching and instructional staff, a high number of uncertified or provisionally licensed teachers, limited access to technology, few educational specialists (e.g., math and reading specialists) and resources (e.g., accelerated curriculum for all students), limited extracurricular opportunities, and dilapidated physical environments” (Blanchett et al., 2005, p. 72).

Furthermore, Blanchett et al. (2005) describe schools that serve mainly White students as the complete opposite as those that serve African American or Hispanic students. They state,

“these schools are often located in suburban or rural areas and are touted and labeled as "high-performance" schools. Many of their teachers and instructional staff hold graduate degrees, receive higher salaries, and have access to state-of-the-art technology and science labs, accelerated, honors, or advanced placement curriculum, newer or renovated physical structures, and a waiting list of teachers who would like to become employed by the school” (Blanchett et al., 2005, p. 73).

Though over 50 years have passed since the ruling of Brown v. Board of Education, schools that serve urban youth (especially African-Americans and Latinxs) continue to have disproportionately worse conditions and access to resources that can promote academic achievement than the schools that their White counterparts attend. In this study, when I refer to urban students or urban communities, I am specifically referring to African-American and Latinx students who largely populate urban spaces and traditionally attend high-poverty schools where they are often marginalized as it relates to their access and experience.

Educational Debts of Urban Youth in Science. In her 2006, presidential address

to the American Educational Research Association, Gloria Ladson-Billings (2006) expressed the need for educators and policy makers to reframe their thoughts around the idea of the achievement gap, which the National Governors' Association (2005) describes as "a matter of race and class" that persists between minority and disadvantaged students and their white counterparts. In drawing sharp distinctions to the status quo, Ladson-Billings believes we should refer to existing achievement gap as an education debt. She argues that when educators discuss and propose remedies to improve the achievement gap, which mainly focuses on the disparities in students' standardized test scores; we are solely focusing on student achievement without questioning the systems and structures in place that may account for disparities in achievement measures. Therefore, if we only interrogate the achievement gap as a phenomenon birthed from minority and disadvantaged students performing poorly when compared to their white counterparts, the burden of poor academic achievement lies solely on the student, without considering the systems, structures, and spaces which provide urban students a so-called valuable education that is ineffective. Ladson-Billings (2006) suggests, "looking at the [achievement] gap is a misleading exercise."

Conversely, Ladson-Billings explains that,

"the education debt is the forgone schooling resources that we could have (should have) been investing in (primarily) low-income kids, which deficits lead to a variety of social problems (e.g. crime, low productivity, low wages, low labor force participation) that require on-going public investment. Without the education debt we could narrow the achievement gap" (Ladson-Billings, 2006).

Studies show that urban schools, which mainly serve students from underrepresented ethnic groups, have fewer experienced teachers, receive fewer resources and teachers have less control over the curriculum, as compared to schools in suburban communities

(Lippman, Burns & McArthur, 1996; Freedman & Appleman, 2009). By focusing on improving the education debt of urban schools, we can ultimately improve the academic achievement of students who attend urban schools, especially as it relates to science.

Once it is understood that, there is a significant education debt between minority students and their White counterparts writ large, we can address the fact that this education debt persists in specific content areas such as science. Researchers find that schools that serve mainly minority groups of students offer fewer science courses, and therefore offer fewer opportunities for students to succeed and experience science (Norman, Ault, Bentz, & Meskimen, 2001). Moreover, Norman et. al. (2001) argue that the science education debt for students of color is a function of a minority group's disadvantaged position in the United States' society. Groups of people who have a disadvantaged position in society tend to suffer socioeconomic hardship, and the stigma of inferiority (Norman et. al., 2001). "In urban settings schools in impoverished neighborhoods underperform relative to schools in more affluent settings" (Norman et. al., 2001, p. 105). A low number of students of color successfully complete high school and go on to pursue a science related degree in college. Therefore, only about 17 percent of scientists and engineers in the United States are minorities (NSF, 2015).

According to the Status and Trends in the Education of Racial and Ethnic Groups report, White students outperformed Black and Latinx middle students in science in the United States (Aud, Fox & Kewal-Ramani, 2010). White students have also outperformed Black and Latinx students by over 12% on standardized assessments such as the Trends in International Mathematics and Science Study in science in both the 4th grade and 8th grade (Gonzales et. al., 2004).

Researchers have studied the deleterious effects on student academic achievement when they attend schools with fewer resources, and it is clear that students of color are mainly students who attend schools with limited resources and in turn succeed less academically compared to their White counterparts (Day, 1989; Kozol, 1991; Necochea and Cline, 1996). Students' socioeconomic status (SES) also contributes to the science education debt. Students from high SES backgrounds tend to declare as science majors because of their access to more rigorous science courses. While on the other hand, students with low SES (which are traditionally minority students) tend to be underrepresented in science programs and in science fields (NSF, 2015; West, 1985).

New Focus on Science and STEM Education. Due to an increasingly competitive global economy, growing challenges in sustainability, and the effects of the education debt in science education, there has been specific emphasis on improving outcomes in science, technology, engineering and mathematics (STEM) in recent years. In particular, educators, including even initiatives launched by the White House of the United States of America, have placed a specific emphasis on (STEM). President Obama created many STEM initiatives to support the academic achievement of American youth in STEM. In 2015, President Obama announced over \$240 million to prepare students to excel in the STEM fields, especially those from underrepresented ethnic groups (Fact Sheet, 2015). The United States Department of Education reports that the United States is falling behind internationally in both mathematics and science, which is unacceptable considering the global economy (U.S. Department of Education). Reports show STEM occupations are projected to grow by 17 percent from 2008 to 2018, compared to 9.8 percent growth for non-STEM occupations (Langdon, McKittrick, Beede, Khan & Doms,

2011). Concurrently, African American and Latinx students' interest in STEM has decreased significantly. It is now lower compared to ethnic counterparts and is expected to remain lower during the coming years (Munce & Fraser, 2012). Therefore, due to a lack of interest in STEM, especially by students of color, they will not acquire the skills needed to compete for future STEM jobs, and ultimately there will be fewer jobs available for them. In order for urban students to successfully compete in the competitive global economy, science educators must utilize innovative approaches to teach and engage students, especially minority students, in science.

Culturally Relevant Pedagogy

There is a significant amount of research in urban education that is grounded in, and that focuses on, cultural relevance as a significant aspect of teaching and learning. Scholars such as Gloria Ladson-Billings (1995b), Emdin (2010), Django Paris and Samy Alim (2012), discuss the importance of engaging urban youth through culturally relevant and even culturally sustaining pedagogies. In her landmark article *Toward a Theory of Culturally Relevant Pedagogy*, Ladson-Billings (1995b) argues that in the midst of conversations regarding diversity, equity, and teacher education in urban settings there has not been much emphasis on pedagogy, i.e. the way in which students in urban settings are being taught. Ladson-Billings (1995b) writes, “the dilemma for African-American students becomes one of negotiating the academic demands of school while demonstrating cultural competence. Thus, culturally relevant pedagogy must provide a way for students to maintain their cultural integrity while succeeding academically” (p. 476). Ladson-Billings (1995a) also highlights that in “the classrooms of culturally relevant teachers, students are expected to ‘engage the world and others critically,’ rather

than merely memorizing content from outdated textbooks, which students in some urban communities only have access to” (p. 162). In culturally relevant classrooms in urban settings, students should be learning about social inequalities and writing letters to school boards with the understanding of their social status, and demanding the same resources as their counterparts of other ethnic backgrounds across the country. Ultimately, Ladson-Billings (1994) describes culturally relevant pedagogy as “a pedagogy that empowers students intellectually, socially, emotionally, and politically by using cultural references to impart knowledge, skills, and attitudes” (p.18). Essentially, culturally relevant pedagogy is a practice that encourages educators to connect students’ home and school lives while still meeting the expectations of the curricula. In Ladson-Billings’ (1995a) studies of effective educators in urban settings, she identifies culturally relevant pedagogy as pedagogical excellence and as an effective way of educating African-American populations, which rests on the following criteria: “(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” (p. 160).

In a study by Goldston and Nichols (2009), science educators who teach at a middle school in a predominately Black community in the Deep South used photo narratives to envision the benefits of culturally relevant science pedagogy. The researchers encouraged the teachers to produce photos of important aspects of the school’s community to give insight into who they are and what they value personally in relation to culturally relevant pedagogy. Through this study, educators were able to realize that the Black church was prominent in the community and that Sunday’s sermon

is supportive of oral traditions in Black communities, which encourages teachers to rethink literacy, in particular, narrative interspersions, practices in their science classrooms. In addition, teachers realized that they needed to create a space to be more accepting of students' discourse. Teachers who participated in this study were able to think about their positionality, which highlighted, "sociocultural landscapes and structural inequalities of the community which should be used in conceptualizing culturally relevant pedagogy in science" (Goldston & Nichols 2009, p. 195). Teachers were also able to identify cultural references that could be used to connect content to artifacts within the community in the classroom. Although teachers were not able to translate their new understanding of culturally relevant pedagogy into their science practices, they did recognize the importance of utilizing culturally relevant pedagogy. They also recognized that questioning injustices in science education are important to develop culturally relevant practices.

In William Tate's (1995) article, *Returning to the Root: A Culturally Relevant Approach to Mathematics Pedagogy*, he describes what culturally relevant mathematics pedagogy looks like through his research and provides exemplary practices based on his observations of a middle school math educator named Mason. Tate (1995) observed that problems-posing tasks involved topics such as "the AIDs epidemic, drugs, ethics in medicine, sickle cell anemia, and cities of the future" (p. 170). Through culturally relevant practices, students were empowered to create social change in this middle school math classroom. Over the course of two years, students from this math class embarked on a mission to close or relocate liquor stores in the community, because of their close proximity to schools. Students studied laws and regulations and created fiscal incentives

for liquor stores that relocated. Students were able to enact social change as the city council adopted a resolution, which stated that liquor could not be consumed within 600 feet of the school. Tate (1995) noticed, “Mason’s pedagogy incorporated an awareness of the problems African American children face in education and society” (p. 171). It was Mason’s objective as an educator to develop democratic citizens through her pedagogy. Mason’s pedagogical approach is closely aligned to the experiences of her students and includes investigative research, questioning content, people and institutions, and open-ended problem solving connected to the realities of students and social action (Tate, 1995).

Reality Pedagogy. Similar to Ladson-Billings, Christopher Emdin (2011) discusses the importance of utilizing students’ culture to drive instruction, but also the importance of utilizing the reality of students when teaching. Emdin’s (2011) reality pedagogy draws from the frameworks of critical pedagogy and culturally relevant pedagogy. Reality pedagogy is composed of 5 C’s, which are practical tools for educators in any setting to be culturally relevant while using the reality of their students to drive instruction which includes: co-teaching, co-generative dialogues, context, cosmopolitanism, and content. When enacting reality pedagogy, a student rather than another adult acts as a co-teacher and is charged with the task of learning content before their peers and is responsible for teaching that content to the class. Co-teaching encourages the teacher to arm students with the tools and support that they will need to teach a portion of the class. When students are encouraged to co-teach, not only are they empowered, but also it provides an opportunity for the teacher to sit in the physical seat of a student and learn how that student is engaging the class from a student’s perspective.

Co-generative dialogues occur when teachers cogenerate a plan with students to discover some of the best methods and practices to teach a particular group of students. Students are involved with creating a plan for how the classroom is being managed, and through their peer-relevant pedagogy when content is being taught, they are able to break down the social constructs of a traditional classroom and wield their agency to create a learning environment where students have a voice. Context, the third member of the “5 C’s,” describes a set of practices that revolves around the teacher and student bringing artifacts from the students’ community into the classroom to show students a sense of belonging and to connect content to situations in which students can easily see a connection with their immediate communities. Cosmopolitanism is a philosophical construct that when described in reality pedagogy, becomes a tangible approach to transforming human roles in social settings. Lastly, “content” refers to the academic content that teachers are responsible for constructing to help students learn (Emdin, 2011). These tangible tools, as Emdin (2011) refers to as “the 5C’s,” are culturally relevant because they encourage students to reach toward and eventually experience academic success. Moreover, they encourage students to bring artifacts into the classroom from their communities that represent a part of their culture that wouldn’t be represented otherwise, and lastly, they encourage students to challenge the status quo of the current social order in the classroom by making use of their voice and agency to change how the class is being managed and how instruction is delivered through co-generative dialogues. More importantly, any educator, regardless of content area or grade level, can utilize these tools to be culturally relevant.

As Ladson-Billings (1995b) outlined, because culturally relevant pedagogy is

critical to student learning, it promotes academic success and opportunities for students to develop cultural competence and critical consciousness to challenge social constructs. Similar to the students from Tate's (1995) study, students in a science classroom who are engaged in culturally relevant practices can also have an opportunity to enact social change since science content can easily be connected to real issues such as global warming, inflated cost of prescription drugs, and the overconsumption of fossil fuels. Culturally relevant pedagogy can also promote a deeper understanding of science content among students because of the explicit connection between science content, students lived experiences and realities, resulting in an environment where they are more engaged to learn (Adjapong and Emdin, 2015). I argue that it is critical for science educators who strive to be culturally relevant in their practice to become aware of societal inequalities that affect their students. Furthermore, they are charged with the task of learning more about their students, their students' lived experiences and, the community where the school is located similar to the successful educators reported in the Goldston and Nichols' (2009) study. In order to truly be a culturally relevant educator, you must understand the experiences of those that you teach. As outsiders to the culture and experiences of students, if educators strive to become more aware of the experiences of their students, they will be able to utilize student culture within the classroom as a catalyst to develop "strong ties" with students, and stronger social networks (Burt, 2001).

Funds of Knowledge as it Relates to Culturally Relevant Practices. As science educators, we define the discipline of science as one where we study the natural world through observations and experimentation. I argue that in order to successfully teach our students how to study the natural world, science educators must be able to make

connections between the natural world, science content, and the world that students have experienced, which in many cases can be completely different from that of the natural world that teachers have experienced. The field of science education is a part of a community that encourages the use of the funds of knowledge framework to better engage students in science content, especially if their reality differs from that of the science teacher (Barton & Tan, 2009; González, Moll, & Amanti, 2005; Hammond, 2001; Moje et al., 2004). Funds of knowledge “refers to the historically accumulated and culturally developed bodies of knowledge and skills essential for household or individual functioning and well-being” (Moll, Amanti, Neff, and Gonzalez 1992, p. 133). When science educators take a step back from being masters of science content and become learners of their students’ experiences and realities, it provides the science educator with a unique opportunity to learn about their students, their student's culture, and families in unmistakable ways. This also allows the educator to gather resources that are embedded in the experiences of students to use in the classroom.

Researchers also argue that learning involves an interaction between students’ mental schemes and the experiences they have, which include experiences outside of the science classroom and school walls (Driver & Leach, 1993). Therefore, there has also been a push for a constructivist approach to teaching and learning of science content and science curriculum development. The goal of a science curriculum that leans toward a constructivist approach is to “provide a social setting for mutual support of knowledge construction” (Bereiter, 1985). Constructivist science educators do not only want to understand the task which they are giving students, but they want to understand the process in which students are taking to learn science content and successfully complete

that task. In order to do so, educators must understand the task that students are engaging in and not just the task the teachers think they are giving students. In other words, science educators must work to understand students' experiences to understand better how they have socially constructed knowledge (Driver & Leach, 1993).

From Hip-Hop Based Education Toward Hip-Hop Pedagogy. To continue to push science educators to remain culturally relevant, I suggest a new and innovative approach to teaching that is rooted and Hip-Hop culture and draws from the frameworks of culturally relevant pedagogy and reality pedagogy, which I identify as Hip-Hop pedagogy. Hip-Hop Pedagogy is anchored in the creative elements of Hip-Hop, which is a cultural phenomenon that urban youth practice and engage in within their communities. Hip-Hop culture has impacted and empowered youth populations across the globe, especially youth of marginalized groups, since its conception (Adjapong & Emdin 2015; Dunley, 2000). Though much research has been published in regards to educators using Hip-Hop as a culturally relevant tool in the classroom, most of this research focuses on Hip-Hop Based Education (HHBE), which mainly focuses on how to incorporate Hip-Hop culture into school-based curricula, particularly using English Language Arts curricula (Hill & Perchauer, 2013; Morrell, 2002; Morrell & Duncan-Andrade 2002; Seidel, 2011). There is a lack of research regarding utilizing Hip-Hop culture to inform pedagogy, specifically the art and science of using Hip-Hop as a culturally relevant teaching approach in the classroom (Hill & Perchauer, 2013; Morrell, 2002; Seidel, 2011). Emdin's (2010) research addresses the need to meet students on their cultural turf by engaging them in teaching practices that are anchored in the realities of young people, especially in the content area of science where students of color have traditionally been

marginalized. Emdin (2011) argues that educators should “focus on the cultural understandings of students within a particular social space, like a science classroom” (p. 286). Utilizing Hip-Hop pedagogy, which is anchored and draws from the elements of Hip-Hop culture, can provide science educators an opportunity to focus more on the cultural understandings of youth.

Conceptual Framework

Culture, Capital and Social Networks. This study is rooted in a sociocultural framework that explores the concepts of culture and social capital as they relate to the experiences of African-American and Latinx urban students in a science classroom. Vygotsky states, “human activities take place in cultural context, [and] are mediated by language” (John-Steiner & Mahn, 1996, p. 191). Most urban students’ experiences outside of school are rooted in Hip-Hop culture (Emdin, 2010). The ways urban students dress, the ways they talk, the ways they dance, as well as other non-verbal forms of communication, are all rooted in Hip-Hop culture. Vygotsky’s (1981) research, presented an understanding of culture as something that is firmly entrenched in societal processes, which he believes, is the emergence of mental processes. Vygotsky states, “above all, in the widest sense of the word, it means that everything that is cultural is social. Culture is the product of social life and human social activity. That is why just by raising the question of the cultural development of behavior we are directly introducing the *social* plane of development” (Vygotsky, 1981, p. 164). Vygotsky's account of culture puts forward that humans are never free of cultural influences, even when engaging in an action alone. “Instead, human mental functioning, even when carried out by an individual acting in isolation, is inherently social, or sociocultural, in that it incorporates socially

evolved and socially organized cultural tools” (Wertsch & Tulviste, 1992). Vygotsky posits that all actions performed by individuals are somehow shaped by cultural influences. Urban students who identify as a part of the Hip-Hop generation frequently engage in traditional Hip-Hop practices outside of school, but once those practices are incorporated in teaching and learning students are given the opportunity to engage in science content as seamlessly as they would in a traditional Hip-Hop practice.

I suggest bringing Hip-Hop culture into urban classrooms, not only by incorporating it into curricula, but also incorporating the culture into the ways in which teachers teach their students. Normally, learners depend on others with more experience to teach them in a way that will make them feel comfortable with the content. If students are engaged and excited about science content in the classroom, and their exchanges around the content are occurring with the use of hip-hop forms of communication, over time, students take on increasing responsibility for their own learning (Lave & Wenger, 1991; John-Steiner & Mahn, 1996). Being culturally relevant through Hip-Hop pedagogy will not only allow students to view themselves and a culture which they value as a part of the classroom, but it can also encourage independent self-education of science content; since students will take increasing responsibility of their own learning (Ladson-Billings, 1995).

In addition to students taking on an increased responsibility of their own learning, utilizing a pedagogy in an urban science classroom which is directly anchored in the realities of students allows for the formation of “weak ties” and “strong ties.” There are links between individuals and groups within every social network that are categorized as “strong ties” or “weak ties.” “Strong ties” correspond to the links or connections

individuals or groups who are “friends” have a lot in common. On the other hand, weak ties correspond to “acquaintances” who do not have much in common that would normally connect them (Easley & Kleinberg, 2010). Krackhardt (1992) describes a “weak tie” as “a ‘local bridge’ to parts of the social system that are otherwise disconnected, and ... is likely to provide new information from disparate parts of the system” (p. 216). If educators are using a form of teaching that is directly connected to the realities and experiences of urban youth, then “weak ties,” a local bridge, that connects the students to the teacher are formed and the educator will be able to provide new information (science content) to the student, and vice-versa. The student will then be able to provide new information (Hip-Hop content) to the educator. The implementation of Hip-Hop pedagogical approaches involves the process of learning and utilizing the complex nuances of communication in Hip-Hop, which shows a valuing of student culture and allows for the creation of “weak ties” between the students, science content and even the science educator (Burt, 2001). By utilizing a pedagogy that is anchored in Hip-Hop, the educator creates a space within the classroom where students’ “strong ties” they can be expressed. Enacting a pedagogy that is anchored in Hip-Hop serves as the catalyst to allow “weak ties” that already exist between teachers and students to develop into “strong ties” overtime. Coleman (1998) refers to these connections as dense networks and describes them as close-knit networks that facilitate trust and cooperative exchanges. The creation of these dense networks between students and the science educator can allow for a positive exchange of science content to students and provide a space for educators to authentically learn about the realities of their students.

I also draw insight from sociologist Bourdieu (1986) who describes capital and its

varied forms as necessary for articulating the ways that humans exist in a social world. In particular, I focus on the form of capital that is acquired in social fields like classrooms when individuals develop a conscious or unconscious personal investment in an activity or process. This form of capital is called “cultural capital” and in its embodied state, is both inherited and acquired as one engages with either new or familiar tools in an activity. In other words, one may possess forms of cultural capital outside of the classroom, and then use these forms of capital to acquire new forms of knowledge in the classroom. The goal is for science educators to create contexts that generate new forms of cultural capital that will eventually lead to the acquisition of science content knowledge. If students develop more opportunities to expand their cultural capital within their science classrooms, they will not only be more prepared to navigate science spaces outside of the science classroom, but they will also be more comfortable while navigating these spaces. Hip-hop is a form of cultural capital that many urban youth possess. When brought into science classrooms, and used as a viable form of knowledge acquisition in science, it can be used to expand youth cultural capital to include science. Students who develop more cultural capital within the science classroom may be more likely to take on a science identity because both Hip-Hop and the teaching approaches being employed in the classroom are connected to their lived experiences. In this type of scenario, students are accumulating and exchanging cultural capital both in hip-hop spaces outside of the classroom and within the classroom. Bourdieu (1986) describes cultural capital as having an unconscious and non-deliberate quality in terms of how the individual generates it. However, he also describes cultural capital as something gained as the result of “conditions of acquisition.” I suggest that science classrooms that allow and welcome the

expression of hip-hop culture are the ideal spaces for the “conditions of acquisition” for urban youth who identify as hip-hop.

Criticality of Traditional Systems and Structures. This study is also grounded in critical theory as referred to by Kellner (1989) in reference to the Frankfurt School for Social Research located in Germany. More precisely, when I refer to critical theory I am referring to broader themes, which include poststructuralism and Deweyan pragmatism (Kellner, 2003). These themes support critical pedagogy and suggest that social justice can be used as a tool to inform pedagogy practices within education systems. I aim to utilize a critical theory of education, which draws on a Marxian critique that stresses the necessity to critique existing and traditional social structures and ideologies, in particular, with respect to public education. Similar to the Marxian project, this study intends to criticize the assumptions of hegemonic structures and systems within schools and classrooms across the country, with the goal of overcoming oppressive practices that mainly benefit students of less diverse backgrounds than those from urban communities.

By combining critical theory and autoethnography as a research method, I intend to use a critical autoethnographic lens to critique traditional school structures and pedagogies through my personal experiences in public schools in the same community that serves as the context for this study. It is also important to highlight that this work is inherently critical of commercialized Hip-Hop music, which promotes violence, drugs, sex, and misogyny. Commercialized Hip-Hop is a small fraction of Hip-Hop culture, yet it is an aspect of Hip-Hop culture that is mostly consumed by the public and negatively criticized by those who do not see the value or educational potential of Hip-Hop writ large. Hip-Hop music that has been commercialized is produced by record label

executives who capitalize off the lived experiences and realities of Hip-Hop artists. Hip-Hop artists earn multi-million-dollar record deals to make music and visuals that promote violence and misogyny amongst other things to, often times, negatively portray their communities because that is what record labels can and choose to sell. These record labels sell these skewed images and recordings without concern about the adverse effects that it may have on urban communities or how young people of color (Hip-Hop generation) are viewed by their White peers who are not privy to the commercialization of Hip-Hop.

In addition to being critical of Hip-Hop culture and commercialized Hip-Hop, this work allows educators to be critical of school systems that are known for pushing students out of schools because of the use of monolithic pedagogical approaches that were developed in the 19th century for all students, but have proven to not engage students from urban communities (Emdin, 2016). The focus of incorporating the creative elements of Hip-Hop into the science classroom, and moreover pedagogy, provides a lens for those not familiar with the culture who believe that Hip-Hop is a genre that only promotes violence, drugs, sex, and misogyny to value the use of Hip-Hop culture to engage young people. More importantly, this study encourages educators and researchers to understand the various possibilities of using a culture that directly reflects students, which will allow them to better understand and relate to students of the Hip-Hop generation who have been traditionally misunderstood, which ultimately can create better relationships between students and educators.

This study provides new insight on how Hip-Hop can be implemented in educational spaces with the goal of supporting students' learning, engagement, and

agency in science. As mentioned earlier, many researchers have revealed the benefits of incorporating Hip-Hop in education, but mainly focus on English classroom settings. For example, Morrell and Duncan-Andrade (2002), discuss using Hip-Hop to promote youth literacy in an English classroom. In their study, students developed written and oral debate skills, learned how to critically critique Hip-Hop songs and poems, and created and presented formal presentation based on their critiques. This study provides insight on how Hip-Hop can be incorporated into teaching and how an educator interacts with students in a science classroom, as opposed to an English classroom. Lastly, this study is grounded in critical theory to provide a lens to critique traditional school systems and structures that inherently fail to value the authentic cultures of the Hip-Hop generation, with the goal of presenting solutions to better reach and engage all students.

Chapter III

HISTORICAL CONTEXT OF HIP-HOP

The Birth of Hip-Hop

Hip-Hop is the most consumed genre of music by listeners across the world (Hooton, 2015). However, many consumers of Hip-Hop music and culture fail to recognize the rich history behind the birth of an innovative and progressive culture. Like all genres of music, Hip-Hop has roots in other musical genres such as Jazz, the Blues, Rock, and Funk to name a few. Hip-Hop as we currently know it, was birthed in the Bronx, in the recreation room of an apartment building located at 1520 Sedgwick Avenue on August 11th, 1973 to be exact (figure 3.1). Clive Campbell better known as DJ Kool Herc, the father of Hip-Hop, was the host and DJ of a back to school party that was thrown to bring the community together. Herc, a Jamaican native who moved to the Bronx as a child, was well known for spinning records in the community. He had a signature move as a DJ where he would find the break in a song, the moment where the vocals and most of the instruments that composed the beat will drop. Oftentimes during the break, only the drums would be present, and DJ Kool Herc would prolong this moment of the song for the crowds' enjoyment. At the time his signature move was called the Merry-Go-Round. Today, it's most commonly known as the breakbeat. DJ Kool Herc developed his technique of playing only the breakbeat through observation and noticing that the crowd mostly enjoyed that part of the song, especially dancers who would commonly perform their specialty move during the break. The break, allowed space for a blend of talents to be presented. In the summer of 1973, in front of huge crowd DJ Kool Herc's technique of playing the breakbeat began a grassroots musical

revolution, which is known to have birth Hip-Hop.

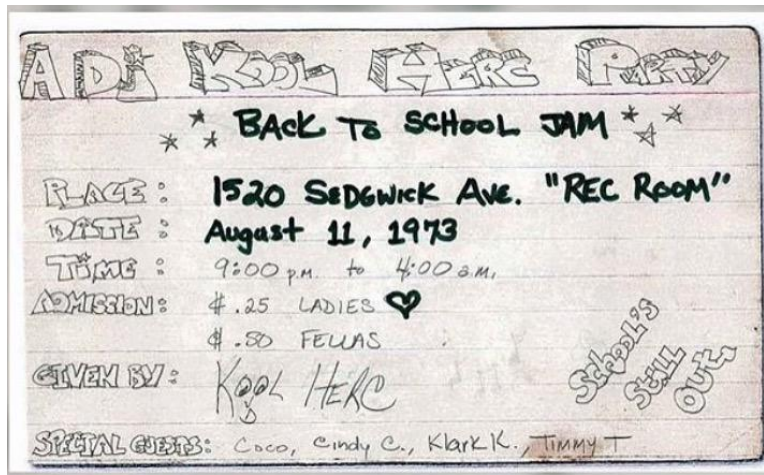


Figure 3.1. Invitation to DJ Kool Herc Party where Hip-hop was birthed.

If we took a closer look at the birthplace of Hip-Hop, the Bronx, in the 1970's, the elders of my community recall a time when gang violence over turf reached its peak and poverty was catastrophic (Chang, 2005). Gang violence between various crews became problematic, which encouraged the New York Police Department (NYPD) to launch efforts to penetrate local gangs that ultimately failed (Chang, 2005). It is important to note that these gangs that have been noted for committing violent acts against one another also were responsible for creating and organizing social events to uplift their communities despite economic hardships. Hip-Hop was created as a social outlet and a therapeutic outlet (Emdin et. al., 2016) by and for Black and Latino youth in response to the effects of industrialization in the Bronx (Chang, 2005; Rose, 1994).

In the 1960's, the Bronx began to deteriorate due to a number of reasons, including a steady rise in crime, a struggling economy, budget cuts to key social services

such as the fire and police departments, and one of the largest construction projects that the Bronx borough has experienced (Gonzalez, 2004). During the early 1900's, the Bronx was planned to be a suburban community, one in which people could conveniently travel a short distance to their jobs; however, during the 1950's and 1960's, crime, particularly in relation to drugs, across New York City rose dramatically, and poverty became an underlying issue affecting many New Yorkers. Although the entire city experienced an increase in crime and poverty, the Bronx was hit the hardest. The increased crime rate encouraged many community members to relocate, especially those who were affluent, which caused a significant change in the community as many homes and buildings became vacant (Gonzalez, 2004).

Robert Moses, a very influential city planner responsible for the construction of many New York City landmarks, was New York City's Construction Coordinator. Moses was in charge of developing the Cross Bronx Expressway. Popular thought was that this development would exacerbate the already devastating social and economic conditions of the Bronx and its community members. It is known that two routes were proposed to Robert Moses during the planning phase of the Cross Bronx Expressway, but Moses decided to build along the route that would displace more than double the amount of families because the alternate route was not in the best interest of his political colleagues. Although the deputy mayor of New York City at the time, Henry Epstein, spoke out publicly against Moses' chosen construction route, Moses continued with his plan (Caro, 1974). Community members protested the construction of the Cross Bronx Expressway as they could not afford to relocate or to lose the low rent rates they were offered in the Bronx (Caro, 1974).

Caro (1974) suggests that the construction of the Cross Bronx Expressway is responsible for the downfall of the Bronx. Thousands of families were displaced and forced to uproot from their homes to allow for bulldozers, plows, and other construction machinery to pave the way for the Cross Bronx Expressway. Crime continued to rise in the communities that surrounded the Cross Bronx Expressway, which caused residents and businesses to relocate, deserting many buildings and storefronts.

Due to the actions of Robert Moses and the group of individuals who were in positions of power, thousands of low-income families of the Bronx were displaced. A community that already faced social and economic hardships was forced to deal with the devastating effects of the construction of the Cross Bronx Expressway with little consideration.

In the midst of this social and economic crisis that plagued the Bronx, Hip-Hop music and culture were born. In an effort to build strong communal ties in times of economic and social hardship, urban youth attended block parties to escape their unfortunate realities. Block parties similar to the one hosted by DJ Kool Herc, Afrika Bambaataa, and the Ghetto Brothers (former street gang) created a space for young people in the Bronx to celebrate being young and free (Chang, 2005). The power of music and camaraderie united Bronx youth and “for the youth the block party was the space of possibility” (Chang, 2005).

Since its conception, Hip-Hop music was and continues to be used as a tool to promote social justice. In 1982, the song perfectly entitled “*The Message*,” by Grandmaster Flash and the Furious Five, was released, and provided America with imagery of urban communities and the sense of frustration that people who lived in

communities that seemed to be forgotten by society. In 2015, Kendrick Lamar released his critically acclaimed Hip-Hop album, *To Pimp a Butterfly*, which also provided America with the perspective of a young Black male and the realities of those in his community during a time in our society when there are social movements solely dedicated to raising awareness of the value of the lives of people of color. At its core, Hip-Hop is a culture and genre of music that promotes social justice and provides an outlet for youth who have been marginalized to share their stories and experiences with the world.

The Hip-Hop Generation as the Neoindigenous

There are over 550 federally recognized indigenous nations of Native Americans that are comprised of nearly three million people in the United States (US). These three million individuals who have been identified by the US government as indigenous are descendants of the approximately fifteen million Native people who had once inhabited the now proclaimed US land (Dunbar-Ortiz, 2014). The United Nation defines indigenous as individuals who follow distinct social systems, culture, and beliefs; who use distinct languages, who form non-dominant groups of society and have a connection to territories and natural surroundings. The United Nations (UN) declaration on the Right of Indigenous Peoples “posit[s] that the indigenous have their own ways of constructing knowledge, utilizing distinct modes of communication in their interactions with one another and hold cultural understandings that vary from the established norm [and that of the dominant group]” (Emdin, 2016, p.8). Emdin (2016) then explains that the “UN definition of the indigenous speaks to the collective oppression that a population experiences at the hands of a more powerful and dominant group” (p. 8).

In this study, I acknowledge and pay reference to indigenous populations but, similar to Emdin (2016), draw parallels between indigenous populations and urban youth, especially those who identify as the Hip-Hop generation. Despite the explicit connection that indigenous populations have to specific territories and natural surroundings, there are connections that can be made between indigenous populations and urban youth. More obvious connections revolve around how urban youth, similar to indigenous populations, are traditionally known to construct knowledge differently (Moje et. al., 2004), they follow and identify as part of a different culture (Hip-Hop) than the dominant groups, they communicate with one another differently than dominant groups. and they follow a different set of beliefs than the dominant group. Most importantly, in recognizing urban youth who identify as the Hip-Hop generation as neoindigenous, we must consider how urban youth have suffered from oppression and been marginalized as a result of decisions made by the dominant group.

In Linda Tuhiwai Smith's (1999) text *Decolonizing Methodologies*, she suggests that research and scholars have traditionally favored imperialistic ways of knowing developed primarily by Westerners. In other words, those in power, those who have colonized and marginalized other groups of people, have privileged their ways of knowing and constructing knowledge. Privileging the dominant group's ways of knowing promotes a lack of consideration as it relates to marginalized groups' ways of knowing and constructing knowledge, which I argue may be different, especially if the dominant group and marginalized group do not follow the same culture or belief system.

Smith (1999) posits that proving the validity of indigenous knowledge, including "that indigenous peoples have ways of viewing the world which are unique," is not the

only challenge indigenous populations face, but also proving the authenticity and control over those forms of knowledge (p. 104). These are similar challenges found with the Hip-Hop generation who often have different experiences than the dominant group due to the differences in lived realities and beliefs, which encourage them to construct knowledge and view the world differently. Because we know that urban youth and the Hip-Hop generation construct knowledge and view the world differently, there has been a push for educators to use culturally relevant pedagogies and practices, especially when engaging urban youth (Brown, 2003). The Hip-Hop generation identifies with the five creative elements of Hip-Hop (explored further in this chapter), which guide their experiences and the unique way in which they view the world and the way they construct knowledge. Smith also highlights that indigenous populations “often have their own language or code” (Smith, 1999, p. 127). The Hip-Hop generation, as well, often communicate and engage with one another using alternative colloquialism, commonly known as slang, when engaging their peers.

In *Decolonizing Methodologies*, Smith (1999) discusses the notion of ‘Trading the Other,’ as it relates to indigenous populations and Western Civilization. She explains that when ‘Trading the Other’ the dominant group trades nothing with the less dominant group (marginalized) in exchange for their knowledge, culture, materials and spiritual perspectives to fuel their commercial enterprises. Smith recognizes the fact that trade normally occurs between two parties who exchange things of value, but when ‘Trading the Other’ only the dominant party of the two benefits, leaving the non-dominant group further oppressed with without control over sacred cultural practices. Smith (1990) writes, “‘Trading the Other’ is a vast industry based on the positional superiority and advantages

gained under imperialism” (p. 89). Today, there are a number of sports teams, including the Washington Redskins, Southern California Apaches and the Kansas City Chiefs, whose mascot’s names have derived from the name of indigenous groups. Not only do these sports teams use these names for marketing and branding, but they profit from the use of these names which belong to indigenous groups who do not receive any of the profits.

I argue that the Hip-Hop generation also falls victim to ‘Trading the Other,’ similar to indigenous populations. Record labels and media outlets commodify and profit off of the realities of urban communities by encouraging Hip-Hop artists to create music that promotes violence and misogyny. The media hyper-exposes the negative realities of urban communities as “television news programs and newspapers over represents racial minorities as crime suspects and whites as crime victims” (Blow, 2014). Hip-Hop, a culture that began as a social justice movement and a tool to bring individuals from urban communities together to celebrate commonalities, is now a ten-billion-dollar industry (Watson, 2016). Of the 45 million consumers of Hip-Hop, 80 percent are White and the total group has over one trillion dollars in spending power (Watson, 2016). Through this ‘Trading of the Other,’ the dominant group continues to oppress the Hip-Hop generation inadvertently and maintains their powerlessness in relation to their image and how they are perceived by society.

My intention to make connections between indigenous populations and the Hip-Hop generation is not meant to draw attention away from indigenous studies and research and to focus population in urban communities, rather my goal is to draw comparison between indigenous populations and urban communities, thereby to highlight the

collective oppression that both groups experience at the hands of a more powerful and dominant group.

The Power of the Dap (Handshake)

A few teachers who teach in traditional urban schools have been recognized nationally for creating handshakes with students to build culture, create positive relationships with students, and to garner excitement from students (Murphy, 2017). Smith (1999) recognizes that indigenous populations utilize distinct modes of communication in their interactions with one another. Participants of the Hip-Hop generation greet, congratulate, affirm, and bid farewell using “the dap,” a simple or intricate handshake between two people. “The dap” is Hip-Hop’s spin on a traditional handshake but is more personal as it oftentimes includes a hug between two participants. “The dap” is considered more personal than the traditional handshake because there are specific and intricate hand gestures that group members with “strong ties” share with one another. These specific and intricate handshakes demonstrate a personal bond shared by the participants. Different groups of people have different ways to greet one another and even have secretive and special handshakes. Notorious gangs such as the Bloods and Crips have special handshakes to identify and greet fellow gang members. Members of historical Black Greek Letter Organizations (BGLO) also have intricate handshakes, which are kept secret and commonly known among BGLO members as grips. Grips (BGLO handshakes) are used to identify fraternity/sorority members and to signify a unique bond that members of the same organization share. Engaging in “the dap” with students provides an opportunity for teachers to communicate with students and participants of the Hip-Hop generation in a way that students would traditionally

communicate with one another outside of school.

Chapter IV

METHODOLOGY

As urban students' interest in STEM continues to decrease (Munce & Fraser, 2012), it is important that urban students begin viewing the field of STEM as visible and accessible, counter to what Basu and Barton (2007) have described. Through the implementation of Hip-Hop pedagogy in an urban science classroom, I suggest that students' will increase their engagement as it relates to STEM and increase their cultural capital in the science classroom, which will allow them to be more comfortable navigating STEM spaces outside of the science classroom. Students would be confident in their skills and abilities as related to STEM and be confident enough to pursue a career in STEM if they chose to, rather than not wanting to pursue a career in STEM because they are not engaged.

Research Questions

1. How does the implementation of Hip-Hop pedagogical approaches in an urban middle school science classroom influence teaching and learning?
 - a. Do Hip-Hop pedagogical approaches support urban students learning of science content?
2. Does the implementation of Hip-Hop pedagogical approaches increase urban students' interest in science as perceived by students?
3. What pedagogical strategies can be derived from Hip-Hop culture?

In this study, I identify and describe Hip-Hop pedagogical approaches, which can be identified more broadly as culturally relevant teaching approaches but are specific practices anchored and derived from the creative elements of Hip-Hop. These include,

but are not limited to graffiti art, MCing, breakdancing), DJing and knowledge of self. In addition, the implementation of these pedagogical approaches involves the process of learning and or utilizing the complex nuances of communication in Hip-Hop, which shows a valuing of student culture and allows for the creation of “weak ties” between the students and science content (Burt, 2001). There are links between individuals and groups within every social network that are categorized as “strong ties” or “weak ties.” “Strong ties” correspond to the links or connections individuals or groups who are “friends” have a lot in common, such as to share a similar cultural experience. On the other hand, “weak ties” correspond to “acquaintances” who do not have much in common that would normally connect them (Easley & Kleinberg, 2010). In this study, I argue that the connection that students share by virtue of engaging and participating in Hip-Hop culture represents “strong ties,” which are inherently developed outside of school walls in the community. By utilizing a pedagogy that is anchored in Hip-Hop, the science educator creates a space within the classroom where students’ “strong ties” they can be expressed. Enacting a Hip-Hop pedagogy within the science classroom serves as the catalyst to allow “weak ties” that already exist between teachers and students to develop into “strong ties” overtime. Furthermore, Hip-Hop practices are known to promote positive relationships among participants and positive communal spaces, where “strong ties” are mostly present. Employing Hip-Hop Pedagogy in the science classroom creates a positive communal space within the classroom that reflects the Hip-Hop community where “strong ties” already exist among participants of Hip-Hop culture. Using Hip-Hop Pedagogy provides an opportunity for the teacher who is traditionally is an “outsider” to Hip-Hop and youth culture to engage in this communal process with students who

identify with Hip-Hop. Recreating community structures where “strong ties” are present within the classroom through the implantation of Hip-Hop Pedagogy, also allows for the activation of “strong ties” between teacher and student.

When Hip-Hop is brought into educational spaces to engage students it is often incorporated into English curricula (Hill & Perchauer, 2013; Morrell, 2002; Morrell & Duncan- Andrade, 2002; Seidel, 2011). In this study, I plan to uncover the effect that Hip-Hop pedagogy has on teaching and learning in an urban science classroom, and I investigate whether the implementation of Hip-Hop pedagogy can support students learning of science content. These questions are important especially in the context of the urban science classroom as students of color interest in STEM is known to have decreased and is expected to continue to decrease significantly in the coming years (Munce and Fraser, 2012).

Ethnography

Of the many qualitative research methodologies available, I used ethnography in order to understand how the implementation of Hip-Hop pedagogical approaches that are anchored in student’s culture influence teaching and learning in an urban science classroom. Ethnography is associated with an in-depth description of the customs of individual peoples and cultures. In this definition of ethnography the term ‘culture’ can include “what people do (behaviors), what they say (language), the potential tension between what they do and ought to do, and what they make and use, such as artifacts” (Creswell, 2007, p. 71). The pedagogical approaches that students were engaged in and that are being studied are anchored in Hip-Hop culture, a culture in which students participate in daily consciously and subconsciously outside of school.

Utilizing a qualitative method of study poses challenges, as in any research study. It is imperative to recognize that qualitative research has a reputation for being less reliable or trustworthy, which stems from a belief that qualitative research is fundamentally subjective and therefore is prone to bias (Davies & Dodd, 2002). It is also important to recognize as Smith (1999) states in her interpretation of researchers of indigenous groups that, “insider [critical qualitative] researchers have to have ways of thinking critically about their processes, their relationships and the quality and richness of their data analysis” (p.137). Smith (1999) goes on to state, the major difference between the ‘insider’ critical qualitative researcher and the ‘outsider’ researcher (quantitative researcher) is that the ‘insider’ has to “live with the consequences of their processes on a day-to-day basis for ever more, and so do their families and communities (p. 137). While utilizing critical qualitative methods to describe and analyze research of indigenous and neoindigenous it is important to understand that as an ‘insider,’ I acknowledge that my position is not valued by many researchers. Though as an insider I must be “as ethical and respectful, as reflexive and critical, as ‘outsider’ research[er]” (p.139).

When researchers identify qualitative research methods as a less reliable form of research, it promotes a perspective that continues to keep communities such as the indigenous and neoindigenous marginalized. Recognizing qualitative research as a less reliable form of research encourages the limited access to the authentic stories and narratives of the indigenous and neoindigenous that would have been shared by ‘insider’ researchers as opposed to ‘outside’ researchers who may not have “strong ties” and connections to the groups in which they are studying.

As I utilize a critical autoethnographic lens in this study, I have the goal of

sharing the voices and experiences of a community and group (neoindigenous) that I too belong to. I also recognize that “the ‘outsider’ role has been and continues to be problematic for indigenous [and neoindigenous] communities” (p. 139). As a researcher who identifies as a member of the population that I am studying, my goal is not to inflict any harm or biases on this group. Therefore, as we continue to study groups of people such as the indigenous and neoindigenous, we must value and encourage the use of qualitative research methods for researchers to position themselves as ‘insiders’ as it relates to conducting research and understanding these populations in an authentic and genuine fashion.

Critical Autoethnography. Autoethnography is “an emerging qualitative research method that allows the author to write in a highly personalized style, drawing on his or her experience to extend understanding about a societal phenomenon” (Wall, 2006, p. 1). Critical autoethnography is a melding of autoethnography and critical theory used to situate the lived experiences of the researcher within a larger system of power (Boylorn & Orbe, 2014). In other words, critical autoethnography allows me to draw upon my lived experiences as it relates to Hip-Hop, science education, and urban school systems to provide a better understanding of this study, but also to situate my lived experiences with the goal of deconstructing these larger systems of power. Traditionally in an ethnography, “the ‘self’ strives to be nonexistent in the text.” (Madison, 2011). Using a critical autoethnographic lens for this study provides an opportunity to invite the reader into the thoughts of the researcher and capture the essence of the researcher’s experiences. Utilizing critical autoethnography as a qualitative method not only allows me to draw on my personal experience as an urban youth who attended New York City

public schools and has experienced similar sentiments toward urban schooling as described in traditional urban education research. But it allows me to reflect on my lifelong experiences and connection with Hip-Hop, which are directly connected to the reason in which I am conducting this study. Growing up in the same community where Hip-Hop was birthed, while immersed in its culture, being disengaged in school as an urban youth and deciding to become an educator and education researcher in the same community where I was raised to critically deconstruct my own childhood experiences in urban public school provide context for understanding this research study. Abet, in this study, I recognize that although I identify as part as the Hip-Hop generation, my perceptions and experiences as it relates to Hip-Hop might differ than that of the participants of this study. The participants of this study are approximately 15 years younger than the researcher, and although they too may identify as part of the Hip-Hop generation, their experiences and relationship with Hip-Hop culture may be different than that of the educator. Therefore, a ‘weak tie’ exists between the educator and participants of this study as it relates to their connection to Hip-Hop culture (Coleman, 1988).

Further, as it relates to academia, Hip-Hop is a relatively new field of study and research. Engaging in this Hip-Hop based study requires that the reader/researcher employs a Hip-Hop framework to the implementation and interpretation of the study. While conducting this study, I make specific connections between autoethnography as a research methodology and Hip-Hop, specifically to an MC (Master of Ceremony/Mover of the Crowd) who utilizes narratives, lived experiences, and authentic realities to construct rhymes/lyrics. Hip-Hop is a culture that consists of individuals making sense of the world around them through their lived experiences. The chief artifact of life

experience or method describing one's life experience is through oral narrative in Hip-Hop. I argue that if an MC were tasked to write an academic paper, they would use narratives, lived experiences and their realities to construct their academic paper. Essentially, utilizing narratives in Hip-Hop is what autoethnography is to qualitative research; where researchers consider their personal experiences as an anchor of their research study. Given that Hip-Hop is a culture that consists of individuals making sense of the world around them through their lived experiences, it is important that we collect and analyze the data from this study through the experiences and lens of the participants and their culture. Therefore, Hip-Hop serves as the most effective approach to conducting qualitative research, and narrative becomes the chief artifact in making sense of the experiences of those who are a part of Hip-Hop.

Although traditional scientific research requires the researcher to minimize oneself in research studies, as many view self as a contaminant to a study, some researchers view using self (autoethnography) as a source of data as being self-indulgent, narcissistic, introspective and individualized (Atkinson, 1997; Sparkes, 2000). Though, Ellis (1991) argues that the emergence of autoethnography as a method of inquiry moves researchers' "use of self-observation as part of the situation studied to self-introspection or self-ethnography as a legitimate focus of study in and of itself" (p. 30). I chose autoethnography as a method, not to evoke emotion in the reader, but because it provides an appropriate means to investigating the study considering the context and it provides a deeper understanding of how I, the investigator, am connected and invested in this study.

Participants and Setting

The primary site of my proposed study was a 6th-grade science classroom in a

public urban middle school. Participants in this study were selected from a 6th-grade science class taught by the principal investigator. The school enrolls 464 students in grades 6 – 8. The ethnic breakdown of the school is described on the school's website as follows: 67% African-American, 28% Latinx, 3% Asian, and 1% White. When I refer to urban students in this study, I am referring to African-American and Latinx students who largely populate urban spaces. All students qualify for free or reduced lunch. I have selected this research site because I work as a science educator in an urban setting and already have direct access to participants. I served as the principal investigator of this study and enacted the Hip-Hop pedagogical approaches in the middle school science classroom in my role as a classroom teacher.

Data Collection

The primary data sources for this study include student focus groups, video vignettes, and the Increasing Students' Interest in STEM Survey. Secondary data sources include participant observations and field notes. All focus groups were video recorded and transcribed in their entirety, and reflective field notes will be taken during and after each focus group. Videotaping of 6th-grade science classes throughout the data collection period provided additional means of making classroom observations. Observations and field notes taken during and after each class respectively provided another source of data, which I used to code and analyze for recurring themes. Focus group interviews were conducted with participants about their past experiences in science courses, and their conceptions of how the different teaching approaches that I use in the classroom engages them in the sciences.

Increasing Students' Interest in STEM Survey. All students participating in

this study completed a pre/post survey to measure their interest in STEM. The survey was created by the Massachusetts Department of Higher Education (Bouvier & Connors, 2011) to measure middle school students' interest in STEM who participated in a long-term STEM out of school program. This survey was chosen for a number of reasons: (1) it was created with urban middle school students in mind, (2) 70% of students who participated in the original study were from underrepresented minority groups and from urban communities, (3) the survey was created to measure students' interest in STEM pre and post STEM engagement intervention. In addition to the Increasing Students' Interest in STEM Survey (Bouvier & Connors, 2011), I added additional questions from a Hip-Hop culture questionnaire from a previous study (Adjapong & Emdin, 2015) to provide data on students' interest of Hip-Hop. This survey provided pertinent quantitative data regarding students' engagement and interest in STEM, specifically science, pre and post students engage in Hip-Hop pedagogical approaches.

Table 4.1
Data collection procedure for research questions

Research Questions	Data Collection Procedure
1. How does the implementation of a Hip-Hop pedagogical approach, in an urban middle school science classroom, influence teaching and learning?	Videotaped recordings, Focus group observations, Participant observations, Field notes
1b. Do Hip-Hop pedagogical approaches support urban students learning of science content?	Focus group observations

Table 4.1 (Continued)
Data collection procedure for research questions

Research Questions	Data Collection Procedure
2. Does the implementation of Hip-Hop pedagogical approaches increase urban students' interest in STEM?	Pre/Post Increasing Students' Interest in STEM Survey
3. What pedagogical strategies can be derived from Hip-Hop culture?	

Focus groups. Focus groups of 3-5 participating randomly selected students were formed. The goal of the focus groups was to understand student's perceptions and opinions of the different Hip-Hop teaching approaches that are implemented in the classroom. There were at least three focus group meetings conducted for each of the Hip-Hop pedagogical approaches implemented in this study.

Videotaped recordings/video vignettes. Participants were recorded during classes when Hip-Hop pedagogical approaches are enacted. These recordings gave the researcher an in-depth understanding of what Hip-Hop pedagogical approaches impacted participants in different ways and the nature of, and the exact moment these approaches were implemented. The video recordings allowed the researcher to rewind, fast forward and analyze the classroom frame by frame.

Data Analysis Methods

A variety of data analysis strategies were used to efficiently and effectively analyze anticipated data collected during this study. Observations and field notes produced in the natural setting of this study were coded and used as a guide to select

video vignettes that showed students interacting with the Hip-Hop pedagogical teaching approaches being studied. Focus group interviews were transcribed in their entirety. Qualitative coding techniques, including member checking and coding for recurring themes, were used to analyze the data generated from this study (Guba & Lincoln 1989; Creswell, 2013). All focus group and observation data were entered into a Word document for word-by-word coding and initial coding for categories. Then, the data that was selected for categories was entered into Nvivo to organize and then combined into recurring themes.

Reliability, Validity, and Trustworthiness. The use of multiple qualitative methods to collect data ensured the validity, reliability, and trustworthiness of this research project. As mentioned previously, this study allows me to make many connections to my personal life and experiences as it relates to culture and urban science education. To ensure that I took an objective approach to the analysis of the data of this study I utilized many qualitative research methods that provided the participants to share their narratives. Utilizing multiple research methods such as focus group interviews, observations/field notes, and the Increasing Students' Interest in STEM Survey allowed me to triangulate and compare the findings to ensure that they corroborate one another. To further demonstrate reliability, quotes from students' focus group interviews are included in the presentation of this study. Adding to the trustworthiness of this study, I utilized member checking as an approach to ensure that all participants interviews were being interpreted within the appropriate context and not solely through my experiences, which I recognize may not entirely be the same as that of my students (Shenton, 2004).

Consent and ethical considerations

Sixth-grade science classes were videotaped during this study. These videotaped experiences were used for the purpose of providing a complete record of exact behaviors and instructional practices with participants' responses to these instructional practices. This study involved minimal risk, similar to a student enrolled in an NYC public school. Although some students participating in this study will be my students, they were not given any preferential treatment during the study and participation in this study did not impact their grades. Students were able to opt out of participating in this study at any time.

Composition of Study

In this dissertation, I pulled together three very distinct ways of conducting a study and analyzing data, with the idea when woven together they allow us to make more sense of the phenomena that I am exploring. Utilizing my experiences as a student and teacher in public schools in the Bronx, NY it became imperative that I engage in a critical autoethnography. However, because I am interrogating new phenomena (Hip-Hop Pedagogy), it is also imperative for me to use available traditional research approaches. The merging of my critical autoethnographic research with traditional research approaches allows me to be able to provide research outcomes for the reader that they would not be privy to if I chose one over the other. Finally, I utilize a manuscript style in this study to provide context from other studies that I have conducted to this study. Again, I identify myself as a bricoleur and the multiple methodologies utilized in this study as my bricolage with the goal of securing an in-depth understanding of the phenomena of Hip-Hop Pedagogy and how it's implementation in the urban science classroom affects

teaching and learning (Claude Levi-Strauss, 1962/1996, p.17).

Chapter V

BRIDGING THEORY AND PRACTICE IN THE URBAN SCIENCE CLASSROOM: A FRAMEWORK FOR HIP-HOP PEDAGOGY IN STEM

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Abstract

This paper explores the state of urban science education as it relates to achievement and engagement of urban youth in STEM and provides insight on improving the experiences of urban youth in the science classroom through the lens of an urban science educator. It provides a framework for Hip-Hop Pedagogy in STEM as an innovative approach to teaching and learning, which anchors the culture, realities, and lived experiences of urban youth in pedagogy. Finally, this paper provides educators with practical tools and approaches, which were formed from theory and research that transcend the traditional monolithic approach to teaching science and allows educators to learn and incorporate the culture of urban youth within their pedagogy.

Introduction

As a science educator teaching in the same urban community where I grew up and attended public school, I notice that my students have a very similar connection to Hip-Hop culture as I had as an adolescent. Students sing along to Hip-Hop music that they hear blaring from cars driving past the school and constantly tap their pencils on the desk creating and replicating Hip-Hop beats. While noticing urban students' apparent

connection to Hip-Hop, it is difficult to ignore the rates of achievement as it relates to students of color, who predominantly populate the urban communities where they attend school. Educators are aware of the persistent achievement gaps or as Gloria Ladson-Billings (2006) refers to “educational debts” that exist between minority students and their counterparts of less diverse social settings, especially if we consider students’ performance on standardized exams as the chief marker of achievement.

Studies show that in relation to White students, minority youth earn lower grades and score lower on standardized tests (Vanneman et. al., 2009). In addition, researchers reveal the significance of the achievement gap between the test scores of both low-income and minority students as compared to others (Reardon, 2011; Jencks & Phillips, 1998; Steele, 1992). Education policy makers have noticed that over the past few decades proposed, education reform intended to improve minority student achievement has not met its goal (Boyd & Shouse, 1997; Zernike, 2001). It is significant to note that no intervention established by education reformers has been successful in closing the seemingly perpetual achievement gap.

Similar educational debts persist in STEM (Science, Technology, Engineering, and Mathematics) education writ large, and science education, in particular, as it relates to urban youth (National Governors’ Association, 2005). In the United States, there is a significant education debt between minority students and their White counterparts (Vanneman et. al., 2009). Researchers find that schools that serve mainly minority groups of students offer fewer science courses, and therefore offer fewer opportunities for students to experience and succeed in science (Norman, Ault, Bentz, & Meskimen, 2001). Moreover, Norman et. al. (2001) argue that the science education debt for students of

color is due to minority group's disadvantaged position in the United States' society. Groups of people who have a disadvantaged position in society tend to suffer from socioeconomic hardship, and the stigma of inferiority (Norman et. al., 2001). "In urban settings, schools in impoverished neighborhoods underperform relative to schools in more affluent settings" (Norman et. al., 2001, p. 105). A limited number of students of color successfully complete high school and go on to pursue a science related degree in college. Therefore, only about 17 percent of scientists and engineers in the United States are minorities (NSF, 2015).

Furthermore, in recognizing educational debts of urban youth, we must acknowledge that there has been a monocultural approach to teaching science. This monocultural approach to teaching science stems from the standards for college preparedness, dating back to the turn of the 20th century. Science curricula and pedagogies have historically benefited middle-class White students, and have failed to provide quality instruction for students who have been traditionally marginalized coming from culturally diverse backgrounds, largely urban students (Melnick & Zeichner, 1998; Tyack & Cuban, 1995). Possibly when standards for college preparedness were initially established, schools across the country were segregated, and it was unimaginable for students of color and White students to attend the same schools. As per the Brown V. Board of Education Supreme Court ruling, schools across the nation were desegregated, but no form of action was taken to integrate the curriculum or instructional practices to support students of color.

Research suggests that students from underrepresented ethnic groups traditionally fall behind their counterparts of less diverse backgrounds in major content areas

(National Governors' Association, 2005). In addition, urban students are less likely to be interested in the sciences partially because educators misunderstand the realities and experiences of urban students and as a result, they are not able to demonstrate the relevance of science (Kahle, Meece, & Scantlebury, 2000; Seiler, 2001). According to Munce and Fraser (2012), African-American students' interest in STEM has decreased significantly over time, it is now lower than that of any other ethnic group, and is expected to remain low in upcoming years. As such, scholars such as Gloria Ladson-Billings (1995) and most recently Django Paris and Samy Alim (2012) have argued for culturally relevant and sustaining pedagogies. In Science Education, scholars like Mary Atwater (1996) speak directly to the ways that culture may be a powerful piece of science teaching and learning. In order to gain insight into urban students' experiences to better engage them in the science classroom, I argue that it is time that science education researchers suggest and identify pedagogical approaches that "focus[es] explicitly on understanding the realities of youth within urban classrooms and supports the teacher in utilizing an understanding of these realities as an anchor for instruction delivery," and move away from oppressive pedagogies and practices, which are known to disengage and marginalize urban students in science (Emdin, 2011, p. 5).

In this paper, I provide a framework for Hip-Hop pedagogy, which is rooted in culturally relevant pedagogy and reality pedagogy, that is directly connected to the culture of Hip-Hop and therefore connected to students' cultural and lived experiences as an effective way to engage urban students in content utilizing their realities in the science classroom. Hip-Hop pedagogy is "a way of authentically incorporating the creative elements of Hip-Hop into teaching and inviting students to have a connection with the

content, all while meeting students on their cultural turf and teaching to their realities and experiences” (Author & Emdin, 2015). As a teacher and researcher, I implement Hip-Hop pedagogical approaches in my everyday instruction and notice the opportunities that this innovative approach to teaching provides my students to make connections between their true selves and content (Author, 2015). Emdin (2010) calls for a teaching approach “which involves a process of learning and or utilizing the complex nuances of communication in hip-hop and a valuing of student culture” (p. 62). In this paper, I suggest a framework for Hip-Hop pedagogy and the implications for each of the five elements of Hip-Hop to be used practically in classroom settings, which I argue will encourage the realities and lived experiences of students to be considered in the classroom.

Conceptual Framework

Culture, Capital, and Social Networks

This study is rooted in a sociocultural framework that explores the concepts of culture and social capital as they relate to the experiences of African- American and Latinx urban students in a science classroom. Vygotsky states, “human activities take place in cultural context, [and] are mediated by language” (John-Steiner & Mahn, 1996, p. 191). Most urban students’ experiences outside of school are rooted in Hip-Hop culture (Emdin, 2010). The ways urban students dress, talk, dance, and engage in other non-verbal forms of communication are all rooted in Hip-Hop culture. Vygotsky (1981), in his research, demonstrated an understanding of culture as something that is firmly entrenched in societal processes, which he believes is the emergence of mental processes. Vygotsky states, “above all, in the widest sense of the word, it means that everything that

is cultural is social. Culture is the product of social life and human social activity. That is why just by raising the question of the cultural development of behavior we are directly introducing the *social* plane of development” (Vygotsky, 1981, p. 164). Vygotsky's account of culture puts forward that humans are never free of cultural influences, even when engaging in an action alone. “Instead, human mental functioning, even when carried out by an individual acting in isolation, is inherently social, or sociocultural, in that it incorporates socially evolved and socially organized cultural tools” (Wertsch & Tulviste, 1992). Vygotsky posits that all actions performed by individuals are somehow shaped by cultural influences. Urban students who identify as a part of the Hip-Hop generation frequently engage in traditional Hip-Hop practices outside of school, but once those practices are incorporated in teaching and learning students are given the opportunity to engage in science content as seamlessly as they would in a traditional Hip-Hop practice.

I suggest bringing Hip-Hop culture into urban science classrooms and not only incorporating it into curricula, but also incorporating the culture into the ways in which teachers teach their students. Normally, learners depend on others with more experience to teach them in a way that will make them feel comfortable with the content. If students are engaged and excited about science content in the classroom, and their exchanges around the content are occurring with the use of hip-hop forms of communication, over time, students take on increasing responsibility for their own learning (Lave & Wenger, 1991; John-Steiner & Mahn, 1996). Being culturally relevant through Hip-Hop pedagogy will not only allow students to view themselves and a culture which they value as a part of the classroom, but it can also encourage independent self-education of science content;

since students will take increasing responsibility for their own learning (Ladson-Billings, 1995).

In framing Hip-Hop Pedagogy, I also draw insight from sociologist Bourdieu (1986) who describes capital and its varied forms as necessary for articulating the ways that humans exist in a social world. In particular, I focus on the form of capital that is acquired in social fields like classrooms when individuals develop a conscious or unconscious personal investment in an activity or process. This form of capital is called “cultural capital” and in its embodied state, is both inherited and acquired as one engages with either new or familiar tools in an activity. In other words, one may possess forms of cultural capital outside of the classroom, and then use these forms of capital to acquire new forms of knowledge in the classroom. The goal is for science educators to create contexts that generate new forms of cultural capital that will eventually lead to the acquisition of science content knowledge. If students develop more opportunities to expand their cultural capital within their science classrooms, they will not only be more prepared to navigate science spaces outside of the science classroom, but they will also be more comfortable while navigating these spaces. Hip-Hop is a form of cultural capital that many urban youth possess. When brought into science classrooms, and used as a viable form of knowledge acquisition in science, it can be used to expand youth cultural capital to include science. Students who develop more cultural capital within the science classroom may be more likely to take on a science identity because both Hip-Hop and the teaching approaches being employed in the classroom are connected to their lived experiences. In this type of scenario, students are accumulating and exchanging cultural capital both in hip-hop spaces outside of the classroom and within the classroom.

Bourdieu describes cultural capital as having an unconscious and non-deliberate quality in terms of how the individual generates it. However, he also describes cultural capital as something gained as the result of “conditions of acquisition.” I suggest that science classrooms that allow and welcome the expression of hip-hop culture are the ideal spaces for the “conditions of acquisition” for urban youth who identify as hip-hop.

The Hip-Hop Generation as the Neoindigenous

In developing a framework to Hip-Hop pedagogy I acknowledge indigenous populations but, similar to Emdin (2016), draw parallels between indigenous populations and urban youth, especially those who identify as the Hip-Hop generation. Despite the explicit connection that indigenous populations have to specific territories and natural surroundings, there are connections that can be made between indigenous populations and urban youth. More obvious connections revolve around how urban youth, similar to indigenous populations, are traditionally known to construct knowledge differently (Smith, 1999), they follow and identify as part of a different culture (Hip-Hop) than the dominant group, they communicate with one another differently than dominant groups, and they follow a different set of beliefs than the dominant group. Most importantly, in recognizing urban youth who identify as the Hip-Hop generation as neoindigenous, we must consider how urban youth have suffered from oppression and been marginalized as a result of decisions made by the dominant group.

In Linda Tuhiwai Smith’s (1999) text *Decolonizing Methodologies*, she suggests that research and scholars have traditionally favored imperialistic ways of knowing developed primarily by Westerners. In other words, those in power, those who have colonized and marginalized other groups of people, have privileged their ways of

knowing and constructing knowledge. Privileging the dominant group's ways of knowing promotes a lack consideration as it relates to marginalized groups ways of knowing and constructing knowledge, which I argue may be different especially if the dominant group and marginalized group do not follow the same culture or belief system.

Smith (1999) posits that proving the validity of indigenous knowledge, including “that indigenous peoples have ways of viewing the world which are unique,” is not the only challenge indigenous populations face, but also proving the authenticity and control over those forms of knowledge (p. 104). These are similar challenges found with the Hip-Hop generation who often have different experiences than the dominant group due to the differences in lived realities and beliefs, which encourage them to construct knowledge and view the world differently. We know urban youth and the Hip-Hop generation construct knowledge and view the world differently as there has been a push for educators to use culturally relevant pedagogies and practices, especially when engaging with urban youth (Brown, 2003). The Hip-Hop generation identifies with the five creative elements of Hip-Hop (which will be explored in a subsequent section), which guide their experiences and the unique way in which they view the world and the way the constructed knowledge. Smith also highlights that indigenous populations “often have their own language or code” (Smith, 1999, p. 127). The Hip-Hop generation, too, often communicates and engages with one another using alternative colloquialism, commonly known as slang, when engaging their peers.

My intention to making connections between indigenous populations and the Hip-Hop generation, is not meant to draw attention away from indigenous studies and research and to focus population in urban communities, rather my goal is to draw

comparison between indigenous populations and urban communities to highlight the collective oppression that both groups experience at the hands of a more powerful and dominant group; in this case, science and science educators.

Hip-Hop Pedagogy

Hip-Hop pedagogy is an outgrowth of my research and experiences in urban classrooms and focuses on utilizing the culture of students within particular social spaces, including the science classroom (Adjapong & Emdin, 2015). To continue to push science educators to remain culturally relevant as it relates to students who identify as the Hip-Hop generation, I suggest educators utilize pedagogical approaches that are rooted in Hip-Hop culture. It is important to recognize that Hip-Hop is more than a genre of music. Hip-Hop is as culture has impacted and empowered youth populations across the globe, especially youth of marginalized groups, since its conception (Adjapong & Emdin, 2015; Dunley, 2000). Hip-Hop pedagogy draws from the frameworks of Culturally Relevant Pedagogy (Ladson-Billings, 1994) and Reality Pedagogy (Emdin, 2016). From Culturally Relevant Pedagogy, Hip-Hop Pedagogy draws a focus on understanding youth culture that is exhibited in students' communities and the use of an of understanding students' youth culture and their communities in improving teacher effectiveness. Culturally relevant pedagogy encourages teachers to immerse themselves so deeply in the culture of the specific students through actual engagement with the students, that it becomes second nature to find ways to develop students' interest in, and natural affinity for, science. From Reality Pedagogy, Hip-Hop pedagogy draws a focus on the teacher learning about the authentic realities of students and teaching utilizing students' authentic realities and culture to engage them in science better. Reality pedagogy provides teachers with tools to

become proximal with students to engage in dialogue where teachers can learn from the experiences of students who have traditionally been marginalized by school systems as it relates to science.

Hip-Hop Pedagogical Approaches

Hip-Hop pedagogy is an approach to teaching and learning that is rooted in Hip-Hop culture; which urban youth identify with (Adjapong & Emdin, 2015). In the subsequent sections, I have outlined and make specific connections between pedagogical approaches and each of the five creative elements of hip-hop (MCing, graffiti art, breakdancing, DJ and knowledge of self) (Chang, 2007) and provided practical tools, which educators can utilize to engage urban youth in science rooted in these elements.

MCing (Master of Ceremonies)

Traditionally, the Master of Ceremonies (MC) is known a host of an event and their responsibilities consist of introducing speakers and maintaining the flow of an event. In Hip-Hop, MC is the artist who is responsible for delivering musical content to an audience. All MCs approach the role of MCing differently using their unique style. Oftentimes, when an MC is performing to an audience, they are accompanied by a fellow MC whose essential role is to be a professional in terms of knowing and understanding the musical content to provide support to successfully showcase meaningful performance for the audience.

Co-Teaching. Co-teaching is a teaching approach, most commonly used in secondary education, which has been popular for decades. Co-teaching is defined as “two or more professionals delivering substantive instruction to a group of students with diverse learning needs” (Cook & Friend, 1995, p.25). The goal of implementing this

approach in a classroom is to allow the responsibilities for instruction to be shared between the two masters of content. In this study, the student is identified as a professional and master of content in the science classroom. As the responsibilities for instruction are shared between both the teacher, who is normally viewed as the main authority figure of the classroom and a student, the student feels a sense of empowerment and excitement that can allow them to take responsibility for their own learning and participation to enhance their science content knowledge (Lave & Wenger, 1991; John-Steiner & Mahn, 1996). Co-teaching between a student and teacher increases instructional options and provides students with the opportunity to showcase their mastery of the content as they support their colleagues to gain that same mastery. In addition, co-teaching in itself is a culturally relevant approach in the sense that the student who is now deemed the professional is a part of the same population that is receiving the instruction. In Hip-Hop Pedagogy, co-teaching occurs with a student and the teacher who both identify as the masters of content, parallel in Hip-Hop where traditionally two MC's deliver musical content to an audience and is supported by the utilizing the following steps:

Before class:

- A student who volunteered to be a co-teacher is given a lesson plan to review for homework in preparation to teach the class the following day.
- The teacher performed a quick review of the lesson plan with the co-teacher to ensure that content is reflected accurately.
- The student was responsible for enhancing that lesson plan so that it can reflect their “teaching style.”

During class:

- The teacher sits in a student's seat in a place that is prominent in the classroom and in the view of the co-teacher.
- The teacher pays close attention to parts of the lesson where the content delivered and guides the instruction (by raising a hand as a traditional student would) only when there are issues with the content (Emdin, 2011).

Call-and-response. Smitherman (1977) defines call-and-response as "spontaneous verbal and non-verbal interaction between speaker and listener in which all of the statements ('calls') are punctuated by expressions ('responses') from the listener" (p. 104). Responses from the audience can follow from a speaker specifically requesting them, or they can be unsolicited and spontaneously interjected into the ongoing interaction (Foster, 1989). Call-and-response is a popular teacher approach and is commonly used in music and dance produced by African-Americans. Several studies show call-and-response to be effective in teaching students in urban communities (Foster, 2002; Piestrup, 1973). Call and response is considered integral to communicative behavior and functions as an expression of identity and as a means of conveying cognitive information among African-Americans (Cazden, 1988). In Hip-Hop, to engage the audience, the MC traditionally uses call-and-response during their performance as a way for audience members to have an opportunity to be active participants during the performance. This exchange between the MC and the audience generates high energy and allows every audience member to participate in the exchange. When utilizing Hip-Hop Pedagogy, call-and-response can be used to review and reinforce science content information, as a classroom management tool and to generate positive emotional energy

among students.

Review and reinforce content information: To review and reinforce potential and kinetic energy.

Teacher: Kinetic energy is the energy that an object has

Students (in unison): When it's in motion

Teacher: Potential energy is the energy that an object has

Students (in unison): When it's in the position to do work

Classroom management: To gain the attention of students when necessary.

Teacher: If you can hear my voice clap once

Students (in unison): [Clap] Teacher: If you can hear my voice clap twice

Students (in unison): [Clap] [Clap]

Teacher: No music

Students (in unison): [Clap]...[Clap] [Clap]...[Clap]

The clapping rhythm used in this call and response pattern originated from a classic Hip-Hop dance song entitled, "No Music," by Harlem rapper Voice of Harlem.

Graffiti Art

Graffiti art is an aspect of Hip-Hop culture that has not been nearly as received as rap music. The graffiti movement was popularized in Philadelphia in early 1965 by a Black teenager who was trying to attract the attention of a woman he was interested in. The graffiti movement then found its way to New York City by 1968. Urban youth who participated in tagging their street alias on the walls of urban neighborhoods, train cars,

etc. enjoyed the attention their art received because it made them feel like a celebrity (Chang, 2007). Graffiti artists find it liberating to climb tall gates and slip under fences to create murals that represent them. Gregory Tate identified this as reverse colonization. Graffiti artists created murals of their street names across New York City to reclaim their communities that have been affected by gentrification and New York City's planning efforts led by Robert Moses Cross Bronx Expressway in the Bronx (Bronx Museum of the Arts, Walker Art Center, & Spelman College, 2001). Graffiti art provided urban youth an opportunity to be expressive in their communities.

In recent years, educators have been focusing on incorporating the arts into the STEM acronym, changing it to STEAM (Science, Technology, Engineering, Arts, Mathematics). Educators (Alberts, 2008) suggest that "art and science are intrinsically linked" and students are able to better their understanding of science content through creating their own artistic representations of the science content. In support of incorporating art into the teaching and learning of science, science educators note that the "visual arts just seems to really be able to hone in on the concept, taking it from the abstract to the concrete, so students are really able to understand it" (Robelen, 2011). When utilizing Hip-Hop pedagogy, students are charged with tasks where they engaged in the visual/graffiti arts, similar to graffiti artists, to work through and demonstrate their understanding of science content. Using graffiti art as a pedagogical approach to support students understanding of science content also allows students to "make representations to: express their thoughts, feelings and perceptions, show relationships and changes, and make explanations and predictions" (Nelson and Chandler, 1999, p. 41). Teachers are encouraged to create tasks where students are able to visually demonstrate science

concepts and make connections between science and real world examples. For example, if students are learning about the law of conservation of energy, they can be tasked to illustrate a real world example of objects that transfer energy and explain with evidence and reasoning how energy is transferred. From this point on, I will refer to what is traditionally known in academia as visual art as graffiti art.

B-boying/B-girling

As in any culture, there is a performance aspect where many participants of the culture communicate through dance. The aboriginals' (an indigenous group) of Australia Haka dance, a traditional ancestral war cry dance, has transformed into a dance that is currently performed at celebratory events such as weddings. Many indigenous African tribes have dances that serve many social purposes such as communicating with their gods to ask for rain (rain dance) to prepare for the harvest, to prepare for war, and to welcome a new born baby into the world, to name a few. In early days of the formation of Hip-Hop, breakdancing began as a direct response to the social factors that urban youth experienced in the late 1960's and during the 1970's in the South Bronx. During that time, the development of the Cross Bronx Expressway abruptly displaced over 5,000 families in the South Bronx and destroyed neighborhoods, amid high crime rates and gang violence that consumed the Bronx (Shapiro, 2005). Instead of fighting, gangs formed breakdancing crews where their best b-boys/b-girls would battle one another on the dance floor. B-boys/b-girls would dance to the rhythm of the beat played by the neighborhood Disc Jockey (DJ). As time progressed, b-boys/b-girls took the art of dancing more seriously and always strived to perfect their moves. They danced faster, developed more complex moves, and improved their form (Fresh, 1984). Breakdancing received its name

because b-boys/b-girls would dance during the break beat of a song. Although b-boying is not currently as popular as it once was in the 1970's, I argue that this style of dancing has evolved into contemporary Hip-Hop dance, which continues to be a pivotal part of Hip-Hop culture. The intricate, well thought out, and well-performed dances that Hip-Hop dancers perform demonstrates a kinesthetic aspect of Hip-Hop culture.

There are four stages of cognitive development which Bruner (1966) and Piaget (1951) describe as how humans assimilate knowledge about their surrounding environment through four sensory modalities, one of which is kinesthetic learning. Kinesthetic learners prefer “learning achieved through the use of experience and practice. In other words, the kinesthetic learner has to feel or live the experience in order to learn it” (Murphy et. al, 2004). Kinesthetic learning involves the physical manipulation of objects or the body, like a dancer (Gardner. 1993). Through breakdancing and contemporary Hip-Hop dance, urban youth learn how to manipulate their body. In doing so, youth who follow Hip-Hop culture, communicate well through body language and can be taught through physical activity, hands-on learning, acting out, role playing (Lane, 2008). When utilizing Hip-Hop pedagogy, students engage in kinesthetic learning activities, which allow them to physically manipulate objects and their body alike, similar to Hip-Hop b-boys/b-girls, with the goal of better understanding and engaging with science content. For example, when discussing the various states of matter, students can conceptualize themselves as particles and move around the classroom as particles would when energy increases and decrease. When energy decreases students should be moving closer to one another to the point where they are huddled in a fixed position (solid) and when the energy increased students should move around the classroom at a faster rate at times

bumping into one another. It is important to highlight the current research that already exists around kinesthetic learning in science (Hawk & Shah, 2007; Willingham, 2005; Tanner & Allen, 2004), but in this study I argue that there is a specific connection between Hip-Hop culture and dance (kinesthetic activity) that can be harnessed within the science classroom to engage youth who identify as part of the Hip-Hop generation. To focus on the connecting between kinesthetic learning and Hip-Hop culture, I will refer to what is traditionally known as kinesthetic learning to 'breaking.'

Disc Jockey (DJ)

The disc jockey (DJ) is arguably the most important creative element of Hip-Hop culture. At its core, the DJ is responsible for supporting other creative elements including the Master of Ceremonies (MC) and the b-boys/b-girls. The DJ's primary duty is playing and controlling the music, the rhythm, and the beat to which the MC adds their lyrical content to produce a completed song. The DJ is also responsible for finding the break in the beat, the moment in the song where only the drums are present, to provide an optimal rhythm for the b-boys/b-girls to showcase their best dance moves. Furthermore, the DJ is responsible for reading the mood of a crowd and playing the perfect arrangement of songs to harness the crowd's energy. Jeff Chang's (2007) depiction of the conception of Hip-Hop describes DJ Kool Herc,

“like any proud DJ, he wanted to stamp his personality onto his playlist.

But this was the Bronx. They wanted the breaks. So, like any good DJ, he gave the people what they wanted, and dropped some soul and funk bombs. [People] were packing the room. There was a new energy” (p. 85).

Chang describes DJ Kool Herc as a DJ who incorporated his personality into his playlist

while playing songs to the crowds' preference. Chang also explains that DJ Kool Herc was responsible for harnessing a new energy that was attractive to a crowd of people. When utilizing Hip-Hop pedagogy, students will be in charge of being the DJ of the classroom and harnessing energy among their peers by creating playlists that are played during class. Teachers allow students to curate a class playlist of their favorite music instrumentals (music without lyrics). The student-curated playlist should be played during class as background music when students are completing individual and group task. The goal of utilizing a playlist curated by students is to harness the same form of energy as a traditional DJ within the classroom. Also, a student-curated playlist provides an opportunity for teachers to gain knowledge about student's interest that they would not have learned otherwise.

Knowledge of Self

Knowledge of self is the last and most unknown creative element of Hip-Hop culture. Afrika Bambaataa is a DJ and is known as the grandfather of Hip-Hop. He is best known for creating the first sounds that influenced the creation of Hip-Hop music. Bambaataa defines knowledge of self as a central component of Hip-Hop culture. In support of the knowledge of self as a creative element of Hip-Hop, Bambaataa states,

“We got to get people back to the knowledge. Too many are caught up on the partying... they are not dealing with all the elements of Hip Hop; they're just dealing with the rap side of Hip Hop. We got to let them know that it's a culture, and come back to the knowledge, because this is what controls and holds everything together” (Conzo, 2007).

Bambaata argues that the Hip-Hop generation has been overly consumed with rap music

and is not engaging in Hip-Hop as a culture. Rap music is a small fraction of Hip-Hop culture, which is known to have been commercialized and therefore slightly removed from being nested in the authenticity of Hip-Hop culture. Bambaataa along with many Hip-Hop purists believe that knowledge of self is central because participants of Hip-Hop culture must remember that Hip-Hop was created based on authenticity and as a social political movement. Essentially, knowledge of self is central to Hip-Hop as it encourages participants of Hip-Hop culture to be aware of who they are, be authentic to themselves and be confident in oneself to make positive social political change for their communities. At its core, Hip Hop culture was birthed as a means to push back against the existing systemic inequalities in 1970's post-industrialized South Bronx community in order to provide an outlet and voice for urban youth.

As urban students' interest in STEM continues to decrease (Munce & Fraser, 2012), it is important that urban students increase their engagement in STEM. Through the implementation of Hip-Hop pedagogy in an urban science classroom, I suggest that students will increase their engagement as it relates to STEM and increase their cultural capital (Bourdieu, 1986) in the science classroom, which will allow them to be more comfortable navigating STEM spaces outside of the science classroom. Students would be confident in their skills and abilities as related to STEM and be confident enough to pursue a career in STEM if they chose to, rather than not wanting to pursue a career in STEM because they are not engaged. In essence, Hip-Hop Pedagogy provides a similar outlet for urban youth in contemporary educational spaces as it did in the 1970's post-industrialized South Bronx. Hip-Hop pedagogy positions youth to use their voice to push back against existing educational structures, including the implementation of monolithic

pedagogies, to include knowledge of self and culture within educational spaces.

Preparing Teachers to Implement Hip-Hop Pedagogy

One of the goals for developing a framework for Hip-Hop pedagogy in STEM, is to arm educators with practical tools that are derived from the culture and realities of students who identify as the Hip-Hop generation. Previously, I outlined the value of implementing Hip-Hop pedagogical approaches which require knowledge of youth culture. In this paper, I suggest that if educators deploy strategies to understand the authentic realities of their student population as they vary from school to school or classroom to classroom, they will be more effective. Furthermore, I suggest that Hip-Hop pedagogy be acknowledged as a culturally relevant approach to teaching and learning developed for all STEM educators despite the fact that they may not be of the same culture (urban or Hip-Hop generation) as their students. I argue that the fact that teachers may not share the same culture as their students does not prove to be a limitation of this approach of teaching and learning, but rather a strength; as this pedagogy encourages the teachers to position themselves as a student of their students' culture. According to the U.S. Department of Education, about 50 percent of the public school student population is nonwhite, while 80 percent of public school teachers are white. Considering the racial disproportion between students and teachers across the country, the reality is many educators will not identify with the same culture and practices as the students they teach. Consequently, in preparing teachers to implement hip-hop pedagogy, I am providing a tool (co-generative dialogues) that teachers can use to understand the authentic realities of youth culture before and during their implementation of the hip-hop based pedagogical practices outlined above. In the following section, I outline the use of co-generative

dialogues in a classroom as one possible strategy to support teachers as they deploy hip-hop pedagogy in their STEM classrooms.

Co-generative Dialogues as Cyphers

In order to be effective when implementing Hip-Hop pedagogy, I suggest all educators use strategies to engage in co-generative dialogues (co-gens). Co-gens are special meetings that educators hold with a small group of students to discuss and gain student perspective about phenomena, which occur in the classroom, such as classroom culture and instruction. “Co-gens are structured to emulate the ways that many urban youth communicate when they are engaged in an aspect of Hip-Hop culture called the cypher.” (Emdin, 2011, p. 287). When conducting a co-gen students follow the rules of engagement of a Hip-Hop cypher. Students sit in a circle equal distance from one another, students have equal turns to talk, all voices and ideas are respected and no voice privileges another (including the teachers). When engaging in co-gens with students, teachers are to position themselves as equal participants of the co-gen

The goal of the co-gen is to reach a collective decision about the rules, roles, and responsibilities that govern the lives of students within the classroom (Roth, Tobin, & Zimmerman, 2002). Co-gens are held with a group of four to six students who each represent a different demographic within the classroom (engaged, high-achieving, low-achieving, etc.). The role of the educator, who is the expert of instruction, is to conduct co-gens with students, who identify as the Hip-Hop generation, as they are the masters of cultural content to gain a better understanding of how to effectively implement Hip-Hop pedagogy to enhance teaching and learning within the classroom. During the co-gen, the small group of students are given the “opportunity to reflect on their classroom

experiences, critique the instruction, discuss the inhibitors to their classroom learning, and, most importantly, provide teachers with an insight into what can work well in the classroom from the students' perspective” (Emdin, 2011, p. 287). Ultimately, the co-gen can be used as a tool for teachers to gain insight from students on the implementation of Hip-Hop pedagogical approaches. It also serves as a space where teachers may member check with a small group of students about their use of particular hip-hop pedagogical practices with the whole class.

Conclusion

In closing, this framework of Hip-Hop Pedagogy is a call for science educators to consider an innovative approach to teaching and learning that is connected to the culture of urban youth. Considering the educational debts we collectively owe to urban youth as it relates to science and STEM, we must acknowledge that the monolithic approaches to teaching science, which has not considered students culture, does not encourage achievement in science. Hip-Hop pedagogy is an attempt to bridge theory and practice to demonstrate pedagogical approaches that can be used to better reach urban youth in the science classroom. If we do not consider students’ culture, we are ultimately doing a disservice to students of diverse backgrounds by not working towards closing the “achievement gap” and not paying the educational debts we owe to them.

Chapter VI

RETHINKING PEDAGOGY IN URBAN SPACES: IMPLEMENTING HIP-HOP PEDAGOGY IN THE URBAN SCIENCE CLASSROOM

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Abstract

A significant amount of research regarding Hip-Hop Based Education (HHBE) fails to provide insight on how to incorporate elements of Hip-Hop into daily teaching practices; rather, Hip-Hop based educators focus mainly on incorporating Hip-Hop culture into curricula. This study explores the benefits of using two specific Hip-Hop pedagogical practices in an urban science classroom. Call-and- response and co-teaching, two different pedagogical approaches that are related to Hip-Hop culture, were implemented and studied to understand their benefits in an urban science classroom. Participants in this study are middle school students who attend an urban school in one of the largest school systems in the country. This study provides insight on ways Hip-Hop can be incorporated into the art and science of teaching, extending current HHBE research, which mainly discusses how Hip-Hop can be used to design curricula based on music and rhymes. Through this study, the researchers find that Hip-Hop pedagogical practices studied in this paper support students science content acquisition, connects science content to students' realities, and encourages their voice and agency.

Introduction

In both authors experiences and observations as science educators in the same

school system where we obtained both our primary and secondary education almost a decade apart from each other, we have each noted a significant lack of engagement and what can be described as an aversion for learning science among African-American and Latinx students. We argue that there are many reasons why students of color may not be interested in science including “envision[ing] the field of science as distant and inaccessible” (Basu & Barton, 2007, p. 467).

According to Munce and Fraser (2012), African-American students’ interest in STEM has decreased significantly over time and is now lower than that of any other ethnic group. It is expected to remain low in upcoming years. Additionally, there is an achievement gap in science that exists among African-American / Latinx urban students and their counterparts from other ethnic and less diverse social settings. Yet there continues to be an ongoing misunderstanding of the experiences and realities of these African-American and Latinx students who predominantly populate urban settings (Kahle, Meece, & Scantlebury, 2000; Seiler, 2001). In order to gain insight into urban students’ experiences, we argue that it is time that science education researchers develop and suggest innovative approaches that “focus explicitly on understanding the realities of youth within urban classrooms and supports the teacher in utilizing an understanding of these realities as an anchor for instruction delivery” (Emdin, 2011, p. 5).

Since its conception, Hip-Hop culture has impacted youth populations across the globe, especially youth of marginalized groups. Though much research has been published in regards to Hip-Hop Based Education (HHBE), researchers mainly focus on how to incorporate Hip-Hop culture into school-based curricula, particularly using English Language Arts curricula (Hill & Perchauer, 2013; Morrell, 2002; Morrell &

Duncan-Andrade 2002; Seidel, 2011). There are not many studies about the pedagogy of Hip-Hop, specifically, the art and science of using Hip-Hop as a teaching approach in the classroom (Hill & Perchauer, 2013; Morrell, 2002; Seidel, 2011). Emdin's (2010) research addresses the need to meet students on their cultural turf by engaging them in teaching practices that are anchored in the realities of young people, especially in the content area of science where students of color have traditionally been marginalized. This study is not intended to overshadow or disregard the work of HHBE scholars, but to serve as an extension of HHBE research to arm educators with practical and tangible pedagogical tools to support efforts to be culturally relevant while teaching to the realities of their students.

We define Hip-Hop pedagogy as a way of authentically and practically incorporating the creative elements of Hip-Hop into teaching, and inviting students to have a connection with the content while meeting them on their cultural turf by teaching to, and through their realities and experiences. Emdin (2010) calls for a teaching approach "which involves a process of learning and/or utilizing the complex nuances of communication in hip-hop and a valuing of student culture" (p. 62). In this paper, we challenge urban educators - in particular science educators- to focus on the culture of students by using Hip-Hop pedagogical approaches that resonate with the realities of their students.

In this paper, we explore the benefits of two Hip-Hop pedagogical approaches, co-teaching and call-and-response, in an urban science classroom. Although co-teaching and call-and-response can be identified more broadly as culturally relevant teaching approaches, there is an added value for identifying them as Hip-Hop pedagogical

approaches in this study is that these approaches are anchored by the creative elements of Hip-Hop. These include, but are not limited to: graffiti art, MCing, Bboying (breakdancing), DJing, and knowledge of self. In addition, the implementation of these pedagogical approaches involves the process of learning and/or utilizing the complex nuances of communication in hip-hop, which shows a valuing of student culture and allows for the creation of “weak ties” between the students and science content (Burt, 2001). There are links between individuals and groups within every social network that are categorized as “strong ties” or “weak ties.” “Strong ties” correspond to the links or connections individuals or groups who are “friends” have a lot in common. On the other hand, weak ties correspond to “acquaintances” who do not have much in common that would normally connect them (Easley & Kleinberg, 2010). Hip-Hop practices that are enacted in an urban classroom act as “weak ties” that can be developed over time into strong ties between students who identify as Hip-Hop and the science content.

Conceptual Framework

This study is rooted in a sociocultural framework that explores the concepts of culture and social capital as they relate to the experiences of African- American and Latinx urban students in a science classroom. Vygotsky states that “human activities take place in cultural context, [and] are mediated by language” (John-Steiner & Mahn, 1996, p. 191). Most urban students’ experiences outside of school are rooted in Hip-Hop culture (Emdin, 2010). The ways urban students dress, the ways they talk, the ways they dance and other non-verbal forms of communication are all rooted in Hip-Hop culture. We suggest bringing Hip-Hop culture into urban classrooms and not only incorporating it into curricula, but also incorporating the culture into the ways in which teachers teach

their students. Normally, learners depend on others with more experience to teach them in a way that will make them feel comfortable with the content. If students are engaged and excited about science content in the classroom, and their exchanges around the content are occurring with the use of hip-hop forms of communication, over time, students will take on increasing responsibility for their own learning (Lave & Wenger, 1991; John-Steiner & Mahn, 1996). Being culturally relevant through Hip-Hop pedagogy will not only allow students to view themselves and a culture which they value as a part of the classroom, but it can also encourage independent self- education of science content; since students will take increasing responsibility for their own learning (Ladson-Billings, 1995).

For this study, I also draw insight from sociologist Bourdieu (1986) who describes capital and its varied forms as necessary for articulating the ways that humans exist in a social world. In particular, I focus on the form of capital that is acquired in social fields like classrooms when individuals develop a conscious or unconscious personal investment in an activity or process. This form of capital is called “cultural capital” and in its embodied state, is both inherited and acquired as one engages with either new or familiar tools in an activity. In other words, one may possess forms of cultural capital outside of the classroom, and then use these forms of capital to acquire new forms of knowledge in the classroom. The goal is for science educators to create contexts that generate new forms of cultural capital that will eventually lead to the acquisition of science content knowledge. If students develop more opportunities to expand their cultural capital within their science classrooms, they will not only be more prepared to navigate science spaces outside of the science classroom, but they will also be more

comfortable while navigating these spaces. Hip-hop is a form of cultural capital that many urban youth possess. When brought into science classrooms, and used as a viable form of knowledge acquisition in science, it can be used to expand youth cultural capital to include science. Students who develop more cultural capital within the science classroom may be more likely to take on a science identity because both Hip-Hop and the teaching approaches being employed in the classroom are connected to their lived experiences. In this type of scenario, students are accumulating and exchanging cultural capital both in hip-hop spaces outside of the classroom and within the classroom. Bourdieu describes cultural capital as having an unconscious and non-deliberate quality in terms of how the individual generates it. However, he also describes cultural capital as something gained as the result of “conditions of acquisition.” I suggest that science classrooms that allow and welcome the expression of hip-hop culture are the ideal spaces for the “conditions of acquisition” for urban youth who identify as hip-hop.

This study provides new insight on how Hip-Hop can be implemented in educational spaces with the goal of supporting students’ learning, engagement, and agency in science. As mentioned earlier, many researchers have revealed the benefits of incorporating Hip-Hop in education, but mainly focus on English classroom settings. For example, Morrell and Duncan-Andrade (2002), discuss using Hip-Hop to promote youth literacy in an English classroom. In their study, students developed written and oral debate skills, learned how to critically critique Hip-Hop songs and poems, and created and presented formal presentation based on their critiques. This paper provides insight on how Hip-Hop can be incorporated into teaching and how an educator interacts with students in a science classroom, as opposed to an English classroom.

Research Questions

1. How are Hip-Hop pedagogical approaches (co-teaching and call-and-response) beneficial in an urban middle school science classroom?
2. How do Hip-Hop pedagogical approaches support urban students learning of science content?

Methodology

Setting and Participants

The primary site of this study is a 6th-grade science classroom in a public urban middle school located in the most densely populated city in the northeast region of the United States. The school is located a few miles from the affluence of a large economic hub, yet streets away from areas of extreme poverty. The school enrolls 486 students in grades 6 – 8. The ethnic breakdown of the school is described on the school's website as follows: 68% African-American, 26% Latinx, 3% Asian and 2% White. The school is a Title 1 school, and all students qualify for free or reduced lunch. Students are from urban communities of extreme poverty populated by people of color.

Intervention with Hip-Hop Pedagogical Approaches

Principal Investigator. The first author of this paper acted as the principal investigator of this study and enacted the Hip-Hop pedagogical approaches in the middle school science classroom in his role as a classroom teacher. Both authors served as researchers and took field notes based on observations of students and their reactions to the specific pedagogical approaches implemented. The researchers identified moments that had evidence of student participation /engagement, and moments where students self-identified as scientists.

Co-Teaching. Co-teaching is a teaching approach, most commonly used in secondary education, which has been popular for decades. Co-teaching is defined as “two or more professionals delivering substantive instruction to a group of students with diverse learning needs” (Cook & Friend, 1995, p.25). The goal of implementing this approach in a classroom is to allow the responsibilities for instruction to be shared between the two professionals. In this study, the student is identified as a professional and expert in the science classroom. As the responsibilities for instruction are shared between both the teacher, who is normally viewed as the main authority figure of the classroom, and a student, the student feels a sense of empowerment and excitement that can allow them to take responsibility for their own learning and participation to enhance their science content knowledge (Lave & Wenger, 1991; John-Steiner & Mahn, 1996).

In Hip-Hop, when a Master of Ceremonies (MC) is performing to an audience, often that MC is accompanied by a fellow MC whose essential role is to be a professional in terms of knowing and understanding the musical content to provide support to successfully showcase meaningful performance for the audience. Co-teaching increases instructional options, provides students with the opportunity showcase their mastery of the content as they support their colleagues to gain that same mastery. In addition, co-teaching in itself is a culturally relevant approach in the sense that the student who is now deemed the professional is a part of the same population that is receiving the instruction. In this study, co-teaching was supported using the following steps:

Before class:

- A student who volunteered to be a co-teacher is given a lesson plan to review for

homework in preparation to teach the class the following day.

- The teacher performed a quick review of the lesson plan with the co-teacher to ensure that content is reflected accurately.
- The student was responsible for enhancing that lesson plan so that it can reflect their “teaching style.”

During class:

- The teacher sits in a student's seat in a place that is prominent in the classroom and in the view of the co-teacher.
- The teacher pays close attention to parts of the lesson where the content delivered and guides the instruction (by raising a hand as a traditional student would) only when there are issues with the content (Emdin, 2011).

Call-and-response. Smitherman (1977) defines call-and-response as "spontaneous verbal and non-verbal interaction between speaker and listener in which all of the statements ('calls') are punctuated by expressions ('responses') from the listener" (p. 104). Responses from the audience can follow from a speaker specifically requesting them, or they can be unsolicited and spontaneously interjected into the ongoing interaction (Foster, 1989). Call-and-response is a popular teacher approach and is commonly used in music and dance produced by African- Americans. Several studies show call-and-response to be effective in teaching students in urban communities (Foster, 2002; Piestrup, 1973). Call and response is considered integral to communicative behavior and functions as an expression of identity and as a means of conveying cognitive information among African Americans (Cazden, 1988). In Hip-Hop, to engage the audience, the MC will use call-and-response during their performance as a way for audience members to

have an opportunity to be active participants during the performance. This exchange between the MC and the audience generates high energy and allows every audience member to participate in the exchange. In this study, call-and-response is used to review and reinforce science content information, as a classroom management tool and to generate positive emotional energy among students. In this study, call-and-response was supported in the following way:

Classroom management: To gain the attention of students when necessary.

Teacher: If you can hear my voice clap once
Students (*in unison*): [Clap]
Teacher: If you can hear my voice clap twice
Students (*in unison*): [Clap] [Clap]
Teacher: No music
Students (*in unison*): [Clap]...[Clap] [Clap]...[Clap]

The clapping rhythm used in this call and response pattern originated from a classic Hip-Hop dance song entitled “No Music” by Harlem rapper Voice of Harlem.

Data Collection

The primary data sources for this study were student focus groups, video vignettes, and a Likert scale questionnaire. Secondary data sources are participant observations and field notes. All focus groups were video recorded and transcribed in their entirety, and reflective field notes were taken during and after each focus group. Videotaping of 6th-grade science classes throughout the data collection period provided another means of making observations. Observations and field notes taken during and after each class respectively provided another source of data through which the researchers coded and analyzed for reoccurring themes. Focus group interviews were conducted with participants about their past experiences in science courses, and their conceptions of how the different teaching approaches that the principal researcher uses in the classroom

engages them in the sciences.

Questionnaire. All students participating in the study completed a questionnaire to gain information about their perspective on Hip-Hop culture and the use of Hip-Hop incorporated into instruction. The goal of the questionnaire was to provide information that concluded or refuted whether or not participants in the study identify as students of the Hip-Hop generation and if they enjoy Hip-Hop pedagogical approaches. The questionnaire was composed of five-point Likert scale questions (using a scale of 1 – 5, where 1 = strongly disagree and 5 = strongly agree), but also allowing participants to elaborate on their choice of their selection on the Likert scale for every question.

Focus Groups. Focus groups of 2-5 students were formed with participants selected based on responses from the questionnaire. The goal of the focus groups was to understand student's perceptions and opinions of the different Hip-Hop teaching approaches that are implemented in the classroom. There was a focus group of students for each of the two Hip-Hop pedagogical approaches that this study focuses on.

Video Taped Recordings/Video Vignettes. Participants were recorded during classes when the principal investigator enacted Hip-Hop pedagogical approaches. These recordings gave researchers an in-depth understanding of what Hip-Hop pedagogical approaches impacted participants in different ways and the nature of, and the exact moment these approaches were implemented. The video recordings allowed researchers to rewind, fast forward and analyze the classroom frame by frame.

Data Analysis Methods

A variety of data analysis strategies was used to efficiently and effectively analyze data collected during this study. Observations and field notes produced in the natural

setting of this study were coded and used as a guide to select video vignettes that showed students interacting with the two Hip-Hop pedagogical teaching approaches being studied. Focus group interviews were transcribed, as were open-ended answers from the questionnaire.

Qualitative coding techniques, including member checking and coding for reoccurring themes were used to analyze the data generated from this study (Guba & Lincoln 1989; Creswell, 2013). All focus group, questionnaire, and observation data were entered into a Word document for word-by-word coding and initial coding for categories. Then, the data that was selected for categories was entered into Nvivo to organize and then combine into reoccurring themes. The three themes that emerged from the data analysis were (1) using Hip-Hop to support students' understanding of science content, (2) supporting students' agency and voice through Hip-Hop pedagogical approaches, and (3) students' connection to Hip-Hop and Hip-Hop pedagogical approaches.

Results and Findings

The findings of this study are organized by reoccurring themes that emerged during the data analysis process. To elaborate on reoccurring themes, exemplary moments from transcripts that reflect the findings of students who participated in this study individually and collectively would provide insight on student's experiences with Hip-Hop pedagogy and in turn the benefits of these teaching approaches.

Call-and-Response Supporting Students' Understanding of Science Content

In the middle school science classroom that was the focus of this study, all students participated in, and were engaged by, the call-and-response approach when it

was enacted. Oftentimes, it took up to three “call” prompts to receive a response from the entire class, but students found that this approach was an effective way for students to remember and memorize scientific content taught during its use. Call-and-response was used to reinforce definitions of basic scientific words like force and energy. Naomi, a student who participated in the call-and-response and focus groups thought that call-and-response approach was beneficial to student learning “[because the teacher is] jamming [the content] into our head without jamming it into our heads.” The student here was referring to the colloquial definition of the word jamming that connotes music and dance as a method to get her to remember information without jamming (forcing) the information.

Another student, Sean agreed, by stating, “saying it over and over, they (students) will be listening and they will get it.” Sean felt that when the teacher enacted call-and-response around science content all students in the class would listen and eventually not only join in by participating, they will have a better understanding of the content. Naomi later said, “You keep repeating it until [students] can understand and catch on.” Similar to Sean, Naomi felt that the more call-and-response was enacted around science content, the more participation there would be from students. Therefore, we suggest that students gain a better understanding of the science content through rhythmic call-and-response interactions with the teacher and entire class. Both Naomi and Sean felt that this was an effective and interactive way of learning in the science classroom.

Interviewer: So when I do call-and-response either if I’m asking you to respond with definitions or with clapping, does that make you more attentive in the classroom?

Sean: Yeah, I think that it like gets us more hype to do the work.

Sean explains how the call-and-response approach not only garners student's attention in the classroom, but it also makes students "hype," which means it makes students excited and eager to engage in the science content, activity or lab that might be next on the agenda for the lesson.

Overall, students who participated in this study explained how the use of this Hip-Hop pedagogical approach in the science classroom helps engages them in, and deepen their understanding of, the science content.

Co-Teaching Supporting Students' Agency and Voice

The second theme that emerged from this study was how the implementation of Hip-Hop pedagogical approaches supported students' agency and voice in the science classroom. Both students who had an opportunity to co-teach enjoyed their time teaching the class because they were able to influence what and how students, including themselves, learned in the classroom. They were able to interact with students differently than the teacher to foster students' understanding of the content. Courtney said, "[co-teaching] was great because I felt in charge, I felt like I had control over what the kids were learning and what I was learning." She later went on to explain how it is beneficial for students to learn from their peers because, "it is like us helping us... we have conditions that we can understand, like the way I was teaching...[the teacher] explains things but is not putting anything into it, and sometimes we would get confused." Courtney enjoyed the feeling of being "in-charge" when she co-taught the class and had control over what her peers were learning and how they learned it. She saw benefits in students teaching other students because they are able to explain the content in ways

where the content can be transferred from student to student because they understand one another realities and “conditions.” Courtney felt that it was more beneficial for students to learn from one another than for the teacher to disseminate the information because students “do not always understand the content when the science teacher teaches it.”

Brandon shared similar sentiments to Courtney, but focused more on acquiring the trust of his peers and developing the skill to talk to a large number of his peers. He said, “because I’m in front of all of these people it seems like [they] trust me and chose me to do something smart.” Brandon felt that since his peers were engaged while he co-taught, they trusted him to teach them science content. Brandon then says, “[co-teaching] helps me because when I was teaching in front of [of the class], because I was talking slow, and I got to stand in front of people and talk.” While Brandon was very timid when in front his peers teaching science content, he viewed co-teaching as an opportunity for him to develop his voice in the science classroom. Brandon is normally a quiet student that often participates, but often feels like he has no voice in the science classroom because as he stated, “my partner doesn’t like to talk to me.” Brandon was excited for the opportunity to be in a position of power to develop his voice and public speaking skills in the science classroom, while co-teaching.

Students’ Connection to Hip-Hop and Hip-Hop Pedagogical Approaches

The third theme that emerged from this study was students’ connection to Hip-Hop and the Hip-Hop pedagogical approaches implemented in the science classroom. Students who answered the Likert questionnaire expressed their connection to Hip-Hop culture and how they would like to see more of it in the science classroom. Out of the 31 students

who completed the questionnaire, when students were asked if they enjoyed and listened to Hip-Hop music 81% strongly agreed, 13% agreed, and 7% neither agreed nor disagreed (Table 6.1). Some short answer responses included:

Student 1: Because I love Hip-Hop

Student 2: I love it

Student 3: Because that is my culture

Student 4: Because of the beat and what they say connect to me some time

Table 6.1
Students responses to Likert scale questionnaire

Question		Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
Q1. I enjoy Science	#	0	2	9	9	11
	%	0%	8%	29%	29%	34%
Q2. I enjoy this science class	#	0	2	9	11	9
	%	0%	7%	29%	34%	29%
Q3. I enjoy that my teacher uses culture to teach me	#	0	1	4	12	14
	%	0%	3%	13%	39%	45%
Q4. I enjoy and listen to Hip-Hop music	#	0	0	2	4	25
	%	0%	0%	3%	13%	81%
Q5. I would like to see more Hip- Hop culture inside the classroom	#	0	2	0	5	24
	%	0%	7%	0%	16%	77%

These responses show that students in this urban science classroom are active participants of the Hip-Hop generation. Students connect to Hip-Hop because they identify it as a part of their culture.

When the call-and-response approach is used for classroom management, students become excited and would wait for the teacher to say “no music,” so they can respond

and clap with the matching rhythm. Through analyzing the video vignettes, I noticed some students did not respond to the first two prompts (1. if you can hear my voice clap once, 2. if you can hear my voice clap twice), but respond enthusiastically to the “no music prompt” because it allowed them to clap to a rhythm that is tied to their culture and their life outside of school. When asked where the rhythm that students clap to when call-and-response is used for classroom management, students could not identify the popular song entitled “No Music” by Hip-Hop artist Voice of Harlem. Instead, students said, “the rhythm came from the streets, just the streets in general. It didn’t necessary come from where I came from... it came from the streets, it came from Harlem, it came from the Bronx, Brooklyn.” Students were able to connect the call-and-response approach to their lives outside of school. When students say the rhythm comes from the streets, they are referring to the urban communities where they live and where their school is located. Sean also shared, “I think playing music in class is cool, not high, but I think it would get everyone to do their work.” Sean believes that while students are participating in group work or independent work Hip-Hop music should be played at low volumes to encourage students to do their work, it is also another way to bring students realities into the classroom, as Sean said “it makes me feel comfortable. It makes me feel at home.”

Discussion

Based on the interviews and statements of participants in this study, it became clear that students were overwhelmingly positive about the benefits of Hip-Hop pedagogical approaches in the classroom. These approaches were welcomed because they are rooted in the culture of the students, reflect their realities, and puts the teaching

and learning in their own hands. The findings of this study also show that students are able to memorize and then understand science content through both the call-and-response and coteaching approach because it allows them to move from memorization to active participation through the use of culturally rooted approaches to teaching. Students noticed that they are able to relay scientific content to their peers while co-teaching more efficiently than their teacher because they (students) are members of the same community. In many ways, the teacher is an outsider to their culture that needs to create “weak ties” to students that can be fostered by Hip-Hop pedagogical practices (Burt, 2001). While call- and-response may be perceived as just repetition, it has a rich tradition within African communities and takes on a very distinct form within Hip-Hop that gets activated through the enactment of call and response. Within the science classroom, this Hip-Hop pedagogical practice (call and response) awakens a connection between students and the content and creates the conditions for student engagement in science. If students are able to obtain a deeper understanding of the science content and understand the definitions of scientific vocabulary words they increase their science cultural capital and are more likely to navigate spaces where they will need knowledge of science content to thrive (Bourdieu, 1986; Coleman, 1988).

In this study, when a student explained that they had fun while engaging in Hip-Hop pedagogical approaches in the science classroom, I related that to positive emotional energy, which is ultimately beneficial to the learning experience of students and their interactions with one another. Through call-and-response, students are allowed to participate in a positive collective effervescence, which is a sociological construct created by French sociologist Durkheim, where participants in the same community

come together, simultaneously communicate the same action, and experience the same social force (Rawls, 2004; Throop & Laughlin, 2002). If teachers are able to create situations that evoke students enacting positive social effervescence in the science classroom, it allows the teacher to further strengthen “weak ties” with students because both the teacher and students become co-participants in the exchange of positive emotions (Burt, 2001; Rawls, 2004).

Through this study, we were able to affirm that students are more excited and engaged when Hip-Hop pedagogical approaches are implemented in their science classrooms, students gain a better understanding of science content through their exposure to Hip-Hop pedagogical practices, students are provided with a different route to develop their voice in the science classroom and are able to share and obtain scientific content knowledge from their peers. Moments like when a student like Brandon expresses how he was nervous speaking in front of a class full of his peers, until co-teaching allowed him the opportunity to practice that skill in a way that connects him to his peers or when Courtney expressed how she was able to explain a concept to her peers because they share the same realities speak to the fact that incorporating Hip-Hop pedagogy in the science classroom allows students to feel at home while within the school walls and feel comfortable with learning science.

Conclusion

The fact that this study positively impacted teaching and learning in an urban science classroom holds tremendous value for urban learning, teaching, and research in a subject area where achievement gaps are most prevalent. However, although an urban science classroom served as the setting for this study, we believe that Hip-Hop pedagogy

can be beneficial when utilized in any content area. This motivates us to engage in future work that moves beyond the one class that is the focus of this article, and towards comparative studies among classes in different subject areas where Hip-Hop pedagogy is used, not used at all, and/or used sporadically. Other possible next steps for researchers include developing and modifying more teaching approaches and activities that are anchored in the other creative elements of Hip-Hop (such as knowledge of self, storytelling graffiti art and DJing), and longitudinal studies of the impact of Hip-Hop pedagogical practices on students. This article, and the burgeoning area of research that births it, shows that Hip-Hop pedagogy has the potential to transform classrooms and generate new forms of cultural capital for urban students and their teachers. Once Hip-Hop based approaches to teaching and learning that focus on practical aspects of pedagogy become rooted in our practice and research, new opportunities for students are opened, and educators collectively move towards more equitable and transformative experiences for young people.

Chapter VII

FINDINGS

The purpose of this study is to uncover the effect that Hip-Hop pedagogy has on teaching and learning. Much research that focuses on incorporating Hip-Hop in educational spaces mainly focuses on how to incorporate Hip-Hop culture into school-based curricula, rather than how to incorporate Hip-Hop into pedagogy as well as the art and science of teaching (Hill & Perchauer, 2013; Morrell, 2002; Morrell & Duncan-Andrade 2002; Seidel, 2011). In order to study the effects of Hip-Hop pedagogy on teaching and learning, a variety of qualitative data analysis strategies were used to efficiently and effectively analyze data collected during this study. Open coding was used for the initial analysis to group similar themes that were repetitive and to identify categories from focus group interviews, observations, and field notes. Once open coding was used to develop concepts and categories, focus group interviews, observations from video vignettes and field notes (produced in the natural setting/context of this study) were coded for recurring themes (Guba & Lincoln 1989; Creswell, 2013). All focus group and observation data were entered into a Word document for “word-by-word coding,” as I was very familiar with Microsoft Word and used the comment function for initial coding. After this step, the data that was selected for categories was entered into Nvivo to organize and then combined into recurring themes. The themes that emerged from data analysis were (1) Students developing deeper understanding of science content through Hip-Hop pedagogical approaches, (2) Students identifying as scientist as a result of engaging with Hip-Hop pedagogical approaches, (3) Students reactions to Hip-Hop Pedagogical Approaches and (4) Deconstructing traditional classroom spaces through the

implementation of Hip-Hop pedagogical approaches. Exemplary moments were taken from recurring themes that reflect students who participated in this study individually and collectively to provide insight on student's experiences while engaging in Hip-Hop pedagogy and in turn the effect that Hip-Hop Pedagogy has on teaching and learning. I define exemplary moments and include excerpts from the interviews that are included in subsequent sections that are designed to represent key themes that emerged.

Quantitative data analysis strategies were used to analyze student responses to the Increasing Students' Interest in STEM survey. Student responses to the Increasing Students' Interest in STEM Likert survey were collected, sorted, and organized in a Microsoft excel spreadsheet. An online Wilcoxon test calculator was used to compare the responses of students before and after engaging in Hip-Hop pedagogical approaches.

Students developing deeper understanding of science content through Hip-Hop pedagogical approaches

Through engaging in focus group discussions with participants of this study around the effect of Hip-Hop Pedagogical approaches, the first theme that emerged from student responses was that students developed a deeper understanding of science content as a result of engaging with Hip-Hop Pedagogical approaches. Two students, Leila and Hyam, shared how engaging in a breaking activity where students imagined and acted as molecules that were gaining energy and losing energy allowed her to gain a deeper understanding of phase change even though she learned this concept a year prior in elementary school. This breaking activity represents the element of b-boying/b-girling as it provided students an opportunity to physically act out science concepts similar to how b-boys/b-girls physically act out dance moves in dance battle competitions.

Leila: Here, it's easier. At first, I couldn't understand it. I actually learned it in my old school, and I had no idea. I was one of those kids, I didn't know what those (molecules) are. We were the only three in the back and we always used to be like, "Huh?" And we also used to tell the teacher ... The teacher never did this activity with us. He did stuff like explaining in harder words, but when we act out, it seems easier to understand.

Hyam: I couldn't imagine it when we were talking about it, I couldn't imagine it, but when we acted as molecules it, I learned more.

Both Leila and Hyam attended the same elementary school where they both were in the same science class. Leila shares that they learned about molecules as they relate to phase change a year prior in their old school, but left elementary school without a clear understanding of what molecules were. Considering that molecules are composed of a number of atoms, which exist in everyday life, but cannot be seen with the naked eye or traditional science equipment, it is challenging to teach students what molecules are and how they behave (Kessler & Galvan, 2007). Leila explains that she was one of those students who “had no idea” about what the elementary science teacher was explaining when discussing molecules. Further, Leila shares that both her and Hyam were two of three students that would be “sitting in the back of the classroom like ‘huh’” suggesting that they were confused and did not understand the content because their teacher used “harder words,” or science vocabulary words that students have yet to understand, to explain the content. But when Leila had an opportunity to act (move) as a molecule in the science classroom she felt like it “seem[ed] easier to understand,” how molecules behave demonstrating her ability to gain a deeper understanding of molecules as it relates to

phase change through a Hip-Hop Pedagogical approach. In the same focus group interview, Hyam shared that she “couldn’t imagine” molecules or how they behaved when her elementary science teacher taught this concept. But when she acted as molecules, she “learned more,” deepening her understanding of how molecules behaved.

In a different focus group interview, discussing the same breaking activity where students acted as molecules, both Iris and Skye expressed that they were able to gain a deeper understanding of how molecules behaved.

Iris: It was cool, we got to get up for once, and I got to understand it better
 because we’re imagining it ourselves as actual things (molecules).

Skye: I feel like I have a better understanding.

While Iris enjoyed the opportunity to get out of her seat and move around the class, she also felt that acting as a molecule allowed her to understand the content better because she imagined herself as an actual molecule, rather than just being talked to about molecules. Encouraging Iris to imagine herself, then act as a molecule allowed her to relate her actual physical self to that of a molecule. Furthermore, it provided what Skye shared a “better understanding” of how molecules behaved. Given that many science concepts are abstract, and are challenging for students to gain a deep understanding of these concepts, providing students an opportunity to imagine themselves, act, visualize, and illustrate science concepts provides students with an alternative avenue to gain a deeper understanding of science content. Conversely, science learning becomes a very personal experience when students are using their bodies to understand science content.

When discussing a task where students were asked to create a graffiti art representation of the earth, its six outer protective atmospheric layers, and characteristics

of each layer, Savon shared how engaging in this activity allowed him to gain a deeper understanding of the layers of the atmosphere.

Interviewer: Anything else that you like about the drawing aspect of [this task]?

Savon: Because it was a chill day. We just had time to draw and just do this and I was able to wrap my mind about the different layers of the earth's atmosphere by drawing.

Savon shared that having the time to illustrate a visual/graffiti representation of the earth's atmosphere allowed him to “wrap [his] mind [around] the different layers of the earth's atmosphere.” Having an opportunity to independently create a graffiti art representation of the earth's atmosphere provided Savon with the time and space to gain a deeper understanding the layers of the earth's atmosphere. Students were given an extended amount of time to complete the illustration task because the expectation was that students were taking the time to independently learn about the science concept that they were illustrating.

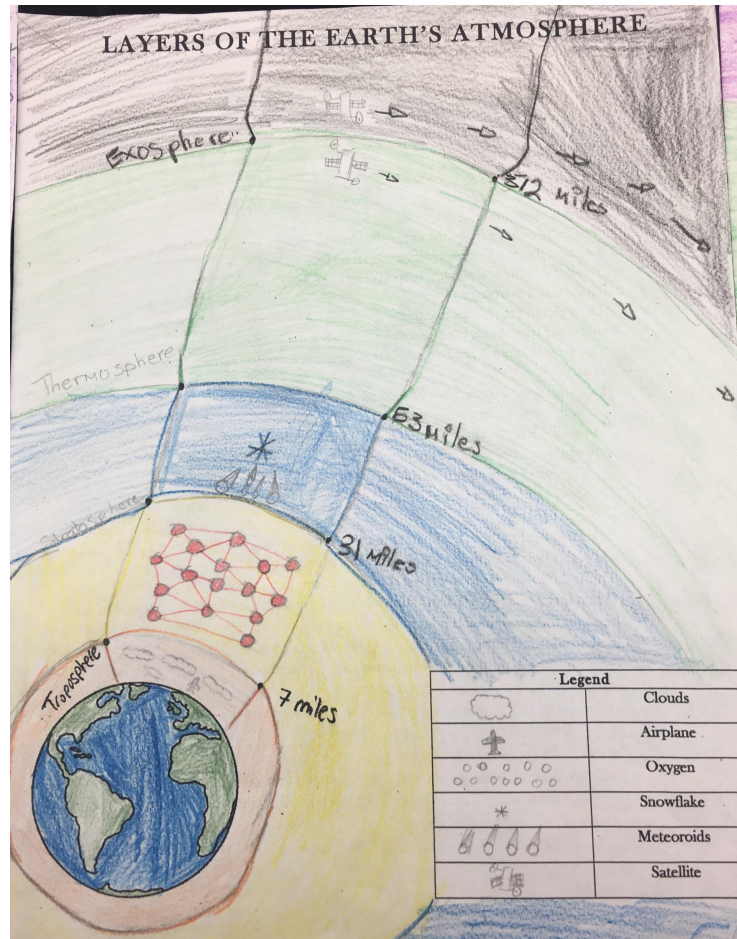


Figure 7.1: Savon's graffiti art representation of the earth's atmosphere

In the same focus group interview, Mariah and Savon shared how creating graffiti art representations of the earth's atmosphere allowed them to have a deeper understanding of science content.

Interviewer: Now after participating in this activity and doing this activity, how is your understanding of layers of the atmosphere?

Savon: It's clearer.

Mariah: I know what's inside each of the atmospheres.

Savon: I never knew what the ozone was. Like I said, I thought satellites and meteorites were literally just super close to the earth.

Interviewer: Oh, so you thought they were close. So this... That's cool, I like that because I didn't think about that. So creating this graffiti art diagram gave you a better representation of how far different object in our atmosphere are.

Savon: Yes.

Interviewer: So you thought if you just went up a little bit, you were in outer space. So this gives you a representation of how far outer space is.

Savon: Yeah, but some of these words are meaning, like meso means middle, troposphere is the first [layer] and the exo means outer, yeah.

Savon explained that his understanding of the layers of the earth's atmosphere was made "clearer," which can also be interpreted as having a deeper understanding after engaging in the graffiti art activity. Mariah affirmed Savon's statement by sharing that she knew what was in each layer of earth's atmosphere, meaning the characteristics of each layer, after engaging in the graffiti art activity. Through this graffiti art activity, students drew a visual/graffiti representation of each of the earth's atmosphere's layers to scale and included visual/graffiti representations of the characteristics of each layer. For example, students drew clouds to demonstrate that weather occurs in the troposphere layers and space shuttles at the top of the thermosphere. Savon demonstrates his understanding of the earth's atmosphere by sharing that through the graffiti art activity he learned the meaning of a few prefixes (e.g., meso- and exo-) and understood that the mesosphere was the middle layer because meso- means middle and the exosphere was the outermost layer because exo- means outer.

Students identifying as scientist as a result of engaging with Hip-Hop pedagogical approaches

The focus group discussions with participants of this study uncovered another magnificent theme. The theme that emerged was that students identified as scientists as a result of engaging with the Hip-Hop Pedagogical approaches outlined in this study. Focus group interviews and the Increasing Students' Interest in STEM Survey were used to distinguish if students were able to identify as scientists as a result of Hip-Hop Pedagogy. Through focus group interviews I found that most students felt that they could become scientists if they decided to pursue that career path. When interviewing Anika, she shared that sentiment of often engaging in an authentic science lab,

Interviewer: Okay, so do you feel like in my science class you have the opportunity to experience science?

Group: Yeah.

Interviewer: How so? Give me examples.

Anika: It gives you a hint of what you will need to do ... You know the lab rules?

Interviewer: Mm-hmm (affirmative).

Anika: The rules you need to follow in the lab? It gives us a hint of what we should do if we want to become a scientist.

Interviewer: So you feel like my class, this science class, prepares you to become a scientist in the future?

Anika: Yeah, if you want to.

Teacher: Why do you think you could become a scientist if you wanted to be a

scientist?

Anika: It seems fun cause the way you teach us, it makes it not boring and causes you prepare us with the tools and stuff that we need to become a scientist.

Anika was engaged in a number of lab safety lessons at the beginning of the school year to prepare her and her peers for the number of kinesthetic science lab opportunities they participated in throughout the academic year. Students were encouraged to create memorable raps/songs about the lab safety rules with the goal that students will remember their song and lab safety rules throughout the school year. Although only a 6th-grade middle school student, Anika was taught lab safety rules that apply in any science lab from secondary school to higher education. Anika expressed that learning science lab safety rules in her 6th-grade science class could prepare her to be a scientist in the future. Anika further explains that she feels that she could pursue a career in science because science “seems fun” because of how it is taught utilizing Hip-Hop Pedagogical approaches. In addition, Anika feels that she is being prepared with the tools that he would need to be a successful scientist.

In a different focus group interview, Leila shared similar sentiments as Anika, as it relates to identifying as a scientist from engaging in science through Hip-Hop pedagogical approaches.

Leila: When we did the phase change lab and used beakers, hot plates and stuff, and I can imagine myself when I’m grown up doing it, because I’m never going to get bored with it. It seems like fun to me. Also, seems cool that it’s advanced learning and having fun at the same time.

Through a breaking lab activity where students were able to use authentic science

equipment such as beakers, thermometers, goggles and hotplates, Leila was able to engage in an authentic science experience, which she enjoyed. After participating in a breaking lab activity Leila was able to realize that engaging in science, particularly this lab experience, can be very fun and engaging. Furthermore, she can imagine herself engaging in similar authentic science experiences when she grows up because she had “fun” and will “never going to get bored with it.”

Another student, Hociel, shared that he felt his 6th-grade science class prepared him to be a scientist:

Interviewer: Do you feel like the way your science your science class is taught prepares you to be a scientist?

Hociel: Yes, you taught me a lot about science and if I didn’t understand, all I had to do was raise my hand and ask you and you would explain it to me and give different examples until I understood. I feel like your class prepared me to be a scientist if I wanted to be and I do want to become a zoologist more now because of your class.

Hociel expressed that his science teacher utilized multiple techniques to convey science content to him if there was a misunderstanding at some point. Also, Hociel felt that his 6th-grade science class prepared him to become a scientist if decided to choose that career path because he was given an opportunity to comprehend science content in a variety of ways that connected to his Hip-Hop identity, which made him feel confident and take ownership of his science content knowledge. It is also important to recognize that entering his 6th-grade science class, Hociel had a heightened interest in animals and learned that zoology is the study of the behavior and physiology of animals. Hociel

mentioned that he now has an increased desire to become a zoologist as a direct result of his experience in his science class.

Most students demonstrated that they felt that their 6th-grade science class prepared them to be scientists in the future, which I suggest, encourages students to develop a science identity. However, one student demonstrated that she hasn't identified as a scientist even after being engaged in Hip-Hop pedagogical approaches, although she enjoys the class.

Interviewer: Have you ever imagined yourself a scientist?

Mariah: I haven't but I really like science and this class.

Interviewer: What does that mean? So you haven't, which is fine, but you enjoy science.

Mariah: I have always liked this science class and still do. I just don't see myself as a scientist.

During this interview, Mariah clearly states that she doesn't see herself as a scientist although she enjoys her science class. It is important to highlight this moment as Mariah represents students who did not identify as a scientist as a result of being engaged through Hip-Hop Pedagogical practices. After the intervention (Hip-Hop pedagogy), 3% of participants disagreed or strongly disagreed to the 'I am a scientist' question from the Increasing Students' Interest in STEM survey, while 13% of participants had no opinion (Table 6.1). Though the data demonstrates that when comparing students pre- and post-survey responses, the difference was considered to be extremely significant with a two-tailed P value of less than 0.0001. Although all students did not identify as a scientist, as a result of being introduced to Hip-Hop Pedagogical approaches, there was an extremely

significant shift in students who did. Before being engaged using Hip-Hop Pedagogical approaches, 30% of students agreed or strongly agreed to the ‘I am a scientist’ question. After using Hip-Hop Pedagogical approaches, 67% of students agreed or strongly agreed to the ‘I am a scientist’ question. This demonstrates a significant shift in students identifying as scientists’ as a result of Hip-Hop Pedagogical approaches.

Students reactions to Hip-Hop Pedagogical Approaches

Through engaging in focus group discussions with participants of this study, an additional theme that emerged was students’ general reactions to being engaged using Hip-Hop Pedagogical approaches. Overall, students discussed how the Hip-Hop Pedagogical approaches employed in this study made them excited to learn, was directly connected to their culture, made them feel comfortable and engaged them in the classroom. Also, students specifically shared their reactions to being able to curate music playlists that were played in class. Shammya shared how being engaged through Hip-Hop pedagogical approaches she is excited to learn science and therefore has a better understanding of content.

Shammya: I’m being totally honest; I didn’t think of myself as a scientist before because science wasn’t a big deal to me. Like the elementary school stuff. Every time I would do science class and stuff, and would really get bored. Now I’m here and you’re teaching science. It makes it more exciting to be in class because you teach in a different way that none of my other science teachers taught me. You let us work together. You make sure when we do projects and stuff we’re protected but also focused on our work and made sure we understand and stuff.

Shammya shared that she “didn’t think of [herself] as a scientist because science wasn’t a big deal to [her]” based on her science experience from elementary school. Shammya explained that when she was in science class in elementary school, she would not be engaged, but rather bored. But in her current 6th-grade science classroom, she becomes excited about learning science as a direct result of the pedagogical approaches implemented. Shammya stated “you’re teaching science. It makes it more exciting to be in class because you teach in a different way that none of my other science teachers taught me.” Shammya highlighted that the pedagogy that she is engaged in through her 6th-grade science class makes her excited to learn science and is different than that of other science teachers that she has experienced. Shammya enjoys that there are opportunities for her to work with her peers to understand science concepts. She also expressed that when in her 6th-grade science class she and other students feel protected, meaning that Hip-Hop pedagogical approaches create a safe space within the science classroom where students feel that they can take risks and make mistakes while learning science concepts.

In a different focus group interview, April expresses how Hip-Hop pedagogical approaches create an environment where students feel comfortable because they are engaged through practices that they enjoy engaging in, like graffiti art.

April: Yes, because if the student doesn’t answer the reason they feel uncomfortable, but then you give them things that make them comfortable, like drawing or writing or something that makes them comfortable. With adding science to it, then they’ll participate more and learn more instead of just sitting in the back of the class not raising their hands or asking

questions.

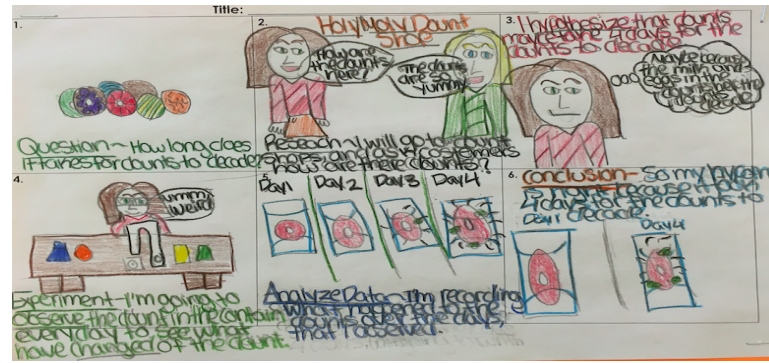
April shares that oftentimes students don't express to teachers when they are uncomfortable in class but through engaging students through graffiti arts, a form of expression which they are comfortable with, to learn science, students would be encouraged to participate more. By engaging students in science through an approach that connects to their lives outside of school, graffiti arts provides an opportunity for students to find comfort in the science classroom while engaging and learning science content as opposed to students not feeling comfortable where they will engage in non-participatory behavior such as sitting in the back of the classroom, not asking or answering questions, as April describes.

Finally, Shanyia shares how she has a personal connection to Hip-Hop pedagogical approaches as it directly connects to her culture.

Interviewer: So you liked the activity because you like to draw?

Shanyia: Yeah, the drawings that I showed you I made. I love to draw, personally, I love art. I do different types of art. If it was something related to art, dancing, hip hop, music, I love all of that. That one is part of my culture, of me as a person. I love everything. I love coloring and all that.

Shanyia shared how she enjoys engaging in graffiti art task because she loves art and loves to draw (figure 7.2). Outside of school Shanyia naturally engages in various forms of art so when she has opportunities to draw and make connections to science content, her “love” and passion for art is harnessed in the science classroom. Shanyia shares that art, dancing, and Hip-Hop are all directly connected to her culture, which is why she enjoys engaging in activities that are directly connected to the creative elements of Hip-Hop.



Frame 1: In the first frame of my cartoon strip, there is a picture of donuts. For my scientific question I wonder how long does it take for donuts to decay?

Frame 2: In the second frame of my cartoon strip, there is a picture of a scientist asking customers about donuts. For my scientific research, I'm going to go to a donut shop to ask about the ingredients in a donut.

Frame 3: In the third frame of my cartoon strip, there is a picture of a scientist thinking about the questions that I have for my hypothesis. For my scientific hypothesis, I think donuts may take 3 – 4 days to decay because they are made with milk and eggs that can get spoiled.

Frame 4: In the fourth frame of my cartoon strip, there's a picture of a scientist experimenting and observing the donut and documenting the changes every day.

Frame 5: In the fifth frame of my cartoon strip, there's a picture of my data collection chart that I used to record the change of the donuts.

Frame 6: In the sixth frame of my cartoon strip, there's a picture of before and after of the donuts decayed. For my conclusion, my hypothesis was correct because it took four days for the donuts to decay.

Figure 7.2: One of Shanyia's graffiti art task demonstrating the scientific method.

Students Reactions specifically to the DJing Approach. Through focus group interviews and classroom observations students have shared their reactions to the DJing approach. In this subcategory of students' reactions to Hip-Hop Pedagogical approaches, I highlight students' responses to the DJ approach. Students expressed that being able to curate a class playlist provided them with voice and agency while listening to music in the class, while engaging in science task, brought them joy and was exactly what they did, outside of school, at home. Brandon shares how he felt when he was given an opportunity to help curate a class playlist.

Interviewer: So, how did you guys feel when I asked you about what songs you like to listen to and actually played that in the classroom? How'd you feel?

Brandon: Some teachers they will pick the music that they like, a lot of students disagree with the music the teachers like but you want us to enjoy so you ask us, the students, which one we like and what we feel like listening to

Interviewer: So what do you like about that?

Brandon: I think we get more choices.

Interviewer: You feel like you have a choice? How do you feel when I ask you what you want to listen to?

Shammya: I feel like you think our opinions matter because you really came to us instead of picking what you think and also looking for our opinion instead of just jumping to a conclusion.

Brandon shares that some of his other classes, teachers play music that they like/choose, which oftentimes is not similar to music that the Hip-Hop generation engages in, with the assumption that students will enjoy it was well. But “students disagree” with their teachers’ choice of music. Brandon explains that if the teacher's goal is to play music during class for the enjoyment of students, it should only be acceptable to play songs that students have chosen “that [they] like and what [they] feel like listening to. When students were given the opportunity to curate a playlist to be listened to within the science classroom, they felt like they had more choice within the classroom and felt that their opinions and voices matter since the teacher was seeking their participation in selecting songs rather than just selecting songs for them. Students felt that their voices were considered and they were asked for their preference of music rather than teachers assuming their preference of music.

Shammya later describes how playing music in the class made her feel during the lesson:

Interviewer: Yeah, so when I played the music how did you feel? How did the music make you feel in the class?

Shammya: I listen to music every time I do my homework so ... as I listen to the music I just like get my work done in less time than me just sitting there being bored.

Shammya shares that she listens to music as she is completing her homework, in a nontraditional education space, and she explains that she is able to get her work done at a faster pace when she does listen to music. Further, Shammya shared that without music playing while she is engaging in classroom task or homework makes her more susceptible to becoming bored which is a characteristic of disengagement. Essentially, incorporating music in the science classroom while students are engaging in science task is a tool to increase engagement within the science classroom. Later in the interview, Shammya describes how the class reacted to music being played in the classroom overall. Shammya said, “Everybody was like singing along and having a great time but also doing their work like they are supposed to.” Shammya expresses that though students were singing along to the Hip-Hop instrumentals (music without lyrics), students continued to work as they are normally expected, with diligence and focus. Through observations of students, while music was being played in the classroom, students did mouth and whisper some lyrics they knew from various songs; however, students still were working diligently on their science task. Through student observations, it was also noticed that students would engage in various dances in their seats to the rhythm of the song they

were being played. These dances that students were engaged in, while in their seats, are cultural Hip-Hop dances that are popular or known to be done during certain Hip-Hop songs. All-star athletes who openly identify as participants of Hip-Hop such as, NFL wide receiver Odell Beckham Jr., NBA point guard Russell Westbrook, NBA small forward Kevin Durant, also engage in the same dances that students in the 6th-grade science classroom engaged in. These all-star athletes engage in these dances either before engaging in their respective sport to energize/hype themselves up to play against their opponent or to celebrate an achievement during a game. Either way, when these all-star athletes engage in these dances, it represents a form of excitement and enthusiasm. When students are listening to Hip-Hop music in the science classroom, it encourages students to become excited and enthusiastic about the science content, which in turn increases engagement as it relates to science.

Deconstructing Traditional Classroom Spaces through the Implementation of Hip-Hop Pedagogical Approaches

Through engaging in focus group discussions with participants of this study, another theme that emerged was the deconstruction of traditional classroom spaces that students experienced in recent years while participating in urban public schools. Participants of this study were 6th-grade students who were new to the middle school and therefore only previously experienced science in an elementary school setting. Through discussions, students shared their experiences of being in a science classroom. One student stated:

Shemaya: Well, in my old school, I always thought the teacher was boring. He did all the experiments; he didn't tell us what it was about. He didn't explain to

us. He didn't do anything. He told us to write down stuff. Mr. Adjapong, he explains stuff. He makes us do hands-on experiments too, and he makes learning better and fun.

Here, Shemaya describes her science experience in her previous elementary school. She clearly expresses her disengagement in her elementary science class as she found her teacher to be "boring." She also explained that her teacher only modeled/demonstrated experiments/labs and kinesthetic/hands-on experiences rather than allowing students to participate in experiments/labs to engage and experience science for themselves. In my experience as a science educator in urban schools, teachers oftentimes do not "trust" students with the science tools to engage in experiments/labs on their own under supervision with a fear that student may misuse or damage science equipment. In addition to not being provided an opportunity to participate in hands-on science experiments, Shemaya felt that her elementary school science teacher did not explain science content effectively. Shemaya juxtaposes her elementary science experience to her middle school science experience where she was engaged using Hip-Hop pedagogical approaches and expresses that she is provided with the opportunity to engage in hands-on experiments and experience science for herself, which she describes "makes [science learning] better and fun."

As a student of urban public schools, I shared similar experiences to Shemaya which I convey to a group students in a different focus group interview.

Interviewer: I remember when I was in school and I was in science class, we didn't even really learn. We watched videos sometimes and we would just copy stuff off the board, that's it.

Jayden: That was like me last year, just that the kids didn't really listen to the science teacher. Like when you would talk the kids in the back would say, "Shut up" during the class. People don't do that in this class. Last year it was boring and he didn't let us do nothing. This year we move around.

Teacher: Okay. So this year you think science is more fun, it's more engaging because I provide opportunities to move around?

Jayden: What I think is that if one person in the class doesn't like the way you teach and everybody else does, so he doesn't like it so then he starts acting up so you can stop teaching the way you're teaching. I feel like the teachers allow them to distract the classroom and mess the class up.

Jayden shared similar elementary school science experiences to Shemaya. Jayden cited students' behavior and students' response to their teacher as a reason why he did not have a good experience in elementary science. Jayden then suggested that students misbehaved in his elementary science class because they did not like the way that their teacher taught them, which caused them to misbehave and ultimately ruin the learning experience for others in the class. But Jayden believed that his elementary science teacher allowed students to ruin the learning experience and "mess the class up," suggesting that the teacher could have encouraged students to engage in positive behavior if they utilized different teaching approaches that engaged all students in science content and therefore encouraging students to contribute positively to the class. Jayden also expresses that his experience in science as a middle school student, where he was engaged using Hip-Hop Pedagogical approaches, was different than when he attended elementary school, as students do not ruin the learning experience for others because they are given

opportunities to move around. When Jayden says, “move around” he is describing his experiences participating in breaking activities, which provided students an alternative way of learning and experiencing science content.

Students shared why they preferred to learn through graffiti arts as opposed to traditional teaching methods, such as reading and copying notes from textbooks. Students were asked to create a cartoon strip where they were to illustrate a real-life example of the scientific method in action brought science to life.

Interviewer: For this activity, we had the opportunity to draw, do you think to be able to draw this cartoon script it brought science alive a little bit for you?

Shannye: Yes

Daneiros: Yeah

Cara: Yeah

Interviewer: How so? Explain, elaborate.

Shannye: It brought science alive because when you sit in the classroom, you just think, you don’t get to do this stuff. Last year we just copied notes.

Cara: Yeah, we would just sit there in textbooks.

Shannye: You went out there and since you’re a cool and fun person, you decided let’s maybe do what kids love to do, like color, and then [encourage us to] make [an] example.

Daneiros: It’s also like the real world.

Shannye: The real world.

Cara: Real world problems that you would see every day, like that you would come across.

Shannye demonstrates how being able to engage in a graffiti arts task to understand science brought science alive to her. She added how her experience in being able to draw and color in the science classroom is different than her previous science experiences where she just copied notes. Shannye also explains that drawing and coloring are things that kids “love to do,” therefore allowing students to draw and color examples of the scientific method provides them an opportunity to connect the scientific method to real word problems that they (students) would experience every day and would come across. This provides an additional avenue for students to connect science to their lived experiences while doing something they love, which is drawing and coloring. During the same interview, Cara then goes on to explain, “[drawing/coloring] is more interesting because when you’re looking into a textbook, you’re just looking back and forth at the paper writing. When you do something like this, you can talk to friends, get new ideas, and have that moment.” Cara is describing how when engaging in graffiti art task, students are able to communicate with peers to develop ideas, gain a better understanding of content, and have “that moment” where they, as a student, can truly understand the content and take ownership of that understanding. This method is a contrast to how students have traditionally learned science, generally by flipping back and forth from textbooks and copying notes, which does not facilitate the same form of learning, engagement or collaboration among peers.

In addition to students sharing their past experiences of engaging in science in their elementary schools during focus group interviews, often students would share their experiences of other classes which they were taking in the 6th grade when asked if they thought other teachers should incorporate the elements of Hip-Hop into their instruction.

Interviewer: Obviously, the activity that we did allowed and encouraged us to move around. I'm connecting that to the b-boy and the dancing aspect of hip hop, because when they're dancing and are in constant motion. My question is, do you think other teachers should incorporate other elements of hip hop in their teaching and why?

Group: Yes [*unison*]

Shemaya: In Ms. Dawson, and I have to be honest ... That's the most boring-est class I ever had in the whole entire year.

Interviewer: Why is it boring?

Shemaya: Because she says for us to write down this. You (Mr. Adjapong) tell us to write down this, then you show us pictures and we have to do the activity and then we have movement and we have to turn to our partners and explain. We do this by ourselves in Ms. Dawson's class. We just sit there at the board, stare at her, write down everything she says to write down and then we read our books after. Then when people start to slouch, she gets upset, she just expects us to get back up.

Shemaya describes her experience while in Ms. Dawson's English Language Arts (ELA) class as "the most boring-est class I ever had in the whole entire year" because Ms. Dawson has students "write down everything she says." Shemaya explains that students normally slouch, which oftentimes is a sign of disengagement, in Ms. Dawson's class. Shemaya compares her experience in Ms. Dawson's class to that of her science class where she is engaged using Hip-Hop Pedagogical approaches. In her science class, Shemaya had opportunities to view graffiti art as an alternative way to learn science

concepts, she further explained, “we have movement, and we have to turn to our partners and explain [what we learned]” demonstrating opportunities to collaborate with peers and physically move around the classroom, which he does not experience in Ms. Dawson’s classroom.

Furthermore, students describe feeling excited when engaging in breaking activities within their science classroom. Israel and Skye participated in an activity where they had to imagine themselves as molecules of a substance that were gaining and losing energy, therefore, changing the composition of the substance from a solid to a gas and vice versa. When describing their experience of engaging in Hip-Hop pedagogical approaches Israel and Skye share:

Israel: I felt excited because I know you’re the only teacher in the school that would have done nobody else would have done that. Let us get out of our seats and walk around like try this.

Skye: They’re all, "You guys get out of hand."

Interviewer: Do you think that’s what teachers think about you guys?

Skye: Yes.

Israel: Yes.

Israel and Skye explain that this experience of getting out of their seats and walking around while engaging in science content is unique only to their science class because their other teachers view and predict that students will “get out of hand,” meaning students will be rowdy, off-task, and unwilling to participate. Israel was excited solely because his science teacher tried a teaching approach that was non-traditional and in

doing so, gave students an opportunity to learn in a non-traditional way, as other teachers would not dare to try to engage their students in such a fashion.

The previous exemplary moments from focus group interviews demonstrate students analyzing and deconstructing their experiences in traditional classroom settings as compared to their experiences in their 6th-grade classroom where they were engaged using Hip-Hop pedagogical approaches. Students' descriptions of their traditional classrooms were very similar and mainly consisted of their teachers utilizing monolithic teaching approaches which include students copying notes from the board and textbooks, and students remaining in their seats while not being able to engage with one another. All students explained that they enjoyed the teaching approaches (Hip-Hop Pedagogy) utilized in their 6th grade science classroom as opposed to other classrooms because they feel like science was brought alive, they were allowed to "do what kids love to do, like color," they "do hands-on experiments," which makes "learning better and fun," and allows students to make connections between content and real world experiences.

This shows that students who participated in focus group interviews prefer being engaged using Hip-Hop pedagogical approaches as opposed to traditional teaching methods, which they have experiences in their past science classrooms and in other classrooms while in middle school. While in traditional classrooms, some teachers aren't able to engage students, which causes students to become disruptive to others learning process, teachers are not willing to try innovative teaching approaches due to the fear that students would become rowdy or unwilling to participate.

Analysis of Increasing Students' Interest in STEM Survey

All students who participated in this study responded to the Increasing Students'

Interest in STEM Survey before (pre- intervention) and after (post-intervention) being engaged using Hip-Hop pedagogical approaches. The results of the Increasing Students' Interest in STEM Survey were analyzed using the Wilcoxon paired t-test, a nonparametric test to compare the effect of being engaged using Hip-Hop pedagogical approaches on the same group of participants. I chose to use a Wilcoxon paired t-test because it is a nonparametric test as Likert scale items are not interval scale responses. Therefore, we must treat them as ordinal (Sullivan & Artino, 2013). Using the p-value (significance of 0.05) calculated for each Likert item, I was able to identify whether the intervention caused a significant shift in participants' interest in STEM, particularly science. Likert items 1-6 and 8: 1) Science is fun, 2) Science is interesting, 3) I enjoy science, 4) I am a scientist, 5) I enjoy this science class and 6) I enjoy the way that my science teacher teaches me, 8) My education will create many future opportunities for me all have a calculated p-value of less than 0.05, demonstrating that there was an extremely statistically significant shift in students' responses and attitudes toward science due to being engaged by Hip-Hop pedagogical approaches (table 7.1). Through the implementation of Hip-Hop pedagogical approaches, students have found science to be fun and interesting, students enjoyed science and the way in which their science class was taught, and students have developed science identities. There was not a significant statistical shift in Hip-Hop pedagogical approaches having an effect on students enjoying and listening to Hip-Hop music (p-value of 0.68916). Based on student responses from the pre-survey, there was a mean of 4.67, and a mean of 4.76 from the post-survey results demonstrating that students "agreed" that they enjoyed and listened to Hip-Hop music. Studies (Adjapong & Emdin, 2015) have shown that urban students identify as part of the

Hip-Hop generation. Therefore, the results from this survey correspond with the results of existing studies around urban students enjoying and listening to Hip-Hop music. Furthermore, the data from the Increasing Students' Interest in STEM Survey suggests that students had an affinity toward Hip-Hop music prior to the intervention and this affinity toward Hip-Hop did not change as a result of being engaged by Hip-Hop pedagogical approaches. Lastly, there was also not a significant statistical shift in Hip-Hop pedagogical approaches having any effect on students' perceptions of what they are learning in their classes will be important for their futures (p-value of 0.93624). Based on student responses from the pre-survey, there was a mean of 4.51, and a mean of 4.52 from the post-survey demonstrating that students "agreed" and understood that what they were learning in their classes will be important for their future, and the intervention did not have a significant effect (table 7.2). This also suggests that students understood the value of education pre- and post-intervention.

Table 7.1

N and Percentages (in Parentheses) of Student Responses for Selected Likert Items From the Increasing Students' Interest in STEM Survey

Likert Item	Pre-Intervention (Hip-Hop Pedagogy)					Post-Intervention (Hip-Hop Pedagogy)					p
	<u>SA</u>	<u>A</u>	<u>N</u>	<u>D</u>	<u>SD</u>	<u>SA</u>	<u>A</u>	<u>N</u>	<u>D</u>	<u>SD</u>	
1. Science is fun	33 (40)	36 (44)	6 (7)	7 (8)	1 (1)	53 (64)	23 (28)	4 (5)	2 (2)	1 (1)	<<0.0001
2. Science is interesting	42 (51)	32 (38)	3 (4)	1 (1)	5 (6)	55 (66)	22 (27)	4 (5)	1 (1)	1 (1)	0.02088
3. I enjoy science	35 (42)	32 (39)	8 (10)	3 (4)	5 (6)	54 (65)	23 (28)	4 (5)	1 (1)	1 (1)	<<0.0001
4. I am a scientist	8 (10)	22 (27)	15 (18)	16 (19)	22 (27)	25 (30)	42 (51)	13 (16)	2 (2)	1 (1)	<<0.0001

Table 7.1 (continued)

N and Percentages (in Parentheses) of Student Responses for Selected Likert Items From the Increasing Students' Interest in STEM Survey

	<u>SA</u>	<u>A</u>	<u>N</u>	<u>D</u>	<u>SD</u>	<u>SA</u>	<u>A</u>	<u>N</u>	<u>D</u>	<u>SD</u>	<u>p</u>
5. I enjoy this science class	44 (53)	26 (31)	6 (7)	2 (2)	0 (6)	58 (70)	17 (20)	4 (5)	3 (4)	1 (1)	<<0.0001
6. I enjoy the way that my science teacher teaches me	48 (58)	26 (31)	7 (8)	2 (2)	0 (0)	62 (75)	18 (22)	2 (2)	1 (1)	0 (0)	<<0.0001
7. I enjoy and listen to Hip Hop music	63 (76)	14 (17)	1 (1)	2 (2)	3 (4)	60 (72)	20 (24)	3 (4)	0 (0)	0 (0)	0.68916
8. My education will create many future opportunities for me	60 (72)	21 (25)	1 (1)	0 (0)	1 (1)	69 (83)	12 (15)	1 (1)	1 (1)	0 (0)	0.00512
9. What I am learning in my classes will be important to my future	47 (57)	32 (39)	3 (4)	1 (1)	0 (0)	53 (64)	23 (28)	5 (6)	1 (1)	1 (1)	0.93624

Note: SA = strongly agree, A = Agree, N = Neither agree or disagree, D = disagree, and SD = strongly disagree.

Table 7.2

Statistical data on student responses for selected likert items from Increasing Students' Interest in STEM Survey

Likert Item	n	Mean	p-value
1. Science is fun			<<0.0001
Pre Hip-Hop Pedagogy	83	4.12	
Post Hip-Hop Pedagogy	83	4.51	
2. Science is interesting			0.02088
Pre Hip-Hop Pedagogy	83	4.27	
Post Hip-Hop Pedagogy	83	4.55	
3. I enjoy science			<<0.0001
Pre Hip-Hop Pedagogy	83	4.07	
Post Hip-Hop Pedagogy	83	4.51	
4. I am a scientist			<<0.0001
Pre Hip-Hop Pedagogy	83	2.73	
Post Hip-Hop Pedagogy	83	4.06	
5. I enjoy this science class			<<0.0001
Pre Hip-Hop Pedagogy	83	4.23	
Post Hip-Hop Pedagogy	83	4.54	
6. I enjoy the way that my science teacher teaches me*			<<0.0001
Pre Hip-Hop Pedagogy	83	4.45	
Post Hip-Hop Pedagogy	83	4.70	
7. I enjoy and listen to Hip Hop music*			0.68916
Pre Hip-Hop Pedagogy	83	4.59	
Post Hip-Hop Pedagogy	83	4.69	
8. My education will create many future opportunities for me			0.00512
Pre Hip-Hop Pedagogy	83	4.67	
Post Hip-Hop Pedagogy	83	4.76	
9. What I am learning in my classes will be important to my future			0.93624
Pre Hip-Hop Pedagogy	83	4.51	
Post Hip-Hop Pedagogy	83	4.52	

Chapter VIII

DISCUSSION OF FINDINGS, IMPLICATIONS, AND LIMITATIONS

DISCUSSION OF FINDINGS

The purpose of this exploratory qualitative study was to study the impact of Hip-Hop pedagogical approaches in an urban science classroom. More specifically, my goal was to explore the ways that students perceive instruction that utilizes Hip-Hop pedagogical approaches and gain insight into their perspectives on the use of these approaches to teaching and learning. I embarked on this journey to gain more insight into whether or not hip-hop based pedagogical approaches support students learning of science content and/or affect students interest in STEM. The chief interventions in this study were Hip-Hop Pedagogical approaches that were enacted in an urban 6th-grade science classroom. Ongoing analysis of the intervention revealed factors that enhanced teaching and learning in the 6th-grade urban science classroom, as well as students' self-reporting an increased understanding of science content and students' interest in STEM.

This chapter discusses the four themes that emerged from the qualitative data analysis: (1) Students express that they develop a deep understanding of science content through Hip-Hop pedagogical approaches, (2) Students' responses to data collection methods (focus group interviews/students interest in STEM survey) provide evidence that they identify as scientists as a result of engaging with Hip-Hop pedagogical approaches and (3) Students overall reactions to Hip-Hop Pedagogical Approaches were positive and (4) Implementing Hip-Hop pedagogical approaches allowed students to provide insightful critiques of traditional classroom spaces. Analysis of the data revealed a number of supportable assertions, or claims, justified by data that reaffirm existing theory

while generating new theory which will be explored further in this chapter (Gravemeijer & Cobb, 2006).

Using existing teaching and learning frameworks, the Hip-Hop Pedagogical approaches that were implemented in the 6th-grade science classroom may be identified as culturally relevant teaching approaches (Ladson-Billings, 1995a). However, each Hip-Hop Pedagogical approach was directly rooted in Hip-Hop culture; which an overwhelming majority of students (96%), who participated in this study, identify as part of (Table 7.1). A hip-hop based framework is essential to this study given the overwhelming number of students that see themselves as hip-hop, as well as connect with the intricacies of hip-hop and its forms of expression. I argue here that while culturally relevant pedagogy is an essential framework for understanding the intricacies of urban teaching and learning, hip-hop is a necessary framework/approach/strategy that is under focused upon, but essential for improving urban science education. The implementation of Hip-Hop Pedagogical approaches influenced teaching in the 6th grade classroom that was the focus of this study because it encouraged the science educator to enhance the ‘traditional’ way of teaching science; which Tsai (2002) identifies as the “transferring knowledge from teacher to students, learning science as acquiring or ‘reproducing’ knowledge from credible sources, and scientific knowledge as correct answers or established truths” (p. 773). Or as students described in focus group interviews as flipping back and forth through textbooks copying notes and sitting while listening to the teacher explain science concepts using terms that were unfamiliar to students. Given the limitations of the traditional science curriculum and its ineffectiveness in engaging urban youth, I was forced to develop these tools and approaches that were derived from the

culture of the students (Hip-Hop culture) to enhance the traditional way of teaching science. The goal of using a pedagogy that is anchored in Hip-Hop is to encourage students of color to view themselves as scientists. I could not achieve this goal by utilizing the traditional science curriculum given its ineffectiveness in engaging youth of the Hip-Hop generation. In my experience as a student in New York City public schools, I recall purposefully not engaging in my science teacher's lessons solely because I thought it was redundant and it did not reflect anything that I have experienced or was interested in. Additionally, in my experiences as a New York City public school science educator, I found my students not engaging in science lessons when implementing the traditional science curriculum.

Hip-Hop Pedagogical approaches influenced teaching as it provided practical pedagogical tools for the science educator to incorporate Hip-Hop culture, practices of that culture, and students' realities and lived experiences in the science classroom. This approach to teaching also encouraged the incorporation of visual art/graffiti, co-teaching, call-and-response, movement/kinesthetic learning, and student-curated music playlist, which counters aspects of traditional science teaching that students consider disengaging (Adjapong & Emdin, 2015; Emdin, 2016). In focus group interviews, Shammya stated, "Like in elementary school, every time I would do science class and stuff, I would really get bored." Shammya reflects and juxtaposes her elementary science experience with her middle school experience. In elementary school, Shammya would often find herself bored/disengaged. She then says, "now I'm here, and you're teaching science. It makes it more exciting to be in class because you teach in a different way that none of my other science teachers taught me." Shammya explains that being engaged using Hip-Hop based

approaches is different than her previous science classroom experiences and is engaging because it creates a sense of excitement around science content.

In addition to incorporating students culture and their realities in teaching approaches, as demonstrated by students' responses in focus group interviews, Hip-Hop Pedagogical approaches are innovative and counter aspects traditional science teaching, which focuses on solely transferring knowledge from teacher to students. Students expressed how their current science class in which they were being engaged using Hip-Hop Pedagogical approaches was more engaging than their science class in elementary school due to their elementary school's teachers' use of traditional science teaching methods. Having conversations with students around how the implementation of Hip-Hop Pedagogical approaches influenced teaching and learning in their 6th-grade classroom provided students an opportunity to deconstruct traditional classroom spaces as they reflected, critiqued and were critical of the pedagogical strategies used by various educators that they have experienced (Kellner, 1989). Captivating urban 6th-grade students in science using Hip-Hop pedagogical approaches demonstrates to students that teachers do not have to utilize traditional science teaching methods and can utilize methods that are anchored to students' cultures, which students prefer over traditional science teaching and ultimately find and have expressed to be more engaging.

Engaging students in science utilizing Hip-Hop Pedagogical approaches influenced student's learning as demonstrated through students' responses from focus group interviews and the Increasing Interest in STEM Survey. Through the implementation of Hip-Hop Pedagogical approaches students self-reported that they were able to develop a deeper understanding of science content, which suggests that these

pedagogical approaches that are anchored in students' culture support students learning of science content. Lelia stated "here (middle school science classroom), it's easier [to understand]. At first, I couldn't understand it. I actually learned it in my old school, and I had no idea ... but when we act out, it seems easier to understand." Here Lelia explains that engaging in a Hip-Hop pedagogical approach supported her understanding of science content that she learned previously in her elementary school, but did not fully grasp.

The findings of this study show that students were able to conceptualize science concepts effectively by engaging in breaking activities, which students, like Lelia, cited lead to a clearer understanding of content. Also, students expressed that being allowed to create graffiti representations of science concepts provided a space for students to independently construct their own understanding of abstract concepts that can only be visualized through a model representation. Savon shared, "we just had time to draw and just do this, and I was able to wrap my mind about the different layers of the earth's atmosphere by drawing."

Additionally, the findings show that students, like Savon, felt that having extended time to work on visual/graffiti representations of science concepts in class provided them with the time to self-learn concepts and peer educate, even after they have been instructed by their teacher. I argue that if students are developing a deeper understanding of science content by being engaged through pedagogical approaches that are directly anchored in their culture, students have an opportunity to gain cultural capital as it relates to science knowledge and engaging in scientific processes that can otherwise seem to foreign to students (Bourdieu, 1986). Bourdieu (1986) explains that cultural capital is acquired when one successfully engages in a new activity and develops a

conscious or unconscious personal investment in an activity or process. If students are deepening their understanding of new science content by being engaged using Hip-Hop pedagogical strategies, they are; therefore, successful in learning and understanding this context, they are then gaining cultural capital as it relates to science. Students' increased cultural capital gained in the science classroom provides students with an opportunity to be more prepared to navigate science spaces outside of the science classroom. They will also be more comfortable while navigating these spaces. In essence, students will be better prepared and possibly more inclined to pursue a career in science because of their personal investment in learning science content and increased cultural capital gained in the science classroom.

Through analyzing student focus group interviews, there were many moments where students shared their reactions to being engaged through Hip-Hop Pedagogical Approaches. The findings of this study suggest that students found teaching and learning in their 6th-grade science classrooms to be exciting and engaging, especially when compared to teaching in their previous science classrooms. Also, through students' responses in focus group interviews, students shared that they felt comfortable when participating in a task, as many of the tasks students engaged in the classroom reflected tasks that students engaged in outside of the classroom and school walls. April shared, "you give them things that make them comfortable, like drawing ... something that makes them comfortable. With adding science to it, then they'll participate more and learn more instead of just sitting in the back of the class not raising their hands." Additionally, I suggest that engaging in Hip-Hop pedagogical approaches made students feel that they had opportunities to directly employ cultural practices using science as a context for

learning. Overall, from students' responses in focus group interviews, students made several references to being more comfortable in science, especially when they had opportunities to work with one another. Students expressed that they felt a genuine connectedness to the way that they were taught science and their culture. As Shanyia stated, "I love to draw. personally, I love art. I do different types of art. If it was something related to art, dancing, hip hop, music, I love all of that. That one is part of my culture, of me as a person." Skinner and Belmont (1993) cite, "engagement includes both behavioral and emotional components. Children who are engaged show sustained behavioral involvement in learning activities accompanied by a positive emotional tone." (Page number?) This positive emotional tone that students experience, as a result of these Hip-Hop pedagogical approaches, are beneficial to the learning experience of students and their interactions with one another as well as their interaction with their teacher. Through the implementation of Hip-Hop pedagogical approaches, I argue that students are able to simultaneously engage in a positive collective effervescence, which is a sociological construct developed by sociologist Durkheim, where participants in the same community come together, concurrently engage in the same action/activity, and therefore experience same positive social force (Rawls, 2004; Throop & Laughlin, 2002). Therefore, when students participate in Hip-Hop Pedagogical approaches, they find themselves engaged in a "positive emotional tone" while experiencing the same positive social force, thus creating a positive effervescence amongst each other.

Engaging students who identify as the Hip-Hop generation and utilizing teaching practices that are anchored in their realities and Hip-Hop culture provides a space for students to feel comfortable while participating in science tasks. Not only do students feel

comfortable because they are engaging in practices in their science class that they would normally engage in while their communities and outside of school, but opportunities are created for positive social networks to be formed among participants of the classroom. In many instances, the teacher is the outsider as it relates to youth culture, but implementing pedagogical approaches that are anchored in youth culture/Hip-Hop demonstrates that the teacher can create a connection that works towards strengthening social networks between the teacher and the learner(s). Krackhardt (1992) describes a “weak tie” as a ‘local bridge’ to parts of the social system that are otherwise disconnected and a “strong tie” as the connection between individuals who have a lot in common. Traditionally, teachers and students share a “weak tie” that represents the disconnection between cultures (youth culture or cultural heritage). Using Hip-Hop Pedagogical approaches as demonstrated in this study, serves as a catalyst to develop “weak ties” between students and teachers into “strong ties.” I argue if teachers consciously incorporate Hip-Hop and students’ culture within the classroom, specifically through pedagogy, positive social networks and interactions can be formed. Coleman (1998) refers to these connections as dense networks and describes them as close-knit networks that facilitate trust and cooperative exchanges, which would benefit relationships between students and teachers within the classroom. In addition to the formation of positive social networks, the fluidity that students described in their reactions to Hip-Hop Pedagogical approaches represent tangible ways that cultural disconnection between students and teachers can be mitigated for students of diverse backgrounds. Mitigating this cultural disconnection is crucial for students of diverse background as they continuously find themselves in classrooms where their cultural, linguistic and racial identities are under attack.

The findings from the Increasing Students Engagement in STEM Survey provide additional evidence that corroborates the qualitative data collected from student focus groups and classroom observations around the influence of Hip-Hop Pedagogical approaches on teaching and learning and on students' interest in STEM. When considering the first six Likert items from table 7.1, the data analysis suggests extreme significance after reporting a p-value of <0.05 for all six items. This suggests that results are unlikely to be due to chance and therefore due to the implementation of Hip-Hop Pedagogical approaches. Considering the influence of Hip-Hop pedagogical approaches on students learning in the science classroom, the data from each of these Likert items provides a glance on how students were impacted by Hip-Hop Pedagogical approaches. For example, as a result of the implementation of Hip-Hop Pedagogical approaches, students found science to be fun (table 7.1), interesting and generally enjoyed their science class. Students also enjoyed the way and methods (Hip-Hop Pedagogical approaches) that their science teacher used to teach them. Moreover, the findings from the Increasing Students Engagement in STEM Survey suggests that there was an extremely significant shift as it relates to students' science identity as a result of Hip-Hop Pedagogical approaches, therefore, increasing students interest in science (table 7.1). I argue that if students have developed a science identity as a result of Hip-Hop Pedagogical approaches, students must have also developed an increased interest in science as a discipline, which encouraged the development of a science identity. Wiley (1994) describes the idea the structure of the self as involving multiple identities that an individual may find within himself, such as a Hip-Hop and science identity. Wiley (1994) further explains that an individual's identities "hang on" the structure of the self, which

may be more or less prominent depending on the situation or environment that an individual is exposed to. Wiley (1994) describes how people act based on a drive for intrasubjective ritual and solidarity. He writes, “the internal conversation [between an individual's identities] can create intra-personal rituals that, in turn, produce and maintain the internal solidarity” (p. 109). If captivated through the rituals of Hip-Hop Pedagogical approaches and having opportunities to learn science content from one another as demonstrated in the findings, students are provided with opportunities for their Hip-Hop identities, which are already developed, to “create intra-personal rituals that produce and maintain the internal solidarity with their science identities, which in turn become developed. Hence, anchoring student’s culture (Hip-Hop) within the teaching practices of the science classroom creates possibilities for students to develop identities in science by way of their already established Hip-Hop identities. Furthermore, there was no statistical significance to students’ perceptions of the importance and value of education and science content knowledge. The average of students’ responses for Likert item 9 (what I am learning in my classes will be important to my future’) suggest that students agreed that education would provide future opportunities and what they are learning in their classes is of importance to their before and after Hip-Hop pedagogical approaches were implemented within their science classroom (table 7.2). This shows that students are aware and understand that their education is important and science content knowledge is valuable for their future. These findings support Ladson-Billings (2006) assertions of “educational debts” which unfairly constructs students of diverse backgrounds as defective, lacking and criticizes them suggesting that they need to catch up. Rather, these findings suggest that we focus less on students and what we consider their ability to

achieve in science, but interrogate the monolithic approach to teaching science that has been established in science classrooms across the nation and considering incorporating the culture of students.

Although the option to employ more traditional methodologies presented itself over the course of the study, I chose to conduct and analyze the findings of the study using approaches that align to Hip-Hop and its focus on first-hand narratives. Given that Hip-Hop is a culture that consists of individuals making sense of the world around them through their lived experiences, qualitative research that highlights lived experiences and narrative becomes the chief artifact in making sense of the experiences of those who are a part of Hip-Hop.

Hip-Hop Pedagogy is Just Good Teaching

Although Hip-Hop pedagogy is informed by Hip-Hop culture, it serves as both culturally relevant way of engaging urban youth in science and as a way to incorporate multiple modalities within the instruction. In addition to traditional science instruction, which usually promotes reading and writing learning styles, Hip-Hop pedagogy encourages Visual, Aural, Reading/Writing and Kinesthetic learning styles (VARK) (Sankey, Birch & Gardiner, 2010). Fleming (2001) proposed that learners have a preferred learning style, namely, visual, aural, read/write or kinesthetic (VARK), with many students (about 40%) being multimodal (using a combination of these). I argue that utilizing a Hip-Hop pedagogy is beneficial in an urban space because it is culturally relevant, but can also be useful in any other setting because this style of teaching caters to multimodal learners in any setting – it's just good teaching. Graffiti art activities allow students to make visual representations of science concepts, call-and-response provides

and opportunity for students to aurally engage and learn science concepts, breakin' (bboy/bgirl) activities provide students an opportunity to physically and kinesthetically move to gain a better understand science concepts. Hip-Hop pedagogy is a form of teaching which derived from Hip-Hop culture, but at its core, it caters to every type of learner and encourages students to engage in science content through instruction.

Conclusions and Implications

The purpose of this study is to uncover the effects that Hip-Hop pedagogy, a culturally relevant approach to teaching, has on students in an urban science classroom, more specifically on teaching and learning. The researcher attempted to investigate how the implementation of pedagogical approaches anchored in the culture of Hip-Hop influenced teaching, students learning of science content and students interest in science.

The researcher found that utilizing an approach to teaching that is anchored in Hip-Hop culture and youth culture had a significant influence on the teaching and learning in an urban classroom. Hip-Hop Pedagogy being grounded in the five creative elements of Hip-Hop allowed the teacher to utilize innovative teaching approaches that are far different than the monolithic teaching approaches, such as copying notes and lecturing, that are traditionally found in science classrooms. The findings of this study indicate that students enjoyed their current 6th-grade science class as compared to their previous 5th-grade science class. The researcher concluded that students enjoyed and preferred their current science class mainly due to the Hip-Hop Pedagogical approaches that were utilized because of the autonomy that this approach to teaching provided students and because students were allowed to engage in practices in the classroom that they normally engage in outside of school. This allowed students to develop an increased level of comfortability as it relates to learning and engaging in science content.

The researcher found that through the implementation of Hip-Hop Pedagogical approaches, students gained a deeper understanding of science content. The findings demonstrated that students were able to effectively conceptualize science concepts through breaking and graffiti art activities, which lead to a deeper understanding of science content. In addition, providing a space for students to engage with their peers to discuss and reflect on science concepts provided students with an opportunity to construct their own understanding of science concepts. Providing students with the time and space to engage in science concepts independently, and with their peers, provides opportunities for them to construct their own understanding of abstract science concepts, rather than memorizing content from a teacher's lecture or textbook.

The researcher also found that through the implementation of Hip-Hop Pedagogical approaches, an increased interest in STEM was projected. More specifically in science by providing a space for students to gain a science identity. Results from the Increasing Students Interest in STEM also demonstrates that a majority of students self-reported the increase of a science identity. The findings of this study demonstrated that through hands-on experiences in the science classroom, students felt more prepared and knowledgeable about engaging in science practices in the real world. I argue that simply utilizing Hip-Hop pedagogical approaches provided opportunities for students to engage in practices that they would normally engage in outside of school, in school, in their science class. This allows students to make connections between their lives and science, which I argue, bridges an existing disconnect between science as a discipline and students of diverse backgrounds.

Ultimately, I argue that executing a Hip-Hop Pedagogy in the urban science

classroom provides an opportunity for educators to effectively and authentically incorporate youth culture into teaching and learning in a culturally relevant manner. Hip-Hop is one of the most widely consumed genres of music, and studies demonstrate that urban youth identify as belonging to the Hip-Hop generation. Bringing Hip-Hop culture into the science classroom provides an opportunity for students to engage in cultural practices that they engage in outside of school. By learning science through these practices that are anchored in students' culture creates spaces and opportunities for students to gain cultural capital as it relates to science, be critical of the school system, engage in positive cultural effervescence and ultimately see themselves as scientists.

Granted, schools were integrated after the 1954 decision in the *Brown v. Board of Education* case where the Supreme Court ruled the segregation of public school unconstitutional, but the curriculum and pedagogy still fail to reflect the values and culture of the urban youth who integrated these public schools. Currently, urban youth are falling behind in science as compared to their rural counterparts, and this trend is expected to continue. In light of the documented education debt of urban youth in science, I argue if science educators do not consider alternative approaches to teaching and learning, which include the culture of the youth we are inflicting harm on our students such as symbolic violence. Bourdieu defines symbolic violence as the imposition of principles of any symbolic representation such as pedagogy, where the recipients have little choice whether to accept or reject them (Bourdieu, 1986). Traditionally students do not have a choice of what pedagogical approaches their teacher utilizes, and studies have shown that the monocultural approach to teaching and learning in the science classroom has not benefited urban youth. The findings from this study demonstrate that students did

not find monolithic teaching approaches engaging, which include limited interaction with their peers and copying notes from a lecture or from the textbook. When considering urban youth as the Hip-Hop generation and in turn as neoindigenous, it is important to recognize that neoindigenous populations construct knowledge and communicate differently than dominant groups. Therefore, traditional monolithic approaches to teaching and learning in the science classroom continue to contribute to the educational debts of urban youth.

The implications of the study suggest that incorporating Hip-Hop culture into the teaching and learning in the science classroom has a tremendously positive effect on students understanding of science content, engagement in science and science identity, which I argue can be used to address the institutional educational debts as it relates to science education. Otherwise, if science educators do not consider incorporating students culture into the pedagogy we will continue the trend of students of diverse backgrounds interest in STEM decreasing, which can be detrimental to our global economy as careers in STEM are expected to grow by 17% over the next few years (Langdon, McKittrick, Beede, Khan & Doms, 2011).

Limitations

As for any research project, there are limitations that the researcher cannot control and which may place restrictions on the possible conclusions. In my study, one limitation based on the design is the fact that I am the principal investigator as well as the teacher of the students/participants of the study. There is already an established relationship between the participants and researcher, which can be both a limitation and strength of this study. In addition, not using any quantitative methods to quantify how the enacted

Hip-Hop pedagogical approaches support students learning can be viewed as a limitation. Critics of this study might suggest that middle school students cannot gauge the effect of different teaching strategies have on the acquisition of science content.

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