

Innovation as a Construct of Social Justice and Decolonization Within Culturally Responsive Teaching and Learning

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Synonyms for innovation: “change, alteration, revolution, upheaval, transformation, metamorphosis, reorganization, restructuring, rearrangement, recasting, remodeling”
- Dictionary.com

“Black people have always developed alternative ways of existing outside of [their] oppressions” (Womack, 2013, p. 37). Prior to the social protests of the 1950s and 1960s, and prior to Brown v. Board of Education (1954), Black people resisted and utilized their imaginations and intelligence to innovate ideologies, legal and social processes, and movements to cause upheaval to the societal status quo that denied them education, economic, and political opportunities. “Improvisation, adaptability, and imagination [were] the core components of this resistance” (Womack, 2013, p. 37) and enabled them to use innovation as a socially just construct to decolonize oppressive systems and to create forward momentum for their educational advancement. For centuries, the use and intention of innovation has been used as a construct to alter the present realities, within a particular time and space, and is usually connected with the technological, scientific, and engineering processes intended to modify or improve products and services and is rarely associated with Black people’s efforts to change, alter and disrupt the systemic and societal processes that denied them educational opportunities were also innovative - in thought, in the form of a long-term vision, and in action - with the intended result of furthering the educational aspirations of themselves and for themselves. Moreover, I argue for the importance of (re)positioning their efforts to change, alter, and initiate the upheaval of systems that were established to oppress them as ones that are innovative and that such efforts be regarded as those that are aligned with social justice decolonization. Finally, this article will describe a contemporary context where innovative teaching and learning practices occur. It will also analyze how such practices serve as a link to social justice and a visible effort to decolonize learning spaces while creating forward academic momentum for students of color.

Keywords: Culturally responsive pedagogy, social justice, innovation in education, decolonization

"A Jim Crow society breeds and needs a Jim Crow historiography. The dominant historiography in the United States either omits the Negro people or presents them as a people without a past, as a people who have been docile, passive, parasitic, imitative. This picture is a lie. The Negro people, the most oppressed of all people in the United States, have been militant, active, creative, productive."

- Herbert Aptheker

Introduction

Before the end of the Civil War, educating black slaves in the U.S. was against the law. In the northern United States, efforts emerged in free black communities to organize schools, yet few Black students received any education. The 19th Century, however, was an important milestone for the education of Black people in the U.S., as many public schools were established to allow for the education of Black students (The History Engine, n.d.). During this period Black people who were newly freed from slavery, and those who were free during slavery faced the collective reality of disenfranchisement, racial discrimination in public places, and economic threats to their freedom and land. To counter this reality, Black people "established their own institutions, formed activist networks, and participated in reform movements from temperance and abolition to education" (Baumgartner, 2019, p. 5). Further, politically organized and well-educated Black people made the quest for education a central framework for their push for racial equality after the Civil War. (Mitchell, 2008, p. 190).

The 20th Century and early part of the 21st Century saw the emergence of court cases designed to make education equitable for children who were minoritized by socio-economic factors or oppressive education policies. The following cases - *Brown v. Board of Education* (1954), *Lau v. Nichols* (1974), *Plyler v. Doe* (1982), and *Williams v. California* (2001) - have been argued for or against from a basis of whether the federal or state laws have an obligation to uphold the decisions made in court. Nevertheless, "over the past sixty years, the courts have established that education is a critically important right in U.S. society" (Oakes, 2018, p. 121). However, despite education being upheld as an important right presumably for all in our society, it does not appear to be granted in an equitable fashion to all.

Prior to the 20th Century, a series of court cases, social movements, and organized political and social appeals were launched by Black people that voiced concern and emphatically objected to the oppressive methods used by those driven by racism to quell and often prohibit the education and societal advancement of Black people.

Today, public schooling has been placed in a position of reacting to education policies decided upon or originated within the courts and state legislated laws. "This reactive role has strengthened the conservative nature [...] by interpreting policy coming into the schools through established dominant traditions and discourses" (Gitlin, 2009). As a result of the influence of the dominant culture in the shaping of public schooling, minoritized students from lower economic means are often stripped of power and lack social justice leaders with the power to challenge and transform the effects of the dominant culture.

To be sure, public schooling, its students, and society as a whole can no longer wait for the widely used social justice instruments of action, activism, and written scholarly pronouncements to succeed at overtaking dominant discourses within public schooling spaces. Rather, what is needed is a re-imagined view of social justice that not only generates a new, innovative way of producing knowledge within our students but also disavows all remnants of the dominant, conservative discourse that has crippled the

spirits of so many and denied opportunities for advancement to students who have become further minoritized by the socio-economic and education policies within the United States. The timeline I chose to center this argument is pre-Brown vs. Board of Education, as I maintain that the efforts made by Black people to advance their cause for education in the pre-Brown vs. Board of Education era helped to generate forward progress toward the systematic dismantling and decolonization of overt segregationist efforts in education spaces.

Social Justice and Social Justice Design

Social justice is “the capacity to organize with others to accomplish ends that benefit the whole community” (Novak, 2009). Building off this, social justice education embodies the acknowledgment of difference and empowers those within a learning space to work towards the reversal of oppressive elements that result in [the] marginalization of students (Applebaum, 2009). To accomplish the reversal of oppressive elements with the education system, a set of tools, mobilized enactments, and actions were developed and implemented by Black people to educate and empower, and that enabled them to not only acknowledge the oppressive systems that marginalized them but to also work to eliminate such obstacles to their education. Before the Civil War, “African American girls and women in the North from working and middle-class families engaged in conscious, vigorous, and sustained acts of defiance and protest in their quest for an education” (Baumgartner, 2019, p. 2).

Within the public school system, there existed an absence of organization to accomplish ends that benefited all. Rather, what was evidenced were a series of policies that were created to impose rules and laws with which to force academic achievement. Yet, those for whom the policies were intended to benefit were not thriving academically nor economically, and were, in some instances, relegated to far worse positions than before the enactment of the policies. For example, Ron Unz, a man of economic privilege, “founded, funded, and led the anti-bilingual organization English for the Children” (Oakes, 2018). As a result of his successful campaigning and influence with the California State Government, California passed a law requiring instruction to be conducted only in English, which cast many bilingual students into low academic levels in schools. If one were in support of Unz’s stance, one would argue that he acted in defense of maintaining America’s English-speaking, “love it or leave it” values. Would his stance not attempt to ensure that the entire American community benefits? To counter the exclusionary approaches made by individuals like Unz, I maintain that the linguistically diverse students who were harmed by Unz’s racist ideologies also needed to utilize a set of design tools that were centered in resistance, socially just innovative educative practices, like the groups of Black people prior to *Brown vs. Board of Education*, in order to innovate a new path that moved forward their education agendas and aspirations.

Innovation As a Social Justice Design Consideration

Human-Computer Interaction scholars Dombrowski, Hartman, and Fox (2016) suggest that “social justice might best be understood not as a single concept, but as a constantly evolving mechanism for thinking through how power, privilege, and access affect social structure” (p. 2). Within this article, I focus upon social justice design that centers on specific dimensions of justice that were created by political philosopher, Hennie Lötter. He developed six social justice design strategies as a way for human beings to design systems in more socially just ways: transformation, recognition, reciprocity, enablement, distribution, and accountability (2011). I am centering the points within this article using

Lötter's social justice design strategies to explore how the educational advancement efforts of Black people, serve as considerations for innovation as a social justice design construct in practice, for the purposes of disrupting societal systems that have traditionally oppressed, silenced, and marginalized Black people. Further, I pose two questions that serve as guides in this exploration:

1. How might innovation and social justice design strategies make an impact on societal systems during *pre-Brown vs Board of Education* times that serve to advance equitable education opportunities for the marginalized?
2. How might innovation and social justice design strategies during *pre-Brown vs Board of Education* times make an impact on societal systems that did *not* provide equitable education opportunities for the marginalized?

The 19th Century efforts of Black people to advance their educational opportunities are not typically heralded as innovative, for, traditionally, the word, innovative, is usually reserved for the technological and scientific spaces. However, I maintain that during the time where the majority of Black people were realizing freedom for the first time, and there was, in the antebellum period, only an estimated population of 319,594 free Black people, as compared to a total slave population of 2,009,048 (Statista, n.d.) the majority of Black people were subjugated to non-citizen status in all of society. However, the efforts made by Black people to assemble as a collective, to develop documents that were presented to legislative bodies to appeal for education rights, and to publish treatises of protest and resistance in local papers that denounced inequitable education policies, were in fact efforts centered in innovation. Such efforts reveal evidence of intentions to disrupt the status quo found in a society that disenfranchised Black people and treated them as non-citizens. Based upon what many of us have been taught or conditioned to be regard certain discoveries, inventions, or technologies as innovative and the historical implications framed in dominant culture that tend to fail to acknowledge Black imagination and genius in mainstream society, I posit that my argument to regard Black people's 19th Century actions to advance their education opportunities as innovative may require some introspection beyond the case made in this article. For each of the design strategies presented within this article, I will make correlations with examples of 19th Century work and efforts by Black people, as well as contemporary educators, in order to make a case for the work that is representative of social justice design constructs as consideration for innovation.

Innovative Design to Achieve Transformation

In 1794, Prince Hall founded one of the oldest Black organizations designed for social change and transformation - the Prince Hall Freemasons, whose initial mission was to "transform black men into symbolic artisans, and thus citizens of the masculine body politic, which reveals a dialectic of African-American male "social self-creation through labour" (Wallace, 2002, p. 407).

In 1787, Prince Hall, the founder of the Negro Masonic Order, an organization created to advance the social order of Black people, drafted a petition to the Boston state legislature to appeal for equal educational rights of Black students (Aptheker, 1951). Hall's individual action is one that represents social justice design for transformation, which I maintain may be one of the first social justice design strategies designed and evidenced to support the educational advancement for Black people in the United States. Though individual action rarely brings about the transformation of inequalities on a large societal scale, the consideration is for such action to be taken up on a more collective scale, in order to bring

about innovation to disrupt the existing social order, thereby resulting in the possibility of transformation writ large if more individuals take up the strategy.

Innovative Design to Achieve Recognition

The next dimension of the social justice strategy involves that of recognition. "Recognition focuses on identifying unjust practices, policies, laws, and other phenomena, as well as identifying those people who are most negatively impacted by such phenomenon" (Dombrowski, 2016, p. 6). In 1818, the Pennsylvania Augustine Society, an organization founded by free Black people to serve the social, educational, and welfare of the Black community (Aptheker, 1951), created a constitution of the society with a preamble that addressed the need for equitable resources and education opportunities so that those within the Black community could learn a trade and make a fair wage. The actions demonstrated by the Pennsylvania Society clearly represent a strategy evoked to address the need to shed light on unjust practices thrust upon the Black community in Philadelphia. The appeal within the preamble was written,

We the Subscribers, persons of colour of the city of Philadelphia, [] sensibly impressed with the high importance of education, towards the improvement of our species, in an individual as well as social capacity [are] convinced that it is an unquestionable duty which we owe to ourselves, to our posterity, and to our God, who has endowed us with intellectual powers, [] to procure for our children a more extensive and useful education than we have heretofore had in our power to effect. (Aptheker, 1951, p. 73)

Within the text, however, no evidence exists that this appeal was transformed into a legal document or petition filed within the court, therefore I surmise that the preamble served as a motivation for those who read it or had it read to them, in order to instill within them a sense of innovative ways to acquire education, to aspire to an education that would supplant them a place as citizens within the United States, and to remain steadfast in achieving forward momentum in social advancement and positioning in society.

Innovative Design to Achieve Reciprocity

"Reciprocity describes the relationship between those who are owed justice and what needs to occur for the obligations of justice to be fulfilled" (Dombrowski, 2016, p. 7). In 1827, the *Freedom's Journal*, the first Black-owned newspaper founded by Samuel Cornish and John Russworm, emerged in New York City as a counter-narrative to discrimination and slavery. In its first publication, the emphasis on education and training was highlighted: "education being an object of the highest importance to the welfare of society, we shall endeavor to present just and adequate views of it, and urge upon our brethren the necessity and expediency of training their children, while young, to habits of industry, and thus forming them for becoming useful members of society" (Aptheker, 1951, p. 83). During the 19th Century, American education in public schools operated as "an Americanizing agent, an institution whose central purpose was to fuse children from all religions and ethnicities into a single American citizenry" (Baumgartner, 2019, p. 2). Also, during this same period, Black people endeavored to use education as a way to "lift up their race" (Baumgartner, 2019; Butchart, 2013) out of poverty and second-class citizenry, and sought to use education as a way to share with dominant culture society that Black people who were educated were deserving of being treated as productive citizens trained to contribute their skills to various industries. Butchart (2013) cites, "The very feeling of inferiority which slavery forced upon them fathered an intense desire to rise out of their condition by means of education" (p. 2). Cornish and Russworm, endeavoring to appeal to the power structure on the need for Black people to be educated and to be granted

educational access to train their children to learn the various ways of industry and how to be productive citizens, in order to contribute to the well-being of society overall. This appeal to the dominant culture to grant access to educational opportunities, or to reciprocate to them what is granted to all White citizens, is an innovative design effort to achieve reciprocity.

Innovative Design to Achieve Enablement

“Oppression occurs when people are unduly constrained by “institutions, laws, policies, and human behavior or unable to engage in their own development” (Dombrowski, 2016, p. 8). The purpose of this strategy, therefore, is to serve as a counteraction to oppression and provide the means, tactics, and strategies by which people can thrive within the society through alignment with institutions, laws, policies, and human behavior deemed acceptable.

Innovative Design to Achieve Distribution

The design strategy of distribution involves how society assets and deficits are distributed evenly. In 1849, a group of free Black people wrote a petition to the State Convention of Ohio (Aptheker, 1951, p. 256A), thereby demanding,

The vicious character of uneducated communities is seen the world over, and to prove it, we need not cite you to all past history. Therefore, even if the colored educational privileges to them all; but here we are, born on your soil, and unless your own professed principles be a lie, entitled to all the rights and privileges of all others. Consequently, you are doubly bound to act for us as for yourselves.

With respect to their desire to achieve distribution, the free Black people in Ohio were merely appealing to be granted equal rights to education that all people were granted under the Ohio Constitution. In the 1840s Ohio, as long as a Black person came to the state with at least two freehold surety bonds, plus payment of five hundred dollars to the common pleas court, then they were granted the freedoms and rights that were represented within the state constitution (Aptheker, 1951). I maintain that despite their following the rules of the state, and the process for appealing for rights that are normally granted and utilized by White people, it was the societal biases and social injustice practiced by White people that denied the Black people of Ohio the right to achieve equal distribution of education rights granted to them by the state constitution.

Innovative Design to Achieve Accountability

This design strategy involves holding accountable those who benefit from the systemic oppression and marginalization of people. This strategy allows for the development of coalitions of power that hold others in power accountable for their actions that benefit from or enforce systems of power. In 1855, at the First California Negro Convention, which was held in Sacramento, delegates gathered and drew up petitions that denounced the inequitable treatment of Black children, as it related to their being denied education. The delegates appealed,

We again call upon you to regard our condition in the State of California. We point with pride to the general character we maintain in your midst, for integrity, industry, and thrift. You have been wont to multiply our vices, port Government, at the same time you deny us the protection you extend citizens while seeking to degrade us. You ask us why we are not more intelligent? You receive our money to educate our children and then refuse to admit our children into common schools. (Aptheker, 1951, p. 327)

To be sure, the Black people in California were well versed in their knowledge of the rights under the law of California, and utilized the processes for appeal and petition, to denounce the unfair treatment of denying their children access to schools. The delegates' appeal implies that the Black citizens of California paid their fair share of taxes yet were denied the rights granted to tax-paying citizens. Their actions sought to disrupt the current systems of oppression and hold lawmakers accountable for upholding the laws to include them.

Consequently, the actions of Black people during pre-*Brown vs Board of Education* though were innovative and sought to disrupt the societal forces that denied much access to an equitable education, if any education at all, did not yield change but were the harbingers of the societal and educational rights that would come later. I argue that because of these innovative ways that were inserted into the legal fabric of our society, Black people during pre-*Brown vs. Board of Education* paved the way for new ways of incorporating teaching and learning practices that were instrumental in transforming the education spaces for the oppressed, particularly those considered Black or from the African diaspora.

"Institutionalized rejection of difference is an absolute necessity in a profit economy which needs outsiders as surplus people. As members of such an economy, we have all been programmed to respond to the human differences between us with fear and loathing and to handle that difference in one of three ways: ignore it, and if that is not possible, copy it if we think it is dominant, or destroy it if we think it is subordinate. But we have no patterns for relating across our human differences as equals. As a result, those differences have been misnamed and misused in the service of separation and confusion."

- Audre Lorde

A Social Justice Education Policy Centered on Innovation: Culturally Responsive Education

Ladson-Billings (1994) defined culturally responsive pedagogy as one "that empowers students intellectually, socially, emotionally, and politically by using cultural references to impart knowledge, skills, attitudes" (pp. 16-17). In order for critical thinking and discourse to occur in classrooms, as well as for sociopolitical consciousness to emerge within our students, the curriculum and teaching strategies utilized by culturally responsive teachers are implemented to support students in developing critical stances towards inequities, their communities, and within their own classrooms. The next part of this paper will highlight two contemporary teaching and learning practices or programs that are innovative and have transformed teaching and learning for Black students.

In using culturally responsive education as a pedagogical and curricular framework, the foundation work of two researchers is noted: Geneva Gay and Gloria Ladson-Billings. Gay (2010), whose work focuses on culturally responsive teaching, defines teaching "as using the cultural knowledge, prior experiences, frames of reference, and performance styles of ethnically diverse students to make learning encounters more relevant to and effective for them" (p. 31). In order for a more equitable climate to exist for the ethnically and linguistically diverse students in the classroom, the curriculum and instructional practices must be examined, and the pedagogy of the teacher must be questioned by herself.

Innovation is required to successfully alter the trajectory of failed schools, failed grades, and failed people within our society. Innovation itself - as a social justice design construct - is to be considered. Rather than use affirmative action to force change that initiates the position, advancement, and academic achievement of students, public schooling requires innovative action that uses a multi-faceted approach to social justice. Further, public school requires innovative action to affirm the varied cultures of students and the communities and countries from which they are informed and to forge those cultures into the curriculum, school culture, and pedagogical strategies of teachers, leaders, safety workers, and food handling staff who operate in the public schooling systems. A social justice education policy that will enable a transformed way of educating students and thereby results in innovative approaches to knowledge acquisition addresses more than the need to redistribute assets, create education equity, and eliminate the oppressive systemic barriers to access and opportunity. Rather, "the unprecedented crisis we are in requires thinking and action that [] foster citizens that see equity between groups as in everyone's interests (i.e., it is in everyone's interest to work across differences such that difference is the engine for learning and growth, not violence and the destruction of the "other") and are able to act based on thinking that does not simply repeat the failed proposals/policies of the past" (Gitlin, 2009).

An education policy centered on innovation that is directed towards designing and sustaining social justice is one that goes beyond the traditional teaching and learning strategies found in public schools. It is one that puts cultural responsiveness at the core of its pedagogical and curricular framework and uses innovation and problem-based methods to direct the work of students, teachers, the community, and policymakers. Further, such a policy operates on a continuum, resulting in that policy continuously evolving to fit the needs of the entire ecosystem made up of students, teachers, the community, policymakers, and conditions within the school, the community, student achievement levels, and societal changes. Culturally responsive education generates an improvement in education for students whose cultures have been marginalized or silenced in education spaces (Neito, 2018).

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

Using Innovation and Culturally Responsive Education to Teach For Social Justice: An Integrated Critical Analysis

This next section examines the proposed policy of education innovation within which research into teaching, learning, curriculum, and assessment practices are conducted. The analysis is illustrated through work that exemplifies the principal characteristics of each practice. I maintain that current social justice ideologies are centered upon tenets that result in equity and that enable students to achieve full agency in their classrooms, which leads to an increase in academic achievement (Gutiérrez & Rogoff, 2003; Nasir, 2011) what occurs as lacking in and around public schooling places, as it relates to minoritized students: equality, resources, conditions, power, learning. Further, this reimagined policy of innovation is centered in a *culture of equality* (Carothers, 2018), which supports the varied modes of student learning and multiple intelligences and calls for teachers to extend their pedagogical strategies and curricular tools to support student knowledge acquisition according to their intellectual abilities. At the time of this article, there does not exist a national education policy to support utilizing a curriculum centered in a culture of equality. Nonetheless, the following paragraphs cite contemporary practices that support a framework behind innovative education policy that is steeped in a social justice framework: the teaching practices found within a New York City-based nonprofit

organization called STEM Kids NYC, which I established, and those found within a program called Science Genius.

Methodology

In order to generate my analysis of STEM Kids NYC, I employed the standard of authenticity, whereby I captured, through recordings of classroom activities, interviews with teachers, and review of student work product, the original context of the setting and the perspectives of the participants. A theory I used to inform my analysis was a qualitative research methodology known as portraiture. Originated by Sara Lawrence-Lightfoot (1997), it is a methodology that is in connection with illuminating the good that is occurring within communities that are socio-economically marginalized, as well as illuminating the accomplishments of those who live in those communities.

Critical Analysis

The mission of STEM Kids NYC is to bridge the gap between a current school curriculum and the immediate need for schools to prepare students for STEM skills and for jobs that do not yet exist. Science Genius “is an initiative focused on utilizing the power of hip-hop music and culture to introduce youth to the wonder and beauty of science” (HipHopEd, 2021).

A practice that can be designed and implemented to support the generation of social change and transformation is the teaching practice of using cultural responsiveness in the classroom. Sleeter (2017) posits that “curriculum development requires considering not only how students learn to consume knowledge, but also how they learn to evaluate and produce it” (p. 29). Culturally responsive teachers who choose to connect social issues with the curriculum and that exist within the communities in which their students reside can use inquiry-based strategies to present content from a multicultural perspective, as well as present problems, issues, or challenges that affect or benefit students’ multicultural communities, in order to create student-student discourse to examine and reflect upon the main ideas of the content presented. It is from this discourse that students can collaboratively work together - with the teacher serving as a guide, to devise solutions to address the social issues or challenges.

Within STEM Kids NYC, which was founded in 2015, culturally responsive teaching practices are enacted, and culturally responsive curriculum and lesson plans are implemented for students in various New York City, Brooklyn, and Queens schools and community-based centers. Within STEM Kids NYC locations, learning spaces are ones where cognition is purposely situated around the student’s prior knowledge and their multimodal learning style. Further, the STEM Teachers develop what Eglash et al. (2013) cite Bransford (2000), Eglash, Bennett, O’Donnell, Jennings, Cintonino (2006), and Villegas & Lucas (2002) and emphasize that culturally responsive teachers use

materials and modes of inquiry that are culturally relevant, modifying instruction to accommodate students prior knowledge, encouraging cooperative learning environments, using model-based approaches, and facilitating staff reflections on students’ progress. (p. 632)

Further still, within STEM Kids NYC, there exist teachers of various groups- African, African American, Korean, White, Indian, and Mixed race - and all are members of one or more STEM professions or majors: Science, Computer Science, Engineering, Creative

Technologies. Some are undergraduate or graduate students and some already have their PhDs. What they have most in common is a set of culturally responsive STEM teaching tools that are integrated within a culturally responsive STEM curriculum I designed and enacted professional development sessions to train the STEM Teachers: To address the absence that is evident in K-12 curriculum regarding the contributions of people of diverse cultures in the STEM fields, STEM Teachers integrated STEM icons of color in their lesson plan activities, and presented these icons to their students. The common practice used is that whatever STEM domain reflected in the lesson plan, the teacher introduced a STEM icon that had a mastery in that particular STEM field. The intention is so that the icons, who look like the students, would resonate with the students and they would develop a belief that they also belonged in STEM because others who looked like them were successfully contributing to advance the field. This presentation of *historical culture*, a term defined by Eglash et al. (2013), addresses the “myths of genetic determinism: showing students that there is a history of Black mathematicians in contemporary academia” (p. 633). This introduction further diminishes any preconceived negative notions that students may have about their race or another peer’s race.

The actions demonstrated by the STEM teachers are reflective of the innovative design tool of transformation, in that the use of STEM icons is intended to transform the mindset of students of marginalized groups, who may not see the contributions of people who look like them in K-12 textbooks. This design tool is used to disrupt the hidden curriculum that exists in public school education, whereby the contributions of diverse populations are nearly absent in history, science, mathematics, and engineering textbooks.

Another tool the STEM Teachers use is centered on design-based thinking and participatory action research that make up social justice design processes. Students are presented with problems in society or asked to brainstorm issues with design or within society, and then are taught various ways to solve those problems using a STEM solution. Eglash (2013) cites the work of Terry (2011) and Gutstein (2003) for using statistical analysis to “illuminate injustice in society and affirm cultural accomplishments and social justice triumphs” (p. 634). Through various lessons in Science, Computer Science or Engineering, and design, STEM Kids NYC students learn to interrogate various problems within society and, with the teacher serving as a guide, create prototypes or models of solutions that address those problems. For middle and high school students, they are introduced to ways to engage with government leaders, to present their models and prototypes for consideration to effect change and transformation in their communities. The activities that occur within STEM Kids NYC classrooms that guide students in interrogating systems that are deemed unjust in society are representative of the innovative design tool of accountability, whereby the students become empowered to hold accountable those who enforce the systems and practices that oppress and subjugate groups who do not hold power in society.

The third teaching tool STEM Teachers use is an inquiry-based style of teaching, and is representative of the innovation design tool of enablement, whereby students are empowered by their teachers to engage with them to in the development and production of their knowledge constructs. Teachers who utilize the enablement design tool are seen engaging in constructionist activities to support students in developing their ways of knowing and allowing them to derive their individual knowledge constructs that are centered around the lesson and the content. The term, constructionism, is an epistemological framework that was originated by mathematician, computer scientist, and educator Seymour Papert, who spent the majority of his career teaching and conducting research at MIT. As a founding member of the MIT Media Lab, Papert

centered constructionism in the activities of learning by doing, and extended the social scientist term of constructivism, to include “building knowledge structures” irrespective of the circumstances of the learning” (Papert & Harel, 1991, p. 2).

This form of teaching for discovery is the opposite of most traditional classroom settings, particularly in STEM learning spaces. Traditional STEM classroom settings tend to facilitate a more structured approach to teaching, with an aim of deriving a scripted answer, rather than what STEM Kids NYC teachers use, which is the utilization of a student’s use of their own language and tacit knowledge they’ve constructed through their experiences with STEM phenomenon.

In summary, students who are enrolled in STEM Kids NYC programs demonstrate a high self-efficacy around Science, Computer Science, Engineering, and Robotics, and can articulate knowledge of particular concepts within the STEM disciplines, as well as have a more informed identity of themselves as Scientists, Computer Scientists, Engineers, and scholars. The teaching tools, curricular framework, and ways of being of the instructors within STEM Kids NYC are excellent representations of innovative ways of educating Black students who otherwise may not have been exposed to a STEM learning space that supported and elevated their quest for learning, and are also great examples of ways teachers instill within their students the belief that they can also be members of a group of scholars and professionals who are in STEM fields. Compared to a traditional academic setting, where many students of color do not feel welcome in STEM learning spaces, I maintain that STEM Kids NYC’s work is centered on innovative social justice design.

The next contemporary organization that demonstrates a culture of equality and social justice innovative design is a program called Science Genius, which was founded by Dr. Christopher Emdin, Associate Professor of Science Education at Columbia Teachers College. Science Genius is

an initiative focused on utilizing the power of hip-hop music and culture to introduce youth to the wonder and beauty of science. The core message of the initiative is to meet urban youth who are traditionally disengaged in science classrooms on their cultural turf, and provide them with the opportunity to express the same passion they have for hip-hop culture for science. (Hip Hop Ed Website, 2021)

Methodology

The primary data source for this analysis included field notes from attending Hip Hop Ed conferences in June 2019, whereby I took field notes of student performances that demonstrated their use of scientific knowledge infused with a rap that resulted in authentic work product, as well as reviewing secondary sources of video vignettes of classroom activities in science learning spaces. A theory I used to inform my analysis was a decolonizing theoretical framework developed by Smith (2021). The framework suggests that ways of knowing traditionally created by Western traditions that historically colonized nondominant cultures have privileged dominant cultural narratives and influenced the construction of knowledge in schools. Smith’s framework is centered on presenting counternarratives to knowledge construction by non-dominant groups and acknowledges that these alternative ways of knowing are on an equal plane as Western ways of knowing. I also used a feminist poststructuralist framework to analyze and critique the way in which power relations are produced and enacted in non-dominant communities and learning spaces.

Critical Analysis

Science Genius utilizes Hip Hop Pedagogy, a framework that incorporates the hip hop elements of rap, b-boying, beatboxing, DJing, MCing, and rap battles into a style of teaching and learning Science. This approach is shown to give students in urban science classrooms access to a connection to the science content (Adjapong, 2019).

The Science Genius teachers use a culturally responsive teaching framework of instructing students on how to create “bars” or lyrical lines of rap that center on specific science content. Further, the science content is integrated with a rap that represents poetic rhythm synced with the scientific vernacular. Students are, in theory, creating their study notes for Science quizzes and Regents tests. In addition, the teachers within Science Genius are K-12 science teachers, science graduate students, and science professors who often resemble the ethnic makeup of their students and often come from the same neighborhood as their students. Like the teachers within STEM Kids NYC, the Science Genius teachers facilitate from a framework of what Eglash (2013) terms heritage culture, but also from vernacular culture (Eglash 2013), which is representative of urban youth cultural and linguistic practices, or some other form of culture that is centered on local social networks. The pedagogical style of the teachers within Science Genius enables students, like the STEM Kids NYC teachers, to generate deductions from presenting the content, yet also give their students creative license and freedom of self-expression to present their science knowledge constructs in multiple modes through rap, music, beatboxing, and digital presentation.

I attended the Hip Hop Ed conference in 2019 and witnessed the genius and confidence of students reciting science facts integrated with a hip-hop beat that is cleverly interwoven with both the beat and other lyrics they used. What I observed were students combining culturally relevant phenomena and lived experiences they relate to in their life, which were likened to witnessing a miracle occur within an urban learning space that would otherwise depict disengaged urban youth as being disengaged in science classes. Thevenot (2021) emphasizes that

Researchers have uncovered many reasons as to why Black and Latinx students do not persist in STEM. The lack of success in STEM and the perceived declining persistence in STEM for Black and Latinx students is attributed to the social barriers they face within their academic environments, or the lack of preparation they received prior to entering the STEM program. (p. 60)

My observations gave me pause to reflect upon the innovative design tool of reciprocity and the remembrances of what Cornish and Russworm accomplished in the 1800s with their paper, the *Freedom's Journal*. Cornish and Russworm, like those at Science Genius, sought to illuminate the academic brilliance of those in the Black race, in order to show the dominant culture that their brilliance is just as deserving to be given opportunities to contribute to the field of science. In the case of the Science Genius students, their demonstration of knowing scientific knowledge and their facility to creatively engage with science content using rap is proof that the students are truly scientists and are positioned for success in science - as scientists.

Themes were derived from my review of video vignettes that served as archival data retrieved from the Hip Hop Ed website. What I observed were students who shared their personal narratives of initially not being comfortable with science vernacular found in science textbooks or worksheets. After their experiences with the Science Genius teachers,

students became empowered through the use of rap and hip-hop pedagogy and created authentic raps centered in science. The use of rap allowed students to not only express themselves through the historical references of their culture and also demonstrate their ways of knowing centered in science knowledge constructs. I maintain that Science Genius uses innovative ways of teaching, centered on social justice, in order to engage Black students in acquiring knowledge in Science and thriving in the Science learning space. What Science Genius has accomplished is also representative of innovative social justice design.

The Test for Innovative Practices

“Scholars today have demonstrated quite convincingly that people develop intelligence as they interact with others and as they use the tools and symbols of their culture to make sense of the world and their experiences in it” (Oakes, 2018, p. 200). Thus, in innovative learning spaces that are centered in STEM, like at STEM Kids NYC and Science Genius, individual student knowledge as a meaningful context is brought into those learning spaces and utilized to create a rich curriculum and activities that benefit all of the students. Both STEM Kids NYC and Science Genius utilize innovative design tools of transformation, enablement, reciprocity, and accountability at the core of their practice. For curriculum practices to support the framework of being innovative with socially just design tools, they must include the students in the center of such practice and cannot treat the students as subjects on which to shed light to administer focused teaching. Both organizations place students at the center of their practice. Further, for innovation to be evidenced, students have roles as collaborators in curating their education and learning spaces that may include fluid dialogue between them and teachers, the community, and policymakers, and includes a framework of multiculturalism and discourse that brings to light oppressive constructs that marginalize and silence their voices. Within STEM Kids NYC,

the [curricular strategies used by the teachers] provide for the promotion and encouragement of active student participation in STEM learning spaces and empowers students to utilize both their cultural voice and evolving STEM proficiency to contribute as full participants in STEM environments who demonstrate a sense of belonging. (Thevenot, 2021, p. 65).

Within Science Genius, students are empowered to utilize the innovative design tool, *innovative design to achieve enablement*, to extend their learning beyond the traditional borders created by K-12 curriculum, and engage in creating a dialogue with teachers about their education. Adjapong (2019) maintains that Science Genius programs enable students to advocate for their learning and initiate discourse with their teachers:

Genesys had the agency to ask her chemistry teacher to alter her project to allow her to submit a rap as opposed to a timeline or a monologue. After participating in the Science Genius Program, Genesys similar to other students realized that using Hip-Hop to write content-themed raps was an effective method of learning for her. Genesys asked her teacher to allow her to submit a science-themed rap for her project because she felt that it was it was an effective alternative that will help her gain a deep understanding of the content in an engaging manner as opposed to the other options presented. (p. 22)

I maintain that both STEM Kids NYC and Science Genius utilize a culture of equality that allows students to collaborate with their teachers, as well as to lead in the facilitation of their education.

On the whole, using innovation as a social justice construct and as a practice for generating learning presents social and academic empowerment contexts for students, in that innovation, brings about the freedom to express, the placement of new ideas, the empowerment to take risks, and an education structure in which to use findings of oppression, racism, and systemic forces that silence the voice to replace - immediately - those forms of oppression with new ideas, knowledge constructs, and a framework of innovation that results in the initiation of change or elimination of oppressive influences.

Within STEM Kids NYC, students are given choices of what they wish to show and teach - they choose a lesson or unit of study they learned and enjoyed, then they produce a science fair-like demonstration, in order to teach their peers and other invited guests, such as teachers and parents. Then, students participate in showcases throughout the school year, at the conclusion of a unit of study that is usually 8-10 weeks long.

Within Science Genius, students demonstrate what they know in the form of producing rap and lyrics centered around particular science content and then present this in a concert-like setting called a rap battle. Similar to a science fair, judges give each student or student group points based upon style, creativity in the use of science content, and overall presentation.

In the context of social justice-oriented programs or ones that use a socially just curriculum, the teaching practices of the organizations referenced in this article reveal that: students' cultures are integrated into the curriculum, the multiple intelligences of students are included in the curriculum, the curriculum support students' varied ways of knowing and multiple ways to acquire knowledge and provides a learning space that acknowledges students' varied levels of proficiencies. These practices are exemplars of innovative social justice education.

"To teach in a manner that respects and cares for the souls of our students is essential if we are to provide the necessary conditions where learning can most deeply and intimately begin..."
- bell hooks

Implications

In order to be effective in their teaching practice, teachers must be willing to expose their vulnerabilities and biases and engage with the cultural positioning of their students through rigorous self-examination. Further, effective teachers who learn the practice of critical self-reflection will be successful at bringing to the forefront the often painful truths and struggles that are deep-seated within the heart and recesses of their minds, where the drive to succeed is often associated with a carefully crafted narrative that addresses negative stimuli. What shall one do with such stimuli? One suggestion would be to practice care, and the giving and receiving of love to all they encounter in their classrooms, and make their lesson plans rigorous and culturally responsive through the use of innovative design tools that support their pedagogical practices and enable all students to acquire knowledge and develop their facility for initiating social justice enactments that benefit themselves and their communities.

Innovation, framed as a culturally responsive, social justice construct, is a model by which both preservice and in-service teachers who instruct in public, private, and charter school learning spaces can build connections and close the widening gap between their students' understanding of content and knowledge acquisition. Through the effective use of knowledge constructs owned by students or developed within the learning space and the teacher, both the student and the teacher can generate a community of inclusion that

supports a reimagined learning community that includes all students in participatory learning and accomplishes the creation of academic identities for all.

This paper brings to the forefront the direct and creative actions devised by Black people to move their race toward education advancement - a needed process to bring about innovative change and transformation to the downtrodden, minimized, and lowly economic, social, and political positions that plague our society. This action, I maintain, is representative of the truest distinction of what it means to be innovative and the clearest distinction of socially just work that disrupts the systemic status quo of marginalizing non-dominant groups.

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