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Prisons, Pipelines, and the President: Developing Critical Math Literacy through Participatory Action Research

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Prisons, Pipelines, and the President: Developing Critical Math Literacy through Participatory Action Research

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Academic success, and the economic well-being it usually affords, is closely tied to math achievement. Key national indicators reveal decades of underperformance of African American males in mathematics. Scholars argue that the schooling experiences of Black males are highly-racialized, are often bereft of significance, and result in academic and social marginalization. The author reports findings from an eight-month participatory action research (PAR) project involving seven high-school aged Black males in South Los Angeles; students undertook research to empirically verify and qualitatively explore narratives concerning incarceration and university enrollment. Utilizing a critical ethnographic methodology to privilege student voice, the author shares how 'low-performing' students in an urban setting utilize their mathematical knowledge to become critically literate about these narratives. Highlighting two student-constructed counternarratives he terms mathematical counterstories, the author shows how students used data analysis to contradict dominant understandings about young Black males. The author argues math counterstories are a unique synthesis of critical and mathematical literacies that are supported through PAR. Implications for the re-orientation of high school-aged Black males towards mathematics are discussed.

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"I don't want to wake up four years from now and discover that we still have more young black men in prison than in college."

-- Senator Barack Obama, on the presidential campaign trail in 2007

INTRODUCTION

The above quote, attributed to the eloquent (then) senator from Illinois, was a source of heated debate among the political pundits who were constantly monitoring campaign minutia of the prospective presidents in months leading up to the respective nominating conventions of 2008. Obama was charged with pandering to African American audiences with themes of persistent racial inequality (i.e., *playing the 'Race' card*); the thrust of his point above, however, was quickly lost in the morass of political commentary that surrounded the developing dialogue on race emerging from his candidacy. Marshaling statistics on prisons and universities, conservatives (as well as Clinton supporters) challenged Obama's narrative. His opponents dismissed his words as pure strategy – a means to solidifying his position as the preferred (and racially-qualified) Democratic presidential nominee. The dust has now settled and Barack Obama is well into his first term as President of the United States. African American males, however, *are* being imprisoned at disturbingly high rates – in 2001, 1-in-6 had been imprisoned (Mauer & King, 2007), while latest trends project that 1-in-3 will go to prison in their lifetime (Mauer, 2009). African American males *do not* constitute more than a trickle in the higher education pipeline – hovering between only 4.7 and 7.6 percent of students receiving the Bachelor's degree in the three decades between 1976 and 2006 (National Center for Education Statistics [NCES], 2008). Moreover, African American males are suffering what literally amounts to an *endangered* status (Garibaldi, 1992; Jackson & Moore, III; 2006; Noguera, 2003). Simply put, Black men *are still losing*. Though President Obama expressed concerns for the life chances of young Black men which was chalked up as rhetoric during his campaign, the concrete realities of 'existence in Black' cannot be so easily dismissed by the young men who define themselves, and are themselves defined, by this experience.

This article tells a story of the unique way in which a few of these young men refused to be dismissed. Against the backdrop of the broader political conversation about African American men in U.S. social institutions, the author shares context and data from a critical ethnographic study involving seven high school-aged Black males¹ who engaged in participatory action research (PAR) in the summer of 2008. These young men wondered whether Barack Obama's claim held true – specifically, they set out to determine whether disparity existed between the incarceration and university attendance data of Black males in their home state of California. During the PAR process, the young researchers developed 'critical math literacies' that allowed them to critically interrogate this issue. In this article, the principal investigator used the project data to highlight *mathematical counterstory-telling*, a unique pedagogical feature of PAR. These data

¹ In this article, I use the racial descriptors *African American* and *Black* interchangeably. Here, *high school-aged* refers to students ranging in age from 14 to 18 years old (i.e., enrolled in U.S. school grades 9 through 12). With the exception of one twelve year-old student, all participants in this study were within this age range.

demonstrate, among other things, hope and possibility for re-orienting marginalized urban youth to mathematical knowledge and inquiry. First, the manuscript will frame math literacy and the role it plays in supporting the life chances of African American men.

AFRICAN AMERICAN SCHOOLING: MATHEMATICS AND ACHIEVEMENT

Educators have long understood that the historical experience of African American students in U.S. schools has been second-rate at best, while inhumane and criminal at worst; there is no shortage of literature documenting the challenges facing African American education (Anderson, 1988; Irons, 2002; Kozol, 1991; Watkins, 2001). Despite the longstanding relation between education and critical African American perspectives on literacy and freedom (Perry, Steele & Hilliard, 2003; Watkins, 2005), several have noted the unmistakable continuation of institutional ‘stewardship’ of Africans in America – from slavery to the modern mass incarceration of Black men and women (Kunjufu, 2005; Wacquant, 2002; Williams, 1994). It is also clear that the complex webbing that constitutes urban schooling has an important role to play in conditioning and preparing African American students for these contemporary socioeconomic bonds (Anyon, 2005; Noguera, 2003; Oakes, 2005; 2008; Tyack, 1974; Howard, 2003; Howard & Obidah, 2005). Given the central role of math achievement as a ‘gatekeeper’ to academic advancement, the relationship between math education and institutional access becomes highly relevant (Ladson Billings, 1997; Martin, 2003; 2009; Oakes, 1990; Rech & Harrington, 2000; Stinson, 2004; Stone, 1998; Tate, 1997).

Virtually all prominent measures of mathematical achievement brand African American students as ‘underperforming’ (Ladson-Billings, 1997; Lee, 2006; Lubienski, 2002; NCES, 2007; 2009; Tate, 1997). Black students significantly trail their White, Asian, and (to a lesser degree) Latino peers in both reading and mathematics (NCES, 2010). This gap also holds true in major urban school districts, where large numbers of African American students are schooled. The 2009 National Assessment of Educational Progress Report (NAEP) reveals that of the eighteen urban districts participating in its assessment, ten failed to match or surpass the average math achievement scores of the large U.S. cities – including Atlanta, Baltimore City, Chicago, Cleveland, Detroit, the District of Columbia, Fresno, Los Angeles, Milwaukee, and Philadelphia (NCES, 2010).

The composite data paint a picture of the plight of African American students through their PreK-12 academic experiences; understanding and intervening in this experience, then, becomes critical. While many in the mathematics education community are hard at work developing interventions that target African American youth, much of this work is premised upon the notion that ‘good teaching’ is sufficient to address the needs of those who fall on the *wrong side* of the gap statistics (National Council of Teachers of Mathematics [NCTM], 1989; 2000; Schoenfeld, 2002; Stevenson & Stigler, 1992; Stigler & Hiebert, 1999). Recent research by Martin (2000; 2005; 2006) reveals that African Americans’ experiences with the teaching and learning of mathematics are highly-racialized – and that the nature of these experiences must be accounted for when attempting to understand academic success and failure. Other research argues that math instruction does not occur in neutral social or political spaces (Civil & Planas, 2004; Diversity in Mathematics Education Center for Teaching and Learning [DiME CTL],

2008; Gutstein, 2006; 2007; Morrell, 2008). The teaching and learning of mathematics, as such, is subject to the same sets of problems that present themselves across the spectrum of PreK-12 African American academic achievement. There is value, then, to research that critically-reflects upon the racialized realities of math achievement.

CRITICAL RACE THEORY IN MATH EDUCATION PERSPECTIVE

Several scholars have made clarion calls for theoretical frames that acknowledge the salience of race and racism in the experiences of African American males, but that also provide powerful analyses leading to effective interventions (Harper, 2010; Howard, 2008; Martin, 2000). This call is predicated upon the notion that young Black men know their experiences better than anyone. But what are these young men saying about their experiences with math? And who is listening? Are researchers justified in developing interventions without fully considering the perspectives of African American youth on the teaching and learning of mathematics? What research approaches are possible when math education researchers reject deficit frames for understanding the experiences of African American males in math classrooms? There are many important questions to be asked. Critical Race Theory (CRT) has been helpful in shaping such questions – and can be helpful in developing answers.

CRT, emerging as it has from critical legal studies, has taken on major importance the last two decades (Dixson & Rousseau, 2006; Ladson-Billings, 1998; Ladson-Billings & Tate, 1995; Solórzano & Yosso, 2001; 2002). Analytically, CRT provides a helpful framework with which educational scholars can construct critiques of schools as institutions that create and reproduce inequality in American society. Among the five tenets² (or themes) typically thought to be axiomatic in CRT, three are particularly salient in this study:

- (a) The recognition of the centrality of race, racialization, and racism in American society, including its institutions (Lynn, 1999; Martin, 2000; Omi & Winant, 1994);
- (b) The reliance upon the experiential knowledge of people (and communities) of color in critical analysis (Delgado, 1989; Dixson & Rousseau, 2005); and
- (c) The commitment to social justice through transformative action (Solórzano & Yosso, 2001).

As researchers attempt to unpack and understand the experiences of African American males in math education, they find themselves constantly struggling against the background noise and public chatter about ‘achievement gaps’ and underperformance. While achievement data is indispensable to understanding the larger picture of the academic performance of African American students, scholars (perhaps unwittingly) commit to the deficit presuppositions of the Achievement Gap discourse by relying solely upon that data to inform our inquiry (English, 2002; Ladson-Billings, 2006; Love, 2004). CRT can provide powerful lenses that productively complicate simplistic renderings of achievement data and the analyses that follow. Recognizing that race, racialization, and racism are fundamental factors in the day-to-day experiences of high school-aged Black males at once illuminates our understandings of the ways that racial prejudice intersects

² Citing Matsuda et al. (1993), Dixson & Rousseau (2005) discuss *six* CRT themes relevant for education.

with power and authority in schools and in math classrooms, while also destroying colorblind assumptions about how best to intervene (Bonilla-Silva, 2006; Martin, 2006).

Given the need to develop new approaches to the teaching and learning of mathematics with African American males, this article focuses on the unique outcomes of PAR as an approach to creating learning spaces for the development of critical math literacy. With this in mind, the researcher will dedicate the remainder of this article to detailing the nature of PAR, as well as its potential and actual impact on math literacy as embedded in the research activity and findings of seven high school-aged African American men.

PAR & CRITICAL MATH LITERACY: COMPLEMENTARY FRAMES FOR MATHEMATICAL INQUIRY WITH AFRICAN AMERICAN MALES

Participatory Action Research (PAR)

Morrell (2004; 2008) reports findings on the impact of student apprenticeship as ‘critical researchers’ with urban youth from across Los Angeles. For these youth, the process of becoming critical researchers took shape in an out-of-school research space they co-constructed with university researchers and local activists. One of the more important findings about the PAR process is that high school-aged urban youth positioned themselves to develop new notions of the relevance and utility of academic content knowledge. Much in the spirit of the critical research seminar around which Morrell’s (2008) latter work revolved, the principal investigator engaged high school-aged Black males in South Los Angeles in PAR in an attempt to shape an environment for developing new mathematical literacies. The PAR represented in this project attempted to use students’ existing knowledge and understanding of math as a tool for conducting inquiry.

McIntyre (2000) points out that most PAR projects share three guiding principles: (1) There is a collective investigation of a problem; (2) the investigation leans on local ways of knowing for understanding; and (3) there is an ultimate goal of taking individual and/or collective action to address the problem. According to McIntyre (2000): “There is an intentionality in the PAR process about co-creating collaborative spaces to examine and discuss individual, school, and community concerns, and also to foreground indigenous knowledge and tap into individual and community assets, gifts, and talents” (p.128). This is a marked departure from traditional research in math education in that, with PAR, students themselves become researchers, assume the responsibility for developing theory to frame and identify ‘problems,’ and inquire into those issues in order to develop answers/interventions (Cammarota & Fine, 2008; Fine et al., 2004).

Much in the same way that CRT can help education researchers de-center normative understandings and explanations of African American math achievement, “youth”-led participatory action research can ground lines of inquiry in ideas and contexts that youth find important, thereby de-centering “adult” conceptions of meaning and relevance in research and mathematical activity (Alvermann et al., 2006; Delgado, 2006). Adopting a PAR methodology in our work helped to co-construct an alternative math classroom. As students on the PAR team developed lines of inquiry emerging from what they perceived to be meaningful contexts, the researcher simultaneously worked to

help students develop understanding of the key mathematical concepts and skills that would be required to conduct this research (i.e., collecting and analyzing quantitative data). While other researchers have engaged in critical research using mathematics (Enyedy & Mukhopadhyay, 2007; Rogers, Morrell, & Enyedy, 2007), the approach the present study has taken to building a “math classroom” differs from those spaces in that here students themselves drove the curricular context, thereby determining the math content that would be needed to conduct research. This methodological approach to the teaching and learning of math targets a different kind of literacy than traditional ‘school math.’ Further, such an approach is rooted in the meanings that can drive students to develop the level of proficiency for which school math aims.

Critical Math Literacy

There is a growing community of educators and researchers who have taken responsibility for re-shaping how we understand mathematical literacy. The effort to teach and research mathematics *for social justice* (Allestaht-Sinder & Hart, 2001; Anderson, 1990; Frankenstein, 1990; Gutstein, 2006) moves beyond simply doing school math; educators taking this approach aim for a “critical literacy” (Peterson, 2009; Shor, 2009) in and through math knowledge. Its most recent iteration, formulated by Gutstein (2006), has deep roots in the critical pedagogic tradition of Freire (1970), and is further informed by the culturally-relevant pedagogy of Ladson-Billings (1995).

Morrell (2008), in arguing for critical literacy as a product of academic instruction, notes: “It is a given that the acquisition of dominant literacies is crucial to creating more equitable spaces in the world; but it is also true that literacy instruction does not need to occur in a social, cultural and political vacuum. Nor should dominant literacies be the only focus of interventions in schools and other pedagogical spaces” (p.4). For students of math, *dominant literacies* are those mathematical skills, competencies, and understandings that allow for the ‘doing’ of advanced mathematics – math that results in successful testing throughout PreK-12 pipeline and leads into post-secondary educational access and possible careers in the Science, Technology, Engineering and Mathematics (STEM) fields. *Critical literacies*, on the other hand, are those skills, competencies, and understandings that allow for the critique of and successful intervention in issues of social injustice. Engaging in math for social justice, therefore, aims for the development of a synthesis of both of these literacies – i.e., a *critical math literacy*.

Given its centrality to the economics of science, technology, and industrial growth, mathematical knowledge takes on a highly-prized status that has important implications for national standards, curriculum, and instruction (Apple, 1993; 2004). Aiming instructional experiences at developing critical math literacy can be considered an attempt to disrupt the reproduction of inequality in society. For example, a math teacher in a South Los Angeles high school might work to help Calculus and Algebra students develop the dominant literacy in math required to score well on the Advanced Placement (AP) Calculus and California High School Exit Exams (CAHSEE), respectively; the students, in turn, can use this knowledge to develop capital, credentials, and access within the educational pipeline. A commitment to teaching math for social justice, however, might compel this same teacher to also help these students develop an

explicit understanding of how high-stakes exams serve as sorting mechanisms in post-secondary education *through mathematical investigation*; the students can use this critical literacy to protest unfair policies that disproportionately impact African American males in urban schools.

The teaching and learning of math, then, becomes important not simply for the sake of dominant literacies in and of themselves, or even the access they can provide, but also as a potential tool for *transforming* the structures that shape racial inequality in the first place (Martin, 2000; Solórzano & Delgado Bernal, 2001). The pedagogic nature of critical math literacy, blended with a PAR methodological approach, has potential to create learning spaces that are transformative in the lives of young Black men.

SETTING

According to 2000 census data, California is home to some 2.5 million African Americans (U.S. Census Bureau, 2001); this is the second largest population of Blacks within the United States. African Americans comprise 12.0, 10.5, and 7.4 percent of Los Angeles city, Los Angeles county, and California state populations, respectively (U.S. Census Bureau, 2001). Though the City of Los Angeles ranks just sixth among U.S. cities in terms of its total Black population, Los Angeles County ranks second among U.S. counties. While Los Angeles is not a predominantly African American city by any means, both waves of the Great Migration have led to the development of not only a sizable African American population in California, but a unique and complex narrative of intersecting sociohistorical and political economic histories in California and Los Angeles (Flamming, 2005; Sides, 2003). This study takes place in a community that is part of that special history.

6-Week Summer Seminar

In collaboration with the program staff of a South Los Angeles non-profit organization, seven African American males were targeted and recruited to the six-week ‘summer seminar’ (Morrell, 2008) in critical research with mathematics. Each of the seven youth were clients of various programs offered to the community through the non-profit and each volunteered for the seminar based upon their self-expressed need for additional instruction in math. Six of the youth attended local South L.A. high schools. The summer seminar was held at the executive offices of the non-profit in Angeles Park Plaza – the hub of the Angeles Park community. The seminar was scheduled to run parallel to the Los Angeles Unified School District’s summer school calendar. Because six of these students were required to take summer school at their respective high schools, the seminar ran for two to three hours after summer school classes in the afternoon. This schedule allowed students to complete their academic requirements in summer school (i.e., earn ‘recovery’ credits for failed classes) while also participating in the research project.

We met in seminar four days per week. Redd, Kell, Paris, Geronimo, Aaron, DeForest and Sayid³ all agreed to join the research project with the understanding that they would have the opportunity to approach learning math in ways fundamentally

³ Pseudonyms.

different than school math. They ranged in age from 12 to 17 at the time of the study – including a senior, two juniors, a sophomore, two freshmen, and one seventh-grade student. The majority of the young men regularly struggled in their math classes at school and saw this as an opportunity to both improve their understanding of mathematics as well as engage in research. The main function of the seminar was to provide a space for students to undergo apprenticeship as critical researchers (Morrell, 2004). Within this apprenticeship, there were three key experiences I hoped students would have:

- To develop a more critical consciousness through engagement with and discussion around relevant texts, as well as with individuals (Freire, 1970; Freire & Macedo, 1987);
- To develop the knowledge and tools to participate in an action research project based in their community (Morrell, 2004; 2008);
- To move toward fuller participation within a variety of communities of practice (Lave & Wenger, 1991; Wenger, 1999).

These experiences were vital to the success of the PAR project; they provided a foundation for the development of students' racial, mathematics, and social activist identities.

THE PAR PROJECT: "EXPECTATIONS OF THE SYSTEM"

In order to create opportunities for the above experiences, the researcher engaged students in a set of purposeful activities. More fully detailed elsewhere (Terry, 2009), each week had a very specific pedagogical purpose vis-à-vis our goal of conducting critical research. Week One, for example, was centered around *Introductions*. Though in some cases students knew each other (two were brothers, two were cousins, two were neighbors, and three had attended the same high school at one point), we tried to reach beneath surface familiarity towards building more deeply-connected male-to-male relationships. We discussed students' ideas about math and framing the kind of mathematical activity we would engage in during the summer seminar, as well as our motivating goals for training in and carrying out critical research. We established norms for the space. We analyzed and discussed several important films embodying the community-based critical research conducted by high school-aged youth in Los Angeles. Finally, the principal investigator introduced students to the 'research journal' (standard composition books) and shared some perspective on what the summer would look like. Week Two focused on *Research Questions & Methods*. Weeks Three and Four involved *Data Collection*, while Weeks Five and Six focused on *Data Analysis, Reflection, and Dissemination*. While we regularly engaged in mathematical activity designed to provide students with multiple ways to demonstrate their thinking, the core of our mathematical thinking was driven by the need to analyze and understand the phenomena associated with our eventual inquiry.

Early in the seminar, motivated in part by the films and literature we had engaged with as well as by a presentation by a visiting researcher who shared his experiences conducting research with urban youth, the students became interested in conducting critical research on the issue of the incarceration and university attendance of young African American men in California's state institutions. They had come to believe, like

the (then future) President, that university/prison data conclusively painted a bleak picture for Black males. After a series of tough conversations about prison and the possibility of change, Redd comments: *"I think we need to do something about this prison thing."* As the research team developed its critical lens and an understanding of basic qualitative research methods (Delgado, 2006; Morrell, 2004), they formulated the following three research questions:

1. Why are there more Black men in prison than college in California?
2. What were Black men going through that led to their imprisonment?
3. How should young Black men feel about these prison statistics?

Data Collection, Interview Protocol, and Data Analysis

The critical research team wanted to produce a film as a summary response to these research questions. Believing that a short film would be an excellent tool for initiating community conversations about this issue, we immediately set out to fill in our understanding in two ways: First, the young men developed interview protocols and conducted a series of semi-structured interviews with twenty Black males throughout South Los Angeles, hoping to understand the issue from the perspective of local informants. The student researchers recruited these African American male interviewees from a variety of public places in their local neighborhoods across South Los Angeles (e.g., barbershops, community colleges, fast-food restaurants, malls, etc.). This seemed like a logical first step to the research team because many of the examples of critical research they had seen involved short films highlighting interviews with people from local communities (Morrell, 2008).

Second, by collecting and analyzing enrollment data from the University of California (UC) & California State University (CSU) systems, as well as incarceration numbers from the state prisons within the California Department of Corrections and Rehabilitation (CDCR), the young men sought to operationalize their focus on California state institutions in a realistic and manageable way. It was important for the young men to gather this data because they wanted to confirm the numbers they had heard and seen in previous research. Further, this would become the data around which the students would develop mathematical literacy.

Student researchers conducted the large proportion of their interviews with Black males around Angeles Park and throughout South Los Angeles during Weeks Three and Four of the summer seminar. Table 1 above shows a portion of the protocol the student researchers developed and used in these interviews. Their protocol attempted to sort the interviewees into three categories: Those who had experienced prison and/or jail; those who were current college students or graduates; and those with neither experience. They decided that none of their interviewees would be likely to have both experiences; however, they agreed to choose from among both categories in the case that they encountered such an individual. Having captured video and audio footage of the interviews, students reviewed and coded the interviews, identifying the following emergent themes in Weeks Five and Six: (a) *The schooling experiences of Black males*, (b) *the effect of the Black family*, (c) *socio-economics*, and (d) *the prison economy*. These themes emerged as a necessity of the technical process associated with learning how to use film production software and creating their documentary film.

Table 1:

Sample interview protocol from critical research team.

PRISON	NEITHER	COLLEGE
WHY ARE THERE MORE BLACK PEOPLE IN JAIL THAN IN COLLEGE IN CALIFORNIA?	WHY ARE THERE MORE BLACK PEOPLE IN JAIL THAN IN COLLEGE IN CALIFORNIA?	WHY ARE THERE MORE BLACK PEOPLE IN JAIL THAN IN COLLEGE IN CALIFORNIA?
DID YOU DROP OUT OF HIGH SCHOOL? IF SO, AT WHAT AGE AND WHY?	HOW DO YOU FEEL ABOUT GOING TO NEITHER COLLEGE NOR TO PRISON?	WHAT COLLEGE DID YOU ATTEND? WHAT INCIDENT LEAD TO YOUR DECISION TO GO TO COLLEGE?
WHAT INCIDENTS LED TO YOU BEING PLACED IN PRISON?		
HOW HAS PRISON CHANGED YOUR PERSPECTIVE OF DAILY LIFE?	WHAT FACTORS KEPT YOU FROM COLLEGE?	HOW DID YOU FEEL WHEN YOU RECEIVED THE ACCEPTANCE LETTER?
	WHAT FACTORS KEPT YOU FROM JAIL?	
HAS PRISON AFFECTED YOUR CHANCES TO BE ECONOMICALLY INDEPENDENT? EXPLAIN	IF YOU WENT TO JAIL OR COLLEGE HOW WOULD YOUR LIFE BE DIFFERENT? EXPLAIN.	HOW HAS COLLEGE CHANGED YOUR PERSPECTIVE OF DAILY LIFE?
DID YOU EVER BELIEVE YOU HAD A GOOD SHOT OF GOING TO COLLEGE BEFORE YOU WENT TO PRISON?	DID YOU GRADUATE FROM HIGH SCHOOL? IF NOT, WHAT AGE DID YOU DROP OUT OF SCHOOL?	WERE YOU EVER CLOSE TO GOING TO JAIL? IF SO, HOW DID YOU AVOID IT?
WELL, ARE GANGS TO BLAME 4 YOU NOT GOING TO COLLEGE? IF NOT, WHAT IS TO BLAME?	WHAT CAN WE DO AS A BLACK COMMUNITY ABOUT THESE STATISTICS?	HOW DO YOU THINK YOUR LIFE WOULD'VE CHANGED IF YOU WENT TO PRISON INSTEAD OF COLLEGE?

Using Apple's *Final Cut Express* software, students reviewed each interview and parsed them by "cutting" and "grouping" the relevant portions of each interview according to common themes being expressed during the interview. Student researchers noticed that interviewees emphasized certain ideas and concepts both within particular questions and across the entire interview protocol. The researchers adopted these recurring ideas as salient themes. In order to form and communicate a clear message in the documentary film, the various portions of these individual interviews were collected and organized, placing like commentary into individual footage pools from which the filmmakers could later draw when assembling the film. As a team, we *named* these footage pools using themes (a) through (e) above. The team adopted 'dominant' phraseology when appropriate. For example, while students might have commonly referred to being in youth camp or state prison as being "locked up," interviewees may have talked about being "incarcerated." Further, interviewees' discussions of imprisonment often included a discussion of how private investors benefitted from their incarceration. As such, student researchers developed a broader understanding of what it meant to be 'locked up' and began to understand the prison experience of Black men as also having economic dimensions that went beyond individual prisoners' abilities to work upon social re-entry. This type of data analysis led students to use the term *prison economy* as a theme for the prison experience, highlighting both individual and structural aspects of being 'locked up.'

While the thematically collected clips of Black male interviews formed the basis of the first half of the film, the second half focused on analyses of the quantitative data they collected from the California Post-secondary Education Commission and the CDCR. Students produced graphs in MS Excel and wrote a narrative script for this film which provides the viewer with a context for understanding the research project, the motivations for doing the research, the data analysis, conclusions and implications. Students ultimately decided to title the film *Expectations of the System*⁴ - a commentary on how they perceived societal structures to systematically affect the lives of Black men, to the extent that very clear pathways are carved through schools to prisons. The film provides viewers with an important look at these issues from the perspective of the critical research team composed of high school-aged Black males; more importantly, perhaps, it has become an important tool for sustained dialogue around these complicated issues. Further, while this article focuses little on the instructional context of our mathematical activity, it is difficult not to notice sub-textual commentary on the role mathematics played in how these young men were able to explore and understand important community issues, as well as the personal growth they had experienced as a result of conducting the research.

FINDINGS

Envisioning Possibility for Mathematical Counterstories

Solórzano & Yosso (2002) offer characterizations of three kinds of 'counter-stories': *Personal stories*, which share personal encounters with racism (and other forms

⁴ Film available for viewing online at <http://134.69.3.37/expectations-large.mov>

of oppression) and are both recounted and analyzed autobiographically; *other people's stories*, recounted in the third-person, which also share accounts of oppression with biographical analysis; and, *composite stories*, which are synthetically-constructed through empirical data to recount the experiences of people of color with oppression. The notion of using 'data' to construct and tell stories about oppression, as well as to counter the popular ideas that shape African American males' experiences socially and academically, was salient in our PAR project. While it was not important for us to 'categorize' the kinds of counterstories we were considering in the summer seminar, we did reflect upon the following questions in order to prepare ourselves for the possibility of constructing Mathematical Counterstory (MC) in the course of our research:

- *What mathematics are commonly used to tell stories?*
- *How are the stories told instantiations of typical dominant narratives, only expressed through mathematics?*
- *How can we use mathematics in the service of creating competing narratives to counter those stories?*
- *What orientations to math, to schooling, and to achievement are necessary to construct and tell those counterstories?*

These reflective questions nurtured a sense that we could pursue our interests in understanding the incarceration and university attendance of Black males in California's state institutions with a new critical lens and an improved set of mathematical tools. In the remaining part of this article, the author will share how students successfully constructed two very important examples of MC borne out of our PAR project. While the construction of MC represents a small portion of the mathematical activity in the summer seminar and is limited to these two examples, it carries a significant amount of weight as it represents the culminating idea of our research project – that is, the telling of a different story about African American males in our communities *using mathematics*. These lone examples of MC, in this respect, are one of the crowning achievements of the high school-aged Black males involved with this research project.

MC #1: 18-24 Year Old University Students outnumber State Prisoners

As the critical research team began to conduct interviews with Black males throughout various South Los Angeles neighborhoods and institutional settings, we also gathered and analyzed quantitative data regarding the university attendance and imprisonment of 18-24 year old Black males in California. The team based their research on the assumption that Black males are disproportionately incarcerated in prisons, while also underrepresented in universities. This notion was not only consistent with the experiential knowledge that we had, but also matched up well with the data we had seen in presentations during the summer seminar.

The research team agreed that we had to be very pragmatic in defining our variables. Though there are large numbers of Black males attending community/junior colleges⁵, as well as incarcerated in various county/federal jails across California, the

⁵ In presenting this data, I acknowledge that these systems provide vital scaffolding which allow underrepresented students to access four-year institutions (as well as other important vocational certification) – though not always. The exclusion of these data in the PAR project was counterbalanced

research team eventually settled on the University of California & California State University (UC/CSU) systems as a representation of higher education and state prisons as a representation of the prison system.⁶ Once we had this data, students began to sketch a picture of the predicament of Black men in California within these two systems. Redd took the lead on inputting the data into Microsoft Excel and, after a quick tutorial, began to generate a variety of graphs for analysis, including all figures presented here. Though our assumption was that there were more young Black men in prison than in university in California, we were surprised to find this was only the case for the year 2000. As Figure 1 (below) shows, students observed that for the 18-24 year old age group, there were more Black men in the UC/CSU systems than in California state prisons from 2001 to 2007. Further the young men noted an increasing university attendance trend and a decreasing imprisonment trend for 18-24 year old Black males in California.

Not only did this contradict our assumptions about the predicament of the youngest adult African American males in the state but also ran counter to the opinions expressed by many of the Black men that were interviewed by the critical research team. While we recognized that we were very specific in our definitions and that this could have contributed to our findings, this was still a fairly unexpected result. In reflecting on their research, Redd discusses our findings with mixed emotions, admitting that the team had been mistaken:

LT⁷: So when you say we were “kinda wrong”, what do you mean?

Redd: Like the whole time we was out there, interviewing people, telling em: ‘Hey did you know there were more Black people 18-24 years of age in prison than in college?’ And the whole time we’re out there doing that, we come here to [the college campus] and we’re on the computer, and we’re searching and looking up things – and we get this data and start adding it together. *And then, the math tells us that only in 2000 there was more Black men in jail than in college.* From 2001 to 2007, it’s been more men in college than in prison – so it’s like we kinda contradicted what we [believed]– it’s like, I don’t know how to say it but – it’s like we contradicted everything we said. Everything we were out there asking, it’s like, man!

LT: So, let me ask you this: Was it a good thing or bad thing...um, what do you think about this idea that the math helped us to confirm – really we contradic- we countered what we thought was the case. Is that a good thing or bad thing?

R: It’s a good and bad thing.

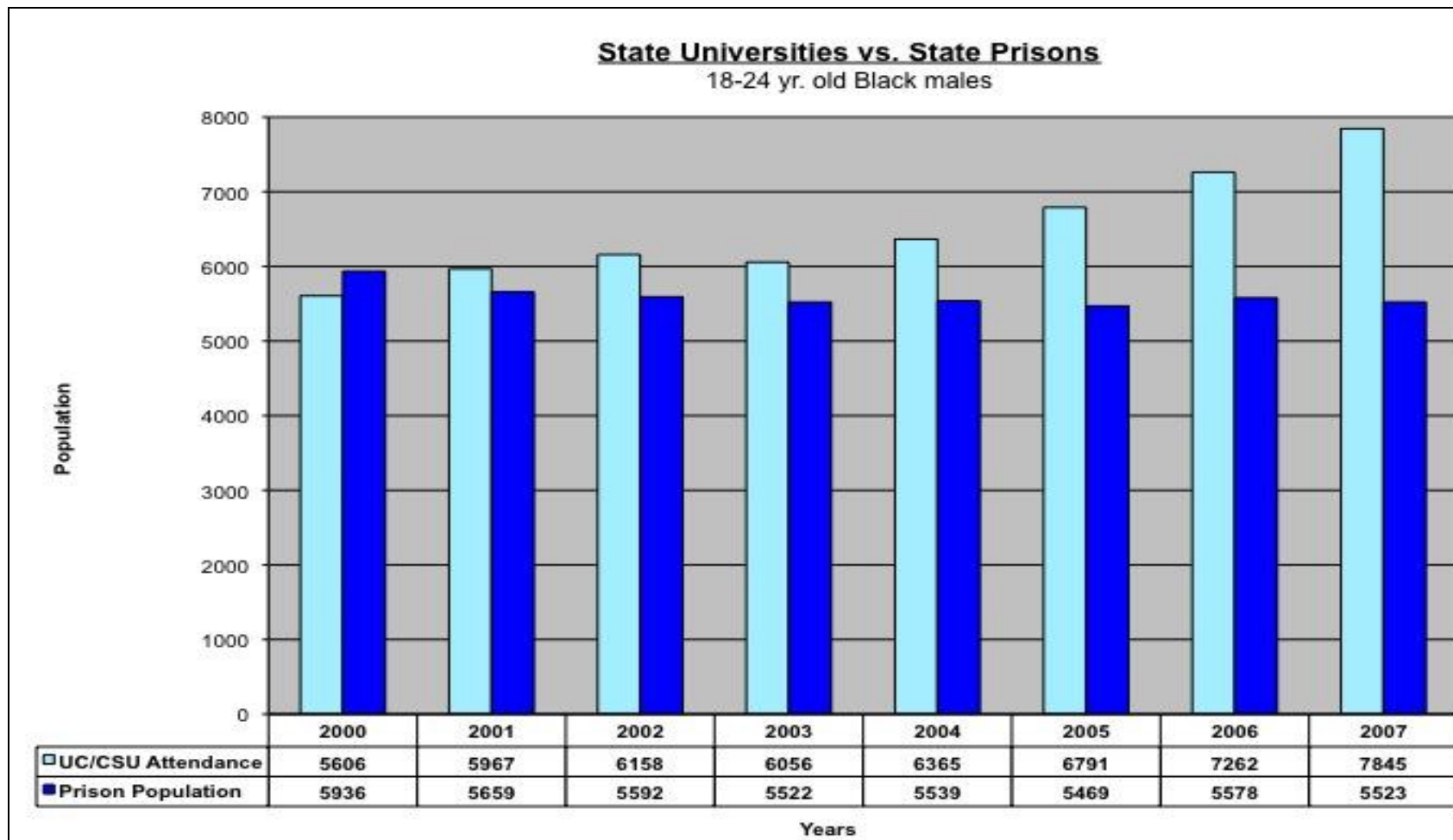
conceptually with the exclusion of Black males who are incarcerated under federal, county, and juvenile justice supervision in the prison population.

⁶ The research team included both undergraduate and graduate programs in their analysis of the University of California and California State University campuses. State prisons included all California State Prisons, as well as those to which the government outsources prisoners in adjoining western and southwestern states. UC/CSU data were collected from customized data reports obtained at the California Postsecondary Education Commission website (<http://www.cpec.ca.gov>). State prison data taken from customized reports obtained from the CDCR’s *Data Analysis Unit* (<http://www.cdcr.ca.gov>). See Reference section for detailed citation.

⁷ Author.

Figure 1

18-24 yr. old Black Student vs. Prisoners, 2000-2007



LT: Ok, so tell me what's good about it and bad about it.

R: Alright. It's good because we actually know what we workin with – we got the right math and shit. It's wrong because, before we even did the math, we went out there and ... Did you notice we interviewing people and they just like, 'Oh, really?' - and we was *really* telling em [something that wasn't true]?

While it is clear that Redd saw the utility of mathematics here for helping challenge one's own assumptions, as well as those of others, he expressed mixed emotions about the manner in which we conducted interviews. He felt it was good that through the process of conducting our critical research, collecting our own data, analyzing and presenting it, we were able to "know what we workin with" – i.e., get a reliable sense of the picture of 18-24 year old Black men in California. He did, however, believe that we misled our interviewees. He argues that our effort would have been better served by predicating our interviews with Black males in the community on our own data. Redd's reaction to this contradiction of popular narratives about young Black males being imprisoned is so powerful that he remains disappointed at our 'mistake' and unmoved when we confirm our hypothesis during analysis of the remainder of the data on 25-34 year old Black men in California. There was something inherently powerful about this finding for our research team.

In the film, the students wanted to share this finding as a counterstory that challenges the depictions of young (18-24 year old) African American males – particularly given our assumption during the interview phase of the project. Through MC, there was potential to see through the so-called 'crisis' and to re-position the youngest adult Black men in the state of California as more than "criminals" – as a burgeoning college-going subgroup and a decreasing prison population. The process of engaging with the mathematics was powerful for Redd, and changed his thinking about what you can do with math:

Redd: I thought what we had was low-key "truth"...You wouldn't have even thought that math could help you out on something like this. When we first started, you wouldn't have even thought it would come to this. We started doing math to find out the whole averages, the statistics that we needed – and we got what we needed because of the math, or whatever. So, yeah, it has changed.

LT: Do you think that it will make a difference for you in school?

R: Definitely.

LT: Really?

R: Yeah, cuz math is used, you know, in everything. Everything contains a little bit of math. Sometimes you need to do math to figure out something. All problems don't have like math problems, like [they all don't have] numbers or nothing. They'll just tell you a riddle or something – but you know it got something to do with math – you gotta use math to figure it out. So [math] is used for different things.

LT: But is that an opinion you had before you did this work this summer?

R: No, no!

LT: You just started thinking that way because of this summer?

R: Yeah....yeah.

For Redd, going through this process of constructing a MC changed his ideas about why and how math is used. He reiterates here that math can be used to challenge so-called truths. Further, however, he understands that math can be used to model and solve problems. Not every problem that involves math is immediately presented through numbers and operations. He knows now that he can approach and solve seemingly non-mathematical problems with his mathematical reasoning and content knowledge. For him, this was a direct result of his experience in the summer seminar.

MC #2: The Structure of the Systems: Different Expectations

The second MC was also a result of student analysis of state university and prison data. Whereas the research team in their initial analysis found that the 18-24 year old group was not quite what we thought it might be, adding slightly older Black men to the picture changed the results drastically. Much in line with our initial assumptions, and the 'better judgment' of all of the African American males we interviewed, the critical research team saw huge gaps between the university and prison cohorts. Adding the 25-29 and 30-34 year old Black men to our analysis created a picture that was much more along the lines of what we had expected when beginning our research project – seen in Figures 2 and 3, respectively.

The team again ran into something unexpected as they considered the larger picture. As they began to think about the two systems in terms of the relative proportionality of Black males from each age group composing it, they noticed that the UC/CSU and State prison systems were structured very differently. In Figure 4 (below), the young researchers noticed that the vast majority of the Black male population in the UC/CSU system between 2000 and 2007 was composed of 18-24 year olds. In contrast, they observed in Figure 5 (below) that there were relatively equal amounts of the 18-24, 25-29, and 30-34 year olds in State prisons. That said, it made sense to them that the system of higher education is structured in such a way as to limit the opportunity of Black males as they get older. The prison system, on the other hand, does not discriminate against older Black men in this way. The Law takes all comers.

Further, when calculating the yearly average of total Black men from 18-34 years old attending UC/CSU's, the researchers noticed that a very small percentage (8.6%) attended UC/CSU's any given year during this window. Further, when calculating the yearly average of total Black men from 18-34 years old who are imprisoned in state prisons (21.2%), the researchers noticed that Black men in this age group are almost 2.5 times more likely to be in prison than university.

Figure 2

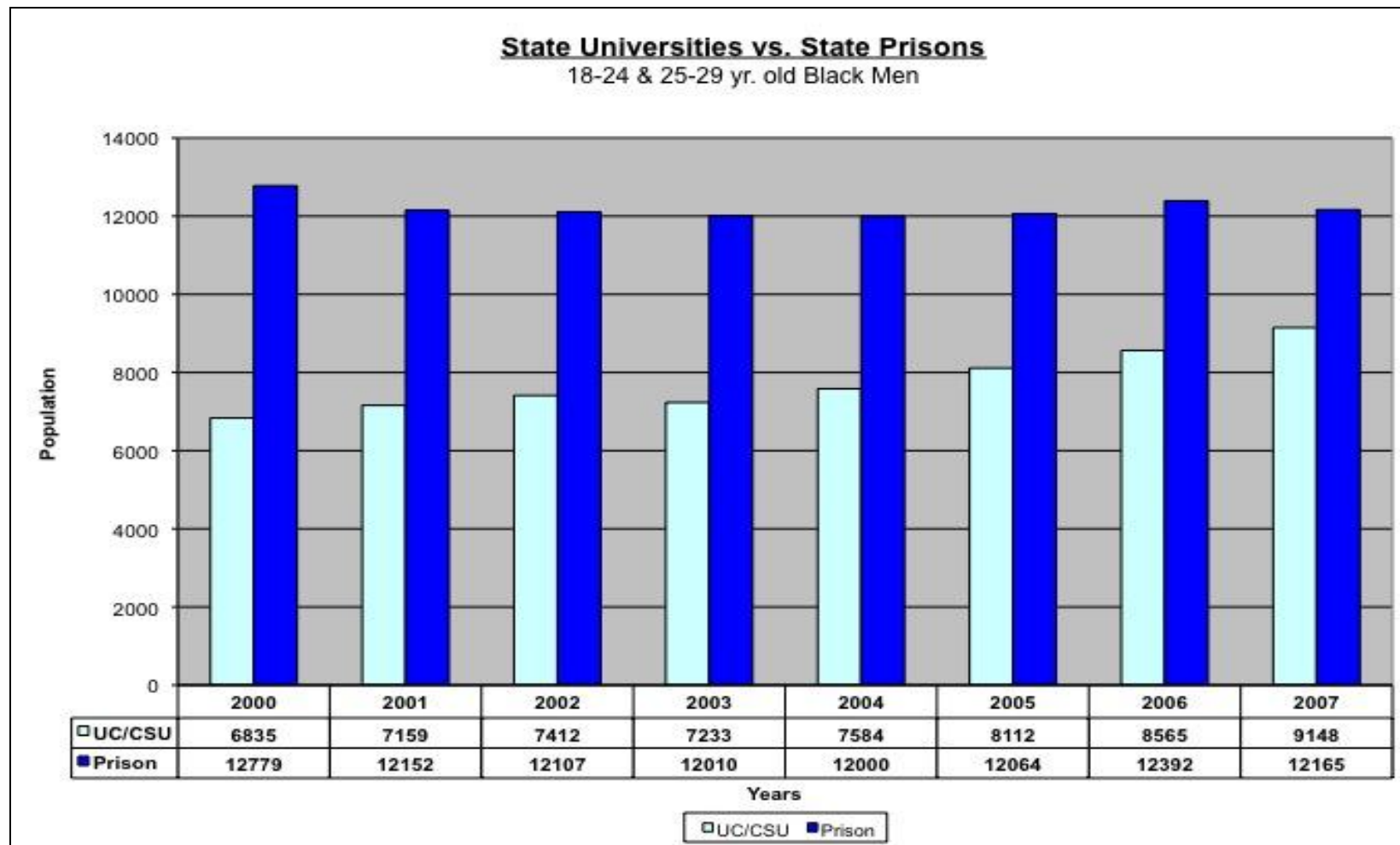
18-24, 25-29 yr. old Black Student vs. Prisoners, 2000-2007

Figure 3

18-24, 25-29, 30-34 yr. old Black Student vs. Prisoners, 2000-2007

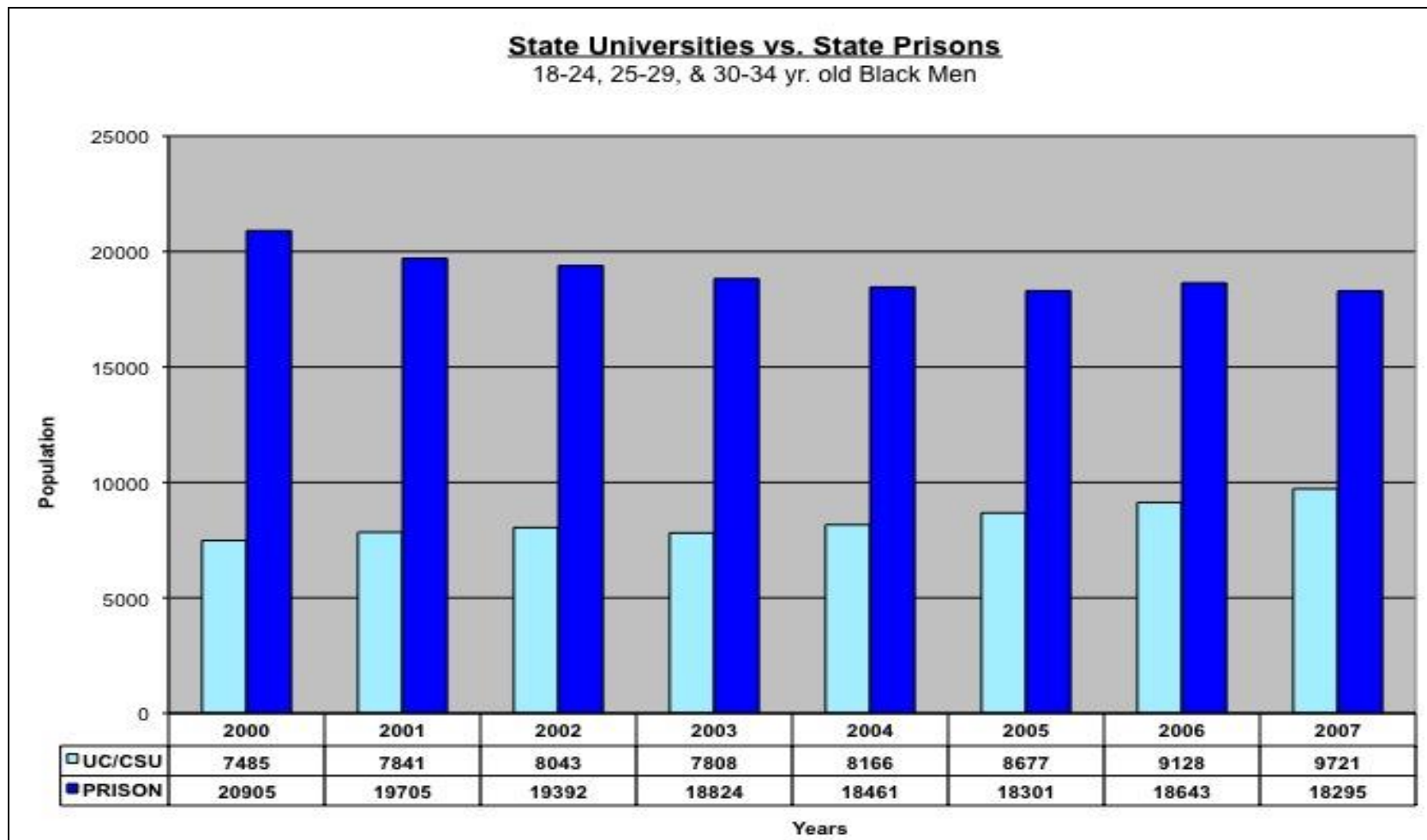


Figure 4

18-24, 25-29, 30-34 yr. old Black students proportionally, 2000-2007

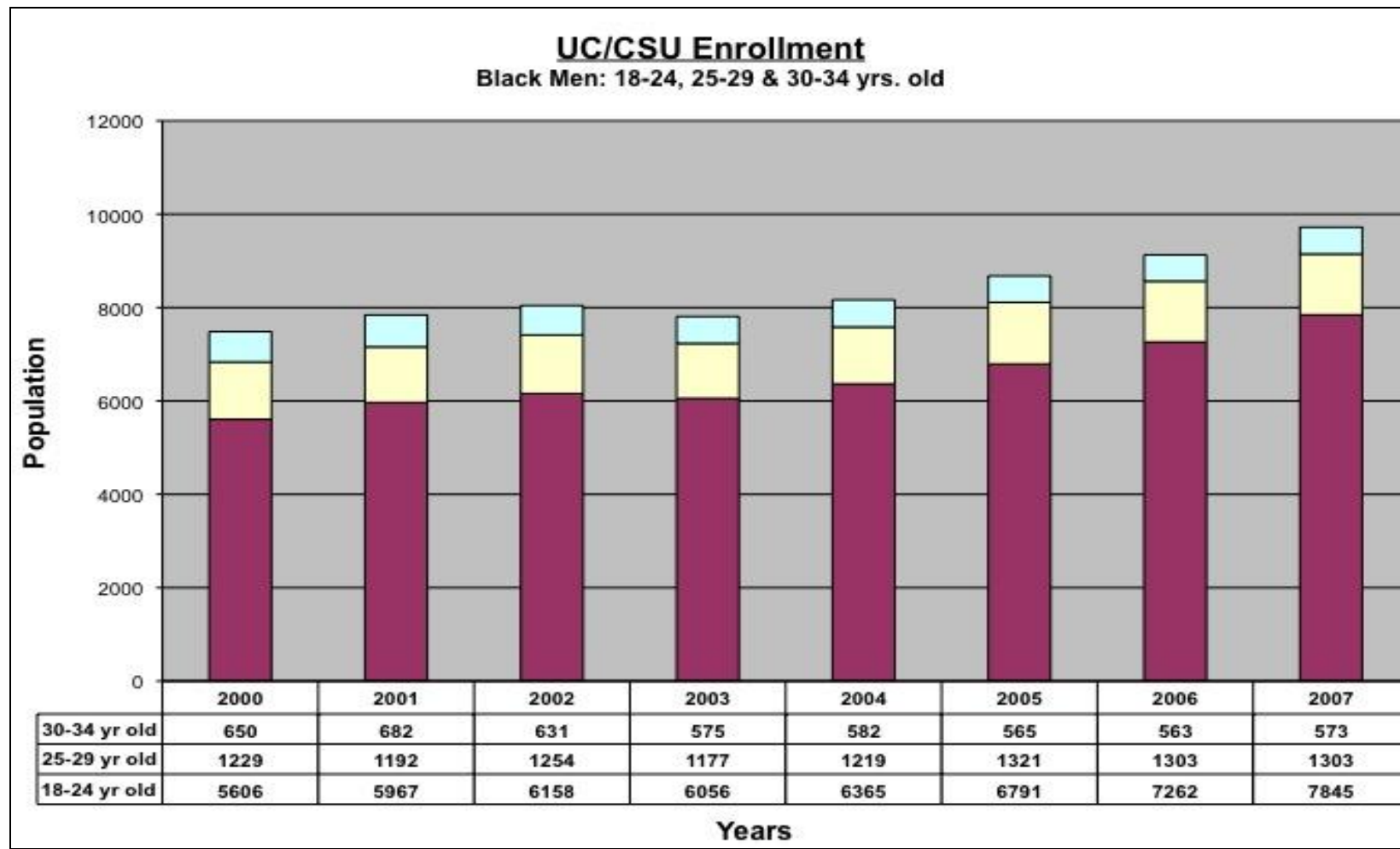
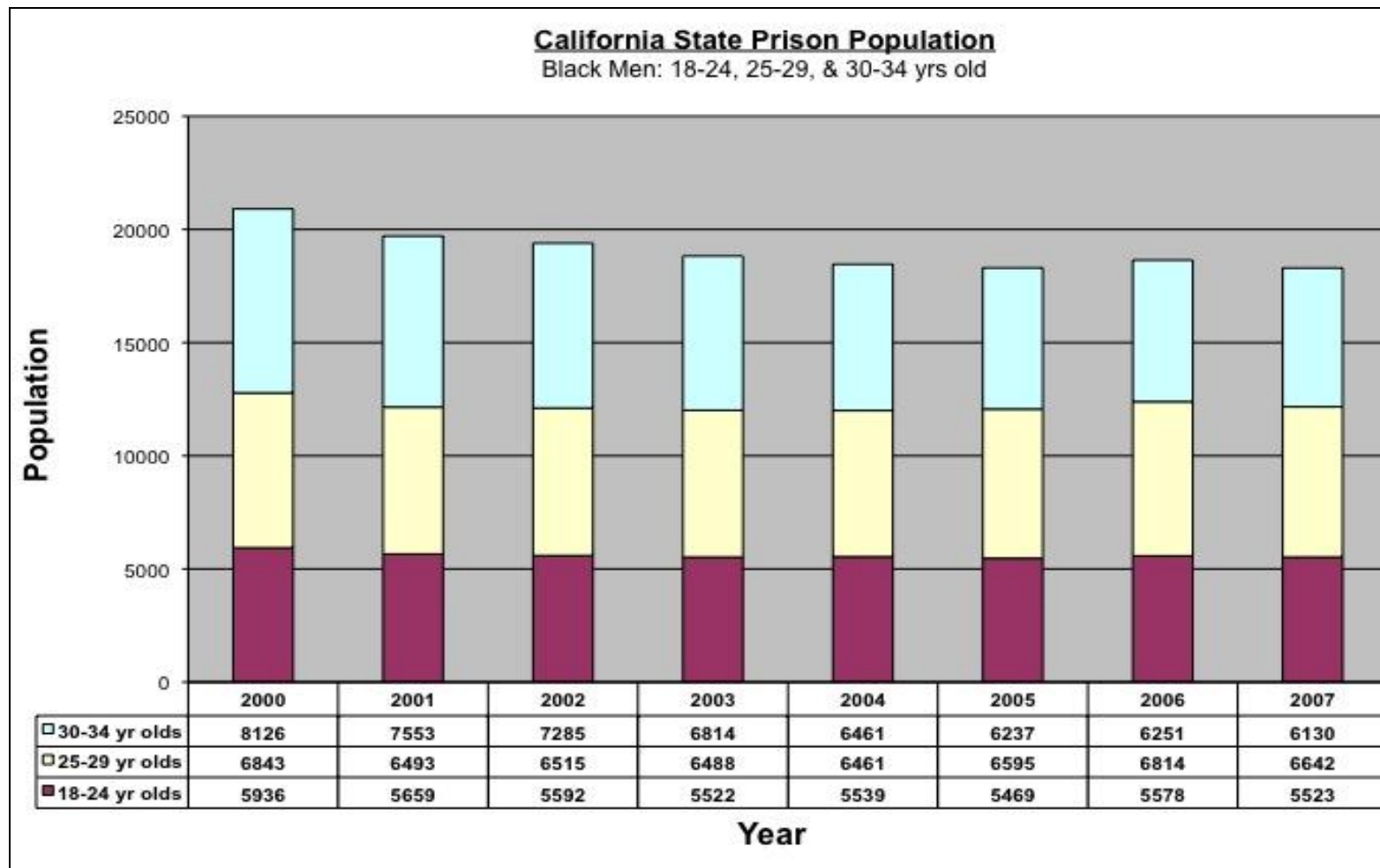


Figure 5

18-24, 25-29, 30-34 yr. old Black prisoners proportionally, 2000-2007



The students used their understanding of the math involved here to tell a different story about both these systems and their functions in society. In their film, the students critique the UC/CSU system as being institutions that structurally limit the opportunities of Black men as they age, challenging the simplistic notion of the university as a location for achieving “a better life through education.” In fact, this is only true for a chosen (young) few. Prisons, on other hand, continue to provide ‘opportunity’ with age. The data demonstrates to students that 18-34 year old African American males are severely overrepresented in the prison system. In many ways, this data confirms for the high school-aged Black men in summer seminar what adults and researchers understand as the ‘zero-sum’ game of higher education.

The young men agreed on different levels that the disproportionate imprisonment of Black men is a feature of American society that is an institutional descendant of slavery. Geronimo articulates this sentiment during summer seminar:

Geronimo: If you think about it, slavery was a long, long, long time ago. Their laws, I think their laws are totally against Black people. And, over time, I feel they didn’t even change. They just kept building on top of it.

LT: Building on top of what?

G: The jail system and how things work in this country. In the long run, this is still sort of like slavery. But we think we got freedom, but we really don’t.

Paris: Just like inside of jail.

LT: Wait, wait, wait a minute. Are you saying to me...? Let me get this straight. Are you saying to me that there’s a similarity between slavery and being in prison?

Aaron: Heeeelll no!

LT: What’s the similarity?

Redd: You still taking orders from people.

DeForest: It’s harder in slavery!

LT: Go ahead, Geronimo.

G: Cuz the jail system and stuff was made a long time ago when slavery was there. They had slavery and they had the jail system too.

LT: But the jail system wasn’t like it is now. I mean, jails pop up like McDonalds! (Group laughs) That’s basically what Mr. Cam was saying. He’s saying people get money to build a jail. Wait, who else said that?

R: It was me. I said that....They told me that in Juvenile Hall, when we was going to class in there. The teacher was saying, “I don’t want to see yal in here.

Do you know that they get paid for having yal young Black men in here, as many of yal as they do? They get paid a nice amount for each one of yal, just to hold yal in here. So, of course [the police] out there looking for yal and they want to put you and house you in here, so yal have nothing to do.”

A: They told me that in [detention] camp.

LT: That’s true. And it applies not just for young men, but also for adult men, right? So that’s part of this problem we got goin on.

The young men have articulated fairly sophisticated critiques of our prison system. While they argue here about the varying degrees of difficulty required to bear up under prisons and slavery, there is broad agreement that, for Black men in the United States, imprisonment is unmistakably and fundamentally similar to slavery. This is also underscored in the comments of several interviewees in our film. It is precisely the notion that there are similarities between these institutions that motivated Redd to voice the sentiment that we all could agree with: “I think we need *to do something* about this prison thing.”

DISCUSSION

The high school-aged African American males formulated three guiding research questions at the outset of their PAR project. These students were able to operationalize the university and prison variables in their first question and, through data collection and analysis, were able to construct a sensible (albeit, highly contextualized) answer for the State of California. Students were also able to get at some important understandings around their third question as well. Understandings about how they might intervene and enact change as members of the African American community are embedded in the interviews they chose to feature, as well as in the very construction of the narrative script that supports the *Expectations* film they produced. However, the trajectory of the project insofar as it pursues these three questions, was altered by students’ discovery that they had contradicted a popular narrative about African American male incarceration and university attendance (in the case of the 18-24 year old subgroup). While the line of inquiry was altered as the young researchers realized the pitfalls of assumption, it is also clear that what resulted was potentially greater from the perspective of a math education researcher – their alternative understandings about the utility of mathematics as a tool for challenging and re-shaping popular understandings about important issues.

Mathematical Counterstory-telling in CRT Perspective

Counterstory-telling, as a CRT method, fundamentally challenges what is known and understood about the experiences of people of color in American society (Solórzano & Yosso, 2001). Among other things, this project reveals that mathematical counterstory-telling, analogously, can productively change how math educators think about African American males’ experiences of teaching and learning math in urban contexts. This is evident in at least two important ways.

First, textual production plays an integral role in the development of critical literacy. Morrell (2008) argues, in fact, for a fundamental pedagogical shift from focusing urban youth on the critical consumption of dominant texts towards the *production* of critical texts in the development of their critical literacy. In the case of the *Expectations* film, we have an example of Black males engaged in the production of a critical text through which they invite the audience to rethink the received wisdoms around the incarceration and university attendance of young Black men in California. While the film in-and-of-itself is a counterstory that challenges images and understandings of Black men (i.e., dominant cultural texts), the particular mathematical counterstories that form the backbone of the counternarrative presented therein help the viewer to critically unravel false presuppositions through the Black males' mathematical activity. As such, the mathematical counterstory-telling in this film can be thought of, not only as forms of critical text production but more importantly, as *valuable mathematical knowledge* produced by these high school-aged Black males within a CRT frame. Mathematical counterstory-telling can provide an important conceptual space, then, for math educators to begin synthesizing their math and social justice pedagogical goals (Gutstein, 2006).

Second, by encouraging the production of critical texts like mathematical counterstories, math educators empower African American males to take important steps in transitioning from reactionary behavior, self-defeating and/or conformist resistance in schools, classrooms and curricula, towards enacting authentic forms of *transformational* resistance through math content knowledge (Solórzano & Delgado Bernal, 2001). Rather than aiding and abetting the diversion of Black males into 'at-risk' pipelines, this pedagogy encourages and facilitates a discourse of structural change among African American youth through content knowledge. It is this kind of praxis of content knowledge and social transformation that is the true heart of teaching math for social justice.

As I have stated, counterstory-telling is fundamentally a subversive pedagogical act. Lynn (1999) argues that CRT, when used as an analytical lens for examining the pedagogical practices of teachers and educators, can lead to new theoretical approaches. The particular understandings of these data developed in the context of the PAR project, and the subsequent counternarration embodied by the *Expectations* film, is strong evidence that not only have the high school-aged Black males from the summer seminar engaged in counterstory-telling for teaching purposes, but that this activist teaching can be understood within the frame that Lynn (1999; 2004) calls a *critical race pedagogy*. That is to say, the activity of these young men in the seminar was informed by critical epistemological perspectives that were unique to their experience of the racial, social, political and economic dimensions of South Los Angeles, its schools, and its local communities. Further, through their activity, they sought to transform the situation by creating and sustaining dialogue about the perspectives of Black men among one other and, more broadly, through the vehicle of the *Expectations* film. I firmly believe that the dispatching of those perspectives in the form of these mathematical counterstories constitutes critical race pedagogical action.

Limitations and Further Research

This article presents findings on the mathematical counterstories that resulted from the PAR of seven high school-aged Black males in South Los Angeles. The student research, which examines the prison and university systems in California, is restricted to 'state' institutions. The focus on state systems clearly limits the *actual* numbers of 18-34 year old African American males incarcerated in 'prison' or attending 'university', thereby potentially obscuring a portion of these respective populations. While this decision was made for practical reasons, we cannot know how including other populations of prisoners or college-goers might have shaped the mathematical counterstories. That said, this specific limitation does not detract from the pedagogical significance of constructing these mathematical counterstories.

These findings are only a snapshot of the knowledge and understanding expressed by students during the summer seminar and must ultimately be understood within larger context of the PAR project, in tandem with the author's critical ethnographic study of that space – contexts which this article cannot elaborate upon. Participants brought a variety of different experiences to this project, thereby distinguishing themselves in terms of their gendered, racialized and cultural identifications as African American males in South Los Angeles; it is difficult to know how the findings can be situated among the experiences of African American males in other settings, as well as among African American females and other students of color. These findings cannot be generalized across these categories. Further, these findings do not predict academic performance in school mathematics as a result of student engagement in PAR; indeed, it is possible that the curricular dissonance between school math and critical inquiry such as PAR can further marginalize students from the mathematical activity of schools – even as school math becomes perceived by urban youth as increasingly irrelevant to their current and future lives.

More exploratory research is needed to determine the particular math literacies that can arise from PAR when engaging a broader sample of African American students across math achievement trajectories, as well as how those literacies impact student identities. Grounding this research amidst a broader theoretical discussion of constructed academic identities vis-à-vis Black masculinity would be informative. Researchers should also engage with urban school communities and their officials (students, parents, teachers, administrators, and other community activists) to collaboratively shape PAR projects that can be thoughtfully integrated into and across *existing* mathematics curricula in ways that might help us determine the potential impact of PAR on dominant math literacies and academic performance. While this will take dedicated thought and planning, this kind of critical action and reflection is essential for educators who hope to implement socially-just pedagogies (Howard, 2003; Howard & Obidah, 2005). Finally, researching the impact of highly-qualified Black male teachers on Black males' experiences of the teaching and learning of mathematics would help in the articulation of the potential role that these teachers might play in increasing math literacy both within and outside of schools.

CONCLUSION

The eventual election of Barack Obama to the Office of the President of the United States can be viewed as a bolded sentence in the history of argumentation against whiteness as a prerequisite for humanity and citizenship. Based upon this expression of will by the American voting public, it may be reasonable to also anticipate a new era of dialogue in and around the social construction of race, as well as our racialized (or non-racialized) experiences within American society and its constitutive institutions. As a Black male, my personal experiences teaching and learning K-16 mathematics revealed that schools play a key role in shaping students' experience (or non-experience) of race long before my training as an education researcher ever suggested so. Math educators, as much as anyone else then, need to be present and active in a discussion about race and racialization in the schooling experience of African American youth.

In this article, the author has shared data on the construction of mathematical counterstories by high school-aged Black males as they engaged in PAR. This mathematical counterstory-telling represents students' attempts to contradict dominant understandings of Black men's experiences in universities and prison in California, while simultaneously creating new understandings of how these institutions are experienced. Much like President Obama, we see the effort as an attempt to 'open up' understanding and dialogue about their experiences as young Black men in society.

The teaching and learning of mathematics plays a crucial role in the reproduction of society in crucial, albeit problematic, ways. While the number of math educators committed to teaching mathematics for social justice is growing, urban youth – particularly Black males – yearn to engage with curriculum and instruction that is embedded with meaning and context. All too often their cries for relevance either go unheard or are interpreted as problematic behavior and subsequently treated punitively. Howard (2001) argues, "The scant attention paid to students' voice is inexcusable given their role as the primary clientele in K– 12 schools. If the programs, practices, and policies rendered within the framework of the places called schools are delivered with students' best interest in mind, we must ask why their voices and viewpoints are so blatantly omitted" (p. 132). Those who teach K-12 mathematics in urban spaces would do well to bear this principle in mind. While we bring our expertise in mathematics content and pedagogical knowledge to the classroom context, students themselves know best what constitutes 'meaning' and 'relevance' in their own lives. We would do well to let them speak. And if we listen, we all may learn.

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