

JEREMIAH J. SIMS

REVOLUTIONARY
STEM
EDUCATION

CRITICAL-REALITY PEDAGOGY & SOCIAL
JUSTICE IN STEM FOR BLACK MALES

Revolutionary STEM Education: Critical-Reality Pedagogy and Social Justice in STEM for Black Males by Jeremiah J. Sims, an educator, researcher, and administrator from Richmond, California, is calling for a revolutionary, paradigm shift in the STEM education of and for Black boys. STEM education has been reliant on axioms and purported facts that for far too long have been delivered in a banking or absorption model that is, arguably, anti-critical. Unsurprisingly, this pedagogical approach to STEM education has failed large segments of students; and, this is especially true of African American males. *Revolutionary STEM Education* highlights, chronicles, and investigates the potential inroads and vistas of a Saturday Science, Technology, Engineering and Math (STEM) program, Male Aptitudes Nurtured for Unlimited Potential (MAN UP), which was designed to foster interest and competence in STEM by middle school Black boys. This program was impelled by a critical-reality based pedagogical approach, which was formulated to arrive at socio-academic synergy, that is, a thoughtful conjoining of students' real life concerns, joys, ways of being, and socio-cultural identities and the curricular material covered in the courses offered at MAN UP.



JEREMIAH J. SIMS, Director of Equity for the College of San Mateo, was born in Oakland and raised in Richmond, California. As a result of his own life experiences, Jeremiah has devoted his career to the pursuit and ultimate realization of educational equity for hyper-marginalized students. Jeremiah is an alumni of the University of California, Berkeley where he earned a B.A. in rhetoric, with honors, as well as an M.A. and Ph.D. in education. Jeremiah has contributed to research that details the efficacy of a critical-reality pedagogical approach to STEM education as well as education, writ large.



ADVANCE PRAISE FOR

Revolutionary STEM Education

“At this particular historical moment, when the national security state has forced humanity to claw its way out of the structurally generated vaults of inhumanity, Jeremiah J. Sims has penned a book that addresses one of the key features of this inhumanity, the vicious attacks on black males in a country that has fallen prey to new species of racism against people of color. Calling for a dramatic shift in STEM pedagogy for black males that combines critical-reality pedagogy, critical race theory, and innovations that cut across the field of urban education, Sims cultivates a pathfinding approach to social justice. Join his paradigm-shifting revolution by reading this book.”

—Peter McLaren, Distinguished Professor in Critical Studies,
Donna Ford Attallah College of Education, Chapman University;
Author of *Pedagogy of Insurrection*

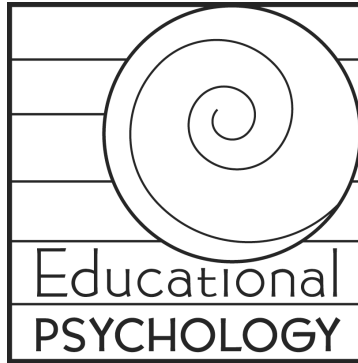
“*Revolutionary STEM Education: Critical-Reality Pedagogy and Social Justice in STEM for Black Males* explores the complex relationships between learning processes, student identity development, and deep equity-focused work in an out-of-school STEM learning environment focused on Black boys. Jeremiah J. Sims provides a comprehensive view of how the MAN UP program supports Black male youth’s learning of STEM concepts, STEM identity development, and understandings of how to use STEM to affect social change in their communities, filling a sore gap in the equity-focused STEM education literature. Teacher educators and teachers (both preservice and inservice) will find the book useful for use in methods courses, professional development sessions, or professional learning communities (PLCs) to engage in teacher learning about equity-focused STEM teaching and learning; the examples of teacher-student and student-student interactions, along with guiding questions at the end of each chapter, will undoubtedly spur conversations and lesson ideas.”

—Tia Madkins, Assistant Professor, Department of Curriculum
and Instruction, University of Texas, Austin

“In *Revolutionary STEM Education: Critical-Reality Pedagogy and Social Justice in STEM for Black Males*, Jeremiah J. Sims argues that positioning students as STEM-savvy, social justice-oriented change agents increases both their STEM identity and their STEM competency. In so doing, Sims provides what STEM education truly needs. This book offers readers both description and explanation. Many contemporary research projects and text simply describe the problem with access to STEM; Sims’ text offers us a revelation. It describes the problem, explains the source of the problem, and tells us what to do about getting students critically involved in STEM.”

—Bryan A. Brown, Associate Professor, Education;
Associate Dean for Student Affairs, Stanford University

Revolutionary STEM Education



Critical Pedagogical Perspectives

M. Cathrene Connery and

Greg S. Goodman, *General Editors*

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Jeremiah J. Sims

Revolutionary STEM Education

Critical-Reality Pedagogy
and Social Justice in STEM
for Black Males



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“There’s not just one way to be an African-American male, to be Black. Sure, we can try to do sports or music or whatever. We can do anything we set our minds to. And, we can also do STEM. I think it’s important that we know that all of us know that.”

—Michael, 6th grade MAN UP scholar

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Preface

I remember my response to my high school English teacher like it was yesterday, though this conversation is more than two decades old. Ms. Horrigan asked me if I planned to go to college—which was an entirely reasonable question as she taught my 12th grade English class. I responded, only semi-jokingly, that I hadn't planned on attending college because, well, the life-expectancy for Black males in my city was only twenty-one years of age. So, I told her that, following my high school graduation, I planned to just take life one day at a time because, clearly, growing up in Richmond, California did not hold the promise of another day for me or any other young man that grew up like me. Admittedly, I was the class clown, so I fully expected Ms. Horrigan to simply laugh this statement off—but, instead, I remember the sheer anguish—instantiated by her suddenly crestfallen countenance. I tried to reassure her that I was only joking. But, she saw something that I could not apprehend at the time: she saw that I was resigned to my fate. Because, like the majority of the students that animate this book, I grew up in urban-poverty, with a single-mother who had to function as both my mother and my father. I grew up in a city that during my high school years, in the early 1990's, boasted the highest murder rate per capita in the United States. I grew up in Section 8 Housing. The ever-present threat of intentional and or unintentional (cases of mistaken identity) fratricidal violence informed my every step from the

age of twelve until my early twenties. It formed in me something that, from time to time even today rears its ugly head: Persistent Traumatic Stress Disorder.

I was only 17 when this conversation took place, but I was already carrying around a lifetime of trauma, disappointment, abandonment, and pain. I was normally jovial in Ms. Horrigan's class; and, even though I was sometimes borderline disruptive, I knew that I was one of her favorite students. She was someone whose care for her students caused her to be innovative. She was what I aspire to be: a caring, nutritive, critical pedagogue—long before I had any idea that those modifiers could be strung together to form an identity. Here she was a middle-aged (possibly older) European American woman, teaching in the hood (albeit at a top high school) simply out of love. She'd made a small fortune—enough to own, outright, two houses in the Bay Area—selling 501 jeans to tourists all over Northern California. She did not need to teach; however, she loved to teach. And, she did it in a way that was and still is paradigm-shifting for me.

Throughout my K12 experience, I repeatedly got in trouble for being a “class clown”. What I know now, that I couldn't have known then, was that my flippant attitude was a defense mechanism that allowed me to laugh despite pain, and to chuckle in the face of a constant, deeply-internalized fear of failure. When I got to Ms. Horrigan's class, I was still class clown. But in her class, I never got in trouble for it. Instead, she carved out the last 5 to 7 minutes of class, at least once per week, to invite me to do stand-up comedy during school hours. This was diametrically opposed to anything I'd ever experienced before. In every other instance my wit carried sanctions. But, instead of castigating me, Ms. Horrigan invited what was at the time the leading aspect of my identity kit into the meaning making process that was her 12th grade English class. As a result, I excelled in her class; as a result, I wanted to become an English teacher. She changed my life academically; and, it is not an overstatement to say that she quite possibly contributed to saving my life. She gave me hope. That is what critical educators do. Sadly, I was never able to share this with her.

This, of course, is beginning to read in a way that is commensurate with the staid narrative. This meta-narrative, instantiated by movies like *Dangerous Minds* and *or the Blindside*—celebrates a benevolent white educator's (or caretaker in the latter example) willingness to go native and function as a messianic figure that helps poor students of color find their voices and realize their erstwhile unknown or misrecognized potential. And, while the characters in my personal play are consistent with this narrative, something altogether different was taking place. Ms. Horrigan did not help me find my voice; clearly, I already had one that I used with self-appointed impunity. I know this because prior to her class my voice

got me in trouble quite often. Instead of viewing me as deficient or in need of a savior, however, Ms. Horrigan allowed me to be exactly who I was, while still holding me to high expectations. More than that, she encouraged me to do well as myself, not as some false persona that required me to repudiate and or abdicate the socio-cultural identity that I was painstakingly developing. The pedagogical dexterity that she displayed provided me with an entry point, for the first time in long time, into my own academic trajectory and ultimately my own academic success. More simply put: she worked alongside me, not for me; and, certainly not against me. *Ms. Horrigan was keeping it one-hundred (percent); that is to say, she was her authentic self, which encouraged and empowered her students to be, at least in some small measure, authentic in return.* This is a theme that I will return to throughout this book, the idea of keeping it 100. If we, as educators, ever want to create spaces for our students to learn as their authentic selves, we have to be authentic as well. In fact, like Ms. Horrigan, we have to take the lead. Ms. Horrigan was an exemplar because she had a genuine care and concern, perhaps even love, for us.

The argument can be made that Ms. Horrigan, well before the term had been coined, was engaging in a form of critical-reality pedagogy precisely because she allowed and, frankly, even invited me to bring elements of my lived experiences into her 12 grade English class. And while my experiences at that point were localized and somewhat narrow, those experience represented who I was as a person. She made me feel that my personhood was so integral in the constitution and meaning making of her course. I began to engage in here class as started by preparing for my 5 to 7 minute routines; soon, I was fully engaged in her class and my engagement was no longer limited to my “comedy” skits. Holistically, I began to feel as though I had a place in that course. This is what reality critical-reality pedagogy does—it invites students to be who they are without asking them to repudiate their cultural affinities or cultural identity’s. To be clear, this is only one component of a critical-reality pedagogical approach. But, it is a requisite component. There also needs to be a laser-focus on creating opportunities for students to disambiguate, deconstruct, and ultimately redress societal injustice using whatever material is covered in a given course of study.

Nevertheless, inviting traditionally-marginalized students to work through course material that is predicated on their interests, concerns, and ways of being is indispensable to this approach; and, in this book I argue, it is indispensable to student empowerment as well. There is an analog to be made between *keeping it 100* and enacting critical-reality pedagogy because both concepts require educators to eschew the trappings of the banking model of education by presenting their authentic selves in their educational spaces so that students will know

that there is space for them to be reciprocally authentic. We know a lot about Ms. Horrigan's life. We knew that she wanted kids but, unfortunately, had none of her own. We heard her stories of vulnerability and stories of triumph. Like Ms. Horrigan, we, educators, have to be willing to be authentic and come with our whole selves so that they can create an environment where students can be exactly who they are and still be view as young people full of promise and potential. This pedagogical orientation is diametrically opposed to the stultifying banking model of education wherein educators insist on maintaining their authority while either misrecognizing or failing to recognize the expertise that students also bring to the fore. Student expertise is not limited to just knowledge of self, which is undoubtedly important, nor is it limited to knowledge of their immediate localized environment, though this, too, is certainly included. In order to understand what it is that students know, and how it is that they want to engage, we have to give them every opportunity to demonstrate what they know to us and to themselves. This is what Ms. Horrigan did; and, this is what I strive to do as well. For me, this is being authentic, this is *keeping it 100*; and, when this approach is conjoined with a focus on redressing social injustice and social inequity, it is an application of critical-reality pedagogy. Ms. Horrigan, though she could not possibly have been aware of this terminology, was a caring, committed educator. My guidance counselor in junior high, however, was not. Ms. Horrigan was the exception; this man, sadly, was the rule.

"No one cares what you do in junior high, Jeremiah; you'll eventually be socially passed." My middle school guidance counselor (who would later become principal) spoke these words to me. I know that some of the young men that I have been blessed to work with have had similarly dismissive conversations with adults entrusted to guide them on their educational journeys. I wonder how many more experienced this but were reticent to speak up. If my memory serves, I was once again in trouble for talking out of turn in class. This was a common theme during my first year in middle school as I worked diligently to carve out a "cool" identity for myself. I will not soon forget this moment, however, because it is when I began to see both school and myself differently. This counselor had given me license to free myself from academic struggle, which I did not know at the time, was analogous to freeing myself from academic growth. This was especially true where math was concerned. After excelling in elementary school, middle school brought struggles that I was ill prepared for, none more so than in math. I was stuck and never got unstuck because according to my counselor, I didn't have to.

Sadly, this story is all too familiar for many young, low-income, urban Black males, and especially so in STEM. Moreover, often we, or our parents, or our

culture are blamed for our struggles in STEM. In truth, structural and institutionalized racism in educational policy and practice is to blame. Structural and institutionalized racism in educational policy and practice result in stultifying low expectations for perhaps the most educationally marginalized group in this country, Black males. Rhetoric around persistent educational struggles of Black males foists the locus of failure on us; and in so doing, this very same rhetoric exculpates the racist structures and institutions that function to ensure inequitable educational opportunities for Black males (and other traditionally marginalized students). Fortunately, as an adult I had people in my life who encouraged and assisted me in pushing forward with my education. However, this is not always the case for young men that grew up like me: poor, Black, and enmeshed within a violent, unrelenting environment.

I was saved by love, by the love of my Savior, by the love of my hard-working single mother, by the love of teachers like Mrs. Searles and Ms. Horrigan, by the love of my church, and when I needed it most, by the love of the women who would become my partner in love and in life. Though my environment was in many ways loveless, somehow, I still felt love and that love saved me. Far too many young men that grow up like me do not get to experience the holistic love that I was blessed to receive. I am not okay with this “reality”; I never will be. No one should be. In time, I was presented with the opportunity to create a program that would begin to address and hopefully, in some small measure, ameliorate this saddening reality by creating a STEM focused academic program for Black boys that was predicated on love. Despite the reticence that my own math-phobia induced in me, I felt I had no choice but to move forward in developing a STEM focused program for predominately low-income, urban Black males: Male Aptitudes Nurtured for Unlimited Potential (MAN UP).

Overview of this book

This book is separated into nine chapters—an overview of each chapter is provided below. It is important to note that at the end of each chapter, as with the preceding chapter (with the exception of the final chapter) there is a page with considerations and questions for both educators and students. These considerations are not meant to be the final word nor raise the only important questions around equitable educational practices in STEM for Black males. Rather, they are included to catalyze intra-group conversations between educators, writ large, and students so that these two groups can, hopefully, come together in a meaningful

way to begin both intra and intergroup conversations that hold the potential to transform the pedagogical practices that characterize STEM education for Black males (as well as other marginalized groups). These questions should also help both students and teachers think, reflectively, about the roles that they occupy within the teaching and learning continuum.

“Cutting straight the truth: Interrogating White supremacist-based racism’s role in perceptions of Black maleness?” is split into two parts. Part one reviews literature on the inclusion of critical and reality based pedagogical practices in STEM education. I discuss literature that speaks to the root causes of underperformance in STEM for Black males: white supremacist-centered notions of Black inferiority and the pedagogical practices that are predicated on the erroneous, stereotypical depictions of Black males that have been normalized by the apparatuses wielded by this very same white supremacist agenda. In order to paint this picture, I discuss literature that perniciously positions Black males as threats and thugs who, irrespective of their age, are not afforded the notions of child-like innocence that buttresses the lived-experiences of the European American (i.e., White) counterparts. Next, I review literature that works to deconstruct white supremacy and the undeniable role it plays in catalyzing and promulgating negative stereotypes of Black males in education generally and in STEM specifically. After this, I review the work of scholars who have discussed the negative effects of stereotyping on Black males’ learning and identity. Then, wanting to move the conversation forward, I transition into an analysis of the literature that speaks to the potential benefits of a critical-reality pedagogical approach to STEM education of urban, middle school Black males by using Freire’s conception of problem-posing education as the frame for the critical MAN UP pedagogical approach.

This chapter also introduces two terms that are central to this study: the critical contextualization of STEM, and socio-academic synergy. Part two of this chapter, “My Approach”, delineates the design of this study including the central guiding question of this work as well as a description of the site where the intervention took place. Additionally, part two of this chapter provides detailed demographic information regarding the focal cohort. I also discuss the data collection procedures and data analysis procedures, and I discuss both the limitations of the research as well as my varied role as the researcher.

The title of Chapter Three is, “Standing in the gap: Black boys and STEM”. In this chapter, I discussed literature that speaks to the root causes of underperformance in STEM for Black males: white supremacist-centered notions of Black inferiority and the, related, pedagogical practices that are predicated on the erroneous, stereotypical depictions of Black males. These negative stereotypes

have been normalized through mass media such that they are accepted as fact in far too many educational circles. This chapter also spoke in greater detail about the many of the negative stereotypes are associated with us, Black males, and how these stereotypes are part and parcel of a larger systematic push to Black boys (and men) for our academic struggles instead of identifying the real culprit: race-based, structural inequity. However, let me keep it 100 right now. These stereotypes are false. There is nothing innately inferior or deficient about any Black male or any other student from a non-dominant group. We all have the same capacity to realize our fullest potential, because intelligence grows over time; it does not remain static. Additionally, I present the analysis of and findings from my data by analyzing the focal cohort's math pre-and post-test scores, their shifts in their Manhood Development Concept Inventory, shifts in their Rhetorical Analysis Concept Inventory, as well as shifts in their CS/Mobile Apps course: Technology for Social Justice Concept Inventory (CS), respectively. As a result, my analysis of the pre-survey data, three categories of participation came to the fore. In this chapter, I highlight five students as case studies for the larger focal cohort to demonstrate the shifts in STEM identity experienced by these students as microcosms of the overall shifts experienced by the entire focal cohort. Following a discussion of these case studies, I return to a discussion of the entire focal cohort. Additionally, I investigate how students began to identify as applied STEM practitioners; drawing on data, I seek to uncover what contributes to and or the limits positive development of STEM identities for the focal students.

In Chapter Four: "Changing the game: The role of critical contextualization and socio-academic synergy in developing STEM identities," I explicate the three terms that I introduced in the previous chapter, socio-academic synergy and critical contextualization as well as the critical contextualization of STEM. Additionally, I analyze the focal cohorts' shifts in STEM competency as captured by both their pre-post CS and Math concept inventories. In addition to working to facilitate MAN UP student's development of a positive STEM identity, this program also focused on developing specific STEM competencies required for college and careers. In addition, I chronicle the focal cohorts' shifts in STEM competency as well as their shifts in competency in their non-STEM RAM course to speak to the ways in which their increases in STEM identity contributed to their demonstrated increases in competency vis-à-vis the courses offered at MAN UP. I work to illuminate the potentially powerful connection between the intentional development of a positive STEM identity—as an applied STEM practitioner—to their confidence and demonstrated ability to excel in the STEM course content covered in MAN UP.

Chapter Five is entitled: “Showing out: Developing competencies in STEM and beyond.” In this chapter, I discuss how the intentional atmosphere developed and curated at MAN UP facilitated and/or contributed to the focal cohorts’ desire, willingness, and ability to apply their increased STEM knowledge for social justice as well as their self-directed applications of STEM for social justice, which, when present, provides evidence that students had begun to critically contextualize STEM. This chapter also looks at the effects of synergizing atmosphere that worked diligently to include students’ voices and their lived-realities into the curriculum as well as the overall ethos of this program. This chapter also speaks to the importance of centering critical-reality pedagogy in STEM and understanding the power of student agency via application, and why it is that a critical-reality based STEM pedagogical approach is a matter of social justice. And, I discuss surveys that students completed that speak to their relationship with MAN UP vis-à-vis their own home schools and draw implications regarding what, if any, elements of MAN UP’s atmosphere contributed to student increases in the considerations described in this studies’ guiding question. I conclude this chapter by making the argument that the critical contextualization of STEM was in fact taking place and was evidenced by the focal cohorts’ positive shifts in STEM identity, competency and in their socially just applications of STEM. I also underscore the innovative nature of the MAN UP program. And, I speak to the importance of MAN UP’s philosophical-pedagogical and material setting insofar as the role of this program’s positioning played in catalyzing a nutritive educational atmosphere that worked to ensure socio-academic synergy between students’ real lives and the course content.

In Chapter Six: STEM for good: “Creating Socio-academic Synergy for the Development of Socially Just Applications of STEM”, I assess the pedagogical atmosphere that characterized this program and how it created and curated a nutritive educational space that afforded the focal participants the opportunity to become applied STEM practitioners by realizing the critical contextualization of STEM. And in doing so, I reiterate the primary position of this study: that a critical-reality pedagogical approach to STEM education was integral to the creation of just such a positive, transformative atmosphere because it carved out a space for the realization of a socio-academic synergy, which, then, encouraged students to envision themselves as applied STEM practitioners as evidence by their demonstrated critical contextualization of STEM.

In Chapter Seven: Perfect love casts out all fear: The Efficacy of Critical-reality pedagogy at MAN UP, I underscores the importance of a reimaged STEM pedagogy that encourages, empowers, and equips hyper-marginalized students to become increasingly adroit at critically contextualizing STEM so that they

experience increases in their STEM identity, competency, and demonstrated ability to apply STEM for social justice. In this chapter, I lay out the foundational argument of this book, i.e., that socio-academic synergy should be a goal of any program seeking to work effectively with and for Black boys because it holds the potential to catalyze both critical contextualization proper and the critical contextualization of STEM, more specifically by taking into account, both pedagogically and curricularly, the specific needs, interests, obstacles, life-experiences and joys of Black boys.

In Chapter Eight, “It takes a village: Highlighting the indispensability and strength of the three-fold cord”, I discuss the necessity and benefit of integrating parents/guardians into both the construction and maintenance of the intentional atmosphere developed and curated at MAN UP. Again, a commitment to becoming a more critical, emancipatory, social justice centered educator is wholly necessary in this work. It is also wholly necessary to work alongside and in solidarity with students and parents. We cannot continue the trend of presupposing that we know exactly what our students need to feel safe and encouraged to being realizing their fullest possible potential. Instead, we have to create opportunities for students and parents/guardians, respectively, to help shape the educational atmosphere by listening to and addressing the issues, concerns, and needs of both the students and their primary advocates.