



# Race Ethnicity and Education

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# Racial capitalism and STEM education in Chicago Public Schools

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## ABSTRACT

This article analyzes the role of STEM initiatives designed by city and corporate elites in a large urban district and outlines an alternative, grassroots vision for (STEM) education and city schools. Within a neoliberal context of gentrification, displacement, disinvestment, and privatization, STEM schools have become strategic components of Chicago's 'portfolio district' that serve the interests of racial capitalism in three ways. First, STEM schools provide a claim to fairness in the midst of racist school closures. Second, STEM high schools are a corporate strategy for racially stratified labor force preparation that restricts curriculum and reifies tracking. Third, curriculum restriction prioritizes corporate interests over students' capacity to shape their communities and the world. The authors draw on the wisdom of Chicago communities who have led resistance against corporate education reform to critique Chicago STEM policy and point to critical mathematics and science education as part of a model for sustainable community schools.

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Science, Technology, Engineering, and Mathematics (STEM) has come to connote prestigious careers in science and engineering where highly paid innovators and experts with advanced degrees shape the future of research, communication, and medicine. This prestige, combined with calls for 'diversity' in STEM, allows policy makers to position STEM-themed schools as a commonsensical innovation in urban school districts that serve economically dispossessed communities of color. This is true for Chicago Public Schools (CPS) where there are, at the time of our writing, 15 elementary schools and 5 high schools with a STEM theme.<sup>1</sup> Chicago is the third-largest school district in the US with a student body of approximately 380,000 students that is 90% students of color and over 80% from low-income households (CPS 2017a).

However, we argue that CPS STEM initiatives are not so much about STEM education as they are strategic components of a market-based school choice model (*portfolio district*) that serve the interests of racial capitalism in three interconnected ways. First, STEM schools provide a claim to fairness and equity even as the district prioritizes attracting middle-class and white families while it disinvests and facilitates displacement in working class Black and Latinx<sup>2</sup> communities. Second, STEM high schools and their alignment with Chicago City Colleges (CCC) are a corporate strategy for racially stratified labor force

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preparation that restricts the curriculum and reifies discriminatory tracking (streaming) in mathematics and science. Third, this curriculum restriction prioritizes financial and corporate interests over students' well-being and capacity to shape their communities and the world. Together, our analysis critiques the dialectics of CPS STEM policy and the priorities it sets for teaching and learning at the school and classroom level.

The model that guided the development of the Chicago STEM high schools was based on a school in New York City and is lauded by its authors – the IBM Corporation – as the 'playbook' for at least 80 schools in various US cities. For this reason, analyzing Chicago STEM initiatives contributes to discussions about the ways that STEM education is being mobilized in service of racial capitalism across the US (see Bullock 2017 for an analysis of a related situation in Memphis, TN). As always, there is fierce resistance to these corporate designs. In the final two sections of the article, we draw on the wisdom of Chicago communities who have led this resistance to point to critical mathematics and science education that fits within an alternative vision for urban school districts.

### **Historical context: Renaissance 2010 and gentrifying Chicago**

In July 2004, the Chicago Tribune published an article outlining CPS plans to close 20 of the 22 public schools in the Bronzeville community in the city's Black Southside – Chicago's Harlem (Dell'Angela 2004). The author drew clear relationships between the destruction of tens of thousands of public housing units, the displacement of former residents, and the creation of 'new' communities – and new schools. Community response was swift. Shannon Bennett, staff member of a community-based organization and Local School Council<sup>3</sup> (LSC) member at a to-be-closed school, said, 'We know change could have happened a long time ago, so why is it happening now? Because of gentrification. We're just bodies holding seats until the people they desire come here' (Dell'Angela 2004, 2).

The plan, part of *Renaissance 2010* (R2010), was the first massive effort to close schools in Chicago, but not the last. The Civic Committee of the Commercial Club of Chicago, a 140-year-old grouping of the most economically and politically powerful elite in the city conceived R2010. The plan was to introduce market logics into education and close 60–70 neighborhood schools while opening 100 new schools, two-thirds of which were to be publicly funded but privately run (charter or contract<sup>4</sup>) (Brown, Gutstein, and Lipman 2009). The Civic Committee (2003) authored a document outlining a business model for education including school choice via charters and contract schools, merit pay, teacher evaluation tied to student test scores, and the freeing of CPS from so-called union self-interest. The report explicitly named teachers as the key factor in suppressing/elevating student (test-score) performance and decried that 'decentralized governance and operations, have left the most important resources of the system – the teachers – essentially unmanaged' (Civic Committee 2003, 51). This 'decentralized governance' refers to the power of LSCs, which, by definition, are comprised mostly of parents and community members. The report thus called for stripping parents of power in their local schools while simultaneously positioning the lack of school choice for low-income parents of color as an essential equity deficit. In other words, this was a plan of the city elites to privatize dozens of schools while weakening the teachers' union and LSCs, en route to centralizing power.

R2010 reinvigorated the decades-long fight for self-determination and education justice waged by Chicago's communities of color (Danns 2014; Todd-Breland 2018). This phase of

the struggle resisted education privatization and union busting, leading to the formation of a citywide, multi-race/multi-class, grassroots education coalition. The Chicago Teachers Union (CTU), revitalized by a resurgent rank-and-file caucus, has been a prominent member of this coalition. In 2012, the CTU's first strike in 25 years became part of this larger movement (Gutstein and Lipman 2013). Led by Black and Latinx parents, students, and community organizations in economically strapped neighborhoods, this struggle has involved thousands in mass rallies, disruptions of various city meetings, sit-ins, arrests, sleeping outside in the frigid Chicago winter on the sidewalk in front of Board of Education headquarters, and a 34-day partially victorious hunger strike in 2015 to save Bronzeville's last remaining public neighborhood high school (Lipman 2017).

As of September 2017, CPS has closed roughly 160 schools, about a quarter of the total (Lipman 2017). In their place, the district opened about as many charters (125) and other privately managed schools (42) (Chicago Public Schools 2017a). In a draconian move, CPS closed 50 schools in 2013, setting the all-time US record for annual school closings. And while the district was around 45% African American during the bulk of the closing years (now down to 38%), 88% of students affected by the closing were Black (de la Torre et al. 2015). This disparate impact suggests a strong relationship between school closures and housing policies that have displaced African American people from Chicago, where from 2000 to 2010, the Black population dropped by about 180,000 residents, or 17% of the total (Eltagouri 2006). The affected schools were in communities that suffered decades of disinvestment, and were staffed with many committed veteran Black educators, whose proportion of the district's teaching force fell from 40% in 2000 to 22% as of 2017 (Chicago Public Schools 2017a).

This highly racialized cauldron of displacement and privatization contextualizes CPS's STEM programs. Chicago Mayor Emanuel consistently frames STEM education as central to the economic growth of Chicago (e.g., Emanuel 2017; City of Chicago, Mayor's Press Office 2011). However, in our view, it plays a significant role in what Lipman (2017), building on Neil Smith (2002), referred to as 'the race and class conquest of the city.' In this sense, STEM education in CPS is implicated in school closings and the forced removal of huge swaths of communities of color, as part of remaking Chicago as a so-called global city (Lipman 2004) capable of competing on a worldwide scale. As the mayor boasts, 'I intend to keep [Chicago] in the top ten globally as a leader economically, culturally, intellectually.... Berlin, London, Beijing, Tokyo, watch out, Chicago's coming for you' (Emanuel 2017).

### **The architects of urban STEM education in service of racial capitalism**

Cedric Robinson's (1983/2000) framework of *racial capitalism* shapes the way we understand globalized neoliberal capitalism as concretely manifested in CPS STEM initiatives. Robinson described the social and economic structures, institutions, and ideologies that emerged from the co-construction of white supremacy and economic exploitation and explained the interconnection of the transatlantic slave trade and the evolution of European and US capitalism:

First African workers had been transmuted by the perverted canons of mercantile capitalism into property. Then African labor power as slave labor was integrated into the organic composition of nineteenth century manufacturing and industrial capitalism, thus sustaining the emergence of an extra-European world market within which the accumulation of capital was garnered for the further development of industrial production. (113)

In this quote, Robinson described how African enslavement was central to the initial accumulation of capital that established racial capitalism as a hegemonic global system. Robinson (2007) explained how the co-construction of *racial regimes* and the specific arrangements of economic exploitation shift (in related ways) in response to opposition and their own internal contradictions: 'With the collapse of the slave system, a different racial regime was required, one which adopted elements from its predecessor but was now buttressing the domination of free labor' (xv). White supremacy and the processes of economic exploitation both shifted to maintain racial hierarchies and maximize profit in light of new sociopolitical circumstances.

Watkins (2001) described how powerful social actors, whom he termed the 'White architects of Black education' shaped educational institutions in service of this shift. Watkins identified General Samuel Armstrong as a prominent architect and explained how he supported Black education – of a particular type. Watkins described how Armstrong believed that a:

...semiliterate peon could be just as profitable as a chattel slave. The new corporate industrial economy required skilled individuals. Apprentices of both the Black and White races were desirable. He understood that the Black, productive under slavery, could be just as productive in the new order. The old forms of labor and social organization had to be supplanted by new labor, markets, techniques, and social organization. In this regard, Armstrong was a visionary. (Watkins 2001, 60)

Besides viewing education as necessary to prepare workers for the new economy, a key concern for Armstrong was the need for social and labor peace to maximize profits and stability. His views on Black people's role in that process were clear as he wrote, 'The Negro is important to the country's prosperity' (quoted in Watkins, 53), and he worked diligently 'for the cause of a segregated and orderly South' (43). Armstrong was not an advocate for violent repression or overt coercion. Instead, Watkins argued that:

Armstrong understood that racial subservience could be reconciled with the new democratic order. The rhetoric of equality easily could be wedded to the practice of racism. (57)

We argue that the current architects of CPS education – the mayor and his close collaborators within the city financial and corporate elite – are engaged in a 21<sup>st</sup> century version of the strategy that Watkins attributed to Armstrong. These present architects of Chicago are using STEM education to respond to the contemporary neoliberal shift in racial capitalism in a way that is similar to Armstrong's nineteenth century strategy. As the US economy shifted from the industrial economy of Armstrong's time to one more heavily dependent on technology and service sector work, the policies and practices of the new architects pointed in essentially the same direction – maximum profitability and minimal social unrest. These current architects proffer racial capitalism in service of the race and class conquest of the city. Armstrong's notion of a 'segregated and orderly South' has an eerie resonance to the reality of hyper-segregated Chicago, whose city leaders try to dampen resistance and outrage in reaction to school closings, police violence, and the overall disenfranchisement of working-class communities of color. Like Armstrong in his time, Chicago's architects' apparently moderate racial views contrast with today's overt and resurgent white supremacy in US politics.

Chicago's education architects include the mayor, executives of corporate partners of CPS STEM schools (including Microsoft, IBM, Cisco, and Motorola), members of the Commercial Club of Chicago, and the seven-member Chicago Board of Education; the mayor appoints this board with no legislative confirmation process. This arrangement contrasts with every other school district in the state of Illinois (892 total) and 98% of the school boards in the US (Education Commission of the States 2015), which are democratically elected. The Board is largely composed of bankers, investors, lawyers, corporate CEOs and officials, city managers, and in more recent years and in response to massive outcries, a few former educators. This mayor-appointed board, based upon recommendations from the district CEO, decides to close, consolidate, phase-out, co-locate, or 'turnaround' schools.<sup>5</sup> With no direct accountability to the public, this board rarely casts a non-unanimous vote and wields power with impunity and farsightedness, suggesting the term 'architects' of education is appropriate. We argue that these architects, like Armstrong in his day, have used (STEM) education to position themselves as proponents of racial equality, even as they simultaneously put it in service of racial capitalism.

### **STEM elementary schools provide a (false) claim to fairness**

When CPS closed 50 schools in 2013, each closed school was paired with a 'welcoming school,' designated to receive displaced students. While students were generally expected to attend welcoming schools (ostensibly nearby), the district said that families could choose to enroll children in any school in the district that had open seats. CPS recast 11 of the welcoming schools as STEM schools and six others received special arts or International Baccalaureate (IB) programs. The 11 STEM schools joined three existing STEM magnet elementary schools and one recently reinvented school to comprise the city's current 15 STEM elementary schools (Chicago Public Schools 2016; de la Torre et al. 2015).

### **STEM as a choice within a portfolio district**

The STEM schools represent one option in a so-called portfolio district model of school choice (Hill et al. 2009). Other Chicago portfolio options include charter schools, prestigious selective-enrollment schools, the arts and IB schools mentioned above, and high schools associated with every branch of the US military. Portfolio districts are an integral aspect of neoliberal urban education policies and practices and as outlined by Lipman, Vaughan, and Gutierrez (2014):

...are based on a market model of multiple education providers or "venders" – public, private, charter, and contract. Each vender has a performance contract and those who do not meet the terms of the contract are not renewed, e.g., are closed, re-engineered, or replaced. The portfolio strategy assumes that schools are much like private services or retail outlets, largely interchangeable, moveable, replaceable, and defined by uniform performance standards. (2)

STEM welcoming schools, as part of the portfolio, served as a claim to fairness and equality of opportunity as city officials closed 50 predominately Black schools. Then-CPS

CEO<sup>6</sup> Barbara Byrd-Bennett explained school closings as ‘an opportunity to redirect the resources and to ensure that our children are prepared for 21<sup>st</sup> century learning’ (Lutz and Oliver 2013). The district invoked the logic of efficiency and the cachet of STEM, which could convince the public that the disinvestment in Black neighborhood schools was acceptable because of the new opportunities available at the STEM schools. This exemplifies how city architects frame STEM education to, in Watkins’ (2001) words, ‘[wed] the rhetoric of equality...to the practice of racism’ (57). This racism has to do with the impact on Black communities, who bear by far the disproportionate amount of school closings and subsequent privatization of education. Furthermore, Black students are increasingly and drastically underrepresented in the five most-desirable CPS, selective-enrollment schools, which only 3% of Black high school students attend. In contrast, 39% of white high schoolers attend these schools (Loury 2017). Black students are also overrepresented in the STEM schools that provide more limited opportunities, as we document in subsequent sections.

Given strong and organized resistance to school closures, city officials need legitimation for what communities of color perceive as attacks. As General Armstrong realized, racial capitalism needs an ‘orderly South’ not riven by revolt. Neither Armstrong in his day, nor Mayor Emanuel in ours, benefits from a raucous, rebellious populace. Armstrong, and we argue, the current Chicago architects, act in ways that suggest they ‘understood that domination and subjugation of a people must take on new forms’ (Watkins 2001, 60). By recasting school closings as opportunities and drawing on the notion that STEM education leads to great economic opportunity, official policies served to reduce resistance to mass school closures. As the mayor said in announcing the new STEM schools, ‘Now is the time to make smart investments alongside tough decisions [i.e., closing neighborhood schools] to ensure our students can reach their bright futures’ (CPS 2013).

Independent of these attempts to legitimize closing and disinvesting in neighborhood schools, parents, families, and communities made their own decisions about their children’s futures (Lipman, Vaughan, and Gutierrez 2014). The assertion by Irene Robinson – an African American grandmother of 9 CPS students who starved herself for 34 days to keep Dyett High School open – that ‘closing schools is a hate crime’ captures the sentiment of the powerful resistance to the school closures. This opposition included two three-day, 30-mile marches in May 2013 by several hundred people in communities of color that were to be affected by the proposed closings. A report by de la Torre et al. (2015) found that STEM programs were not a significant factor in whether families enrolled their children in designated welcoming schools, bolstering the claim that parents were not convinced by city proclamations. In interviews with 95 parents of children impacted by closures, the report found that among parents who enrolled their children in the designated welcoming school, proximity and familiarity with adults in the building were the most important factors in their decision, and the perceived academic quality of the school was also very important. When parents did not send their children to the designated welcoming schools, barriers to enrollment (like transportation) were the most common reasons (de la Torre et al. 2015). Rather than STEM-themed elementary schools or a ‘portfolio’ of choices, parents want quality neighborhood schools, whether or not they want additional options for their children (Journey for Justice Alliance 2014). And that is the one choice denied to parents when CPS closes the neighborhood school, falsifying the rhetorical discourse of ‘choice.’



### Race and class conquest of north side Chicago schools

One irony of struggles against closing neighborhood schools in Black communities on Chicago's South and West sides is that neighborhood schools are resurgent on the wealthier and whiter North side. As some North side neighborhoods have gentrified, new residents' children have come to populate, in large numbers, the feeder elementary schools, more than doubling the white percentage of most of the schools in the North Center and Lake View neighborhoods (where the mayor lives) and reducing the low-income student proportion by as much as 74 percent in some schools since 2001 (Illinois State Board of Education 2017). Marketing urban schools as part of a stable, livable neighborhood environment attracts newcomers and appeals to those already there. Independent of the intentions of individual new families (who nevertheless need to understand their role in larger sociopolitical processes), gentrification of neighborhoods and displacement of low-income residents (mainly of color) and their schools serve the race and class conquest of the city.

A concerted effort, Grow-Community ([growcommunitychicago.com](http://growcommunitychicago.com)), led by mainly middle-class, white parents with economic and political power, in conjunction with four area city council members, is pushing for a K-12 connected school village of neighborhood public schools in the mayor's neighborhood. This includes transforming the two local high schools as attractive options to middle-class families especially because of fierce competition for seats in Chicago's nationally recognized selective-enrollment high schools. The mayor and city council members are focused on keeping these students in CPS, a point made by then-Councilperson Pawar commenting on the K-12 experience: “That’s going to keep people in the city,” said Pawar, who sees too many families flee his ward [where the mayor lives] for the suburbs when their children reach seventh grade’ (Wetli and Ali 2017). Mayor Emanuel has offered full support for the development of North side neighborhood schools, some of which have undergone expansion and costly capital improvements even as he has closed South and West side neighborhood schools (Karp 2016). Lake View High School, one of the neighborhood schools targeted by the Grow-Community group is one of five CPS STEM high schools. In the next section, we describe the conversion of Lake View and four other schools into STEM schools designed to serve the primary purpose of labor force preparation. By contrasting Lake View with its counterparts on the South and West sides, we argue that while this labor force preparation restricts the curriculum for all students, it disproportionately limits the opportunities provided to Black students in particular.

### Racialized labor force preparation

We begin this section with two caveats. First, our critique of the supposed Chicago STEM pipeline (which includes both CPS and the Chicago City Colleges [CCC]) is one of the systemized practices and policies, as well as of the architects of the system – not of individual actors at the local level. In particular, we appreciate deeply the hard-working teachers at CPS and CCC who want the best for students – we have also taught in CPS and, as long-time teachers, we want the same. Second, with respect to meaningful post-secondary work, we are *not* against students learning vocational trades – in fact, both they and their parents have spoken clearly in Chicago for genuine career opportunities (Coalition to Revitalize Dyett High School 2015; People for Community Recovery 2009). We are against a system of tracking, of

racism, of treating people as products to be produced, to then produce more. Instead, we are for a system in which students can cultivate their individual selves, identities, talents and skills, while simultaneously developing solidarity orientations and working for the collective good.

Education in the US has long served labor force preparation, and this function has always been racialized (Watkins 1993, 2001). Its inequity both reflects and projects a society stratified by race and class (Spring 1972; Apple 2004). Regardless of the mode of production, a nation's education system develops young people, materially and ideologically, for social integration and the maintenance of its specific status quo. US education teaches students not to raise fundamental questions about unequal relations of power, while differentially readying them for divergent societal roles (Macedo 1994). Academic tracking (streaming) is a mainstay of US education with roots in early 20<sup>th</sup> century Taylorism and eugenics movements (Gould 1981), and it has especially racialized mathematics and science education, dramatically dis-serving students of color (Oakes 1990). It is as extreme as seven tracks in one CPS public school, Lincoln Park High School (personal communication, Jennifer Johnson, 22 January 2018), and hardly possible from which to escape, especially in an upward direction. We argue that the CPS STEM high schools restrict the curriculum based on corporate priorities while they also reify this racialized tracking.

### ***Early college STEM schools and the CCC: public schools serving private interests***

In Chicago, the intersection of racism and capitalism can be concretely seen in the racialized labor force preparation of CPS STEM education. Chicago's mayor appoints the boards of both the pre-K-12 CPS system and the CCC and thus has broad power to enact various proposals, including shaping CPS STEM education as a key component in constructing the pre-K through college portfolio district. In 2012, the year before the 50 school closings, CPS designated five STEM high schools (one was new and opened that year), each paired with a higher-education institution and corporate partner.

These conversions can be traced to 2011, when IBM awarded Chicago a grant to, 'allow Chicago to prepare a *business plan* [emphasis added] that will personalize education for students, allowing them to build necessary skill sets and put them at the front of the line for quality, high-paying jobs upon graduation.' (City of Chicago 2011, 1). The grant funded an IBM team to:

work with educators and city leaders to evaluate ways Chicago can better align its educational system with the needs of knowledge workers in the private sector, as well as enhance and integrate the high school and community college experiences. The program would be designed for implementation in five Chicago high schools by 2012. (1)

This business plan took the form of a 'playbook' produced by IBM and implemented, as proposed, in five CPS high schools in 2012, with the name 'Early College STEM Schools.' Four were existing schools (Chicago Vocational Career Academy [CVCA], Corliss High School, Clark High School, and Lake View High School) and one was new (Goode STEM Academy). Goode was to partner directly with IBM while the other four schools were to implement the model described by the playbook with corporate partners including Motorola, Microsoft, and Cisco (City of Chicago 2011). The playbook articulated the partnerships between high schools, community colleges, and corporate partners described



below, including an approach to curriculum and school culture aimed at serving corporate interests. It drew largely upon the IBM-sponsored P-TECH High School in Brooklyn, NY and has since become the framework for more than 80 schools across the US (Litlow 2017). The playbook is explicitly and unapologetically a corporate-sponsored, corporate-authored guide to supply identified labor needs by organizing urban high school education around ‘middle skills’ (2) and assimilation into ‘workplace values’ (29). It evidences that CPS STEM education is less about teaching students STEM than it is about executing the architects’ plans to reconfigure the district in ways that serve their interests, specifically in shaping and preparing workers for particular economic niches. It aligns with privatization and an abridgement of self-determination because it takes the aims of public education out of the hands of communities of color and re-appropriates them for corporate interests, exemplifying the interconnections between the racial regime and neoliberal capitalism.

The cachet of STEM education is related to the high status and pay of the associated careers and is also connected with the prestige of canonical scientific and mathematical knowledge. For years, mathematics and science educators have argued that Black students have been systematically denied equal ‘opportunities to learn’ this high-status knowledge (Oakes 1990; Tate 2001). Within this context, the five STEM schools (whose students are 56.5% Black in a district that is 37.7% Black; Chicago Public Schools 2017a) appear to rectify discriminatory access. By examining the playbook’s framework, the uneven establishment of college partners across the five schools, and the unequal opportunities to earn ‘early college and career credit,’ we argue that the opposite is true. CPS STEM education continues racist tracking, limiting opportunities for rich mathematical and scientific learning for CPS Black students.

**Restricted curriculum for Black students: STEM without science.** The curriculum of the STEM schools prioritizes the skills identified as useful to corporate partners to such a great extent that these STEM schools espouse a definition of STEM without science. The playbook’s authors cite Harvard’s ‘Pathways to Prosperity’ report to argue that drop-out rates at urban community colleges are ‘a huge missed opportunity with a significant cost,’ because, as the report points out, ‘in the next decade, half the new jobs will be “middle skills” occupations suited for those with associate’s degrees.’ (IBM 2012, 2). Based on this education-for-work rationale, curriculum planning in the playbook centers around ‘skills mapping,’ with the goal: ‘to ensure that all partners of the STEM-PCC school are developing students with the credentials, technical knowledge and clear understanding of workplace expectations needed for real jobs that keep employers productive and competitive’ (26). The curriculum reflects this goal, strongly emphasizing ‘workplace skills and values.’ But this prevalent emphasis does not completely supplant an academic curriculum:

At a STEM-PCC school, four curricular strands run throughout the six-year experience: English language arts, mathematics, technology and workplace learning. These content areas are the central focus of the program, with other subjects such as foreign language, science, and history woven into the curriculum at appropriate points. (20)

The playbook prioritizes mathematics, English, workplace learning, and technology, but marginalizes foreign language, history, and *science*. It supplants science with workplace learning. As such, CPS STEM schools do not provide equitable access for their mostly Black students to rich STEM learning, but instead reify ‘the notion of...utilitarian

education for Blacks' that Watkins (1993, 322) traced to General Armstrong and other 'White architects.' This utilitarian education restricts the high school and college options ('six-year experience') available to students, and this restriction is different at the various STEM schools, as we demonstrate later in the article.

**Restricted curriculum for Black students: Disparate educational tracks.** High school students can earn college credit through the 'early college' component of the STEM schools, by taking college-level classes on their own campus (taught by sufficiently credentialed CPS teachers) or college classes on the CCC campuses. The potential STEM bonus is that students can earn a two-year CCC degree and high school diploma simultaneously, within the normal four-year high school period.<sup>7</sup> Essentially, the district claimed it established a pipeline to develop STEM entry-level professionals starting in primary grades into the two-year community colleges, or even beyond.

Four of the five STEM high schools (Corliss, CVCA, Clarke, and Goode) are in working-class/low-income neighborhoods of color on Chicago's South and West sides – the first three are all almost entirely Black, and Goode High School is roughly half Black and half Latinx – mirroring their communities. Lake View High School is the fifth school. To repeat, Lake View is on the North side, in a whiter, more middle class, expensive, and gentrified neighborhood, a 10-minute stroll from the Mayor's house. In contrast, its student body does not match its neighborhood, which we discuss later.

These five STEM schools connect to the CCC system in different ways. The community colleges are integral to the larger work-force pipeline in the greater Chicago area, whereby each campus has a particular labor sector focus (Kazis 2016). A principal focus of all CCC colleges is to 'become an economic engine for the city of Chicago' (City Colleges of Chicago 2017). The four high schools with predominantly Black (or Black and Latinx) students pair with community colleges serving largely working-class students of color. Two of the Black CPS STEM schools partner with the city college whose focus is 'transportation-distribution-logistics' – a key sector in Chicago's economy because 'between a quarter and a third of all freight tonnage in the US originates, terminates, or passes through the Chicago region' (CMAP 2012). Goode high school, with Black and Latinx students, pairs with the college emphasizing 'advanced manufacturing' (CCC 2017) because manufacturing, particularly middle-skill labor, is still important in the industrial Midwest despite its 'rustbelt' status. The fourth school, also with almost exclusively Black students, partners with the CCC campus focused on 'health care,' because it is adjacent to the 'world's largest concentration of advanced public and private health care facilities' (UIC School of Public Health 2017), and as many as 84,000 healthcare jobs are claimed to be coming to the Chicago region in the next decade (CCA 2017).

The fifth school, Lake View, on the whiter, wealthier North side, sidesteps the playbook recommendations by partnering with prestigious universities rather than city colleges (though students can and do get CCC credits through dual credit articulations). Lake View's first academic partner was DePaul University, a premier, expensive Catholic university. In January 2017, Lake View added high-status Northwestern University as another academic partner, 'bring[ing] its award-winning STEM education center, Science in Society, to its new partnership with the school' (Cubbage 2017). This sharply contrasts with the academic partners of the four South and West side STEM high schools. Furthermore, the demographics of Lake View's students, remarkably stable for at least 15 years, with mainly working-class Latinx students, are likely to



follow the changes in its feeder elementary schools which have been gentrified along with their neighborhoods. Securing Northwestern and DePaul as partners may serve more the architects' plans beyond the function of labor force preparation. It also provides a clear incentive in the district's efforts to attract middle-class white parents to city high schools.

### **'New' vocational education**

For the four STEM schools serving primarily Black (or Black and Latinx) working-class communities and their students, Early College and Career Credit and the purported STEM bonus are not mainly about STEM. The articulation between the schools and CCC is not a STEM pipeline to lucrative STEM careers, and to name the schools as STEM schools is misleading. It hides that these schools steer students towards working-class jobs within the sectors of health, transportation and freight, and manufacturing as needed by Chicago labor markets. The essence of CPS STEM education is racialized labor force preparation, regardless of skill level – in essence, a new vocational education, driven by the interests of racial capitalism, as ever, but 'new' in that it makes strategic use of the cachet of STEM to make a claim on providing equitable opportunities to the mostly Black (and almost entirely Black and Latinx) students enrolled at STEM schools.

The disparate course offerings at the STEM schools further illustrate how CPS racially tracks students. Two of the overwhelmingly Black schools have zero science or mathematics dual-credit options for students to earn college credit on the high school campus and the third overwhelming Black school offers only a mathematics class that is 'not recommended' for STEM majors as a dual-credit STEM option (see [Table 1](#)). Combined with emphasizing workplace skills while marginalizing science, this lends further incredulity to the claim of a college-prep STEM curriculum. Furthermore, while the early college program allows students to earn college credits and even a two-year associate degree while in high school, for the three almost-entirely Black schools, only 19.7% of 2016 graduates earned credit through the dual systems while 17.4% earned it through either military classes (Junior Reserve Officer Training Corps) or what CPS calls 'career to education' (vocational) courses (see Vossoughi and Vakil [2018](#) for an analysis of militarization and STEM education). In these three schools, only one student (of almost 400 2016 graduates) earned college credit via an *Advanced Placement* test<sup>8</sup> ([Chicago Public Schools 2017b](#)).

Lake View High School partners with two prestigious, private, four-year universities with doctoral programs and national profiles that prepare graduates for professional work (including in STEM). But while Lake View may ready students for these careers, it does so in a context of the removal of low-income people of color from its neighborhood<sup>9</sup> and feeder elementary schools, and functions within the larger neoliberal education 'business plan' which serves a racialized capital accumulation strategy (Lipman [2011](#)). In no way are Lake View's privileged education practice and university partnerships grounded in a liberatory agenda, which stakes a claim of the *right to the city* by marginalized peoples within Chicago (Lefebvre [1968](#)). In this sense, the larger CPS STEM initiative, of which Lake View may be a bright light when seen from the perspective of the continued remaking of Chicago as a global city, in actuality works against the interests of the masses of economically marginalized people of color in the city.

**Table 1.** Overview of early college STEM schools (as of September 2017).

STEM High School	College Partner	Corporate Partner	Student Enrollment	Student Demographics	Geographic Location	STEM Dual Credit Courses Offered by HS
Chicago Vocational Career Academy (CVCA)	Olive Harvey College	Motorola	879	<b>96.9% Black</b> 2.2% Latinx 0.1% White 0.8% 'Other' 95.3% Low Income	Southeast Side	0 Math 0 Science 1 Computer Science
Clark High School	Malcolm X College	Cisco	548	<b>97.4% Black</b> 2.4% Latinx 0.2% 'Other' 93.4% Low Income	West Side	1 Math (for non-STEM majors) 0 Science 0 Computer Science
Corliss High School	Olive Harvey College	Microsoft	303	<b>98.3% Black</b> 1.3% Latinx 0.3% 'Other' 92.4% Low Income	Far South Side	0 Math 0 Science 1 Computer Science
Goode STEM Academy	Daley College	IBM	900	<b>51.0% Black</b> 46.7% Latinx 0.8% White 1.3% 'Other' 87.6% Low Income	Southwest Side	1 Math 1 Science 2 Computer Science
Lake View High School	DePaul University, Northwestern University, Wright College	Microsoft	1385	3.8% Asian 9.2% Black <b>70.8% Latinx</b> 13.4% White 3.0% 'Other' 80.9% Low Income	North Side	1 Math 1 Science 3 Computer Science

\*This does not include offerings that students may access by traveling to the partner college campus.

Data retrieved about dual credit offerings retrieved from: <https://chooseyourfuture.cps.edu/staff-resources/eccc-sqrp/>

School demographic data retrieved from CPS School Profiles at: [http://cps.edu/Schools/Find\\_a\\_school/Pages/findaschool.aspx](http://cps.edu/Schools/Find_a_school/Pages/findaschool.aspx)

There is a marked difference within the post-graduate relationships of the five CPS STEM high schools, and there is clear racial stratification of the work force and educational preparation. The four Black and Latinx schools on the South and West sides mainly prepare students for working-class-oriented community colleges and similarly oriented jobs. The North side school prepares students differentially, but it too readies students for the labor market as dictated by city architects. In neither setting, and in no way overall, does CPS STEM education prepare students to read and write the world (Freire 1994), to challenge the inequalities within schooling and the political systems that contribute to the race and class conquest of the city. Instead, the curriculum and ideological preparation are designed to meet the architects' desires for social and labor peace through assimilating students into 'workplace values.'



### **Learn-to-earn: assimilation into the workplace**

In Mayor Emanuel's 2017 speech to the National Press Club, he emphasized the creation of the STEM schools and their alignment with CCC: 'We live in a period where you earn what you learn...over 60% of all future job openings will require a minimum of two years post-high school education...we're a pre-K to college model' (Emanuel 2017). We describe above how Chicago implements this 'learn-to-earn' philosophy in racially discriminatory ways. These ideas shape education in the ideological interests of its architects with an emphasis on workplace values that constitutes a hidden curriculum for preparing compliant and cooperative workers (Anyon 1980; Apple 2004; Willis 1977). Again, we turn to the playbook that guided the STEM curriculum development:

An integrated, workplace-readiness curriculum taps into students' personal career interests while bringing teachers together for interdisciplinary collaboration. The combination of rigor and relevance engages all students in meaningful learning that is connected to their own lives and usable in the real world. The workplace learning curriculum enables students to relate what they are learning in school to postsecondary education, productive careers, and active citizenship. Students acquire knowledge and skills as they work in teams to investigate significant issues, carry out long-term projects, and create projects that demonstrate their learning. This approach answers the questions that traditional academic programs fail to answer for many students: Why am I learning this, and how does it prepare me for the future? (IBM 2012, 27–8)

Critiques of traditional mathematics and science curricula as irrelevant are common (Aikenhead 2006; Tate 1995). But we reject the notion that corporations should dictate what is relevant through their narrow 'learn-to-earn' ideology. The mention of 'citizenship' above is the playbook's singular reference to students as citizens or participants in democracy or community. The focus on 'middle skills' and 'workplace values' prepares students to serve capital's interests with no attention to preparing them to participate in democracy or work for community self-determination.

Kelly Sundberg, the Microsoft liaison to Lake View High School, characterized the STEM curriculum: '21st century skills of collaboration of problem solving, of really entrepreneurship and intrapreneurship. So, identifying a problem, developing a solution, productizing and monetizing that solution is really the core of it' (Friedman 2015). This vision of STEM education positions problems as having technical solutions, which become opportunities to turn knowledge into commodities. 'Intrapreneurship' refers to the process whereby corporations use their employees' innovative ideas to increase profit. From an equity stance, it is deeply problematic for education to be driven by the interests of racial capitalism that defines problems and solutions on its terms. As Gloria Ladson-Billings (May 4, 2017) recently reminded us, 'Our public schools are not the farm team for Apple or Microsoft or anybody else!'

### **A different project: problem-posing education in science and mathematics**

The playbook's call for a 'combination of rigor and relevance' resembles (in some ways) calls for relevance and academically challenging curriculum that we have made separately in mathematics and science education. Gutstein (2006, 2016) stressed the

importance of valuing community, critical, and classical knowledge, and Morales-Doyle (2017) emphasized equitable academic expectations in the context of meaningful socio-scientific issues. In sharp contrast to the IBM playbook and education driven by corporate architects toward the narrow development of workplace skills, *problem-posing education* (Freire 1970/1998) begins from the concerns of students and their communities and moves in the direction of sociopolitical action against oppression. Such an approach starts with the identification of *generative themes* (Freire 1970/1998), which describe pressing issues in local contexts as understood and named by students and their families in dialogue with educators. Teachers and students learn mathematics and science as they work to understand and address these generative themes. These academic subjects are also subject to critique as ways of knowing associated with institutional power and often implicated as 'colonizing knowledges' (Smith 1999). Problem-posing educators recognize the community wisdom that students may bring into the classroom. They support students to build on that knowledge while also developing canonical academic knowledge and constructing sophisticated critiques of the sociopolitical status quo. Whereas the problem-based learning implied by the IBM handbook frames problems as 'neutral puzzles' (Apple 2004) in the context of corporate workplaces, problem-posing education understands problems as political and emergent from historical contexts.

In our work, the hyper-segregated history and more recent race and class conquest of Chicago has been the context for 'reading and writing the world with mathematics' (Gutstein 2006, 2016) and addressing 'social justice science issues' (Morales-Doyle 2017) in CPS classrooms. For example, in Gutstein's (2016) mathematics class, students learned mathematical modeling to understand the role of predatory lending practices in a foreclosure crisis that facilitated displacement on the West side of Chicago. In Morales-Doyle's (2017) chemistry classes, students collected and analyzed soil samples for heavy metal contamination as they learned about environmental racism and unregulated industrial pollution in economically dispossessed communities of color. In both cases, students took up the role of transformative intellectuals as they grappled with problems created by racial capitalism explicitly and presented sophisticated understandings of these problems to their families and communities. Students considered the strengths and limitations of mathematics and science as ways of knowing. Students and teachers alike came to have a greater appreciation for the deep understandings that community members hold about the challenges they face. In contrast to preparing students to assume their roles in the workplace, problem-posing education engages students as the co-constructors of communities, and of a more just and sustainable world. While there are transformative educators in Chicago, and around the world, who enact these sorts of pedagogies, the constraints of schools designed by corporate architects are barriers to such practices becoming more widespread. For these types of learning experiences to become more common, we would be wise to follow the lead of communities in Chicago who have developed an alternate vision for the district through their struggles against the policies of the corporate architects of CPS.

### A vision of the possible: education for liberation

The vision we propose for schooling is grounded in, and informed by, the struggles of Chicago communities for equitable and just education, our personal participation in

those fights, and Freire's vision of education for liberation. As we briefly outline in the article's introduction, Chicago has a rich tradition of battling for public education based on community self-determination dating back at least to the 1963 school boycott of 250,000 Black students against the district's racist policies (Danns 2014; Todd-Breland 2018). Together, the alliance fighting against corporate, privatized education has worked toward a vision of a 'sustainable community school' district, where schools would serve as long-term neighborhood anchors for 50–75 years. At the heart of this vision are principles of self-determination (in particular for communities of color) and the full incorporation of popular knowledge and community wisdom.

Concretely, this conception of sustainable community schools grew out of the multi-year effort to save Walter H. Dyett High School, Bronzeville's last open-enrollment, public neighborhood high school.<sup>10</sup> That struggle culminated with the 2015 hunger strike that forced the district to reopen Dyett. For the first time in US history (to the best of our knowledge), the people forced a city to reopen a closed school.

The community's vision for Dyett, though not fully implemented, stands as a model for what education might be, as opposed to serving the race and class conquest of the city. Key to the vision is the process by which it built on community wisdom. The 31-person design team that wrote the proposal included parents, grandparents, classroom and special education teachers, university professors, graduate students, community organizers, school administrators, environmental educators, musicians and music educators, counselors, local school council members, neighborhood residents, an architect, CTU members, and researchers. Many lived in Bronzeville, and almost all wrote actual parts of the proposal. Building on the years of focus groups and town hall meetings that created a connected vision of K-12 education in Bronzeville, the design team formed a plan and wrote a proposal that originated from, and was led by, people within the community. The process is similar to Freire's (1993) image of a district of *popular public schools*, which he developed when he served as secretary of education of São Paulo (Brazil's biggest city) from 1989–1991:

To change the face of schools implies also listening to the children, to ghetto societies, parents, school directors, instructional coordinators, supervisors, the scientific community, janitors, cafeteria workers, etc. (30)

In contrast to schools that prepare students to assume 'new collar' rolls in corporate workplaces, the Dyett plan emphasized global leadership and environmental sustainability:

Our philosophy of education is to prepare young people to deeply study and understand their social and physical reality so that they can enter the global stage of history as actors in transforming their world. In the process, they learn the academic and artistic disciplines necessary for their own development and future life plans and for making a contribution to better our planet, which sorely needs both environmental sustainability and leadership for peace and justice – the two foci of our school. (Coalition to Revitalize Dyett High School 2015, i).

In this vision, communities, in solidarity with each other, use mathematics and science to create systems of transportation, food production, health care, and development that are more just and sustainable than the current, exploitative models. And, instead of a portfolio model, the plan emphasized a connected village:

Our model is of a sustainable school rooted in the community. This proposal comes from the people of Bronzeville who speak from the heart about a school that lives in a village of tightly interconnected feeder schools, community institutions and organizations, local school councils of dedicated and loving adults, relationships, and the meaning of place. Our model is based on the village concept. (i)

The fight in Chicago is not only for individual schools, but for a sustainable community school *district*, which would be filled with school-communities moving toward the Dyett model and developing their own variations that embrace similar values and principles. That is the ultimate educational aim of the grassroots coalition involving community organizations, education-justice groups, and the CTU.

### Final thoughts

On the one hand, the city's architects incorporate students and workers into a racialized capitalist economy bent on extracting maximum profit. Some Black and Latinx students are tracked through the STEM high schools and CCC system into relatively stable middle-skill jobs, and a smaller number will transcend their track and find success in prestigious universities and high-paying, high-status STEM jobs, allowing city leaders to assert that their policies are fair and equitable. But on the other hand, for many Black students and their families, Chicago's politics are those of disposability. Irene Robinson's (2016) succinct statement that 'closing schools is a hate crime' captures how state anti-Black violence impacts Chicago (Lipman 2017). Effectively forsaking some entire neighborhoods of color, the city has withdrawn the 'public' with school closings and more, and turned over the education of their children to the market. These are, as Lipsitz (2014, 7) wrote, 'policies of calculated cruelty [that] enact the organized abandonment of entire populations,' and do not affect white or moneyed communities.

Both this state desertion and CPS STEM education are linked to and help justify school closings and gentrification. Disinvested-in Black communities in Chicago have lost population, depopulating schools and providing convenient rationales for school closings, which further destabilizes the neighborhoods and increases resident exodus. As the Journey for Justice Alliance (2014) explains, 'These [educational] policies have placed many of our communities in a vicious downward spiral' (21). STEM education, for its part, creates opportunities for, and coincides with, North side aspirations for neighborhood high schools serving gentrified locales, while on the South and West sides, through the putative STEM pipeline, provides a cover for state abandonment. In these ways, CPS STEM education connects to the displacement in the city that is integral to race and class conquest.

Essentially, Chicago's education architects' policies facilitate what Armstrong wanted: a 'segregated and orderly' space – for Armstrong, the South; for today's elites, Chicago. Displacement of working-class Black and Latinx communities from economically valuable areas – for example, Bronzeville and the Mayor's neighborhood – leads directly to a 'segregated' city. At the same time, the hope of an 'orderly' place rests on legitimating policies like school closings and tamping down resistance to racist police violence and economic and educational marginalization in the context of Chicago's effort to market itself as a global city and attract corporate headquarters, gentrification complexes, and tens of millions of tourists (Lipman 2004, 2017). For the architects, there are essentially



two roads – assimilate populations of color who are perceived as potentially ‘unruly’ into specific job categories for economic productivity, or push them out entirely. CPS STEM education is implicated in both pathways, albeit in different ways.

This view of education and racialized, neoliberal urban economic development contrasts sharply with a grassroots vision of a sustainable community school district using critical pedagogies to support students in reading and writing the world. The potential to change the schools and city exists – it manifests in the education justice and social movements in Chicago that struggle and persevere, based on principles grounded in a more expansive view of human liberation, peace, and justice. That possibilities are real, and transformation conceivable, gives us hope and energy to forge a new reality.

## Notes

1. All data analyzed or referenced for this article were retrieved from public sources including the CPS website, press releases, and news stories. They are up-to-date as of the time of writing in the fall of 2017.
2. The term *Latinx* is a form of the more common *Latina/o*, which has become popular in the US to challenge heteropatriarchy and trouble traditional assumptions about gender embedded in language.
3. LSCs emerged from a grassroots campaign for local control of schools in 1988 and are elected bodies that consist of six parents, two community members, two teachers, one staff member, the principal and one student (in high schools). They have power in issues of school budgeting, planning, and principal selection and evaluation. LSCs constitute the largest body of people of color in publicly elected office in the US (Brown, Gutstein, and Lipman 2009).
4. In the US, charter and contract schools are operated by private organizations who have entered into legal agreements with various levels of government to receive public funding to operate schools. In Illinois, the teachers at charter schools cannot be represented by the same collective bargaining unit as those within local public schools. As such, these schools have been a strategy to privatize public education while also weakening teachers' unions.
5. Phase-outs are schools closed over a period of years; co-locations/consolidations are multiple schools in one building; and turnaround schools are not closed but every employee is fired and can re-apply for a school under new management, usually private.
6. Just as the appointed board contrasts with the elected board in every other district in Illinois and almost every district nationally, the Board-appointed ‘CEO’ position contrasts with the ‘superintendent’ position in every other Illinois district and most nationally. It is indicative of the business model and whereas superintendents must be state-licensed educators, there is no such requirement for the CPS CEO.
7. Cramming six academic years into four calendar years is extremely difficult, especially for working-class students who may have to work or who have other interests like sports, clubs, arts, families, and more. The difficulty of this feat can be seen in the recent graduating class of Goode HS where seven out of 211 students earned an associates degree within the four-year window and six from the previous graduating class earned an associates in five years (Vander Ark 2017, April, 4).
8. Scores of 3 or higher (out of 5) on *Advanced Placement* tests are accepted at many US colleges and universities as credit for introductory courses. They are also used as a measure of a challenging curriculum in evaluating schools and individual students and have historically been associated with racialized tracking (Solorzano and Ornelas 2004).
9. Lake View High School straddles two Chicago *community areas*. Together, from 2000 to 2014, they lost 19.1% of their Latinx population and 27.1% of their Black population (Ali 2016).
10. An open-enrollment neighborhood school is one where any student living in the attendance area can attend with no preconditions.

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