



Bridging the Socioeconomic Divide in Environmental Education and Sustainability Studies in New York City Public High Schools

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Bridging the Socioeconomic Divide in Environmental Education and
Sustainability Studies in New York City Public High Schools

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A Thesis in the Field of Sustainability and Environmental Management
for the Degree of Master of Liberal Arts in Extension Studies

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Abstract

Given the exigencies of climate change, it is crucial to foster environmental awareness, practices, and leadership among the rising generation of students.

Nevertheless, in the age of common core standards and ‘teaching to the test,’ public schools rarely have the resources or impetus to prioritize environmental education. This gap is particularly acute in schools that serve low-income communities of color.

Focusing on NYC, this study assessed the potential benefits of teaching a course focused on eco-justice within a regular course slot (Advanced Placement English). Because resources for environmental education are often limited, the course was designed within a traditional framework, so that no additional organizational capacity or partnerships with outside organizations would be required to offer the it. The study hypothesized that, by focusing on eco-justice, such a course would stimulate student engagement with environmental issues and promote environmental need for cognition.

A case study methodology was employed. Two iterations of such a course were offered at the Academy for Environmental Leadership in Brooklyn, New York, which disproportionately serves low-income students of color. Both iterations of the course presented local as well as global eco-justice issues, emphasizing the disproportionate burdens that climate change places on low-income, non-white populations. Findings suggest that both iterations of the course effectively promoted student engagement with, and critical reflection on, environmental issues. The second iteration of the course, which allowed students to pursue research questions in non-local contexts was particularly

effective at stimulating both engagement and environmental need for cognition. The study considered best practices for such a course and suggested how it might be tailored for use across various New York City communities and beyond

Dedication

Now I understand that all great teachers love us. This is essentially what makes them great. I also understand that it is this love that never dies, and that, having once experienced it, we have the confidence always exhibited by well-loved humans, to continue extending this same love.

–Alice Walker

The paradox of education is precisely this - that as one begins to become conscious one begins to examine the society in which he is being educated.

–James Baldwin

First and foremost, I dedicate this thesis to my ever-loving and supportive parents, Gary and Betty Heuer; my sister, Amy Heuer; and my brother-in-law, Vikram Sharda. Mom and Dad, thank you for being our first “great teachers,” encouraging us through the struggles of our youth with “this love that never dies.” I especially thank you both for giving me the gift of being able “to continue extending this same love,” to family, dear friends, and most especially my students. Amy, due to (in Willa Cather’s words) “those early accidents of fortune which predetermined for us all that we can ever be,” we enjoyed and overcame as sisters, and “we possessed together the precious, the incommunicable past.” I also appreciate you as a fellow “forever student,” as our dear cousins say. Vikram, thank you for being ever engaged and supportive, and a true friend. A sister could not ask for more.

I also dedicate this thesis to my students, past, present, and future. Thank you for your constant willingness to work within the “paradox of education,” with myself and

others, continuing “to examine the society in which” we are being educated. As James Baldwin suggests in “I Am Not Your Negro,” I am not the keeper of knowledge; I am your ally in seeking it. I thank you all, deeply, for the educative experiences you have afforded me.

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Definition of Terms

Climate Justice: Considering issues of climate change through the lens of social justice and human rights issues

CJC: Climate Justice Curriculum

CCLS: Common Core Learning Standards

EBE: Environmentally Based Education

EE: Environmental Education

ERB: Environmentally Responsible Behaviors

Green Washing: Presenting a façade of environmental sustainability

NFC: Need for Cognition

NYC DOE: New York City Department of Education

Service Learning: Teaching strategy that integrates community service with instruction and reflection

SC: Sustainability Coordinator, position focused on sustainability in school curriculum and operations, which the DOE mandates each public school to maintain

SS: Sustainability Studies

Themed Schools: Schools that base academic instruction around specific disciplines, career paths or professional fields

The NYC DOE Sustainability Initiative: Program to increase curriculum and academic programs focusing on issues of sustainability, begun in 2010

Chapter I

Introduction

Currently, a full 10% of youth in the United States are consistently poor (Ratcliffe, 2015), suggesting that urban youth who are educated in low-income and underserved urban neighborhoods make up a significant portion of the nation’s next generation of adults. New York City (NYC) alone serves more than 1.1 million students (NYC DOE, 2018), three-quarters of whom come from families that qualify for free or reduced lunch programs, under federal guidelines (“New York City public schools are offering free lunch,” 2017). For the most part, these students do not hold deep connections with the environment, urban or otherwise, and do not view issues of sustainability as part of their world, let alone something in which they should invest. If genuine pathways are not cultivated for the young urban poor to understand and connect with issues of climate change and sustainability, this population will largely be lost as sustainability change agents and future environmental leaders for their communities and beyond. They will be left blind to the threats of climate change, which will have the greatest impact on traditionally marginalized groups of people (Tanner, 2018).

Under the administration of former Mayor Michael Bloomberg, many low-performing, high-needs high schools across the five boroughs of New York City were closed or phased out and replaced by smaller learning communities. Each of these new, smaller high schools has a theme—e.g., Academy for Environmental Leadership, Academy for Urban Planning, Bushwick School for Social Justice, and New York Harbor

School (NYC DOE, 2015). Although not all of these schools are environmentally themed, their smaller settings afford room to incorporate climate change, sustainability and resiliency-aligned work into their curricula.

For over ten years I have taught in the high school program of the Academy for Environmental Leadership, a school where 96% of the students are nonwhite and, according to *U.S. News & World Reports*, 55% are “economically disadvantaged” (Academy for Environmental Leadership, 2018). At the Academy, we have always had a classroom referred to as “the lab,” but it is by no means equipped to function as a science laboratory. The room has no connections to gas or water, making it nearly impossible to conduct most traditional science experiments. Indeed, over the 12 years of the school’s existence, we have succeeded in offering physics courses just once or twice, and chemistry only a few more times than that—a fact that college admission officers frequently raise when they refer to our seniors’ transcripts as evidence of an ‘insufficiently rigorous’ education. As Strong et al. (2016) suggest, mere standards do not reduce educational inequalities. As an environmentally-themed school, the Academy sets high goals for student achievement in the sciences. Unfortunately, the realities of science education at our school merely serve to underscore the widespread nature of educational inequalities and injustices.

A number of local and national nonprofit organizations partner with urban schools in attempts to engage students in issues of climate change and sustainability. For instance, through its LEAF program, the Nature Conservancy hires high school students to work in National Parks as paid summer interns. Research suggests that students who actively participate in this type of school- and partner-led environmental education (EE)

program may greatly benefit from their service-learning experiences (Covitt, 2002).

These programs do make strides; there are success stories. But success stories are the exception, not the norm, and the vast majority of NYC students will never have the opportunity to participate in a program such as this.

Given the fact that most NYC high school students will never have the chance to work on a campus farm or spend a summer interning in the national parks, it is vital that we learn to engage them at the classroom level. Consistently, across more than a decade of teaching, I have found that my own students are most engaged when I approach the theme of environmental leadership through the lens of human rights and social justice. These observations spurred me to research how teaching high school students about the human rights, social justice, and resiliency-related aspects of climate change and sustainability might help them connect more meaningfully with environmental issues. Ultimately, I hoped, this research would not simply help me to better reach my own students, but allow me to formulate principles and recommendations to guide other teachers of urban youth.

Research Significance and Objectives

The majority of low-income students of color in NYC high schools are not invested in issues of climate change and sustainability because their daily existence teaches them that other issues of social justice are far more pressing. The present research suggests that, by teaching the critical human rights and social justice dimensions of climate change and sustainability, schools can increase rates of environmental engagement within this population and thereby help to build a stronger generation of

sustainability change agents. Specifically, this research seeks to assess the efficacy of a course focused on eco-justice issues in both local and global contents, for stimulating student engagement and environmental need for cognition, in a New York City public high school that serves primarily low-income students of color.

Background

A considerable body of research exists demonstrating that economic inequality is a prime impediment to achieving sustainability (Islam, 2015). For instance, statistical analysis of income inequality and threats to biodiversity across the U.S. reveals a causal relationship between the two (Islam, 2015, citing Mikkelson, Gonzalez, & Peterson, 2007). Cross-national studies of wealthy nations indicate that the higher a nation's income inequality, the more waste it produces per capita (Islam, 2015, citing Dorling, 2010a, 2010b, & 2011; Dorling, Barford, & Wheeler, 2007). Moreover, researchers have found that higher levels of consumption and waste in wealthy nations is driven by the habits of the wealthiest inhabitants of them. For instance, a study comparing the ecological footprints of people in various income brackets in Canada suggests that the wealthiest 10% of the population produces nine times the transportation-related pollution and waste as the lowest-earning 10% (Islam, 2015, citing Mackenzie, Messinger, & Smith, 2008). The combined ecological footprint (factoring in food, housing, transportation, and consumption of goods and services) of Canada's wealthiest 10% is two-thirds greater than the national average (Islam, 2015, citing Mackenzie, Messinger, & Smith, 2008). Meanwhile, even in the wealthy nations, the impacts of pollution and climate change fall disproportionately on poor people and people of color. For instance,

the five California cities with the worst air pollution also have the highest densities of low-income people and people of color; meanwhile, these five cities are also projected to experience the steepest increases in ambient ozone as a result of climate change (Morello-Frosch, Pastor, Sadd, & Shonkoff, 2009). Similarly, low-income people of color are disproportionately likely to suffer heat-related illness and death during heat waves—largely for the simple reason that they are less likely to own air conditioners (Morello-Frosch, Pastor, Sadd, & Shonkoff, 2009). In short, while wealthy, white populations disproportionately drive climate change, the burdens of climate change fall disproportionately on low-income, black and brown populations.

It is a dilemma that public educators and their external partners have been grappling with for years in the context of public schooling. The type of pervasive, educational inequalities that Jonathan Kozol (1991) demonstrated so powerfully nearly three decades ago have only grown worse in recent years (Gamoran & Bruch, 2017). These systemic disparities make it a serious challenge to equip low-income students of color with the environmental knowledge and critical insight they will need to confront issues of pollution and climate change that impose heavy burdens on their communities.

The NYC DOE has made certain efforts to integrate a forthright concern for climate change and sustainability into both the curriculum as well as school operations. Most notably, since the implementation of its Sustainability Initiative in 2010, the NYC DOE has required that each public school appoint its own sustainability coordinator (NYC DOE, 2015). According to DOE reports, some school-based coordinators have made useful gains, for instance, by facilitating student involvement in environmentally-focused service learning projects (NYC DOE, 2015). Nevertheless, a number of

sustainability coordinator positions exist virtually in name only, requiring coordinators to do no more than fill out a DOE sustainability survey twice a year (NYC DOE, 2015). Nor should this be surprising, given the substantial barriers that exist to environmental education, particularly in schools that serve low-income communities of color.

Barriers to Environmental Education

One substantial factor inhibiting environmental education is the nation's escalating focus on standardized testing and school performance metrics. As Cassell and Nelson (2010) put it:

We now face a situation in which students of color are being resegregated into low performing schools and subjected to extremely narrowly focused stripped-down drill-and-skill curricula designed to impart data and information required to pass state standards-based and district benchmark-based tests (e.g., Success for All). The teachers of these students are called upon to function in the manner of de-skilled, scripted one-way disseminators of basic data and information for regurgitation on mandated paper and pencil tests. (p. 181, internal citations omitted)

With the implementation of the common core learning standards, emphasis on performance metrics has increased in public schools across the board. However, in schools that are under-resourced, 'teaching to the test' creates particular strains, leaving little or no room in the curriculum for electives, such as environmental education and sustainability studies (Cassell & Nelson, 2010).

Compounding this problem, as Cassell and Nelson (2010) suggest, the cultural framework in which teachers are trained, and in which they teach, incorporate broad, uncritical assumptions concerning sustainability and the environment. As a result, the educational system "reproduces arcane intellectual viewpoints and modes of analysis and understanding that actually contribute to the problems of socio-cultural and socio-

economic unsustainability and tend to obscure our view of these problems and our ability to effectively address them” (Cassell & Nelson, 2010, p. 184). Although Cassell and Nelson (2010) refer to deeply entrenched worldviews and habits of thought, certain indicators are more obvious and direct. For instance, Day (2017) reports that a majority of America’s middle and high school teachers do not actually recognize the overwhelming scientific consensus concerning the reality of human-driven climate change.

Historically, New York State has been a test-heavy state, requiring students to pass five Regents exams to graduate high school (recently reduced to four) (NYC DOE, 2015). Currently, passing marks on eight exams are required to achieve an advanced Regents diploma (NYC DOE, 2015). Across the U.S., students of color from low-income households struggle to perform at expected levels, and schools serving low-income communities struggle to accommodate special-needs students and English language learners, or ELLs (Cassell & Nelson, 2010). These broad patterns are reproduced in New York City high schools. In 2012, nearly 64% of NYC public high school students lived in poverty (Performance Standards Consortium, 2012). Just 59% of them graduated in four years, and 66% in five (Performance Standards Consortium, 2012). Among white students in the city’s public high schools, the graduation rate was 73.9% (Performance Standards Consortium, 2012). Among black students it was 53.9%; among Latino/as, 51.8% (Performance Standards Consortium, 2012). Among ELLs the graduation rate dipped to 39.7%, and among special needs students it was just 24.7% (Performance Standards Consortium, 2012). In the Academy for Environmental Leadership, where this

study originates, just 46% of high school students met standards for math proficiency, and 51% met reading standards (Academy for Environmental Leadership, 2018).

The stresses placed on New York City’s public high schools have considerable knock-on effects. In addition to severe limitations in the range of subjects that can be offered, teachers quickly ‘burn out,’ resulting in a teacher turnover rate of 58% (Performance Standards Consortium, 2012). Across New York State, many teachers are reluctant to work with ELL and special-need students, simply because their jobs may be jeopardized by poor outcomes on standardized metrics (NYCLU, 2012). Meanwhile, “struggling, hard-to-serve urban schools, where low test scores could doom a school to closure,” find it difficult to recruit either ambitious, aspiring teachers or highly experienced ones (NYCLU, 2012, n. p.).

Strong et al. (2016) specifically address the adverse effects of science standards on traditionally marginalized groups of students. Ironically, as the authors note, it is generally accepted that standardized curricula and testing help to reduce educational inequalities by enforcing common norms. In reality, however, proponents of performance standards ignore the fact that high schools begin with vastly different resources, depending on the communities they serve. As Strong et al. (2016) report:

Schools that serve historically “minoritized” students often do not have resources such as labs, computers, and other technologies or access to science classes such as physics. Thus, students attending a school that cannot fully support their success will be expected to achieve the same outcomes and compete for the same colleges and jobs as students attending more affluent schools, which are likely to have ample science classes and resources. Implicit in policies of standardized education is the notion of objectivity in measurement of student outcomes. In this way, neoliberalism in science education reproduces inequities that already exist between racially and economically marginalized students and their affluent counterparts. (p. 266)

The result is that, for all intents and purposes, the sphere of science and science education comes to be understood as belonging to the racially and economically privileged (Strong et al. (2016).

Another thorny problem is the absence of curricula and pedagogical techniques designed to teach environmental issues in ways that make sense to low-income students and students of color. In part this absence merely reflects the more general lack of resources and attention accorded to environmental education in America's over-stressed public school system. Doubtlessly, however, it also reflects the fact that the environmental movement has long been treated as the province of 'wealthy white folks.'

In actuality, the data suggests that people of color care as much about environmental issues as white people do. For instance, Mohai and Bryant (1998) performed a comprehensive survey of environmental attitudes among adults living in Detroit, a city famous for its issues of poverty, racial segregation, and police violence. The researchers expected to find that white residents were more concerned over highly publicized, nonlocal environmental issues, such as wildlife preservation, than were African Americans (Mohai & Bryant, 1998). Instead, the survey revealed "few differences between African Americans and whites, even over the nature preservation issues over which African Americans long have been thought to be unconcerned" (Mohai & Bryant, 1998, p. 475). Meanwhile, black respondents expressed "substantially greater" concern over local environmental issues such as pollution and air quality than did whites (Mohai & Bryant, 1998).

Indeed, the past several decades have witnessed the emergence of concerted grassroots environmental activism in communities of color—activism that, notably, has

grown out of social justice movements rather than the environmental movement itself (Bullard, 2014). In the 1980s and 1990s, much of this activism focused on local issues of pollution, such as the siting of garbage stations, routing of heavy truck traffic, and dumping of toxic wastes (Bullard & Johnson, 2000). Battles emerged in response to longstanding practices that imposed the environmental costs of such activities (e.g., polluted air and groundwater) on places where black and brown people lived (Bullard & Johnson, 2000). Over the past decade, however, such grassroots movements have increasingly built cross-national and international alliances over shared issues of sustainability and moved to the forefront of the climate movement (Lim, 2017; Schlossberg & Collins, 2014). In a context where social scientists are at pains to explain why the catastrophic threat of climate change has failed to produce broad-based grassroots activism in the U.S. (McAdam, 2017), mobilizations by communities of color may in fact comprise a notable exception.

Nevertheless, in the popular imagination, environmental engagement has long been “equated with check writing, dues paying, and membership in environmental organizations” (Bullard, 2014, p. 236). Meanwhile, mainstream environmental organizations have been slow to embrace the environmental justice issues that matter to communities of color (Bullard, 2014). The resulting sense of exclusion and exclusiveness has been compounded by the fact that people living in low-income communities of color must contend with multiple issues of social and economic injustice, even as these same conditions limit the economic and political capital they have to expend on various struggles.

The result is often a form of ‘triaging.’ A powerful illustration of this effect comes from the context of apartheid South Africa. South African activist Kumi Naidoo is an international leader on both environmental and social justice issues (Sheppard, 2009). Currently the secretary general of Amnesty International, Naidoo served as executive director of Greenpeace International from 2009-2015, and he chaired the first phase of “Tck Tck Tck,” a global campaign to push world leaders forward on climate action (Amnesty International, 2018; Greenpeace International, 2018; Sheppard, 2009). Like most environmental activists of color in the U.S., Naidoo’s engagement with environmental issues was preceded by immersion in struggles for social justice (Sheppard, 2009). Growing up under the apartheid regime, Naidoo joined the anti-apartheid movement when he was still a teenager. As a result of this activism, “he was expelled from school, reinstated and expelled again. By the time he was 18, Naidoo had been arrested, beaten, thrown in the back of a van with a can of tear gas” (Spangler, 2011, n. p.). Life felt precarious, the activist has recalled: ““One day we felt empowered Other days we were terrified. I felt like I was living on borrowed time. Too many friends died in the struggle to think I wouldn't be next” (Spangler, 2011, n. p.). In this context, Naidoo found, “people who engaged in environmental activism were seen as somewhat misguided ‘tree huggers’ or ‘bunny lovers’ who were distracted by minor issues, missing the real point” (Naidoo, 2010, p. 124).

In America’s own Black Lives Matter (BLM) movement of the late 2010s, things are somewhat different. BLM leaders actively promote recognition of the nexus between social and environmental forms of oppression (e.g., Lim, 2017). Nevertheless, for students from low-income, urban communities of color—who bear witness to multiple

forms of economic and social injustice and often experience police violence as a pervasive threat—climate and environmental activism may well appear as forms of action that ‘miss the real point.’

“Need for Cognition” and Strategies for Bridging the Gap

One body of theory with the potential to shape, facilitate, and provide a way to measure student engagement with the environment originates in work on “need for cognition” (NFC). In 1982, Cacioppo and Petty produced a groundbreaking paper outlining the NFC concept and introducing the results of four experiments used to develop and validate a scale for its measurement. Their goal was to address what they viewed as a pervasive oversight in cognitive studies: most researchers focused on the structure of knowledge and the cognitive processes that facilitated its acquisition—leaving unaddressed the characteristics that drove individuals to seek knowledge in the first place (Cacioppo & Petty, 1982). Specifically, they were interested in the ‘gestalt’ that individuals brought to knowledge, postulating that individuals with a high need for cognition were motivated to acquire, evaluate, and elaborate on information that would allow them to structure and understand situations they were presented with (Cacioppo & Petty, 1982). Subsequent study has repeatedly validated the utility of the construct to understanding variation in how people seek and process knowledge, as well as how they respond to persuasive messaging (e.g., Cacioppo, Petty, & Morris, 1983; Haugtvedt & Petty, 1992; Haugtvedt, Petty, & Cacioppo, 1992; Sinatra, Kardash, Taasobshirazi, & Lombardi, 2012; Furnham & Thorne, 2013; Kudrna, Shore, & Wassenberg, 2015; Gatti, 2017).

Notably, research has found no clear correlation between NFC and either general intelligence or facility with abstract reasoning (Cacioppo, Petty, & Morris, 1983). As Cacioppo, Petty, and Morris (1983) observe, individuals of high intelligence may find it easier to engage with complex cognitive tasks and consequently “come to be characterized” as individuals high in NFC; nevertheless, need for cognition appears to be an independent construct. Potentially, NFC mediates between intelligence and the individual’s openness to new experiences and new forms of information (Furnham & Thorne, 2013). This accords with the understanding of NFC “as inclination to consistently engage in and enjoy effortful cognitive activity” (Kudrna, Shore, & Wassenberg, 2015). Higher levels of NFC correlate with greater tolerance for ambiguity, pushing the individual to reach beyond tacitly-accepted schemas that are so often relied on to structure experience in binary, ‘black-and-white’ terms, and towards complex understandings that are better fitted to reality (Gatti, 2017). Individuals with high need for cognition, thus, will “seek more information, evaluate more thoroughly the quality of the information found, be more likely to rely on all of the pertinent information (as opposed to relying on simple cues) and use a wider variety of information sources, including sources that were previously unknown” (Gatti, 2017, internal citations omitted).

Not surprisingly, research increasingly links need for cognition with variation in peoples’ capacity and willingness to engage meaningfully with the issue of climate change (Kudrna, Shore, & Wassenberg, 2015; Sinatra, Kardash, Taasobshirazi, & Lombardi, 2012). Kudrna, Shore, and Wassenberg (2015) have found that students higher in NFC exhibit greater willingness to accept the validity of both climate change and

evolution, concepts that are not simply controversial, but which require a certain level of cognitive persistence to assimilate (Kudrna, Shore, and Wassenberg, 2015). Other researchers have found that, when presented with a persuasive argument concerning anthropogenic climate change, college students who were higher in the attributes of NFC were more likely to shift their attitudes on the issue, based on the information presented (Sinatra, Kardash, Taasoobshirazi, & Lombardi, 2012). Crucially, higher-NFC students were also more likely to express willingness to take climate-related action (Sinatra, Kardash, Taasoobshirazi, & Lombardi, 2012). Given findings such as this, Kudrna, Shore, and Wassenberg (2015) have called for research into how various instructional techniques and pedagogical strategies impact the relationship between NFC and the ability to acknowledge climate change and engage with other complex issues (pp. 256-257).

Critical Environmental Pedagogies

Place-based education is one of the central pedagogies that has emerged to facilitate deeper and more meaningful student engagement with environmental issues. Put simply, place-based education seeks to connect students with their local communities and local landscapes in multiple ways, across the curriculum, as they age (Sobel, 2004). For place-based educators, it is imperative that students “regularly spend time out-of-doors building long-term relationships with familiar, everyday places” (Gruenwald, 2003, p. 8). In this respect, place-based education articulates with a broader movement known as bioregionalism, which “promotes local, practical, grassroots solutions to environmental and social problems” (Armbruster, 2006, p. 238). For example, students

in one Louisiana town looked for ways to reduce mosquito infestations without using pesticides; they began introducing native fish that feed on mosquito larvae to local bodies of water, using both biology and mathematics to track the experiment (Sobel, 2004). The Food Systems project in Berkeley, California connects local schools and local farmers, building school lunches around sustainable, organic produce, and gradually integrating agriculture and food preparation into the curriculum (Sobel, 2004). Place-based education can also comprise projects that involve students in urban planning initiatives or projects to boost local businesses (Sobel, 2004). According to Tzou, Scalone, and Bell (2010), this type of meaningful focus on the local “may play a role in helping youth see the places in which they live, learn, play, and work as places in which they can enact positive social change” (p. 105).

Gruenwald (2003) seeks to forge an intersection between place-based education and critical pedagogies in the tradition of Freire’s *Pedagogy of the Oppressed* (2014/1968). Critical pedagogy seeks to expose how traditional systems of education reproduce dominant power relations, and it envisions new modes of teaching and learning that empower students to recognize and challenge multiple forms of oppression (Gruenwald, 2003; Freire, 2014/1968). Freire (2014/1968) famously critiques what he sees as the dominant, “banking” model of education, in which “knowledge is a gift bestowed by those who consider themselves knowledgeable upon those whom they consider to know nothing,” thereby “negat[ing] education and knowledge as processes of inquiry” (p. 72). In order for marginalized student populations to flourish and be empowered, he argues, teachers must proceed with a “profound trust in people and their

creative power,” partnering with their students in the process of inquiry and “the quest for mutual humanization” (Freire, 2014/1968, p. 75).

It may be difficult to square Sobel’s (2004) place-based student projects to boost local commerce with Freire’s (2014/1968) radical pedagogy. Yet, to a certain extent, there is a natural nexus between place-based and critical approaches, insofar as both seek to validate local knowledge, including the knowledge that students bring to the classroom. In this regard, place-based educational models echo Freire’s call for students and teachers to become partners in inquiry; as Smith and Sobel (2010) suggest, “[i]n effective place and community-based educational settings, teachers and students become coinvestigators of issues and concerns, with students taking increasing responsibility” (pp. x-xi). For Tzou, Scalone, and Bell (2010), this is accomplished by eliciting the lived experiences and narratives of youth affected by pressing social, political, and environmental issues. Where the two approaches have been intentionally merged, results have included “focus on access to green space as a social justice issue, homelessness, the bathrooms in substandard school buildings, learning the history of community revitalization,” as well as arts curricula featuring local artists whose work is representative of local ethnic populations (Tzou, Scalone, & Bell, 2010, p. x).

Advocates for the ‘decolonization’ of education forge perhaps the most persuasive linkage between place-based and critical pedagogies. The concept of educational decolonization is rooted in the experience of indigenous people—against whom, historically, Anglo and European educational institutions have waged systematic programs of cultural dispossession and genocide (Scully, 2012). Educational decolonization asserts the centrality of indigenous knowledge and worldviews, thereby

decentering mainstream educational assumptions and facilitating (metaphorically, at least) the re-inhabitation of indigenous homelands (Scully, 2012). Meanwhile, at the extremes of place-centered educational theory, Bowers (2008) has argued that even concepts such as “critical pedagogy” and “decolonization” are insufficiently localized and place-specific, and that true environmental learning cannot take place without a pedagogy that rejects consumer-based society in full and turns to “the keepers of community memory of past environmentally destructive practices and of sustainable traditions of community self-sufficiency” (p. 325).

When considering the needs of urban students of color, however, a certain degree of balance may be called for. On the one hand, pedagogical strategies and programs grounded in local communities and landscapes can empower students and validate their own bases of knowledge and experience, bringing them into the process of inquiry as fuller partners. On the other hand, it would be both stigmatizing and intellectually limiting to assume that low-income students of color are only or primarily engaged by issues local to them. For African American students, specifically, concentration on the local may elide powerful connections to African history and the African diaspora, which can be educationally liberatory (Dei, 2009). Meanwhile, for all students from marginalized populations, connection to environmental and social justice campaigns in parallel contexts across the nation and the globe can be empowering. Finally, local knowledge and practices do not always or automatically equate to sustainable knowledge and practices. In these respects, the systems-based pedagogy advocated by Cassell and Nelson (2010) may hold particular promise:

We are given hope for alternative futures in the assertion that environmental education, the application of ecological intelligence and the implementation of the

concept of eco-justice, can work to turn formal education away from this traditional frame of mind and turn Western civilization toward a more sustainable and efficacious way of perceiving the world—concentrating on a point of view focused on local places and the interconnections that tie them to the larger community and culture around them. Life, then, comes to be seen not from a hierarchical perspective, but from the perspective of interlocking living matrices linked together by the concept of community-based learning and centered on living creatures in ecosystems and the interconnections among and between them. (186-7)

Central to the present research is the concept of eco-justice to which Cassell and Nelson (2010) give central importance. My own teaching experience suggests that connections between the domination of nature and domination of social groups, and evidence of the parallel ways that diverse groups of people have been marginalized and forced to shoulder disproportionate environmental burdens, can provide the platform for powerful, critical forms of inquiry. Teaching sustainability and climate change through the lens of eco-justice allows urban youth, coming of age in low-income communities of color, a greater sense of purchase on environmental discussions. Furthermore, it can equip them to make their own connections among local and global issues and gain appreciation for the complex interconnectedness of environmental problems at various scales. Within this framework, it is imperative that teachers not simply view themselves as “partners” in inquiry, but that they:

come to see themselves as cultural mediators [who are able to] help students see and address the historical and socio-cultural roots of current economic and environmental crises—roots long buried by the a-priori assumptions of an ancient and now deeply engrained habitus. They must help students ask *why* and *how* and not just *what* and *when*. (Cassell & Nelson, 2010, p. 189)

When thus conceived, the present research proposes, an eco-justice focused curriculum can provide a potent spur to engagement with issues of sustainability and climate, even absent costly additional programming.

Research Questions, Hypotheses, and Specific Aims

My primary research questions were:

1. In a traditional classroom setting, without access to co-curricular programming or outside partners, how—and to what extent—can a curriculum focused on eco-justice facilitate active engagement with, and purchase on, issues of environmental sustainability among students in an urban high school that predominately serves low-income communities of color?

I hypothesized that such a curriculum would dramatically increase students' sense of connection to, engagement with, and purchase on environmental debates.

2. To what extent can such a curriculum facilitate students' need for cognition on environmental issues?

I hypothesized that students would demonstrate marked increases in need for cognition around environmental issues, as demonstrated by their classroom contributions and written work.

3. What would the best practices be for future iterations of such a course?

Specifically:

- a. What types of curricular materials best facilitate student engagement, mastery of key ideas, and need for cognition?
- b. How important is the mix of local and non-local issues to student engagement, mastery of key ideas, and need for cognition?
- c. What types of assignments best facilitate student engagement, mastery of key ideas, and need for cognition?

- d. How might the course be tailored for various learning levels (i.e., Advanced Placement versus general); presentation in other boroughs of New York City or in other cities; and presentation within various disciplines (e.g., science, history, English)?

No hypotheses were formulated for this final question. Rather, it served as the basis for a grounded-theory inquiry (Creswell, 2013), generalizing from the two cases studied to propose a general model for a course that could be implemented in other schools.

Specific Aims

To complete this research, I:

1. Planned and conducted two courses focused on eco-justice at the Academy for Environmental Leadership High School in Brooklyn, New York. Course enrollments were 24 and 19, respectively.
2. Compiled case studies of the courses, based on the following forms of data:
 - a. materials considered for inclusion in each iteration of the course, along with notes concerning rationales for inclusion/exclusion and overall design of the syllabus;
 - b. students' self-reported actions and beliefs as measured before, during, and after the course duration;
 - c. student written work, analyzed through an iterative coding process to identify patterns in student work and elements suggestive of need for cognition; and
 - d. student grades.

Chapter II

Methods

The primary methodological strategy used is the qualitative case study. According to Creswell (2013, p. 73), “case study research involves the study of an issue explored through one or more cases within a bounded system (i.e., a setting, a context)”. Where, as in the present research, a comparative dimension is introduced, the number of cases included typically is small, due to the difficulties inherent in generalizing across contexts (Creswell, 2013). In an experimental design with multiple trials, it is crucial that researchers replicate conditions as closely as possible from one trial to the next, so that if any variables change from trial to trial, they can be closely controlled for. By contrast, in the multiple case study approach, researchers often will deliberately select cases that differ in significant ways—for instance, studying two or more programs that share the same goal but use differing approaches to achieve it (Creswell, 2013).

The two cases studied here represent two course offerings that shared the same basic goal: to facilitate student engagement with, and purchase on, central environmental issues. The courses were offered consecutively, the first in the spring term of the 2016-2017 school year, and the second in the fall term of the 2017-2018 school year. Both were offered as Advanced Placement (AP) English Language and Composition courses to students in grades 11-12. Although an English course, the curriculum specified that it should focus on nonfiction texts, allowing for the design and implementation of unit lessons and research projects focused on eco-justice, sustainability, and climate change.

As discussed below, the two iterations of the course differed in certain important respects. However, certain features of the course remained consistent. Most importantly, both maintained an eco-justice focus. Moreover, both incorporated local as well as non-local environmental issues for consideration, discussion, and elaboration through student work. In particular, both courses highlighted issues of climate change and social equity, including at the level of international governance. In both iterations of the course, specifically, students were expected to engage with and incorporate the following four guiding issues articulated by Paavola (2005, p. 8):

- What is the responsibility of developed countries for climate change impacts caused by their greenhouse gas emissions?
- How much assistance developed countries should make available for developing countries and how should developed countries share the burden of assistance?
- How should assistance be distributed between recipient countries and adaptive measures?
- How should planning and decisions regarding adaptation be made at different levels?

In other words, both iterations of the course sought to promote the type of systems-based pedagogy advocated by Cassell and Nelson (2010), encouraging students to make connections among local and non-local issues at various scales and complexity, both environmentally and in terms of social organization/governance.

Finally, both iterations of the course introduced students to action strategies, encouraging them to contemplate how individuals and groups can and do make productive interventions into both local and global environmental issues. It is crucial to leave students with a sense that environmental challenges, including climate change, are not insoluble and that there are specific forms of action they can pursue in order to make their voices heard. Given that this was a traditional, non-experiential course, this was the

primary strategy pursued to help students conceive of themselves as future change makers and leaders.

Brooklyn Connections Curriculum, Spring 2017

The course offered in the spring 2017 semester included 24 students, approximately equally divided by gender. This iteration of the course began by presenting a Brooklyn-focused environmental curriculum, developed by the Brooklyn Public library, which focused on how concern for Brooklyn's waterways helped stoke local environmental movements. (See Appendix for a more detailed summary of the course curriculum, including a selection of the documents used.)

After exploring the history of environmentalism in New York, students read three contemporary *New York Times* articles focused on, respectively, America's first 'climate refugees,' and attempts to resettle them; the voice of vulnerable populations in global climate talks; and projections for the new human migration patterns that have begun to emerge as the planet warms. These articles acted as a bridge between the local and global. Students were next introduced to the concepts of the global North and global South, historic and current carbon equivalent (CO₂e) emission rates, and debates concerning the responsibilities that various nations bear to reduce CO₂e emissions.

Part of the process in the class was to learn about the past, compare it to the present, and to make projections about the future. At the same time, as students came to view the environment through the lens of social justice and human rights issues, they were encouraged to discuss how these issues, past and present, affected the lives of real people, including the lives of young people in low-income communities of color

(allowing them to make connections to their own lives and the lives of people they know). Thus, they were prompted to engage, recursively, in considerations of eco-justice at both the local and global levels, and to draw connections and parallels among issues arising in various historical and geographical contexts and at various scales, ecologically and socially.

Climate Justice and Resiliency Curriculum, Fall 2017

A total of 19 students, approximately evenly divided by gender, took part in the fall 2017 iteration of the course. These students received the Brooklyn Connections materials around which the first course was based; however, the materials were provided for their own reference only. (See Appendix A for a more detailed summary of the course curriculum, including a selection of the documents used.) Instead, this iteration of the course began with a focus on climate justice. Specifically, students worked in groups to read, annotate, and present sections of a dynamic reader on the issue of climate change justice. Given that the reader focused primarily on international issues of equity, we used targeted discussions to make connections to local issues. Additionally, the course drew on the Resilient Schools Consortium (RISC) curriculum developed in New York City under a grant from the National Oceanic and Atmospheric Administration. Because the RISC curriculum is science-based, not all of the materials were relevant to an English curriculum. However, selective use of the RISC curriculum enabled students to focus specifically on New York-based issues, after their initial engagement with climate justice at the international scale, and it further allowed the course to introduce the important theme of resiliency.

Finally, the second iteration of the course allowed students much greater latitude in their selection of topics for independent research. In the first iteration, as noted, students were asked to limit their research to New York City-based questions. This time, they were allowed and encouraged to look further afield, framing their own questions regarding climate justice around local or global contexts.

Research Limitations

The school setting of the cases presented an important research limitation. The research seeks to understand how, ultimately, connection to issues of environment and sustainability can be promoted among students who may not view these issues as relevant to their lives. However, given the researcher's own posting at the Academy for Environmental Leadership, the respondent pool was already self-selected for students who have expressed an interest in the environment.

Although this is an important consideration that must be re-engaged when framing research results and suggesting how coursework on eco-justice might prove useful in other settings, the limitation is not as critical as it might first seem. This has to do with the specificities of the New York City public school system. At the high school level, all New York City public school enrollment is by application (i.e., students are not automatically enrolled based on their residence and 'catchment zones,' but must specifically apply to schools they wish to attend). Given wide disparities in school reputation, size, atmosphere, resources, and so on, student and their families typically consider a wide variety of factors when deciding which high schools to apply to. Anecdotal evidence strongly suggests that many students who apply to the Academy for

Environmental Leadership are attracted by the school's size, location, reputation for student support, and similar factors. Thus, they may have little prior interest in, or connection to, environmental issues. In the classroom it becomes obvious that a select pool of students does feel such a connection, and these students are much more likely than other members of their cohort to have participated in community gardens, youth run farmers markets, or other EE-guided service learning projects. As counter-intuitive as it may seem, however, the Academy as a whole often struggles to engage its students with issues such as climate change. Indeed, given the school's overarching focus on the environment, a significant number of students seem to experience 'issue fatigue,' and thus it becomes particularly challenging to promote meaningful engagement and a sense of personal connection to such topics.

This research was further limited by the relatively small sample size of the study, and the fact that the classes both took place in a single high school. Within case study research, however, it is not uncommon for researchers to focus on a single program, pilot study, or etc. (Creswell, 2013). Hence, the limitation does not suggest that the findings cannot be meaningfully generalized, particularly when as they are placed in the context of broader theories and bodies of research on environmental education. Moreover, since the Academy draws a significant proportion of its student body from low-income communities of color, the sample offered an appropriate basis for exploring how eco-justice might stimulate personal connection to the environment among this student population.

Finally, pressures of standardized evaluation and 'teaching to the test,' which have been discussed more generally above, exerted a significant impact on the

implementation of the course that formed the basis of this study. Given that it was offered as an Advanced Placement course, an additional layer of evaluation was present: students would have to pass a stringent exam if they hoped to receive AP credit for their participation. Consequently, time had to be carved out of class periods to review AP exam-taking techniques and to work one-on-one with students who were deficient in study skills. Focus on the AP exam, conversely, stoked an identifiable measure of student dissatisfaction. However, while the AP format may have exacerbated the classroom tensions that ‘teaching to the test’ inevitably introduce, such tensions currently exist in American public school classrooms across the board. Hence, if anything, the cases studied here merely reflected structural barriers to success in an accentuated form.

Chapter III

Results

Results from the spring and fall 2017 courses differed significantly. In the first iteration of the course, students generally demonstrated strong incorporation of main ideas and ability to write and reflect on them. However, despite the fact that the first course iteration began with emphasis on local contexts, there was relatively little evidence suggesting personal connection to environmental issues or to environmentally vulnerable populations in other contexts. Moreover, the results do not allow for the conclusion that students' environmental need for cognition (NFC) grew as a result of the course. In part, this may have to do with the fact that the forms of evaluation used in the course did not allow students adequately to demonstrate personal engagement or NFC. In this sense, the results may best be viewed as ambiguous. The second iteration of the course, however, provided far more robust evidence of engagement and connection to the issues studied, as well as increased NFC.

Spring 2017

Results from the spring 2017 iteration of the course suggested that students mastered relevant concepts and were able to reflect critically on environmental issues through the lens of environmental justice. This is best reflected by their responses to the end-of-term essay. For this assignment, students were asked to address the following

prompt, integrating ideas and information they had learned over the course of the semester:

Considering the fact that the United States and Europe have historically produced the highest rates on carbon emissions, is it fair for them to ask the global South (still developing countries), to stop developing in order to reduce their current carbon emissions? Furthermore, what responsibility does the global North (developed countries) have to ‘climate refugees’ and ‘climate migrants’?

The resulting essays provided a great deal of insight into students’ understanding of the materials as a whole, including ways that their engagement fell short of desired results.

One theme that consistently presented was that, while “climate change is a threat to all people,” marginalized populations were disproportionately disadvantaged and threatened by it (Student 1a). Students broadly suggested that the larger and more industrially advanced nations had created a problem that they now attempted to compel less developed and weaker nations to resolve. For instance, Student 2a wrote:

The United States and Europe are the two biggest reasons there is so much climate change, due to their huge amounts of carbon emissions. To make things worse, climate change does not affect the United States and Europe as much as it affects often smaller and less fortunate countries

Students 3a, 4a, and 5a continued this general trend of analysis, suggesting that it was unfair for the advanced industrialized nations to demand that less industrialized nations reduce their CO₂e emissions. Student 5a wrote:

The United States and Europe have historically produced the highest rates of carbon emissions, they are developed and comfortable; hence, it is not fair for them to ask The Global South, to stop developing in order to reduce their current carbon emissions. Instead of placing another burden of the rich onto the poor (vulnerable, soon to become climate refugees), the Global North should step up and pay the price for their own destruction and greatly slow down their own carbon emissions.

As the last sentence of the selection suggests, students were also fairly aligned in believing that the advanced industrial nations should shoulder the lion's share of remediation efforts, in part by making deep cuts in their own CO₂e emissions. However, students were less well able to articulate how such sweeping changes might be made, or to connect reductions in CO₂e emissions to daily patterns of living in the United States.

With regard to vulnerable populations, students generally suggested, once again, that the global North was to blame for the burdens such populations faced. Student 2a wrote, for instance: "Climate refugees are being forced to move from place to place because of anthropogenic climate change, mainly cause by the Global North." There was also recognition that climate burdens interacted with the social frameworks and cultural norms in the contexts where vulnerable populations live. In this regard, for instance, Student 3a noted that, "the global population of climate refugees do not have any legal protection supporting their basic human rights." Once again, however, there was a general tendency to over-diagnose the problem in terms of the global North versus the global South, and student essays paid relatively little attention to climate refugees within the United States. This further suggests they did not connect their own lives to the dilemmas faced by low-income communities of color who have been made vulnerable, for instance, in the wake of Hurricane Katrina. Rather, they viewed climate-vulnerable populations as inevitably belonging to other geographic contexts.

Fall 2017

Results of the first iteration of the course suggested that students might more engaged if they were allowed to pursue more open, self-guided research projects. In

addition to adding a more individually-tailored research component, the second iteration of the course incorporated the theme of resiliency, with the hope that this would help students to feel more inspired and empowered, allowing them to build a deeper sense of personal connection to the issues presented and, potentially, begin to consider their own roles as change agents.

After exploring local and global issues of climate justice, students in the second iteration of the course selected their own areas of research focus and, with guidance, established their own research questions. After conducting research, they wrote research papers that conformed to the ‘synthesis essay’ convention of the AP English Language and Composition curriculum. They then developed presentations that allowed them to share their findings with each other as well as, through special class meetings, with groups of underclassmen (9th and 10th graders).

The results of this final project suggest greatly enhanced engagement with and connection to the issue of climate change, as well as enhanced need for cognition. Enhanced need for cognition is evidenced both by the creativity and variety of topics students selected, as well as their pursuit of conceptual elaborations on traditional climate discourse.

For instance, Student 1b chose to research the differential impacts climate change has on men and women in an agricultural setting. As climate change exacerbates droughts and cultivation of familiar crops, the student found, men often move in search of work and/or a better place for their families to settle. As a result, women are burdened with both farm and household tasks, in a context where both have become increasingly difficult, due to dwindling resources. Just as women are disproportionately burdened

within the family system, the student analogized, communities of color are disproportionately burdened by the effects of climate change within wealthy nations. Hence, the student actively engaged with and applied systems thinking, drawing out the way that multiple levels of environmental burdens become nested and interact with one another. Moreover, this student clearly reflected deeply and creatively on the concept of climate justice itself, ultimately suggesting that climate justice would be better described and thought of as “climate injustice.”

Student 2b chose to tackle the issue of groundwater depletion. Presently, the student pointed out, groundwater supplies roughly a third of human water needs, including water for agriculture. Yet unlike other water sources, groundwater supplies are largely nonrenewable, and they cannot generally be purified once they become polluted. According to Student 2b, the only solution is to reduce the amount of water that we use; accordingly, he/she suggested specific, concrete actions that can be taken in order to reduce the demands made on this resource. In this case, the student went beyond the scope of the project requirements, in order to propose action on the issue. Overall, the presentation suggested a deep and active personal engagement with this topic.

Student 3b chose to investigate how climate change might impact education of children in southern Africa. The student wrote:

The results of climate change have caused education to drop from being the top priority in a child’s life to having them focus on things that otherwise would not be of any concern to them. Children are the real victims here, suffering the repercussions, facing adversity, all due to the fact that there are people and countries, globally, who still are not tackling this problem.

Once again, here the student demonstrates the ability to actively deploy systems thinking, drawing connections from local to global issues and among social and

environmental issues. Moreover, the selection of the topic suggests both deep engagement with readings by and about South African activist Kumi Naidoo, as well as a personal connection—making the link between the student’s own position as a young person seeking education and the situation of students in southern Africa.

Student 4b chose directly to tackle an issue of climate justice familiar to many low-income people of color, namely, the effect of rising temperatures. The student wrote:

In the United States, deaths due to increases in temperature, greatly affect poor communities of color. Heat related deaths occur at a higher percentage among African Americans (150-200 percent higher than white Americans). Cities tend to be hotter, affecting African Americans, as more African Americans live in cities than suburbs. Much of this is not brought to the attention of politicians, causing these communities to be underrepresented. Furthermore, issues of climate change are not the first problem on most African American’s [sic] minds. Jazzlyn Lindsey states: “many struggle, they have to decide if they should go down and help do something about climate change, or go and do something about police brutality or feed their kids.”

Given wide latitude to investigate climate-related issues, then, this student specifically chose to ‘bring the issue home’ and tackle a problem facing communities such as the one he/she comes from. Moreover, this student made a very personal connection to the triaging dilemma discussed earlier. This student presentation ended with a quote from Netroots Nation, which reads in part, “The topic of climate change often brings to mind images of melting glaciers and starving polar bears. For too long we’ve failed to connect the direct impact of environmental injustices, including climate change, on our lives, families, and communities.”

Finally, Student 5b decided to delve more deeply into the theory of climate justice, concluding that climate inequities were often veiled within systems of business and government, given the “inherent oppression weaved [sic] through them.” This

student reflected that the term climate justice was essential “for framing climate change as an ethical and political issue, rather than one that is purely environmental or physical in nature.” The student’s willingness to grapple deeply with discourses of climate change evidences both a high rate of personal engagement, as well as a need for cognition, in the form of assimilation of and elaboration on complex concepts.

Chapter IV

Discussion

Students in both iterations of the course demonstrated basic engagement with course materials and mastery of concepts; however, the second group of students, in Fall 2017, appeared to experience a far greater degree of connection to course themes, as well as enhanced need for cognition and ownership over their work. They were so deeply engaged with the materials that the students themselves came up with the suggestion of sharing their research with ninth and tenth graders, in the hopes of inspiring students in the lower classes and sparking their engagement with issues of climate justice.

During the spring 2017 course, students reported that they were interested in studying climate change through the lens of human rights and social justice issues. In discussions with the students it became clear that engaging in issues of climate change, environmentalism, and sustainability in this way was largely new to them. Exploring the Brooklyn Connections “Social Movements Project Packet: The Environmental Movement and Brooklyn’s Waterways,” interested them somewhat, based on the questions they asked and the time they spent on the materials. As members of marginalized communities themselves, students could relate to the immigrant experience during the cholera epidemics of 1832 and 1848-1849. In discussion they were able to relate the politics of the current medical treatments (or lack thereof) of marginalized communities. The students also showed empathy with individuals in the marginalized communities who lived near the heavily polluted Newtown Creek, now a superfund site.

Students did not provide a great deal of feedback on the excerpt from Rachel Carson's *Silent Spring*; some did, however, enjoy her short opening chapter, "A Fable for Tomorrow." They understood the piece as a poetic allegory on the effects of DDT, but they did not seem impacted emotionally by it.

Overall, students showed the most enthusiasm and asked the most questions when studying human rights injustices that accrue to the effects of anthropogenic climate change. Student inputs reflected that they generally agreed the global North has at least some degree of responsibility to the global South. For instance, during the 2016-2017 school year, Student 1a wrote:

Climate change is a threat to all people, but affects some more than others. The problem with climate change is that it causes problem after problem, especially regarding vulnerable populations; some face storms and floods, and then droughts, then those disasters are followed by crop failure, population growth and famine. All this leads to already vulnerable people suffering. Places like the United States and Europe are already developed; they are the ones causing most of the problems because they released the most carbon dioxide into the atmosphere. The problem now is that developing countries are trying to further develop and in order for that to happen they also have to release carbon dioxide into the air, causing further pollution.

Additionally, Student 4a wrote:

The United States and Europe historically have the highest rate of carbon emissions. They want other countries to stop doing things that produce carbon dioxide emissions so the amount currently being emitted will be reduced. I do not think this is fair of them to ask because many of these countries are undeveloped. The countries that should reduce carbon emissions are the United States and Europe, because they are the ones who produced higher rates in the past and already developed countries.

Re-teaching the course the following year, in fall 2017, I gave students a much greater degree of choice and ownership over their research and writing. Furthermore, I wanted them to not only understand the injustices surrounding issues of climate change, which can lead to a feeling of defeat, but explore means to resiliency in the face of

climate change. The only things I required of their research in fall 2017 was, 1) that they identified a topic of interest having to do with climate change or sustainability (locally or globally), which 2) also had some degree of human rights or social justice impact, and 3) that they attempted to address how that population could build resiliency.

Research topics included: effects of climate change on women living in poverty; the threat of groundwater depletion; the effects of climate change on education in southern Africa; the reasons that climate change has a greater adverse effect on poor communities of color; the effects of climate change and sea level rise on New York City; the worsening of natural disasters in the global South due to climate change; how climate change affects small island nations; how natural disasters caused by climate change adversely affect residents of the Caribbean; and how climate change affects global food supplies.

These research projects yielded multiple levels of engagement and critical reflection. For instance, Student 1b researched how climate change impacts women in society compared to men. Mexico is one of the countries identified where great inequalities exist in how climate change affects females versus males. The student argued that when natural disasters such as floods destroy food and other resources, women are typically the ones responsible for maintaining family resources. Based on this individual research, the student returned to the focus of the course, suggesting that climate justice: “addresses the challenges people face, but also how to protect groups of people, potentially more vulnerable to issues of climate change.”

The student who studied groundwater pointed out that groundwater is used in many parts of the world as a reliable resource, but it can be especially important to

populations in underdeveloped countries that cannot access surface water. Nevertheless, the student did not make the same stark differentiation between the global North and South as in student essays from the first course iteration. Rather, the student also discussed how groundwater depletion affects populations in the United States, pointing to the depletion of the Ogallala aquifer that feeds the Colorado River, as well as the role of groundwater depletion in California's recent water shortages.

When allowed to pursue their own research, a number of the students demonstrated a clear sense of connectedness to marginalized communities in various global contexts. For instance, Student 3b, who examined the toll of climate change on education in southern Africa, reflected on the issue with an abundant sense of empathy, writing that children in southern Africa, "are forced to focus on things that should not be on a child's mind, such as the lack of clean water and food." Moreover, the student noted that a major part of the problem was that "many people in Southern Africa are not even aware of how climate change is affecting them." This, in turn, provided a clear analogy to the learning that the students themselves were doing—empowering themselves by actively seeking to know more about climate change.

Moreover, they became excited by examples of concrete action that various communities had undertaken to build resiliency in the face of environmental disaster. For instance, Student 4b highlighted the example of a Jamaican community that organized to fight Shell Oil Corporation and take on the task of remediating their contaminated water supplies. Student 5b, who studied the effect of sea level rise on New York City, outlined strategies for protecting communities that would be most affected.

Building Out the Course

Overall, results from the second iteration of the course suggest that it is possible to promote high levels of student engagement and enhanced need for cognition among students who might otherwise feel disconnected from environmental issues. Notably, these results were achieved without revamping or replacing entire courses of study, and without the input of additional resources or partnerships with outside organizations. When properly orchestrated the focus on eco-justice itself can motivate and engage those students who are typically left behind by environmental education—members of low-income, urban communities of color.

Several findings emerge as key to considering how such a course might be reproduced in other contexts. First, despite the prevailing wisdom that students are best engaged with environmental education via immersion in the local, it does not appear necessary to begin with a focus on local communities and landscapes. Students are eager to make connections among various contexts. The key appears to be structuring classroom discussion and assignments to provoke and support regular reflection on, and connection to, students' own experiences within their schools and communities. Second, and in a related vein, encouraging students to frame and pursue their own eco-justice focused research projects appears to be central to promoting engagement and fostering need for cognition. Third, it is important that courses such as this include consideration of environmental resiliency. This both helps students to avoid the sense of hopelessness that can attend the study of grave environmental challenges like climate change and to begin to identify mechanisms for change and begin to conceive of themselves as change agents.

Conclusions

In his essay, “Stranger in the Village,” James Baldwin writes: “People who shut their eyes to reality simply invite their own destruction, and anyone who insists on remaining in a state of innocence long after that innocence is dead turns himself into a monster,” (Baldwin, 1955, p. 175). Baldwin is addressing issues of racial injustice in America; however, these lines are applicable to current understandings of anthropogenic climate change. Young people in urban environments, especially those being educated in low-income and underserved neighborhoods, make up a significant percent of the next adult generation in the United States. This generation of young people holds the power to ensure that the effects of climate change are mitigated. They also have the right to understand how issues of climate change could affect their own lives and the lives of their communities. It is imperative that public schooling provide the environmental education necessary to allow these students to engage meaningfully and reflect critically on environmental crises—and to begin to see possibilities for change.

The present study suggests that significant engagement with environmental issues can be promoted among students from low-income communities of color, without additional resources or outside partnerships. Nor is it necessary for environmental education to focus solely on local contexts or to move study out of doors. Rather, by emphasizing the nexus of social justice and environmental challenges—particularly climate change—students readily begin to connect the dots between the forms of inequality and oppression they have witnessed in their own lives and communities and the grave environmental challenges facing other communities across the nation and around the globe.

Appendix

Select Curricular Materials

- DOCUMENT 1: Article. “Cholera in Brooklyn.” *Brooklyn Daily Eagle*. 20 Sept. 1849: 2. Cholera pandemics ravaged New York in 1832 and again in the winter of 1848–49, killing more than 8,500 people. Doctors had little understanding of cholera until 1854 when a London doctor discovered that the disease was carried by contaminated water. Due to lack of proper sanitation, many people disposed of their waste dangerously close to places from which they took their drinking water.
- DOCUMENT 2a: Map. Fulton, Henry. *Atlas of the City of Brooklyn New York*. New York: J.B. Beers & Co., 1874.
- DOCUMENT 2b: Postcard. *Water Tower, Brooklyn, NY*. 1911. Brooklyn Collection, Brooklyn Public Library.
- DOCUMENT 2c: Print. “The Soldier Memorial Arch to Be Erected in Brooklyn.” *Harper’s Weekly*. 1874.

A fear of diseases and the immigrants and laborers who allegedly spread them encouraged wealthy New Yorkers to build reservoirs. In 1842 the Murray Hill Reservoir, located on 42nd Street in Manhattan, opened. The Mount Prospect Reservoir, built alongside Prospect Park, was completed in 1856. Not only did these reservoirs provide clean water to local residents, but they also provided areas for recreation and strolling.

- DOCUMENT 4: Book. Carson, Rachel. *Silent Spring*. New York: Houghton Mifflin Company, 1962.

In 1962, Rachel Carson, a marine biologist for the U.S. Fish and Wildlife Service, published *Silent Spring*, a devastating description of the disastrous effect on wildlife, water supplies and the food supply from insecticides, such as DDT, used in gardening and agriculture. The title comes from what Carson saw as the inevitable consequence of the irresponsible use of insecticides: a spring without birds.

- DOCUMENT 6: Newsletter. Community Environmental Health Center at Hunter College. “Hazardous Neighbors? Living Next Door to Industry in Greenpoint-Williamsburg.” 1989. Brooklyn Collections, Brooklyn Public Library.

In 2007, New York State Attorney General Andrew M. Cuomo launched a landmark legal action against the ExxonMobil Corporation, as well as four other companies, to force the cleanup of a roughly seventeen-million-gallon oil spill that polluted an estimated one hundred acres in Greenpoint, and to restore Newtown Creek, the contaminated 3.5-mile-long waterway that separates Queens and Brooklyn and flows into the East River. Newtown Creek is listed as a superfund site. A superfund site is an uncontrolled or abandoned place where hazardous waste is located, possibly affecting local ecosystems or people. Newtown Creek is one of America’s most polluted waterways (Bopp et al. 134).

Environmentalists could not agree on the need to clean up polluted sites such as Newtown Creek; they also did not agree on the causes of and solutions to the pollution. In the late 1980s, a group of activists in poor minority communities came together to

emphasize the racial and class biases they saw in pollution sites and official government and business clean-up priorities. This “social justice environmentalism” highlighted pollution in places like Newtown Creek and Gowanus Creek.

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Ancillary Appendix
Student Contributions

Student Responses 2016-2017

Students were asked to synthesize information and address the following prompt:

Considering the fact that the United States and Europe have historically produced the highest rates on carbon emissions, is it fair for them to ask the global South (still developing countries) to stop developing in order to reduce their current carbon emissions? Furthermore, what responsibility does The global North (developed countries) have to "climate refugees" and "climate migrants?" Through exploring climate change as a social justice and human rights issue, students were engaged in this unit and final essay.

Their responses included the following.

Student 1a:

Over the past century, global carbon emissions have tremendously increased due to population growth, human activity and industrialization, largely due to countries that are currently developed. Climate change is a threat to all people, but affects some more than others. The problem with climate change is that it causes problem after problem, especially regarding vulnerable populations; some face storms and floods, and then droughts, then those disasters are followed by crop failure, population growth and

famine. All this leads to already vulnerable people suffering. Places like the United States and Europe are already developed; they are the ones causing most of the problems because they released the most carbon dioxide into the atmosphere. The problem now is that developing countries are trying to further develop and in order for that to happen they also have to release carbon dioxide into the air, causing further pollution. There is controversy about making the Global South reduce their carbon emissions. It is unfair to ask them to stop developing because every country should have a chance to develop, but by allowing them to develop the need to reduce carbon emissions is not going to be addressed. Single space and indent all these long quotes

Industrialization is a big factor when it comes to the large amount of carbon emissions being released into the atmosphere. Through history, we seen how the United States relied on industrialization to develop its economy; however, while doing so it was also harming the environment. In *The New York Times* article, “Resettling the First American ‘Climate Refugees’”, it states: “since 1995, more than 90 percent of the island’s original land mass has washed away. Channels cut by loggers and oil companies eroded much of the island.” This explains how due to human activity and companies operating business, it caused the land on Isle de Jean Charles in Louisiana to decrease, limiting the amount of space there is for people to live and has caused many to move to a different location. Most of the people who live there are the decedents of the Biloxi-Chitimacha-Choctaw tribe, Native Americans are a marginalized group in the history of the United States. In “How a Warming Planet Drives Human Migration”, it states: “many have left their homes because climate change has made their lives or livelihoods untenable.”

Around the world, people in places such as: the Amazon Basin, Lake Chad, Syria, China and the Philippines have had to move due to climate disasters.

Obviously, carbon emissions should be reduced. Discussions on how this is going to happen need to be held. However, it is unfair for the Global North to ask the Global South to stop developing. There should be another method to reduce climate change. The Global North needs to help the Global South figure out ways to develop while reducing carbon emissions. The Global North also needs to help vulnerable populations in their own countries.

Climate change is the most significant problem our global community faces. It needs to be addressed in a timelier manor. All countries, as a whole, have to come to an agreement and contribute to the reduction of carbon emission. However, as the Global North is already developed, I feel they have the greater responsibility to reduce emissions and help those countries that are still developing. Furthermore, the Global North might have to take in climate migrants and refugees. The Global South should not be the only countries responsible for decreasing carbon emissions, it is necessary that every country come to an agreement, and the Global North needs to support the Global South in this transition.

Student 2a:

Climate change has cause problems all around the world. Some places are experiencing issues due to climate change worst [sic] than others. Climate change is mainly caused by carbon emissions. The United States and Europe are the two biggest reasons there is so much climate change, due to their huge amounts of carbon emissions.

To make things worst [sic], climate change does not affect the United States and Europe as much as it affects often smaller and less fortunate countries. Also, due to dramatic climate change, some places are becoming so warm and the weather so severe; the people who live there are not used to the changes and cannot live their lives. This causes people to become climate refugees. A climate refugee is someone who is forced out of their country due to the environment change.

The New York Times states: “Nearly 15 million people have been displaced by typhoons and storms in the Philippines.” Countries like the Philippines are being badly affected due to climate change; however, the majority of climate change is not even their fault. This circumstance is very unfair; they are suffering for something they did not cause. “Global giants,” such as the United States and the continent of Europe, caused the majority of climate change, but they are not suffering as much as smaller, more vulnerable, countries. Climate refugees are being forced to move from place to place because of anthropogenic climate change, mainly cause by the Global North. In my opinion, this is not right; it makes the United States and Europe look like bullies to less fortunate countries.

Student 3a:

According to the “A Filthy History Interactive Map: Which countries have emitted the most carbon since 1850?” the United States and Europe are the two places that have emitted the most carbon dioxide since 1850. It is not fair for the countries that have emitted the most carbon emissions to ask countries that are still developing to stop

developing. It is largely their fault and they should take the majority of responsibility for our current situation.

Climate Change is felt more in low-income countries. It is the poor who suffer more during disasters. Countries that are still developing are more likely to be impacted by climate change, largely because so many more of the world's poorest live in tropical latitudes. This is inverse to which countries are most responsible for climate change, mainly developed countries that benefited early on from industry, and thus have historically higher emissions, compared with still developing countries that have only begun catching up in the past few decades. Those living in low-income countries also have the most to lose, as so many depend on agriculture, which is likely to be badly affected by temperature rises and an increase in droughts. For example, according to "How a Warming Planet Drives Human Migration:" "In 2007, eastern Syria along Turkey, Northern Iraq, and Western Iran entered a three year drought. In Syria water scarcity, crop failures and livestock deaths drove an estimated 1.5 people to the cities from rural areas." Furthermore, in addition to the drought crisis, Syria has been experiencing years of a horrible civil war.

Developed countries should take responsibility for climate migrants and climate refugees. It is difficult to determine whether a person is fleeing their home because of an environmental disaster, lack of work, or the established long-term impacts of climate issues, like drought or rising sea levels, but one thing is clear, the global population of climate refugees do not have any legal protection supporting their basic human rights. I believe the places that have historically emitted the most carbon dioxide are the ones who should take action. According to "The Human Cost of Natural Disasters 2015: A Global

Perspective:” “Historically, the Global North of industrialized nations (the United States and western Europe) has contributed most to global warming.” It makes sense that those places are the ones that should take action. Climate change is undoubtedly the product of human causes. So we all need solutions to help reduce greenhouse gas emissions.

Student 4a:

The United States and Europe historically have the highest rate of carbon emissions. They want other countries to stop doing things that produce carbon dioxide emissions so the amount currently being emitted will be reduced. I do not think this is fair of them to ask because many of these countries are undeveloped. The countries that should reduce carbon emissions are the United States and Europe, because they are the ones who produced higher rates in the past and already developed countries.

Climate change directly affects the lives of peoples globally. According to the *New York Times* article, “‘Vulnerable Voices’ Lash Out as Companies Sway Climate Talks:” “Chebet Maikut, the delegate for Uganda, an East African country recently hit by drought, said undue corporate influence could derail the talks by weakening or delay emissions goals.” Meaning, corporate influence, due to money and power, most often speaks more loudly than suffering countries. In the same article, it says: “the influence of tobacco companies was limited at the 2003 framework convention on tobacco control, which ultimately led to worldwide restrictions on their advertising and sponsorship, supporters say,” showing how corporate influence needs to be limited, in order for fair decisions to be made.

Student 5a:

Considering the fact that the United States and Europe have historically produced the highest rates of carbon emissions, it is not fair for them to ask The Global South (still developing countries), to stop developing in order to reduce their current carbon emissions. Furthermore, The Global North (developed countries) have a responsibility to "climate refugees" and "climate migrants," because developed countries are primarily responsible for the climate change epidemic affecting these groups of people. Three articles from the New York Times explain this in depth: "How a Warming Planet Drives Human Migration", "Vulnerable Voices Lash Out as Companies Sway Climate Talks", and "Resettling the First American Climate Refugees".

Jessica Benko is the author of "How a Warming Planets Drives Human Migration". In her article, she explains how, most often, populations who caused climate change are the ones least affected by it, stating: "Climate change is not equally felt across the globe." She goes on to say: "Climate change is a threat multiplier: It contributes to economic and political instability and also worsens the effects. It propels sudden-onset disasters like floods and storms and slow-onset disasters like drought and desertification; those disasters contribute to failed crops." Mostly places that are greatly impacted by storms, floods and desertification are the less-developed areas, even though the developed areas are primarily responsible for climate change. Benko explains how poorer areas are paying the price for urban industrial development.

In the article "Vulnerable Voices Lash Out As Companies Sway Climate Talks" the conversation continues on the Global North vs. the Global South, explaining how it is rather contradictory and ironic to tell developing countries to stop developing after

developed countries have already put their fair share of pollution into the atmosphere during their own development. The article sites how powerful companies in developed countries are “Drowning out the voices of developing nations,” this is a perfect way of describing the relationship between the Global North and the Global South, representing how the Global North blind sides the needs of the Global South to develop.

In their article, “Resettling the First American Climate Refugees”, Coral Davenport and Campbell Robertson address issues of climate justice, but their views are seen through the lens of a slightly different perspective, that of a Native American tribe in southeastern Louisiana, whose land is on its way to destruction due to the effects of climate change. Knowing that they are a Native American tribe, there is only “so much pollution” they could have contributed to the atmosphere, considering that they are practically not industrialized. With this in mind, one can see, again, how the ones who did not contribute as much to climate change are the ones most greatly affected, even within the United States. The government has finally recognized that the tribe was in trouble, and offered to relocate them, but the tribe denied, explaining that they would lose all they built there over generations. Stating: “We’re going to lose all our heritage, all our culture... It’s all going to be history.” The government also failed to realize that not every community will welcome a migration of minorities into their population. It could cause tensions between established communities and relocated refugees; hence another reason the Natives did not want to leave their homes.

Davenport and Robertson explain how more vulnerable populations are paying the price for the Global North’s contribution to climate change, stating: “Around the globe, governments are confronting the reality that as human-caused climate change

warms the planet, rising sea levels, stronger storms, increased flooding, harsher droughts and dwindling freshwater supplies could drive the world's most vulnerable people from their homes. Between 50 million and 200 million people — mainly subsistence farmers and fishermen — could be displaced by 2050 because of climate change.” When these farmers and fisherman are forced from their homes, where will they be placed? Who will help them adapt to their new communities? Will moving them cause other problems, such overpopulation and lack of food? Why cannot the Global North address previous carbon emissions and support the Global South, in order to preserve the only Earth we have.

The United States and Europe have historically produced the highest rates of carbon emissions, they are developed and comfortable; hence, it is not fair for them to ask The Global South, to stop developing in order to reduce their current carbon emissions. Instead of placing another burden of the rich onto the poor (vulnerable, soon to become climate refugees), the Global North should step up and pay the price for their own destruction and greatly slow down their own carbon emissions. The Global North has a responsibility to the "climate refugees" and "climate migrants;" hence, they should greatly slow their production rates, and support the Global South's development through sustainable means. This will give the Global North the chance to vindicate themselves and separate their name from the horrible reputation of damaging the Earth. Hence, creating more prosperous nations and a world full of harmony.

I chose these samples of student work because they are representative of the essays the students produced as a class. This traditionally marginalized student population (students of color, living and attending school in low-income urban

neighborhoods) was engaged in climate change after studying it as a social justice issue. They felt a connection to what they were reading, discussing and researching; however, through the experience of teaching this unit, I concluded that my students would be even more engaged if their area of research was more self-guided. Furthermore, to foster the sense of empowerment I hoped them to experience, I knew their research would need to touch upon some element of building means to resiliency—especially if they were going to feel empowered and inspired to share with students outside our classroom community.

Student Responses 2017-2018

Students explored local and global issues of climate justice, they then chose an area of focus and established their own research questions. Students conducted research, wrote research papers (synthesis essays, as termed in the AP English Language & Composition curriculum), and then developed presentations to facilitate sharing their work within our classroom setting and with underclassmen (9th and 10th graders). Student responses included the following.

Student 1b:

Climate justice is the study of how climate change affects issues of social justice and human rights. It addresses the challenges people face, but also how to protect groups of people, potentially more vulnerable to issues of climate change. Furthermore, climate justice aims to build resiliency to the impacts of climate change, and ensure that the benefits of building resilience and climate mitigation are fairly share among the public. One might think of climate justice as climate injustice, as there are a lot of negative impacts happening to the public, especially to certain groups of people, such as women.

For example, many women are more adversely impacted by climate change. When natural disasters occur, such as hurricanes, tornadoes, storms, flooding or earthquakes, women are more vulnerable to these natural disasters due to their many responsibilities: taking care of their family, cooking, cleaning and farming. The question arises: How are women more significantly impacted by climate change worldwide, than their male counterparts, especially related to natural disasters and environmental change? Women worldwide greatly struggle to make ends meet, for the survival of their family and themselves. Some challenges they face include: having limited amount of resources for household work, and not having as much power or authority as the men. These factors can lead to severe negative impacts for women.

Most often, climate change more severely impacts the role of a woman than a man. One of the many ways women can be negatively impacted is by not being able to perform household duties for their families. Men on the other hand, often do not have these responsibilities. In the book, *Climate Change and Gender Justice*, edited by Geraldine Terry, in Chapter 7, “Gender, water, and climate change in Sonora, Mexico: Implications for policies and programmes on agricultural income-generation,” Stephanie Buechler writes: “These women are highly dependent on natural resources such as water for household tasks, and frequently for farming.” This demonstrates how without having natural resources, such as water for cooking, cleaning and washing, woman cannot complete their day to day responsibilities; it prevents them from being to address their basic means of survival.

Buechler continues: “These events can threaten women’s livelihoods more than men’s due to both gendered responsibilities within the household and gender constraints

to labor market participation.” This shows gender inequalities in this population in Mexico, as women are only expected to do a small number of things, while men do not have limits and can engage in whatever they please. Women are more likely to be expected to be home taking care of the family, while men get to go out and work; women are most often not encouraged to participate in such activities such as getting jobs.

Another way women are impacted by climate change is due to a lack of resources. In Chapter 2, “Gender and climate hazards in Bangladesh,” Terry Cannon writes: “The loss of essentials and other household essentials is a great hardship, and flood’s also undermine women’s wellbeing in general because of their dependence on economic activities linked to their home.” Since women are in charge of the house, losing the items they depend on due to floods weakens their power in terms of the roles they play as housewives and mothers. It leaves them with little authority due to the loss of their most important tools. Cannon continues: “Losses of harvest and livestock have a disproportionate impact on women, many of whom rely on food processing, cattle, and chickens for their cash income.” Losing food due to climate change related natural disasters puts women in greater jeopardy, since they will not be able to provide for their family, nor will they be able to sell food to generate needed income. Furthermore, due to the pressure of gender roles, they do not have other ways to produce income.

Women are also more severely impacted by natural disasters caused by climate change since they have to deal with more responsibilities by themselves, many do not have a great support system. According to Chapter 4, “Gendering responses to El Nino in rural Peru,” Rosa Rivero Reyes writes: “These widespread and profound inequalities put poor women (and their children) in a situation of particular vulnerability to food

insecurity during El Nino.” This states how the dramatic impact of climate conditions and change cause negative effects on poor women due to their vulnerable position. For example, they, and their children, face a great degree of food insecurity. Reyes continues, “Equally, the increased burden of household and agricultural work placed on women in the absence of men cause an acute limitation to their ability to seek paid employment.” Again, this shows how gender roles projected onto women limit their ability to bring income into their homes. Natural disasters, due to climate change conditions, make it even harder on them, as these conditions make the household work they are expected to manage even more difficult.

Last, but not least, poor women are affected more harshly by climate change because they are regarded as lesser to men. Due to gender inequality, which puts women into specific categories, they are kept from doing things that men are encouraged to do, such as getting jobs and holding land in their name. According to Chapter 5, “Engendering adaptation to climate variability in Gujarat, India,” Sara Ahmed and Elizabeth Fajber write: “Women from small and marginal land holding families, where male migration is high, often do not have clear legal title over land, either in their name, or jointly with their husbands, despite land reforms and changes in their property law.” This shows how women are not viewed as equals to men, and are not even treated as a partner to their husbands. They continue, “Gender inequality also affects women’s access to information and communications which could ensure their safety, and the safety of their dependents.” This illustrates how, due to inequality, the lives of women and their children are put at risk, making them more vulnerable due to the mere lack of access to information.

These are just some of the way women are more adversely affected by climate change than men, especially in developing societies. Regardless of what women experience, the vast majority of them still manage to stay strong and try their best to provide for their families, as they are often driven by the need to care for their children. Some women are able to support other women as allies, in order to remain resilient in the face of natural disaster caused by climate change.

Student 2b:

Question: How does the depletion of groundwater impact people throughout the world?

Groundwater is the largest source of usable freshwater in the world and is held underground in the soil, or in pores and crevices in rock. Groundwater is used in many parts of the world as a reliable resource, especially in underdeveloped countries that cannot access surface water. The amount of groundwater being used is growing twice as fast as global population.

Groundwater is a resource that is depended on throughout the world. Large countries, such as the United States, depend on groundwater. About 23% of freshwater used in the United States comes from groundwater sources. According to the USGS Water Science School: “groundwater is the source of about 33 percent of the water that county and city water departments supply to households and businesses (public supply)”. Groundwater is supplied not only households and businesses, it is also distributed to many industries, community services such as fire fighting, community swimming pools, and major attractions, such as amusement parks.

The largest amount of groundwater goes to agricultural purposes. A lot of this water is used for irrigation; which helps grow crops, maintain landscapes, and produce a new growth of vegetation on soil in generally dry areas and during periods of insufficient rainfall. According to the article, “A Glass Half Empty,” by Bruce Pengra: “Across North Africa and in the Arabian Peninsula, enormous reserves of nonrenewable groundwater have enabled large irrigation projects in the middle of the Sahara and Arabian Deserts.” This is an example on how important and beneficial groundwater can be; however, once this water runs out, there will be no more available from that source.

Since groundwater is very beneficial worldwide, and is a big part of our daily lives, there are many issues that come with its depletion. Some of the negative effects of groundwater depletion are the drying up of wells, reduction of water in streams and lakes, deterioration of water quality, increased pumping costs, and reduced land subsidence. Over 30% of the Earth’s freshwater is groundwater, and it distributed unevenly around the globe.

According to Bruce Pengra’s article, “A Glass Half Empty,” he states: “aquifers in some of the world's major agricultural regions, including China, India and the United States, all of them crucial to the food security of 100s of millions of people, are being exploited unsustainably”. This shows how large countries are using up large amounts of nonrenewable groundwater at a very fast pace. He also states: “Even when abstraction does not exceed recharge, it can alter complex aquifer system dynamics, decreasing spring and stream flow and degrading water quality.” This is implying that there will be an insufficient amount of water remaining, which can change the environment around these water resources. Groundwater depletion can also affect many arid (dry) areas by

causing environmental damage, changing ecosystems, making them almost impossible to function. This type of change can greatly affect the food supply in these areas and the people depending on these food sources.

The depletion of the Colorado River and the Ogallala aquifer are examples of large groundwater reserves that are being depleted, despite how necessary they are to the economy and well being of the people they serve. According to Brian Walton's article, "Climate Change Amplifies Groundwater Depletion, Threatening Food Supply," he states: "A National Research Council report argues that groundwater use today is leaving society poorly prepared for potential rapid climate changes in the future." Due to the fact that groundwater is a very essential factor in agriculture, which we rely on, if it is used up it will be difficult for mankind to maintain its food supply.

[In] Richard A. Lovett's article, "Groundwater Depletion Accelerates Sea-level Rise," he states: "Groundwater depletion will soon be an important factor in contributing to sea-level rise as the melting of glaciers other than those in Greenland and Antarctica, scientists say." He also states: "water pumped out of the ground for irrigation, industrial uses, and even drinking must go somewhere after it's used—and, whether it runs directly into streams and rivers or evaporates and falls elsewhere as rain, one likely place for it to end up is the ocean." Therefore, groundwater depletion can contribute to sea-level rise.

What can be done to reduce the amount of groundwater being depleted? We can reduce the amount of water we use that is unnecessary.

Student 3b:

Question: How do the increasing consequences of climate change impact the education level of children in Southern Africa?

Climate change, one of the key issues in today's society, has changed the way people live for a long time, more notably, in the 21st century. Not only has climate change raised our global average temperatures tremendously, but also, in the future it will see the fall of some of the most vulnerable nations in our world, including our children. The results of climate change have caused education to drop from being the top priority in a child's life to having them focus on things that otherwise would not be of any concern to them. Children are the real victims here, suffering the repercussions, facing adversity, all due to the fact that there are people and countries, globally, who still are not tackling this problem.

One of the reasons why climate change has affected children the most is because many people in Southern Africa are not even aware of how climate change is affecting them. This has taken a toll on the young children living there, since they are unable to study and get to school, as they are forced to focus on things that should not be on a child's mind, such as the lack of clean water and food. The article, "Why Climate Change Is An Education Issue," written on July 4, 2016, by Felipe Calderon, discusses the effects that are produced when people are not aware of the situation occurring around them and hence are not able to address the issue.

Calderon states: "These figures are discouraging, but they can be improved. A Yale study concluded, 'educational attainment tends to be the single strongest predictor of public awareness of climate change. By investing in quality education, we can set the next generation on the right path to addressing this global problem.'" This quote

highlights the fact that by providing children with the right tools and putting education at the forefront of the world's priorities, children can have a brighter future, one where they are secure. He also writes about how misguided information about climate change increases the negative effects on the environment.

The debate on whether or not education should be a top priority still remains unresolved. There are many different perspectives that should be taken into consideration, as well as lives to consider. The way we, as a society, communicate our opinions often does more harm than good, because most of us, at least in the Global North, have this idea that we as consumers have to buy and thrive as individuals. The idea of neoliberalism (Neoliberalism article) discusses the concept of people coming together as groups, in order to conserve more of our supplies and ensure that our future will be secure. According to the article: "Neoliberalism has conned us into fighting climate change as individuals," the author makes the argument that society has been managing life completely wrong, especially as far as human health and education goes.

If children are our future, then should not a greater effort be put into saving the environment that they will one day inhabit? It is the sacrifices that are the hardest that will benefit us in the Global North, and the more vulnerable in the Global South, in the long run.

Student 4b:

Climate justice is a term used to address climate change as an ethical and political issue. Climate change is not only an environmental issue; it affects communities in many ways, especially poor communities of color globally. Climate change cannot be

easily stopped or the effects reversed; however, one thing is certain, the global community needs to work together in order to address the greatest challenge of our time.

Climate change more adversely affects poor communities of color. Jacqueline Patterson, the director of the NAACP Environmental and Climate Justice Program, states “she recognized environmental injustice decades ago while working in Jamaica, where Shell Oil contaminated community water supplies.” In this piece, Patterson explains how the community with the contaminated water had to come together and raise money themselves, to address an issue caused by a big company.

In the United States, deaths due to increases in temperature, greatly affect poor communities of color. Heat related deaths occur at a higher percentage among African Americans (150-200 percent higher than white Americans). Cities tend to be hotter, affecting African Americans, as more African Americans live in cities than suburbs. Much of this is not brought to the attention of politicians, causing these communities to be underrepresented. Furthermore, issues of climate change are not the first problem on most African American’s minds. Jazzlyn Lindsey states: “many struggle, they have to decide if they should go down and help do something about climate change, or go and do something about police brutality or feed their kids.”

Climate justice is one of the greatest racial and social justice issues of our time. This is based on numbers provided by some of the world’s top researchers. Climate change is contributing to many extreme weather events, including: droughts, intense flooding, heat waves, blizzards, and many deadly hurricanes. It is estimated that climate change, due to pollution from fossil fuels, will have caused over a 100 million deaths by

2030. This will be many more deaths than World War I and World War II combined. It is also believed that many of these are going to be poor people of color.

An example of a climate related natural disaster affecting poor people of color is when Hurricane Mitch hit Honduras in 1998. After all the destruction of the hurricane (it is estimated that over 7,000 people died), a disease known as the coffee disease spread killing almost all of the country's primary crops, destroying 50,000 jobs. Later came a drought, causing over 100,000 families to be placed on emergency food aid. The government cites Hurricane Mitch as the reason they have so many people joining gangs for income and protection. This is a human rights issue that still affects Honduras today.

In an article posted by Netroots Nation, it states: "The topic of climate change often brings to mind images of melting glaciers and starving polar bears. For too long we've failed to connect the direct impact of environmental injustices, including climate change, on our lives, families, and communities. The effects of climate change are widespread: people die from exposure to toxins from coal fired power plants and are sickened from breathing toxic air from mountaintop removal.

Drought and flooding impact the availability of nutritious food and increase the likelihood that those in flood-prone cities will lose their homes and livelihoods. And communities of color and low-income communities are usually hit the hardest." This idea is very important, when many think of climate change they think of animals and glaciers, and while nature is affected, people cannot forget about the great human impact, especially on poor people of color.

When Hurricane Katrina hit New Orleans, it affected many people, but mainly people of color. The city of New Orleans seemed to favor the white population, fixing

their homes and neighborhoods first. Katrina is just one of many examples of how structural racism affects communities of color; they are often left to deal with the consequences of climate change on their own, unable to rely on help from the government. The United States government has been able to find billions of dollars to help the fossil fuel industry, but has given communities of color very few resources to help after natural disasters. In a article it states “ Moreover, the CEOs making big bucks off coal plants, waste facilities, pipelines and factories emitting even more CO2 into the air are worsening our climate and heating the planet. Not to mention that coal plants are more likely to be built in areas inhabited by low-income people of color, indigenous people and immigrants.” The United States government spends more money helping companies get richer than it does on protecting poor communities of color from issues of environmental racism.

In an article, that explains the impacts of climate change on climate justice, it states: “Climate change is not an isolated problem. It is interconnected with other challenges including inequity and racial injustice. While climate change affects us all, poor communities, communities of color, and indigenous people are often most affected. These communities disproportionately live in climate-vulnerable areas and face a greater risk of getting sick or losing their livelihoods when weather disasters strike. For climate activism to truly succeed, the movement and its leadership should better reflect our society and those most affected.” This is sadly very true. For now, if governments are not going to protect their people, the people need to inform each other, in order to best protect themselves.

Student 5b:

The term “anthropogenic climate change” refers to climate change due to the emission of harmful gases into the atmosphere by humans, destroying the ozone layer, trapping more of the sun’s harmful rays onto the Earth. Hence, the Earth’s temperature is hotter, causing the melting of ice caps, which results in rising sea levels. Rising sea levels cause plenty of harmful effects, such as: flooding, land space reduction, agricultural failure and water pollution. These issues can contribute to the death or downfall of a community and its people. Clearly, any further negative contributions to the atmosphere should be avoided at all cost.

Often, the damaging effects of climate change are thought to more greatly affect the Global South or non-urbanized areas of the world, but in actuality, the effects of rising temperatures affect urban areas as well. This interactive map illustrates flood evacuation plans in place in New York City, due to predictions on sea level rise in the near future: <http://cuspmmap.org/NYC/>. The map shows the potential areas of evacuation, areas that are more likely to be harmed, not if, but when, sea levels begin to rise. This is important because it shows how urban areas, in this case New York City, are affected by climate change. It is important to remember, populations need to address climate change not only when it is close to home, but globally, respecting everyone’s humanity, understanding that we are all ultimately tied together.

Throughout the world, the people who have been the main contributors to climate change are largely the ones who are least affected. There is a notion that only small islands and parts of the Caribbean are the ones who suffer “simply bad weather,” but this is a misnomer. When individuals continue to section off these places, and blind

themselves to reality, they become more susceptible to the threat of climate change, and hence, become victims of climate injustice.

Within many corporate, governmental and political systems, and the inherent oppression weaved through them, the term “climate injustice” is often hidden. Climate justice is a term used for framing climate change as an ethical and political issue, rather than one that is purely environmental or physical in nature. A fundamental proposition of climate justice is that those who are least responsible for climate change suffer its gravest consequences. A prime example is people in inner cities, as depicted on the map, “Climate Central Surging Seas Website”: <https://ss2.climatecentral.org>. The map includes a description, which states: “Scientists agree that climate change has been driving a rise in global sea level, and the rise will accelerate, leading to ocean intrusion on land and aggravated coastal flood risk.

Over 1,000 global tide gauges shown on the map, illustrated by bulls-eyes, give downloadable local projections for sea level rise through the year 2200.” This indicates that within the near future, there will be outrageous flooding within New York City. The parts that will be primarily affected, and hit the hardest, will be neighborhoods along the coastlines of NYC, which are often neighborhoods where poverty and people of color are very present. Given that poor people of color are most often the least contributors to climate change, the rhetorical question stands: “Why are people of color still the ones who suffer the greatest from the effects of climate change when they most often contribute the least?” The answer: environmental racism.

Regarding climate change, it is very common for individuals to feel like the damage is “completely undoable,” especially when a population is marginalized and feels

powerless in general. This, of course, is not entirely true. When it comes to topics revolving around climate change, individuals' mindsets need to shift from a fixed mindset to a growth mindset. It is important to heed that anything that was done, can indeed be undone; it just requires multistep processes. For example, the report, "National Climate Assessment": <http://nca2014.globalchange.gov/> thoroughly explains the steps necessary to not only prevent more damage from happening in the future, but also repair the damage that has already been cause. The report states: "Mitigation refers to actions that reduce the human contribution to the planetary greenhouse effect. Mitigation actions include lowering emissions of greenhouse gases like carbon dioxide and methane, and particles like black carbon (soot) that have a warming effect. Increasing the net uptake of carbon dioxide through land-use change and forestry can make a contribution as well..."

The amount of future climate change will largely be determined by choices society makes about emissions. Lower emissions of heat trapping gases mean less future warming and less severe impacts. Emissions can be reduced through improved energy efficiency and switching to low-carbon or non-carbon energy sources." While illustrating the steps society can take as a whole, to heal and reverse climate change, this text also reveals (without directly saying) how the government of the United States is not currently taking the rights steps, due to a president who does not believe in anthropogenic climate change. As a result, the United States is now taking very minute steps (if any) towards mitigating climate change, thus leaving many people to suffer. Of course, factory and corporate owners could slow down their own emissions, but why would they? They are making such huge profits; hence feeding themselves and the rich off of the "more than enough plate", which of course, is just creating a wider gap between the rich and poor.

Sadly, much of this could be addressed by taking the right steps in the right direction. By simply putting carbon/methane emission restrictions in place, many issues of social justice would be addressed.

Repairing the damage caused to the atmosphere by anthropogenic climate change will indeed be a long and very hard journey; it is not an impossible one though. This issue, on all levels, global, national and local, needs to be viewed as a priority.

Devastatingly, it is not receiving the recognition it deserves from the United States government. However, there are many world leaders who are making the right decisions, and local leaders, within the United States as well. New York City's most marginalized, and hence vulnerable, communities need to stay informed about climate change by sharing with each other. Information is power, the current administration cannot be trusted for information; hence, the informed need to rely on each other to protect ourselves.

I chose these samples of student work because they are representative of the research papers students produced as a class.