EXPLORING THE CONTEXTS OF URBAN SCIENCE CLASSROOMS:

COGENERATIVE DIALOGUES, COTEACHING, AND COSMOPOLITANISM

by

Christopher Emdin

A dissertation submitted to the Graduate Faculty in Urban Education in partial
fulfillment of the requirements for the degree of Doctor of Philosophy,
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This manuscript has been read and accepted for the
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ABSTRACT

EXPLORING THE CONTEXTS OF URBAN SCIENCE CLASSROOMS:

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By

Christopher Emdin

Adviser: Professor Kenneth Tobin

The body of work presented in this dissertation is a response to the reported association between poor outcomes in science achievement and students of color in urban schools. By presenting counterexamples to the cultural motif that urban students of color perform poorly in science, I argue that poor achievement cannot be traced to a group of people but can be linked to institutions promoting subject delivery methods that instill distaste for science and compel students to display an illusion of disinterest in school.

There are two major goals of this study. First, I plan to demonstrate how plans of action generated by coteachers and cogenerative dialogue groups can coalesce under the ethos of making science and schooling accessible to populations that are traditionally marginalized from science achievement. My second aim is to develop mechanisms for transforming science learning contexts into cosmopolitan learning communities that develop student success in science.

Through a three-year ethnographic study of physics and chemistry classrooms in a high school in New York City, I present explorations of the culture and context of the urban classroom as a chief means to meet my goals.

In my research, I find that obstacles to identity development around science can be tied to corporate understandings of teaching and learning that are amenable to local efforts toward change. This change is facilitated through the use of transformative tools like cogenerative dialogues, coteaching, and cosmopolitanism. Through the application of these research tools, I uncover and investigate how various misalignments that present themselves in physics and chemistry classrooms serve as signifiers of macro issues that permeate science classrooms from larger fields. By utilizing cogenerative dialogues as a tool for investigating both micro enactments within classrooms and the macro structures that generate these enactments, I show how students and teachers can work together as co-researchers and coteachers that engage in a dual process of questioning existent structures that do not support science success and transforming them.

Dedication

To my parents and siblings. My constants in a world of uncertainty

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“Hip Hop, you’re the love of my life and that’s true.” The Roots

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CHAPTER 1

The Makings of an Urban Science Education Researcher

I am a product of the inner city. I come from Saturday afternoons in Brooklyn where I rode my bicycle up and down Flatbush Avenue past Korean grocers and Jamaican restaurants, and into dreams of what it would be like to keep riding until there was no more concrete left on the sidewalks. I was always right around the corner from the rhythm of rap songs that drift in the air, providing a soundtrack to my bike rides and my life. I lived for Italian ice, sold on street corners just feet from hand-to-hand drug deals. I remember how each lick of ice froze my teeth just as vividly as I remember frozen faces that nodded as powder-filled vials were swept into empty pockets. I nodded back at those frozen faces and extended waves and hellos, not because they were the faces of friends of mine, but because they were a part of the neighborhood. They were a part of my home. That was Brooklyn. It was a perfect example of what it meant to coexist with “the other” or with others.

When my family moved to the Bronx in my early teens, my life did not change much. I still enjoyed flavored ice on Saturdays, this time on the Grand Concourse. Salsa music filled the air and often blended with rap songs from passing cars and boom boxes. Percussion from the congas of the salsa and the drum machines of the rap music blended together. This was accidental “reggaeton” before it became an official music genre. Puerto Rican flags hung from light poles and apartment windows, and flags from various Caribbean countries dangled from car mirrors and necks as medallions swung back and

forth to dancing bodies of different shapes, sizes, and shades. That was the Bronx: It was a perfect blend of varying cultures.

On weekdays I woke up early and took the train to my high school, which was in Brooklyn. It was a specialized public high school and it was about an hour and a half train ride from my family's apartment in the Bronx. Each step that I took when I walked out of my family's apartment on the fourth floor and headed to school was an experiment and mental exercise. I learned that running as I approached the stairs could enable me to jump over three more steps than if I jumped from the top of the stairs. I knew that if I was running late, I could cut across the abandoned building across the street and shave five minutes off my walk to the train station. I knew that I needed to put both straps on my knapsack before I approached the abandoned buildings because if I had to run, it would be easier if the bag were strapped tight than if it were not tight. I knew how to determine how far away a loud bang was in order to decide if it was safe to come outside. Above all, I knew that once I got on the train towards Brooklyn I had to pull my baseball cap a little lower over my eyes, pull my pants a little lower, clench my fists a little tighter and wear my scowl. My friends and I called the look on our faces the ice grill.

The ice grill instilled fear in the older individuals and people from other neighborhoods. When we wore it, people clenched purses tight and avoided making eye contact with us. I maintained the same look on my face as I walked through the school building and into my classes, through the hallways and on my way back home. As I approached my neighborhood, I slowly became myself again. I straightened my hat and unclenched my fists, and slowly the ice grill melted.

From the look on the faces of people around me, I knew that my attire, demeanor, and look meant I was bound for a life of failure and regret. For some, it meant I was someone to be feared. To me, my appearance meant I was thinking a little harder, was a little bit sharper, and a little more prepared for any surprises life offered than anyone else.

In urban schools, there are millions of students who navigate the terrain of their everyday worlds, walk into schools, and travel through science classrooms prepared for surviving in the world outside of the classroom, but unprepared for success within their classrooms. The statistics to support this fact loom upon science educators and researchers. Rodriguez (1997) wrote about the wide achievement gaps between minority and White students in science, and NCES (2006) data are consistent with this finding. In New York State it has been reported that Black and Latino/Latina students in urban areas take fewer science classes and perform worse on standardized science exams than do their peers in more affluent schools (NYSED, 2007). In the Bronx, students from the region that is the site of my research score 20% lower than their peers on the New York City assessments in science (nycenet.edu, 2007).

Barton and Yang (2000) illustrated the realities of poorer resources, more inexperienced teachers, and lower funding in urban schools when compared to suburban schools, which are all key factors in the poor achievement of African Americans and Latino/Latina youth in science. However, these factors cannot be solely responsible for urban students' poor achievement, and most people who have even a fleeting interest in urban education support this point. More often than not, they support a counter-argument or alternate reason for poor achievement, which typically involves blaming the urban poor for their academic struggles. This stance carries an ideology that presents urban

youth as disinterested in education and unwilling to learn. Bill Cosby espoused such beliefs in a speech in which he berated the urban poor and blamed them for being reluctant to take advantage of the educational opportunities presented to them (Dyson, 2006). While this stance has been both supported and critiqued by the general public, my experiences and research suggest this cannot be the case. In particular, I have observed that students in urban schools often express tremendous interest in school topics and subjects when their interests are piqued and their opinions are valued. The next logical question to be asked is, which perspective is accurate? My research shows that neither stance is absolutely correct.

Completely agreeing with any argument for a distinct cause of a lack of achievement in school or science is problematic because the dynamics that come together to create the success of students in urban schools and classrooms are too multifaceted to produce a simple answer. Through my experiences in teaching and learning in urban schools, I have found that no specific strand of thought quantifies the complexities of teaching and learning science in these schools. However, I feel that approaching a way to address the educational inequities that exist through a contextual investigation of all social fields that impact teaching and learning, particularly science, can benefit researchers and educators. In this process, we begin by valuing all participants in the teaching and learning process (students, teachers, researchers, parents, and administrators) by providing them an equal voice in working to address the inequities that exist. In so doing, there is no conferring of a cause or solution, but rather a joint discovery to solutions. The fact that we have not reached this point is evident when we look at the students' faces in their classrooms.

The “ice grill” on students’ faces is the physical manifestation of the conferring of power of others against them. Hooks (2004) described the hyper-vigilance of Black people in response to the trauma of daily oppression at the hand of a dominant society that results in a constant guarded stance. I argue that this hyper-vigilance is where the cold, stern looks and attitudes students exhibit originate. It is formed by the need to create a façade of brute strength that conceals vulnerability, and a mask of disinterest that obscures wonder and curiosity. In this dissertation, I examine the complex dynamics that lead to poor achievement in science for students in urban classrooms, and investigate methods that can be employed to counter them. I approach this work holding tightly to my strong allegiances to teaching and learning in urban schools. Consequently, I wear proudly my stance as a man of color, having completed a vast majority of my education in urban, public institutions. Through my experiences, I hold an intimate, reflexive, phenomenological, and experiential view of what learning and teaching science in urban settings entails. These social and temporal forces shape the contexts into which I am embedded and guide my path into this work.

In the chapters that follow, I grasp the need to engage in objective and unbiased research as I concurrently hold an obligation to reveal, provide voice to, and expose the realities for students in urban science classrooms. In so doing (holding my stance and obligations as a researcher), I find it absolutely necessary to present the research standing upon my experiences as a science student and educator in urban schools. I present my subjectivity not as a bias, but as a means to insight and an avenue into facticity or accuracy of the research product. I wear my past experiences within urban settings and schools on my sleeve and make no apologies for this position. Rather, I present them as

components of who I am as a researcher and utilize the authenticity criteria outlined by Guba and Lincoln (1989) to ensure that my research is tactical, authentic, ontological, and catalytic for all research participants (see Chapter 2). This position I have carved out as an urban science educator/researcher guides my interrogation of the contexts of urban science classrooms through cogenerative dialogues, coteaching and cosmopolitanism in New York High School.

New York High School

New York High is the site of the research presented in this dissertation and is a school for nursing and medicine located in the Bronx, New York City. The school building was constructed in the early 1960s and has housed a middle school since its inception. At one time, it was touted as one of the best middle schools in the borough. In the late 1980s and early 1990s, when the population in the neighborhood became more diverse, the school was plagued with poor test scores, gang violence, and a bad reputation. Consequently, it was set to close in 2004. In this year, the school would not admit any new students and would close after the few remaining students graduated. As the school was set to close, New York High opened and moved into the building’s third floor.

The school is located a few miles from the affluence of Manhattan, and just blocks from areas of high poverty. It is a few steps away from one of the major streets in the Bronx and is nestled between a park and an elementary school. A few blocks north of the school building, there is a picturesque college campus that stands next to a reservoir, and the constant rumbling of an aging New York City subway line that at times seems to scream for repair as the train charges through the thick air of the Bronx.

In this borough of New York City, there are many people who are of a low socioeconomic status with little access to healthcare (New York City Department Of Health, 2003). In addition, the Bronx has been designated by the Department of Health and Human Services as an area with a high healthcare professional shortage (Calman, 2005). With all of these issues impacting the Bronx, it has been apparent that a change in the way health issues are discussed, and health professionals are supported and educated in the Bronx, is necessary. This need fueled staff of a local community center and local college departments of nursing and chemistry to discuss the creation of a high school for students interested in nursing and health care professions.

Another major reason for the need to open a new school was that college students, most of whom graduated from Bronx schools, exhibited a deficiency in science skills and knowledge. The college that was looking to develop the school was interested in preparing students to succeed in nursing and medicine, and was even more interested in recruiting students from the Bronx to care for the growing number of unhealthy people in the Bronx. Unfortunately, many of the students in the college who were interested in medicine and nursing either dropped out of these programs or were struggling because of challenges they faced in science courses. Biology and chemistry department representatives at the college often complained that high school science classes did not adequately prepare students for their college courses. A professor at the college said "Many of the students are bright but they cannot pass their basic Intro to Chemistry courses." As a result of these problems, the need became evident for a school that could prepare students to succeed in college chemistry, biology, and physics while working towards repairing the health disparities in the Bronx.

In conjunction with the desire to help meet the borough's needs in health and the education of future health-care professionals, several educators were passionate about creating a new high school that was different from all the other schools in the Bronx. These local educators struggled with teaching in schools using archaic resources and a curriculum that did not generate students' interest in science. At the request of the college and the community center, a flyer was sent to local schools that described the needs of the college and the borough and the desire to open a new school. Shortly thereafter, a meeting was set to create a planning team to help design the new school.

My Introduction to New York High

As I walked out of work after a long day of teaching, I saw the flyer about the new school and joined the planning team, and a few days later I walked into the first planning meeting excited for the possibilities to come. The first meeting included several college representatives, the director of a community center, and two teachers from local schools. Although the number of participants was small, everyone in attendance was committed to creating a new school. We eagerly broke into groups to discuss possible components of an ideal school and left the meeting with a responsibility to recruit new members to our planning team. Team members contacted local organizations and other teachers, and eventually the planning team grew to include an administrator from the school district, a current nursing student who graduated from a local high school, representatives from a local hospital, mathematics, science, literacy, and social studies teachers, and the parent of three students in Bronx schools who was frustrated with the education received by her children.

The planning team met several times and constructed a concept paper it presented to a funding agency that was sponsoring new schools throughout New York City. During this phase and into the proposal phase of the development of the school, the team met every two weeks for almost a year at the college. All team members made major contributions to the creation of the concept paper and each person brought valuable experience, knowledge, and creativity to the table. Most members of the team knew what schools in the Bronx were like and formulated a wide range of ideas about what the school should look like. The ways the members of the group exchanged ideas despite race, class and social background differences was incredible. In a sense, the group lived a cosmopolitan ethos because everyone was so dedicated to ensuring that a school in the Bronx would meet the needs of the borough that it was not necessary to address background differences. This cosmopolitan ethos, where all members of the planning team focused on the single goal of creating the school, was necessary for the creation of the school and is a theme that emerges later in this dissertation as a key component of establishing communal science classrooms (see Chapter 3)

Based on the planning committee members' shared experiences, it was determined that the next order of business was to decide the skills, knowledge, abilities, and attitudes students should exhibit upon graduation from the school. This discussion led to a focus on the proposed school's culture and theme, and a move towards creating an operational plan.

We determined that, where applicable, a common thread of health care and community service would run through the academic program. Long-term projects related to the health care indicators in Healthy People 2010 (a federally mandated health

promotion and disease intervention mandate) would allow students to assess their communities, learn about particular health issues and diseases, plan strategies, and address those issues in student-run wellness and health fairs.

The planning team also resolved to utilize innovative and unique curricular approaches. Students would be encouraged to choose health topics they found interesting or that affected someone they knew, while teachers would explore innovative ways to bring together all the academic disciplines through intensive teacher planning and collaboration. For example, the science teachers decided to adopt an alternative to the science sequence used in other Bronx schools and to utilize student input as key to the curriculum. These goals would be achieved by focusing on civic-mindedness and providing structures that empower students about themselves and their community. Finally, an advisory group framework was adopted as the main tactic to achieve these goals.

The Advisory Group would be a class of approximately fifteen students, with a teacher as their advisor. This class would be scheduled into the school day and would provide an arena where students and teachers could address the issues students and staff considered important in society. In advisory group meetings, students could discuss relationships, sexual behavior, health, violence, substance abuse, and their academics. In addition to learning about the values and concerns of students, advisory groups would be established to serve as places to discuss and develop the school's values. These groups would work towards creating community, fostering mutual respect, and solving problems through mature discussions and thoughtful decision-making.

Sciences at New York High

The science curriculum at New York High began with Conceptual Physics (Physical Science 1) followed by a course emphasizing Descriptive Chemistry (Physical Science 2) and a course in Biology (The Living Environment). The sciences curriculum was organized in this format so students would have a broad understanding of the sciences prior to taking The Living Environment state exam. In their senior year, students were required to take a course in either Anatomy and Physiology or Microbiology. This science course sequence was established to help students develop a conceptual understanding of science, help them make connections between science and nursing/medicine, and help them understand that they could be successful in physics in their first year of high school despite possible perceptions that they could not.

The science sequence changed as the school grew and students were pressured to pass standardized exams. Students were required to take a Regents' chemistry course in their second year. In addition, the school began to succumb to pressures to be more conventional and adopted the sequence used in other schools in the Bronx. This speaks to the corporate structures of schools that are discussed in chapter 3.

Students in New York High School: From Proposal to Reality

I have described how the members of the school's proposal team began with a focus on building community and camaraderie into the school culture. They all intended to create something different than what had been commonplace in other schools and wanted to set New York High apart from other schools. This goal posed a challenge once students came to the school.

On any given weekday morning, African American and Latino/Latina students (who comprise approximately 97% of the school's population) come from neighborhoods

all over the Bronx and attend New York High School in search of a future in medicine and the allied health professions. As the students enter the building, they open their knapsacks and shoulder bags and raise their hands towards the sky in an almost dance-like fashion as they slide on their blue, green, and tan nursing scrubs, which are their school uniform.

When I walk into the classroom each day, I am greeted with everything from solemn hellos and eyes that barely leave the ground to warm embraces, firm handshakes and head nods. The students sit in the class and the day begins. The objective of the day's lesson gleams off the projector and the students copy down the aim and question of the day. The year starts the same way every time I teach. I walk in to frowns, scowls, silence, and deep thought and, as the year progresses, I hope to transform these expressions into smiles, questions, jokes, and laughter. Through the use of the research methods employed in this dissertation, the students began to expose their thoughts. They shared the hurdles they seamlessly navigated daily and I attempted to apply the strategies they used to navigate the structures outside of school to teach them science.

Students who had been accustomed to schools where there was not a genuine interest in the students' thoughts or ideas were not quite sure how to function in my science classroom. Staff at the junior high school that shared the building with the New York High did not understand why the high school students were allowed to do things differently, like have classes in the hallways. The junior high school's staff members barked orders at New York High students in the cafeteria and outside of the school building.

These experiences contrasted with what happened in classrooms and students did not know what to make of them. Furthermore, teachers whose cultural backgrounds varied from those of the students had a difficult time understanding why the efforts that went into planning the school did not reap immediate rewards in terms of the behavior and academic performance of students. After the first month of school, teachers began to show frustration with certain classes. There were discussions about how to contain students with bad behavior, and there were suggestions to replicate the pedagogical and management practices that were found in traditional schools.

My research serves as a means to interrogate ways that the teaching and learning of science in urban classrooms results in increased student interest and improved academic performance. Each of the chapters in this dissertation addresses the incorporation of new and different approaches to science education research and pedagogy, and outlines the need for embracing cosmopolitanism as a means to achieving these goals.

Cosmopolitanism: My Stance as a Teacher-Researcher

Cosmopolitanism is a philosophical construct that is founded on the belief that all individuals are members of a single moral community that requires its members to share responsibility for each other despite their differences (Appiah, 2006). Within classrooms in urban schools, where the divides between teachers and students are pronounced, utilizing cosmopolitanism as a goal to be reached for all actors in the social field allow for a collective ideal to be reached.

As a science teacher within urban schools whose goal is to work towards attaining a cosmopolitan classroom, my everyday interactions involve being attentive to the subtle

nuances of students' schemata and practices within the classroom while being aware that my every transaction with students reaches far beyond the classroom. I have learned that I must be conversant of the populations each student represents and the roles that the students play as ambassadors of cultures and beliefs more far reaching than the classroom, and at times more far reaching than I can imagine. I have also learned to acknowledge the individuality of students and not impose presumptions on them as a crutch for an attempted valuing of urban or youth culture. In other words, I find value in holding students to high expectations of academic achievement and behavior within classrooms. In addition, I have learned that much of what I see from students in the science classroom is a mirror of my past experiences. When students express a seeming disinterest in science, I extend additional opportunities for them to engage in science in order to move beyond sub- or role identities that may display disinterest. I allow each student to stand in his or her own light as individuals but also hold collective experiences that bind them and me together that may cause them to react in certain ways in the science classroom. As I walk this fine line and conduct research in science classrooms, I realize that as teachers and researchers engage in the process of understanding students' backgrounds and perspectives, it becomes necessary to make the connections that we (students, teachers, and researchers) have to each other very explicit. In the science classroom, this may be a collective sense of frustration with the way the class is going from the perspectives of both the teacher and student. Through the development of the cosmopolitan ethos or idea in the science classroom, the responsibility for the maintenance of the classroom's culture becomes shared because an implicit responsibility for each other trumps divides implicit in the role of teacher and student. This continued

search for the connection that binds individuals as a means to meet mutual goals within a specific social space is cosmopolitanism.

Working toward the living of that ethos brings me to revisit the experiences of my youth with which I opened this chapter. In so doing, I realize that many years have gone by since the days that I described as I opened up this chapter. I no longer take long bike rides on Saturdays and I rarely have a desire for flavored ice. Nevertheless, I still feel a connection to people from urban areas and students in urban classrooms. It is the same feeling I get whenever I visit certain places today. I have felt it in Philadelphia, in Oakland, and in every major urban center in between. In each of these places, I see the collective scowl of urban youth and in their faces I see that they are always thinking deeply about the next five minutes of their lives and are prepared for anything. This connection to the students and the desire to move them to build similar connections to each other and to science is how cosmopolitanism plays out in the classroom. The chief means by which this is accomplished in the urban science classroom is the cogenerative dialogue.

Cogenerative Dialogues

In a world where the divisions of power, voice, and opportunity among populations vary across race, class, and gender lines, the relationships between teachers and students in schools and the roles of each individual within those groups greatly complicate the ways that existent divides become manifested. In instances where the teacher is the ultimate decision maker on what is considered knowledge versus valuable scientific knowledge, and what is validated as such, students in urban science classrooms are often faced with scenarios that mirror what they have experienced in many worlds

outside of school. Their voices are never heard in legitimized arenas and consequently, they create sub- or role identities where they can validate themselves for the knowledges (multiple ways of knowing and understanding different phenomena) they possess. Cogenerative dialogues are social spaces other than the classroom where teachers and students can critically deconstruct their experiences within classrooms through dialogue. In these dialogues, participants come together and discuss the science classrooms and the causes of problems that plague the classroom. Together, they can devise plans to improve the classroom field.

Cogenerative Dialogues as a Means to Exposing Core Identities

Turner (2002) described core, sub-, and role identities and explained that an individual has core identities that are the fundamental identities that represent who the person is. Sub-identities reflect what an individual's identities are in particular institutions, and role identities are based on individuals' roles as they enact social life. Invalidation of student knowledges within formal fields such as science causes a creation of sub- and role identities that may appear to be in opposition to the structures of the science classroom. Through conversations with students, in cogenerative dialogues it becomes evident that student reactions to teachers and science are merely responses to the existent structures in the classrooms and do not necessarily reflect their core identities, which in many instances reflect a desire to be successful in school. In cogenerative dialogues, the students' core identities that reflect a desire to succeed in schools become present as sub- and role identities associated with the classroom, and poor behavior and academic performance within the classroom are no longer central. In

this new social space, core identities that support success and interest in science and the science classroom become so central that they become transferred into the classroom.

In order to implement a process that can bridge misalignments and make classrooms more cosmopolitan social spaces, the necessity of cogenerative dialogues becomes pronounced. Roth and Tobin (2004) described these dialogues as conversations about particular issues that affect the teaching and learning of science in the classroom with the goal of cogenerating a plan of action to improve the class. In my cogenerative dialogues with students, it became evident that the issues they identify as needing improvement in the classroom often focus more on the relationships students have with the teacher and the subject matter than on the delivery of the subject matter. In fact, once students and teachers establish a productive classroom relationship that affords fluid communication and the valuing of students' voices, students and teachers co-construct pedagogical techniques and curricular materials that facilitate success in science.

LaVan (2004) used cogenerative dialogues in an urban charter school that shared a similar context to New York High, and found that they provided a field for communication across barriers of age, race, and class. She also found that the culture produced within the cogenerative dialogues supported the agency of all participants when they were in the classroom. From studying the impact of the cogenerative dialogues in other research, and comparing these outcomes, these studies, and my research, I conclude that science education research that explicitly investigates the delivery of subject matter and the nature and processes of science instruction in the absence of sociocultural issues fails to realize the complexities of social life within the classroom. In addition, it misses opportunities to hone students' success in science.

Deconstructing Roles in Cogenerative Dialogues

While the cogenerative dialogue serves as a space where all participants (students, teachers, and researchers) have equal turns at talking and all voices are valued equally, the nature of social life often dictates that certain individuals hold the role of the leader in a social field. In my role as facilitator, I began almost all of the cogenerative dialogues. I invited five or six students who represented different groups in the class to hold a conversation with me about the science classroom.

Over time, students began to take a more active role in the conversations and even conducted cogenerative dialogues without my presence. Students often expressed an interest in having all members of the group participate and have their voices heard. In instances where a particular person dominated the conversation within the cogenerative dialogues, the problem was quickly curbed through the visitation of videotape from the cogenerative dialogue session and discussions on the fact that all participants' voices were to be valued within this field.

During the dialogues, I often posed questions that required participants to express their thoughts about specific science topics discussed in class. In these dialogues, the cogenerative dialogue group had concurrent conversations about the science topic at hand as well as the science classroom. Students consistently made statements to ensure that participants understood each other's ideas and that conflicting opinions on various issues were discussed rather than de-emphasized in favor of consensus.

In addition, I introduced the theoretical frameworks found in each chapter in this dissertation to help students understand what was going on in their classrooms in very complex ways. The result of these dialogues was the extension of student and

teacher/researcher roles beyond what they were in the conventional classroom. Responsibilities for teaching and learning were extended to all members of the classroom and as time progressed, the science classrooms began to mirror the ideas and thoughts explicated by the planning team when they designed the school. Students were able to coteach lessons in the classroom and teachers were able to learn about ways to teach students from diverse backgrounds through conversations with the students that did not explicitly revolve around the subject matter.

Coteaching

The means by which a cosmopolitan ethos is enacted is through the cogenerative dialogue. In these dialogues, students develop the ability to express their core identities and express a need for successful transactions within the science classroom. Through the agency afforded in these classrooms, students feel co-responsibility for the classroom that transforms into a desire to coteach.

Conventional coteaching arrangements usually include two teachers (usually special education teachers and general education teachers) who both hold responsibility for the classroom. In this arrangement, one teacher is responsible for instruction while the other one is merely responsible for taking care of a particular student or group of students. This approach to coteaching is often touted as a great strategy for the effective teaching of inclusion students with special needs or disabilities. However, the traditional coteaching model has one person take the role of the lead teacher while other teachers are relegated to becoming assistants. In this model, expertise is not shared among people in the classroom. This approach varies from a coteaching model where “two or more teachers collectively do what under current circumstances has to be done by a single

individual. In so doing, the collective accomplishes much more than any individual" (Roth, Lawless, & Tobin, 2000, p.46). The latter model is an upgrade of the existent model because it stresses the fact that a shared responsibility for classroom instruction benefits the students in the classroom. It also presents an opportunity for the presence of other "experts in the classroom beyond the two teachers." (Roth, Lawless, & Tobin, 2000, p.46)

In the research generated from the studies in this body of work, students who had been involved in cogenerative dialogues began to enact coteaching in the science classroom. I argue that the generation of a cosmopolitan ethos in the cogenerative dialogues afforded students an increased amount of agency and desire to positively affect the classroom. The students recognized that in order for the classroom to run efficiently, it was necessary for them to support the teacher. In many instances, the students viewed themselves as teachers with a responsibility for the quality of instruction in the class (see Chapter 6).

My observations of how coteaching becomes enacted by students in science classrooms is described throughout this dissertation and has an intimate and complex relationship to cogenerative dialogues and cosmopolitanism. I find that the provision of the power to enact coteaching by students is an explicit offshoot of cogenerative dialogues and the cosmopolitan ethos that is generated in these dialogues. Furthermore, in order to enact cogenerative dialogues, the teacher has to be willing to release some of the power that comes with his or her role as teacher and distribute it to all individuals in the classroom. This process requires a valuing of the capital that students bring to the classroom and is a consequence of the move towards cosmopolitanism.

Metalogue

Having realized the importance of cogenerative dialogues as a means to providing a voice to students whose words have been stifled by the structures of classrooms and schools, and witnessing the harmony of once-silenced and dissonant voices as they interrogate the classroom contexts through coteaching, I look to the metalogue as a way of providing agency to those who may search for voice as they investigate the outcomes of a research study. Over the course of replicating the transformative nature of cogenerative dialogue, I trace the history of the metalogue and show how its roots speak closely to the necessity of its use in science education research.

In this dissertation, two chapters utilize metalogue as a means to provide voice to participants who traditionally would not have the ability to weigh in on a research product in a public forum. In the first metalogue, two science education researchers interrogated a research paper that I produced and discussed the theoretical underpinnings of the work. In the second metalogue, two students engaged in a discussion about the outcomes of a research study and an accompanying paper, and shared their thoughts on the paper produced and how students of color are portrayed in science education research. My selection of these two pieces reflects the possibilities of new approaches to research that reflect a cosmopolitan underpinning to the work. Through the valuing of voices other than that of the primary researcher, respect for the opinions and perspectives of others became an integral component of the research.

Why Metalogue?: A History and its Implications

Tracing the historic beginnings of the metalogue leads to the work of Bateson (1972) and subsequent writings in which he utilized the metalogue as both a writing tool

and a means to engage participants in dialogue. In his work, Bateson engaged readers in an exchange that built upon the complexity of the particular phenomenon/topic being discussed. He presented the topic for discussion and began a conversation in a way that concurrently described and interrogated it. The end result of this process was presented in words rich in description and more complex than the ideas on the topic prior to discussion. This ability to deepen through analysis as a conversation proceeds has implications for qualitative research as it opens up possibilities for conversations about a topic that can become the tool for understanding it.

In this dissertation and in other work that utilizes metalogue, the work is held to standards that a single author cannot meet. This goal is achieved by a focus on the research product by multiple lenses that shed light upon it. The metalogue therefore highlights the complexities of interpersonal communications (exchange of different perspectives and points of view) in words and makes an author’s limitations public while expanding them with descriptions more vivid than those presented by the author. I focused on the interpersonal component of Bateson’s work in my use of the metalogue and drew upon Kenny (2000) as a guide to the use of metalogue in science education research. I found Kenny’s analysis and ideas to be a robust outline for the points that are brought forth in traditional research studies and a means to support the shortcomings of these studies through the use of the metalogue.

> There are three particular ideas chosen for elaboration (a) common misunderstandings of human communications, (b) common misunderstandings of human relationships, and (c) common misunderstandings of human patterns of living. In correspondence with these three I present Bateson's suggestions for making three major shifts in our perceptions, attitudes and relationships: Shifting from (a) a focus on the 'control' of others to instead optimizing everyone's 'participativeness' ; (b) Shifting from a focus on treating people as

> machines to relating with them in spontaneity; and (c) Shifting from a focus on the unilateral manipulation of others to creating genuine social patterns of co-evolution (Kenny, 2000, p.33).

With a move toward understanding that the three shifts presented above are necessary comes an acceptance that the “common misunderstandings” explicated in the ideas chosen above for elaboration are indeed apparent in a research study and occur as a function of social life. I will draw examples of how these misunderstandings present themselves in the traditional science classroom. By doing this, I hope to show how hegemonic practices present themselves in fields like science classrooms because of structures within these fields that limit participants’ agency. I will then show how metalogues can provide agency to research participants even within challenging structures.

In the first point, the focus on shifting from control to “participativeness” in human communication speaks directly to the ways that we traditionally esteem a particular author’s research without value for research participants. In a sense, the researcher has complete control of the research outcomes in a way that is similar to how a teacher has complete control over the students in the traditional classroom. The teacher gives instructions to the students and they comply, just as the researcher presents his or her research outcomes to the science education community. In a sense, we replicate the hegemonic practices that we as critical researchers critique through a valuing of the authoring researcher above other experts (other researchers, teachers, and students). Through metalogue, such control paradigms are shifted by placing control over the research outcomes with other researchers or research participants. For example, a research paper that documents that certain students do not engage in the science classroom because they do not like science may stand as an outcome generated by a

researcher. However, in a metalogue on a research paper that involves a student and another researcher, a student can counter what the researcher presents as fact and provide reasons why that take is wrong. Additionally, a fellow researcher can provide a theoretical lens to the research study that highlights aspects of the research that draws larger conclusions. Consequently, we are presented with a deeper study in which “participativeness’ is attained and a richer research product stands side-by-side with the initial one.

In the second notion, the metalogue is presented as a means to address flaws in personal communication through its provision of an avenue where a shift from treating people like machines to dealing with them in spontaneity occurs. The institution of this machine-type communication model reflects a flaw in both science teaching and science education research. In science classrooms, I have seen teaching practice that focuses on the students’ ability to regurgitate science facts as a positive outcome. This implies a mechanistic perception of interpersonal relationships that supports the notion of a docile and subservient student (particularly in urban settings) as one who is an ideal learner. Once again, critical researchers would challenge this notion and rightfully make the argument that the absence of exchange between the student and teacher is a detriment to truly educating the student in a way that his or her voice is valued.

Through metaloguing, the space to fluidly transact (see Chapter 2) created via cogenerative dialogues is extended to the often interpersonally deficient relationships between the researcher and the readers of research. The metalogue supports immediate reactions to the researcher by supporting “spontaneity” in response. In this process, the responses by the readers of the research provide an insightful and accurate “truth

response" from the research participants. Varela (1999) argues that this "truth response" or "immediacy" is perhaps the most accurate reflection of an individual's stance, as it is the outcome of being in the moment with the phenomenon. The goal here is to realize that there is no complete truth but there can be a quest for facticity (reference), where multiple perspectives align, when it comes to an analysis of what is happening in urban science classrooms. In other words, we are providing the structures for polyphonic research by inviting multiple participants to metalogue, but doing so in order to attain a polysemic perspective that should align if the phenomenon is being described by the primary researcher in an appropriate way. Roth and Tobin (2004) described the metalogue as the written product of reflexivity in research. Extending their take, I see the process of reading a research outcome, responding to it, and then engaging in a *reflexive* dialogue with the author as an ideal way to move from a mechanistic communication model between a researcher and research audience to one with more spontaneity.

Lastly, and perhaps most importantly, Bateson's stance on patterns of living and the *unilateral manipulation* of such patterns presents a power removal from the research participant and subsequent power imposed on this person that is supported through the explication of research without the participant's voice. In the classroom, this plays out as the teacher setting all the classroom rules and controlling what the students learn by limiting their exposure to topics that may pique their interests. Implicit in this stance is a belief that students cannot understand complex material or subject matter and that not exposing them to it does them no harm. This point speaks most saliently to the involvement of students in metalogue because their true perspectives can easily become

absent from a research product despite the fact that they are featured in the research study.

I believe this notion of unilateral manipulation is critical because it can be easily misconstrued as the researcher's exhibition of ethical practice. That is, the use of students' words in the work paints the picture of the researchers' valuing of the student. However, if the words of the students are used merely as words to paint the researcher's picture, and do not have value in their own right, they are being manipulated. This process of taking the research participants' words and actions and then interpreting or manipulating them in ways the participants do not intend takes the research participant's power and silences him or her. Employing metalogues on research outcomes with students facilitates opportunities to ensure that the words, thoughts and ideas of students and the researcher are valued equally. Kenny (2000) refers to this process as a co-evolution of the work. What he describes is an evolution from the original research product into a co-evolved one with the student. I see this process as the literary version of the cogenerative dialogue in which all participants' voices are equally privileged.

Bateson's Work and Science Education Research

Through my interrogation of Bateson's work, I was intrigued by a metalogue he had with his daughter (Bateson, 1980) in which he exemplified a writing style that has been described as roundabout, circumspect and metaphorical (Kenny, 2000). In this work, Bateson pushed the boundaries of understanding or making sense of a phenomenon, construct, or idea by allowing sense to be made through the metalogue. In other words, the making sense or making meaning process occurred despite his

abstractness, vagueness, or "roundabout, circumspect or metaphorical" style because the metalogue provides whatever meaning needs to be made.

I draw similarities between the way Bateson's written work has been presented and the nature of educational research products when viewed by teacher-practitioners and students. In my research, I have found that the work of science educators is often perceived to be as difficult to understand as Bateson's compositions may have been perceived by readers. Consequently, the outcomes of research products in science education are limited to an audience of academics and not the people the research is intended to inform. Through the metalogue, these breaches in understanding are mediated as multiple participants visit the work on different levels. Metalogue authors may provide insight and clarification for each other and for readers who may feel more comfortable with a particular metalogue author's stance.

Metalogues for Clarity

Science education research was compared with hard-to-understand literary products like Bateson's work in a recent speech by the former president of the National Association for Research in Science Teaching (Shymansky, 2006). In the speech, Shymansky described the title of a recent article accepted in the *Journal for Research in Science Teaching* (JRST) and challenged the clarity of recent science education research. He argued that science education research is often elusive to the general public, teachers, students, and in some cases other researchers. While this may be true, I argue that the processes of metaloguing, critical questioning, clarifying statements, and considering theoretical frameworks from participants with varying experiences necessarily move the

work to points of clarity and generalizability, while providing agency to multiple research participants.

My choice to utilize metalogues as two chapters in this dissertation therefore stems from an awareness of the limitations of my role as researcher and a realization that revisiting the work when removed from it and sharing the responsibility for it with colleagues and participants provides a richer yet more prudent study. Through metalogue, the research participants imbue the research product with reflection, thought, and a certain authenticity that can only be achieved by the validation of the product by the research participants.

Roth, McRobbie and Lucas's (1998) rendering of the metalogue described it as a means to augment dialogue by discussing the theoretical frameworks employed. In the present research, it has served as a means to apply pressure to my theoretical frameworks in order to ensure they hold up as viable methods for interpreting what takes place in the science classroom and as a means to interrogate the work for more understanding. I found that the process of metaloguing moved my research along a constantly probing course that created a path other science education researchers, teachers, and students may follow.

I hope to have made explicit that metalogues are to research products what cogenerative dialogues are to classroom teaching. Therefore, since cogenerative dialogues are described as part of the practice of good practitioners (Tobin, 2000), the metalogue should stand as a necessary tool of good researchers. Through my work, the multiplicity of participant agency (urban students engaged in cogenerative dialogues and consequently enacting coteaching) is mirrored in metalogue as the students, teachers, and

fellow researchers engaged in metalogues and enact agency through co-authorship of research products.

As a result of my application of this practice, I do not frame the work I engage in as *my* research as it provides not only my take on the classroom, but the words, thoughts, and ideas of others that can challenge the outcomes of the scholarly work I produce. If the researcher values students and teachers as researchers in their own right, the metalogue serves as a means of peer debriefing. Furthermore, the metalogue may serve as a way to attain objectivity in the sense that alternative frameworks presented by research participants can support the work while preserving the robustness of the research. The metalogue therefore stands on equal footing with interviews, field notes, and transcripts as a research tool and a structure that facilitates the expansion of agency and roles for student and teacher researchers.

Chapters in the Dissertation

This body of work is an amalgamation of thought, theory, research, and practice that is nested in an ethnographic study of science teaching and learning in urban classes at New York High School. Each chapter is a reflection of the outcomes of the research and theorizing at different points in the study. I approached the study armed with a limited toolkit of theoretical frameworks that grew as the study progressed. The research products consistently moved me to re-interrogate the lenses that I used to view the classrooms and as I progressed in the study, I found myself transformed by my experiences in the classroom. Within each of the chapters, different theoretical methods are employed as the lights that illuminate what occurs in the classroom vary depending on the focus of each particular study within the larger project. Consequently, this work

foregoes the traditional practice of creating a theory section. Rather, I propose that the reader carries the descriptions of cogenerative dialogues, coteaching and cosmopolitanism presented in this introduction as the threads that bind this work. As the entire body of work is read as a unified piece, the theoretical ties that bind will become lucid as the decisions to focus on different theories and approaches at different junctures will cause the work to stand as a unified piece. The major theoretical approaches and lenses that will resound beyond cogenerative dialogues, coteaching, and cosmopolitanism include, but are not limited to, those presented in the following paragraph.

I utilize the concept of the various forms of capital, the notion of the social field and its porous boundaries (Bourdieu, 1986), the structure | agency dialectic, and the recursive relationship between the structures in a social field and the agency of participants within these fields (Sewell, 1999), the existence of multiple lifeworlds, micro worlds and micro identities (Varela, 1999), the notion of the ritual and the construction of rituals in social fields like the science classroom (Collins, 2004), and an interrogation of the psychoanalytic dimension and theories of oppression (Oliver, 2004).

Chapter 2

In this chapter, I acknowledge the transformative nature of cogenerative dialogues and focus on the ethical dimension of the practice in order to move educational research, classrooms, and schools beyond the current conceptions of what is ethical. This chapter serves as an introduction to my approach to the research and grounds the remaining dissertation chapters. Utilizing a fusion of the Belmont Report with nuanced notions of fourth generation evaluation procedures (Guba & Lincoln, 1989), I root cogenerative dialogues in a philosophical approach to cosmopolitanism that acknowledges the

differences between multiple participants, multiple fields, and varying ways of knowing and being. First, I consider how rooting the character of the truly ethical research act in a cosmopolitan ideal can attain participant beneficence. Second, I consider how to avoid the potential pitfalls of authenticity criteria in the practice of cogenerative dialogues by enacting practices that maximize tactical authenticity. This approach to cogenerative dialogues serves as a method for critique and analysis that challenges current practice and considers the viability and ethics of cogenerative dialogues in inner city schools in a new light.

Chapter 3

In this chapter, I discuss the existence of varying ideologies and perspectives within urban science classrooms and uncover the importance of focusing on student and teacher practices as a means to bridge these disconnections. I describe the existence of corporate and communal ideologies in urban schools, and elucidate the dynamics that create the misalignment that exists between groups that hold varying perspectives. Utilizing three allied theoretical frames, this chapter provides a multi-layered and timely analysis of science teaching in an urban high school in New York. I conjoin Bourdieu's sociocultural theory, an analysis of social life through the use of the structure | agency dialectic, and a theorizing of corporate and communal practice to embark on a journey into how African American and Latino/Latina students' ways of knowing and being can be utilized to meet the goal of improving their rates of success in science within urban schools.

Chapter 4

This chapter is a metalogue based on the previous chapter. In it, Eileen Parsons, Wesley Pitts, and I attempt to critique, clarify, unpack, and extend the thought-provoking

notion of a corporate | communal dialectic presented in the previous chapter and other issues that explore the contexts of several urban science classrooms. The authors metalogue with a focus on controversial issues pertaining to ideology in research specifically, and in the United States of America in general, at the macro level of social life. In this chapter the authors name, interrogate, and debate the underlying assumptions of Chapter 3.

Chapter 5

In Chapter 5, I describe the corporate and communal nature of research, teaching, and learning in urban science classrooms as both a theoretical approach to understanding and a way to view practices within these fields. By providing a new approach to theorizing the cultural misalignments prevalent in urban schools, I looked to provide an informative tool for investigating under-discussed dynamics that impact science teaching and learning. I further expose the nature of the corporate | communal approach by describing practices that define communal practice. I do so conversant of the fact that synthesizing my previous work on corporate and communal practices in the context of my study necessarily pushes science education researchers and teachers to look for somewhat tactile explications of communal practices. That is to say, if communal practices exist within the corporate structures of science classrooms, how do they present themselves and how can they be targeted? This chapter begins a journey into such a study and focuses on student transactions, interactions, and rituals as a key to redefining and attaining success in urban science classrooms.

Chapter 6

The metalogue presented in Chapter 6 describes the responses of two students in an urban science classroom regarding the outcomes of a research project conducted in their classes. It is co-authored with Lasleen Bennett and Jessica Collins and serves as a step toward validating the authenticity of the research produced. More importantly, it serves as a space where students have opportunities to provide much-needed insights into the state of urban science education. The students' responses are brilliant and insightful, clear and unabashed, and above all, informative. Through the responses I revisit my stance as a researcher and an urban educator and return to my work re-energized and invigorated by the possibilities of enacting the students' recommendations and making them a key component of my work. I hope that through this work, eyes are opened to the possibilities of student-involved research products. Furthermore, I hope that the themes of Chapters 3, 4, and 5 become illuminated through this monologue.

Chapter 7

In an age where globalization causes tremendous shifts in the cultural identities of populations endemic to particular geographic regions, the acknowledgment of neo-indigenous populations becomes a necessary course of action for teachers of science in urban classrooms. Currently, perceptions of who is indigenous to a particular location take a formal stance in which one has to be born into the place he or she inhabits and live there for a certain period of time to be considered native to the region. This stance takes the influence of globalization and the shifting waves of individuals into different parts of the world for granted. Furthermore, it disregards the fact that places where individuals inhabit are not only geographical but are also perceptual and ideological. Attached to the

existence of neo-indigenous populations is the need to build camaraderie among these populations in order to provide them with a voice in settings that cease to acknowledge their existence. This is attained through the use of the philosophical tenet of cosmopolitanism and its ethos of accepting multiple cultures. As society ignores the existence of neo-indigenous populations and the need for a cosmopolitan approach to enacting agency, researchers and theorists of social life fall short of complete investigations of the culture that guides social fields. In response, I delineate a theory for whom and what constitutes the neo-indigenous (identity, culture, location), consider how the existence of this population is shaped over time, and how this existence necessitates the enactment of a brand of cosmopolitanism that gives its inhabitants agency in learning science. This article presents a physics classroom in the Bronx, New York City and interrogates the impact of globalization on a neighborhood, a school, and its students. Through this study, I develop a conceptual framework where indigenous populations and cosmopolitanism can be juxtaposed by presenting them in the context of privilege and hierarchy and their implications for the agency of marginalized/othered populations in understanding each other and learning science.

Chapter 8

In this chapter, I synthesize the ideas put forth in this dissertation and discuss the implications of the studies and the next steps in the research

CHAPTER 2

Unearthing Tools for Ethical Science Education Research:

Cogenerative Dialogues and Cosmopolitanism

They said "you have a blue guitar,
You do not play things as they are."
The man replied "Things as they are
Are changed upon the blue guitar
And they said then, "but play you must,"
A tune beyond us yet ourselves,
A tune upon the blue guitar
Of things exactly as they are"
Wallace Stevens

I came across the poem excerpt above while reading Maxine Greene's (1995) book *Releasing the Imagination*. In this collection of essays, she made many arguments for educational researchers and teachers to move beyond the confines of their self-created worlds. Greene called for a viewing of spaces that impact school and schooling as part of the process of teaching in and researching schools. As she made these arguments, I thought of their implications for science educational research in urban settings and the ethicality necessary for engaging in research in this discipline. I agree that educational research requires an interrogation of contexts beyond the classroom. In science education research, this interrogation is needed more than it is in any other educational discipline. When I talk with students, they often say that science is too challenging or that they do not like it based on ideas and thoughts on science that have roots in social fields beyond

classrooms. I agree with Greene's suggestion that researchers expand to different worlds and argue that an expansion of the ways we work with students is also a necessity.

The excerpt from the poem above serves as a metaphor for science education research, the attainment of ethics in this practice, and the expansion of ways science education researchers engage with research participants. I see the man in the poem as the researcher, the blue guitar as the research tools presented in this paper, the tune he plays as the research products, and the people who speak to the guitar player as the stakeholders in a classroom research project. In the table below, I outline the poem and my interpretation of it. In doing so, I set the stage for the presentation of ethical research tools later on in this chapter.

They said "you have a blue guitar, You do not play things as they are	The initial conversation begins with the students saying to the researcher that his research does not describe things within the classroom as they are.
The man replied "Things as they are Are changed upon the blue guitar	He replies by saying that through his research and the use of his research tools, circumstances within the classroom are different from the ways the students perceive things.
And they said then, "but play you must," A tune beyond us yet ourselves,	The students respond by saying that the researcher should continue his work despite the fact that that the end results are a different version of what they experience.

A tune upon the blue guitar Of things exactly as they are”	The conversation closes with the merging of both the students’ and the researcher’s goals because they both reflect “things as they are.”

Many key points necessary for research are presented in this poem. First, the importance of engaging in dialogue with the students involved in the research is presented. Second, the fact that research should reflect real life (things exactly as they are played on the guitar) is presented. Finally, the need for a mutual agreement regarding the research being conducted and the work being produced is presented.

I merge the messages that come from the poem with Maxine Greene’s call for the interrogation and creation of new worlds to engage in dialogue. Consequently, I present cogenerative dialogues and the philosophical tenet of cosmopolitanism as tools for the attainment of ethical research practice.

The Existence of Research Subjects and Research Participants

I begin here by historically situating human subjects research and the notion of whom is perceived as the research subject in question. My questioning of this notion is tied to my experiences in conducting research in science classrooms, and my observations of videotaped data resources and field notes from the project. The data resources displayed teacher and student exchanges in the classroom that demonstrated a lack of value for the knowledges of research subjects. This is not to say that the research was riddled with blatant unethical practice. In fact, over the course of the three-year ethnographic study, the project resulted in evidence of increased science knowledge and

interest as evidenced by students' test scores and participation in class. However, in the course of attaining these goals, schematic understandings that the researcher/teacher brought to the classroom manifested themselves as deficit-based perspectives of research subjects.

On many occasions, there was little to no expectation that students could understand a specific scientific concept or principle. Consequently, there were conversations in the classroom in which the teacher or researcher expressed surprise when a student explained a concept clearly or had a correct answer. In conversations with students after reviewing videotapes of these conversations, it was evident teacher/researcher's ideas about the students' abilities had profound effects on their perceptions of themselves and what they felt they could do in science (see Chapter 6). I argue that these deficit lenses are related to the associations that come with being the research subject. These associations result in the perception that research subjects (in this case students) are lower in status than the observer, because they are not expected to be able to question research products, suggest research questions, or engage in research on their own.

The association of the students with a low status in the research study occurs as a result of deficit lenses that combine with a communitarian way of thought. This approach assumes "that one's identity with one's community must be the principal or dominant (perhaps even the only significant) identity a person has" (Sen, 2006, p.33). The urban science student is associated with a community of urban youth and all the negative generalizations that come with being a part of that community and consequently is relegated to being a research subject and not a co-researcher.

The proposal that I put forth in this chapter is one that questions these negative schematic understandings. I argue that when existent understandings are critically deconstructed, they can lead to views of students as co-participants in the research process rather than subjects. As we proceed, I present and describe tools that may support researchers on a quest for viewing research participants as equals. The use of these tools has the potential to help researchers move towards attaining ethical research practices and results. I also present the pitfalls of using these tools, and describe ways to circumvent the utilization of transformative tools for the replication of existent unethical practice.

Research Practice as a Microcosm of Unethical Societal Practice

The ways that people have treated one another with respect and civility (or a profound lack thereof) have had a resounding influence on human history, and these historical understandings directly impact research practices. Our collective understanding of research that is considered acceptable and principled requires viewing, critiquing, and analyzing what has already been done through the lens of both past and present-day notions of what is moral or acceptable. Researchers make judgments about goodness, fairness, and equity based on generalized notions of these attributes, which have been formed and reformed over space and time. In addition, they inherit traditions they cannot escape of what it means to conduct research that are tainted by the researcher's perceptions and the research participants. These generalized notions take the form of the period's dominant ideology, and inevitably sustain the hierarchical nature of western society. In this system, some knowledges are affirmed while others are subjugated. This is not to say that all researchers are inherently unethical. However, it is apparent that even the ways research products are presented and the terminology used in research is problematic. Discussions

that present students' statistical deficiencies and naming students as research subjects are prime examples (see Chapter 6). Implicit in being a subject is subjugation to someone or some group who has power over another. These ethical issues often present themselves in research products, and they need to be addressed.

Shifts in Perspectives on Ethical Research; Moves Towards More Ethical Practice

As each decade passes, the research community becomes more aware of its ethical stance. In a sense, our collective societal perspectives change regarding our notions of ethics. The emergence of once subjugated knowledges from communities who have been either literally or metaphorically colonized find their ways into mainstream discourse and cause researchers to redefine their meaning of ethics. In science education research, the appropriation of Hall's (2000) work on hybridized cultures and identities has been used to validate localized ways of understanding science (Roth, 2007).

As a research community, we often reassess ourselves and redefine our collective stances. These collective redefinitions and reassessments lead us to different ethical plateaus. Some practices that were once commonly accepted are now considered unethical. These range from the ways that certain populations have been referred to in the work, to generalizations about certain groups' intellectual capacities or abilities. However, the creation of collective definitions of what it means to be ethical and the comfort level with our present collective ethical state foregoes the personal responsibility to maintain ethical practice in exchanges with school students.

Varela (1999) brings us to a point of personal responsibility through his framing of ethics as being closer to action than cognition. In other words, the practices that researchers engage in cognitively through the process of gathering and interpreting data reflect a

research community-based ethicality. Individual researchers' ethical practices are best reflected in their everyday, immediate actions. If a researcher assumes a students' disinterest in science results from deficit-based perspectives and observations, the ethics of the research are in question. Based on the researcher's perspectives, the student may be asked why he or she does not like science. This question would in turn reflect an unethical perception of the student and his or her relationship to science that has implications for the student's perception of self, as well as the data collected in the research

Unethical Human Subjects Research and the Belmont Report

In human subjects research, ethical issues that cannot be immediately foreseen are bound to occur. While potential hazards stemming from research have been conventionally viewed in terms of the possible harms and benefits resulting from a study, I argue that the immediate actions of individuals within a study need to be addressed as well. My focus on ethical practices is rooted in the phrase "research crime". This is a term that was coined to describe Nazi doctors involved in the Nuremberg Trials who carried out research projects without regard for the well-being of their research subjects. In many of these cases, researchers described as good standing, ethical and law abiding citizens conducted research that included torture and death of many Jews Viewing this type of research from a present-day perspective, it would be easy to convince any researcher that the research conducted by these doctors was unethical. However, at the time this research was being conducted, those involved in the project were likely to perceive their research as scientific and necessary.

In the United States, medical researchers who were studying the effects of syphilis denied African American research subjects treatment for the disease long after one became available. This study was conducted by researchers who perceived their work to be ethical

and for the common good of society, despite the long-term negative effects of the study on participants and their families. The unethical treatment of human subjects was not only seen in the Tuskegee Project, but in other investigations such as Stanley Milgram's obedience to authority research and the Willowbrook Hepatitis Study (Grinell, 2004; Sisti & Kaplan, 2004).

As researchers in the late 1970's reflected on these studies, they were able to identify the absence of ethics in such work. In 1979, almost 50 years after the Tuskegee study was conducted, the National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research proposed the creation of the Belmont Report. This document represented a collective stance that denounced unethical research practice. The authors of the report addressed the unprincipled use of human subjects and outlined guidelines for researchers that intended to promote the humane treatment of research participants.

Despite these moves towards ethical practice, it is important to realize that as we evolve into a research community that investigates ethical practice, the nature of research concurrently evolves. New waves and forms of significant human research are generated and the ethical requirements for researchers must also advance.

New Frontiers of Human Research: Contextualizing the Continuum of Human Subjects Research

The new waves of significant research to which I alluded above are in the vein of the type utilized in the work in this dissertation. In this type of research, the sociocultural dimensions of fields that once were not examined through these types of lenses are investigated. For example, traditional science education researchers have concentrated on

specific foci within their discipline. Much of the research focused on testing, curriculum, laboratories, or different subjects without an explicit focus on the relationships within the classroom that impact learning. In science education research that interrogates these relationships and more sociocultural dimensions, each project is filled with newly developing potential harms and consequences of the research.

I therefore draw symbolic comparisons between educational research in urban settings to studies like the Tuskegee research. I believe the atrocities committed in the Tuskegee Project, and the psychic and extrasensory implications of the project, are able to be replicated in educational research. I call for research practice that holds the ethical treatment of urban youth under similar scrutiny as human subjects research conducted in any other arena.

Educational researchers have often glibly neglected the protocols set in place by their respective institutional review boards and have tried to avert the review board's authority in the name of academic freedom (Anderson, 2003; Pritchard, 2002). This argument is often augmented by assertions that educational inquiry does not pose the same types of immediate health risk to research participants as do medical studies. This stance takes for granted that teachers/researchers share a degree of symbolic authority similar to that of medical researchers. It also dismisses the fact that the potential harms of educational research, like medical studies, have far-reaching social and psychological consequences.

The main point to be derived from the paragraph above is that school-based researchers have the moral directive to ensure that participants are afforded unconditional fairness. Furthermore, students must benefit to the greatest extent possible from the results of the research. Researchers must exhaustively pursue justice and beneficence for their

participants by minimizing potential harms and undertaking any burdens associated with the study (Office for Protection from Research Risks, 1991).

Unearthing Tools: From Dialogue and Democracy to Cogenerative Dialogue and Cosmopolitanism

The title of this chapter describes cogenerative dialogues and cosmopolitanism as constructs that need to be unearthed, as they are not new tools. In fact, the use of dialogue in education has been tied to Friere (1998) and can be associated with a more historically far-reaching Socratic tradition that outlines the benefits of identifying an issue and exchanging thoughts and ideas on it. Cogenerative dialogues take these notions of discourse and bring them to another level by focusing on the dynamics between dialogue participants and the co-generated results of the conversations they exchange. In order to focus on these issues, cogenerative dialogues function under the tenet that no voice is privileged over the other. This means there are equal turns at talk, and the dialogue is not ended until all participants have co-generated a plan of action for improving social life in a field where they are all participants.

Cosmopolitanism is a means by which the tenets of cogenerative dialogues are expressed. It is a way of knowing and being that views all human beings as members of a single community. In this community, all members share a responsibility for each other and focus on their similarities rather than their differences (Brock & Brighouse, 2005). As we proceed in this chapter, I present cogenerative dialogues and cosmopolitanism as methods to provide ethical research practice. I do not discuss them as the only means through which ethical educational research is attained; however, I present them as viable tools for the

attainment of both a philosophical and practical approach to ethical research. Such an approach is necessary for the exploration of fields like urban science classrooms.

Cogenerative Dialogues and Researcher Awareness of Potential Harms

The cogenerative dialogue is most simply defined as a conversation that participants have about a shared experience (Tobin, 2005). In science classrooms, I utilize them as a means to accomplish multiple goals. They serve as a way to review topics discussed in class, open avenues for discussions about classroom teaching and learning, provide participants with opportunities to reflect on shared experiences, and allow participants to take collective responsibility for the results of the classroom. The most important component of cogenerative dialogues is the opportunity they provide for participants to cogenerate a plan of action geared toward improving classroom teaching and learning.

In a classroom of 30 students, the cogenerative dialogue group would consist of five to six participants who represent different groups in the classroom. This group would meet outside of class and then discuss the course. Through much of the research conducted in this dissertation, I show how cogenerative dialogues change both teaching and learning practices when stakeholders create spaces where an alignment between student learning strategies and teaching practices can occur. By creating a field where stakeholders can talk across the boundaries of race, class, age, and classroom roles, cogenerative dialogues transform the conventional classroom into an arena where all participants have a vested interest in a group-designed and implemented notion of success. Considering the collective goals of cogenerative dialogues, and their tendency to create transformed communities of

practice, they serve as avenues through which researchers can move towards ethical practice. This happens because research participants can co-generate ways to address the ethical issues that arise in their local communities of practice. Rather than have the focus of conversations in cogenerative dialogues revolve exclusively around science teaching and learning, they can also focus on the research in the classroom. These conversations could include conversations about the data resource being used, the questions asked in the study, the researcher's goals, and after the research has been concluded, the research products.

These cogenerative dialogues could begin with discussions about the researcher's questions and goals for the study. Prior to beginning the research, a cogenerative dialogue can ensure that the research being implemented meets the needs of the classroom. Consequent dialogues could investigate the type of data being collected, the types of questions to be asked, and any other issues students develop that relate to the research. When I have conducted these dialogues with students, they often ask what the purpose of the research is. My response to the students is always that the purpose of the research project is to improve the science class. This response yields questions like "better for whom?" and is usually followed with different student comments about what an improved classroom would look like from each of their perspectives. These comments then become the goals for the research project. The fact that students craft the research questions ensures a certain level of ethicality before the project even begins. Furthermore, it elevates the student's role from research subject to co-researcher.

In my research, where many participants have been disadvantaged socioeconomically by structures within and outside of schools, the goal of completing the

research comes with a responsibility to create opportunities that amplify student voices. This goal is achieved through their participation in the research.

Investigating Beneficence

Beneficence means that all participants in the research receive equal benefits. In order to attain beneficence, it is necessary for researchers to have a profound understanding of authenticity criteria (Guba & Lincoln, 1989) and of their relationship to stakeholder fairness. The notion of beneficence in educational research inherently requires a researcher causing and doing good while causing as little harm as possible to participants in the study. As we explore ethics through cogenerative dialogues, it is necessary to approach the issue of beneficence as an ideal that must be worked toward not only by researchers, but by all who have a vested interest in the study. In other words, multiple participants must enact the process of attaining beneficence across fields. Students who co-construct research questions with the researcher must ensure that their projects do not disadvantage the teacher or other students, just as the principal researcher's questions must not disadvantage students.

While Guba and Lincoln (1989) made it clear that all participants in the research should receive an equal benefit from the research being conducted, there needs to be an increased awareness that achieving participant beneficence is an ongoing process entailing different perspectives regarding what it means to be ethical. This awareness depends on the perspectives of the researchers, participants, and the larger group being impacted by the study. The attainment of communality and a unification of varying perspectives on ethicality, unity, and stakeholder beneficence should emerge as paramount in cogenerative dialogues. This can only happen if researchers fully acknowledge the caveats and potential

pitfalls of research practice and are willing to present research products as artifacts for discussion about the ethics of the research.

Expanding the Practical Approaches to Ethical Practice

In research conducted within urban settings, ways of knowing vary by socioeconomic, racial, and cultural backgrounds. In cogenerative dialogues, where these multiple ways of knowing come into intimate contact with each other, the goal of cogenerating a plan of action for the betterment of a classroom is often met with different reactions. Different perceptions of what is ethical become pronounced when the goal of being or becoming ethical is complicated by the dynamics within the classroom that have caused a mistrust of the teacher or researcher. This mistrust is also tied to what the teacher and researcher represents. If the teacher/researcher reminds students of negative experiences that they have had in schools, they will not see the teacher/researcher as genuinely interested in attaining ethical practices.

This issue plays out as students express ambivalence when confronted with the proposal to engage in fields like cogenerative dialogues. Students find it hard to believe that a teacher who was “Yelling at us one week cares what we have to say the next week.” At times, students are rightly cautious about the authoritative power of a cogenerated plan and may sense that they are being co-opted to support the teacher in his or her control over the class. Furthermore, the act of cogenerating a plan that impacts widespread practice often requires a shift in students’ beliefs and thoughts about themselves. In science classrooms, where students’ voices are only acknowledged when they respond to teachers, the ability to make suggestions that are listened to and implemented is a new construct.

Students are often taken aback by the fact that they are viewed as more than just students. Through consistent cogenerative dialogues where students and teachers work towards meeting their individual and group goals, divides between students and teachers/researchers are mediated. This occurs because students are given the opportunity to address their misgivings about engaging in research and cogenerative dialogues through the use of cogenerative dialogues.

The Challenge of Expanded Student Roles in Non-Expanding Fields

In order to meet the goal of enacting ethical research and providing agency to students, it is necessary to be aware of the sociocultural divides among participants. It is also important to be open to addressing divides associated with individuals' roles and identities within and outside of the classroom. While cogenerative dialogues are a practical way to discuss these divides, cosmopolitanism is the philosophical/ideological approach that is necessary to move beyond discussing and into collectively valuing different identities. Cosmopolitanism can be seen as the tie that binds people despite their differences. It is a catalytic force that navigates differences while rooting research practice in a democratic ideal that stresses stakeholder beneficence.

Creating Cosmopolitan Practices in Cogenerative Dialogue

Cosmopolitanism is founded on the concept that all of humanity belongs to a single community that is bound by either shared morals and ideals, or a valuing of the differences of others. It supports a move away from nationalism and towards the collective responsibility for people who traditionally would be perceived as foreign or unfamiliar

(Appiah, 2006). In cosmopolitan practice, the bonds of family, friendship, and camaraderie are extended to all people (Bhabha, 1996).

Theorizing Cosmopolitanism for Science Education Research

Tailoring cosmopolitanism to cogenerative dialogues requires a process where a shared ethos resounds through all the fields where teachers and researchers exchange thoughts and ideas with each other. In theorizing cosmopolitanism for research purposes, it is valuable to acknowledge the divides (racial, ethnic, and social class) between different groups and realize that each group shares either communal practices or similar attributes, which are practices groups have that cause them to align themselves to, or be aligned with, each other. If these practices or attributes are shared among multiple groups, they share a connection that binds them. If these connections are based on self -recognized alignments to each other, cosmopolitanism is achieved.

In the classroom, groupings can be based on divides between teachers and researchers, between students, or between students and teachers/researchers. If each of these local groups develops a connection within their specific community based on the fact that each of them desires to improve the class, the local groups share communal practices that can develop to cosmopolitanism across all groups.

Utilizing Cosmopolitanism for Equity

In order to begin the process of moving towards ethicality, there needs to be ongoing and continually enacted practices that focus on attaining a cosmopolitan ideal. These continual practices are the cogenerative dialogue. When the philosophy of cosmopolitanism is consistently discussed and lived within and outside of cogenerative

dialogues, participants are able to see that they are truly valued. When a suggestion about the classroom or a certain aspect of the research is discussed in cogenerative dialogues, it is necessary for the individual that makes the suggestion to see them being enacted in the classroom. When this occurs, the cosmopolitan ethos becomes lived and participant beneficence is attained. Participants also develop a taste for the culture of the person that makes the suggestion that may vary from his or her own.

Analyzing the Benefits and Harms of Cogenerative Dialogues and Cosmopolitanism

In order to have cogenerative dialogues that benefit many participants, it is important for the group to include as many participants from the classroom as possible. This occurs when members of the classroom are continually invited to participate in the cogenerative dialogue. When an optimal number of participants has been involved in the cogenerative dialogue (five to six participants in a 30 person class) a revolving door of sorts needs to be created. As a new member joins the cogenerative dialogue group, a member of the group should return to the classroom.

In the absence of a cosmopolitan ethos to guide this revolving door process, it is difficult to conduct research that does not cause a potential harm to the student who leaves the group. The student may feel as though he or she is being pushed outside of the group and the research. Consequently, a structure needs to be created that allows the individual who leaves the group to remain a part of the research process.

In my research, the individual who leaves the cogenerative dialogue group is the person who extends an invitation to the new cogenerative dialogue participant. In addition, students are encouraged to volunteer to leave the group so other students can learn to become student researchers. The cosmopolitan ethos lived in both the cogenerative

dialogue, and the classroom, allows the individual who leaves the cogenerative dialogue group to enact new parts of his or her new student researcher identity, of which cogenerative dialogue is just one component. This may include interviewing students, videotaping the classroom, formulating research questions, co-teaching the research practices developed in the cogenerative dialogue with new students, or establishing new cogenerative dialogue groups with students from the classroom.

Analyzing the Effects of Prolonged Engagement

In the discussion so far, I have described how the cogenerative dialogue benefits all research participants by producing locally relevant understandings and recommendations for future actions (Stith & Roth, 2006). When they are enacted with a cosmopolitan ethos, they are the means by which local cogenerated practices are shared evenly among group members. This is especially true when discussing local contexts like specific science classrooms. In some cases, the relevance of a cogenerated plan of action in one group may not be the same in another. Stakeholders (students/teachers/researchers) in different classrooms may create a research protocol for their cogenerative dialogues and classrooms that do not necessarily align with those created in another field. This occurs because the locally cogenerated plans of action may encompass understandings that are unique and beneficial only to the cogenerative dialogue participants and their classrooms. In these instances, the fact that the researcher is involved in prolonged engagement with a certain group of students functions as a detriment to a project that investigates science teaching and learning in a school, neighborhood, or community. The research becomes so tailored to a specific group that the ability to make claims that the research can be replicated in other

fields is lost. The cosmopolitan ethos that is intended to extend to all participants is only tailored to immediate stakeholders, and not to anyone outside of the classroom. This in turn creates the opposite of cosmopolitanism as a type of nationalism (valuing of one's own nation, or in this case, one's classroom group). This problem often occurs as a result of prolonged engagement in an insular study and can be addressed through an extension of the cosmopolitan ethos beyond the local field where the research is being conducted.

Addressing Prolonged Engagement

The problem that often comes with the extension of a cosmopolitan ethos to others is the fact that this idea is often extended only to individuals with whom one has daily contact. The process of researching the classroom and breaking down the divides among actors within that social field is challenging enough to overcome when constant cogenerative dialogues occur and individuals are revisiting and experiencing a cosmopolitan ethos daily.

Over time, the care and responsibility for others extends to every corner of the classroom. All students have been involved in the research and have extended a cosmopolitan ethos to one another. This care and responsibility has been developed through investigations of the science classroom and the conducting of research. In students' everyday worlds, the cosmopolitan ethos does not find an avenue through which it can grow beyond the classroom. Consequently, the students/teachers/researchers create a group identity that fosters insularity and research products that may be too localized.

When instances like this occur, it is necessary for researchers to introduce their research groups to others that are involved in similar work. The creation of research partnerships with individuals that employ similar theoretical lenses and are willing to employ the same research tools provide opportunities for the cosmopolitan ethos to get shared among larger groups. These groups can then engage in cogenerative dialogues with each other. The new, larger groups can co-construct research practices that would be ethical for the larger group.

In the current research, I present cogenerative dialogues and cosmopolitanism in multiple physics and chemistry classrooms and allow each group to have cogenerative dialogues on the research and research practice across grades and classes. In addition, I have coordinated meetings with an investigator engaged in similar research from a biology classroom in another borough of New York City. This larger group has created cogenerative dialogues that would address the needs of all stakeholders in both science classrooms.

Looking at Harms and Benefits of the Research

Oftentimes, when the research appears to be too localized, researchers focus on the harms and benefits of the research project and on an analysis of whether or not the benefits of the study outweigh the harms. The common perception is that if the research within the local field benefits all participants within that field, then the benefits outweigh the harms and the research project is ethical. I argue that the statement “benefits outweigh the harms” is an ideology that is often mentioned without careful consideration of its meanings. While it is a powerful statement that has implications for research, it very easily glosses over the complexities of the relationships between the benefits and harms of research.

Addressing the Rhetoric of "Benefits Outweigh Harms"

In mathematics, the ratio is seen as a linear relationship between two quantities, and the ratio of one quantity to another equals to an even distribution when they are of the same numerical value. If we were to apply this example, a benefit and harm would have equal value. However, an equal distribution of quantities of harms to benefits presupposes that the values of each harm and benefit are equal. When engaging in research utilizing cogenerative dialogue and cosmopolitanism as tools for research, I function under the assumption that this is not the case. In fact, the approach I described earlier (expanding the scope of the study) as a means to deal with insular research projects is necessary here. It requires moving beyond the study to how the students will fare in other contexts as a result of the study.

Therefore, the benefits must not only far outweigh the harms, but the long-term effects of possible harms should exponentially decrease while the effects of the benefits exponentially increase. This process requires tactical authenticity. Guba and Lincoln (1989) described this as when "all stakeholders and others at risk are provided with the opportunity to provide inputs" (p. 250). However, researchers in science education who work within urban schools must move beyond Guba and Lincoln's (1989) criteria. Populations that have been traditionally marginalized by research and research practices must be ensured opportunities to participate in and receive benefits from the research. I conclude that as many participants as possible within the research field that can provide contributions to the research (through dialogue while understanding and living a cosmopolitan ethos), the more ethical and authentic the research will be.

This chapter serves as a moral imperative that guided my work, and is an amalgamation of my thoughts on the ethicality of research practice from the study that birthed this dissertation.

CHAPTER 3

Investigating Corporate and Communal Practices

Historically, achievement reports that compare student performance as a function of ethnicity show that African American and Latino/Latina students fall far below their White counterparts in science and mathematics (Brand, Glasson, & Green, 2006). In New York State, where the study described in this chapter is located, African American and Latino/Latina students within the inner city take fewer advanced science classes than their counterparts in suburban schools. In addition, African American and Latino/Latina students score lower on standardized science exams than do students from other racial backgrounds (New York State Education Department, 2006). In the last six years, the achievement gaps in science between Whites and Blacks and Whites and Latino/Latinas have widened dramatically (NAEP, 2006). These statistics are alarming and widespread throughout urban, rural and suburban contexts (NCES, 2006). In urban schools, these differences are magnified and consequently, many researchers have rightfully focused on researching the achievement gap between African American and Latino/Latina youth and students of other racial backgrounds.

Unfortunately, these studies have focused on reducing the achievement gap by engaging in research that *primarily* investigates ways to increase the number of urban students who are successful on standardized exams, or simply describes the achievement gap (Jencks & Phillips, 1998) without factoring in the sociocultural and contextual underpinnings of the divide in achievement between these groups. These approaches propose reasons for urban students' lack of achievement as issues intimately tied to

character traits or dispositions that cannot be divorced from a lack of success in school (Perry, Steele, & Hilliard, 2003). Consequently, we are presented with research that appears to be functioning for the purpose of shedding light on issues that plague marginalized students, or helping these students while they concurrently reaffirm false notions of a tacit intellectual deficiency or lack of desire among African American, Latino/Latina, and other students who do not ascribe to macro societal norms. The end result of these studies is the perpetuation of notions of urban populations as being both "other than" and "less than" their counterparts in more affluent schools.

As a result of the limited and often ineffectual research products, it is clear that there are causes for the poor achievement of African American and Latino/Latina students in science that are yet to be investigated.

The Focus of this Study: Urban Science Teaching and Research

This study was developed as a result of observing chemistry teachers forging ahead in teaching a state-implemented, time-driven curriculum that yielded poor results (as measured by students' acquisition of content knowledge displayed on in-class examinations, and other teacher assessments). It was also fueled by the experiences of a physics teacher as he struggled with getting students to engage in the class when teachers have tagged them as disinterested in school.

In order to investigate students' poor results on standardized exams in science, I engaged in dialogues with science teachers about their students' performance on state assessments. Teachers attributed students' poor results to a lack of interest in class, science, or school. Their responses yielded comments that mirror much of current societal beliefs about students of color, which blames students for their lack of interest, or

inability to succeed, in school. As a result of the outcomes of these conversations, I proceeded to look for a means to interrogate the issues that presented themselves. I began by engaging in observations and discussions about the classroom with students and teachers.

I employed cogenerative dialogues (Tobin, 2000) as a tool to deconstruct what was going on in the classroom from both the teachers' and students' perspectives. These dialogues facilitated conversations in which the roles between student, teacher, and researcher were blurred. All participants in the dialogue were able to speak across race, class, and age boundaries despite their roles. In these dialogues, all participants generated collective plans of action to improve the science classroom. I applied the cogenerative dialogue to have discussions that would not have taken place otherwise in classrooms because of their inherent structures. By structures, I refer to the physical and material resources (people, ideas about school, seating arrangements) that affect schooling. Through these dialogues, I was able to engage in an ongoing interrogation of the ideological differences between teachers and students and identify and critique existent classroom practices.

Corporate and Communal Blocs in Urban Science Classes

The corporate bloc consists of structures that propagate notions of success and achievement that are tied to unyielding, flawed, and unapologetic benchmarks such as standardized exams and hyper-structured notions of classroom management. These structures function under the assumption that success on standardized exams breeds success in life and other unrealistic notions of success and achievement.

In urban education, we carry a corporate history through our collective ancestry from "[l]arge impersonal factory-model schools with rigid tracking systems to teach rudimentary skills and unwavering compliance to the children of the poor" (Darling-Hammond, 1997, p. 17). Educators ingrained in corporate ideologies teach students of low socioeconomic backgrounds (often urban African American and Latino/Latina) compliance with existent classroom protocol and strict adherence to science rules and laws rather than investigations of them.

Conversely, the communal bloc focuses on approaches to teaching and learning that views the doing of science as a social process (Seiler & Elmesky, 2006) and values students' ways of knowing and being as integral to school and schooling. In this process, "...in-class recognition of out-of-class excellence encourage(s) students to perceive of excellence broadly" (Ladson-Billings, 1994, p. 99). The communal bloc counters the present hegemonic framework that places knowledge and excellence as reliant upon the corporate notion of schooling. When a student voices an opinion about the science classroom and cogenerates a plan of action with peers, and then sees his or her opinion being enacted in the classroom, his or her notion of excellence and self-efficacy are reinforced. In the next paragraph, I describe the ways that communal approaches are generated in the science classroom.

Prior to introducing cogenerative dialogues in the physics classroom, a lesson on the effects of the force of gravity began with the introduction of the formula $F_{grav} = m*g$. The teacher introduced the value of *g*, provided an example about the forces acting on an object such as a bathroom scale, and almost immediately had students solve equations based on that formula. The progression from introducing the formula to solving an

equation was not too complex for students to grasp. However, it reinforced an existent pattern of teaching that placed less emphasis on the conceptual understanding of the concept and more on the solving of a mathematical equation. In cogenerative dialogues, which I identify as a more communal process, students discussed the classroom lesson and were able to engage in a discussion on the concept of forces and gravity more holistically. They described their experiences riding in elevators in the multi-story buildings in which they lived. They then discussed the reading on a bathroom scale if it was placed on an elevator moving downwards or upwards, and the possible effects of these movements on the scale reading. This conversation eventually led the students to relate the discussion to their experiences as they began asking questions about what happens when the elevators get stuck (as they often do) and there are no additional forces acting on the scale.

Eventually, their conversations tied back to the formula discussed in class and a more complex understanding of forces. Before I knew it, students were drawing the forces acting on a scale and creating diagrams that resembled free body diagrams before they discussed these in class. I argue that breaking away from the existent classroom structure created a more communal field that supported science instruction while fostering student interest.

Investigating Allegiances to Corporate or Communal Ideologies

The existence of a corporate bloc necessitates the presence of an opposite structure that shapes it, and so corporate and communal practices co-exist within urban science classrooms in a dialectical relationship. The corporate bloc carries with it broad

social structures that live an anonymous existence but hold artifacts that carry deep meanings (Turner, 2002). This plays out in science classrooms in an interesting way.

In a measurement lab, students walked into the classroom to see rulers I had placed on their desks. These rulers were longer than traditional ones and marked in sixty-fourths. While three or four students picked them up, most students looked at the rulers curiously and would not touch them. As the class settled in, I asked the students why most of them did not touch the rulers. A young lady responded by saying "In science, you don't touch anything. You just watch." "Even a ruler?" I asked. "Yes Mister, even a ruler."

A communal bloc holds artifacts that are not anonymous. In fact they are laws, customs, beliefs, and co-created understandings that are rooted in community. As students and teachers ascribe to the tenets of each ideology (corporate or communal), ideas and practices overlap in the formation of the general tone of the science classroom or the results of research. However, the existence of a divide is apparent.

There are four important questions to consider:

1) Do the bodies of knowledge being produced in science education contribute to, or dismantle, the reaffirmation of perspectives of inner city students as being intrinsically unable to be academically successful?
2) Do the outcomes of the research being produced benefit the teaching and learning of students in urban science classrooms?
3) Are the outcomes of the research being produced tied to corporate notions of success and achievement?

4) What place does a communal approach to teaching, learning, and research hold in the description of the students and the interpretations made from a research study?

Failing to address these questions leads to instances where researchers, teachers, and students become accustomed to, and accepting of, negative perceptions of already marginalized students' dispositions to learn within classrooms. Furthermore, educators and researchers routinely replicate societal hegemonic practices that relegate the ways of knowing of populations other than those traditionally represented in society as intelligent (because of teacher/researcher alignment to corporate norms) as useless or uninformed. In essence, I argue that the existence of allegiances to corporate or communal blocs is at the core of issues that plague the teaching and learning of science in urban schools.

Cogenerative Dialogues as an Investigatory Tool

In the studies presented in this chapter, I utilize cogenerative dialogues as a means to investigate the four earlier stated questions. These dialogues are conversations that participants have about a shared experience that provide teachers and students opportunities to engage in critical discussions about their experiences within and outside of the classroom (Roth & Tobin, 2006). They also provide students and teachers the opportunity to investigate, question, and research their own practice as learners of science. Most importantly, for this study they served as arenas where an evaluation of self was facilitated and where allegiances to corporate or communal ideologies could be identified. In this study, teachers involved in cogenerative dialogues were challenged to look at students' communal practices and consistently engage in reflection on where they stand in reference to what students think of the classroom.

In cogenerative dialogues, students feel comfortable enough to discuss a lesson I thought went well, but needed improvement. Cogenerative dialoguing therefore serves as a "strong pedagogical orientation…that reads any situation in which an adult finds himself or herself with a child as a pedagogic situation" (Van Manen, 1990, p. 152) that can serve as a learning opportunity. With this kind of practice enacted on a consistent basis, opportunities to identify one's stance beyond the classroom (i.e., more corporate or more communal) are expanded.

As these dialogues were implemented throughout this study, many transformative teaching and learning experiences ensued. For example, in chapter 5 of this dissertation, I provide a detailed description of the emergence of student rituals as a means to improve science teaching and learning. The implementation of cogenerative dialogues allowed for opportunities to address the corporate and communal practices in the science classroom that had become a breeding ground for cultural misalignments between students and teachers.

The use of these dialogues as a tool to bridge cultural, racial, and ideological misalignments and address critical issues in science classrooms stemmed from the successful use of this practice in urban science classrooms in Philadelphia (Tobin & Roth, 2006). I am deeply indebted to the extensive scholarly work provided by previous researchers (Tobin, Elmesky, & Seiler, 2005) serving as the basis of the current study.

The Nature of Corporate and Communal Practice: A Teacher's Dilemma

The collateral results of our national history of hegemony translate into the difference between corporate and communal ideologies and how they play out in urban science classrooms. Over time people grow accustomed to accepting the fact that certain

practices that oppress others commonplace. In the journal entry below, I describe how a teacher realized he was ascribing to hegemonic practices, then I describe how this practice relates to the hierarchal relationship between corporate and communal blocs.

> I ride my bicycle out of my driveway, around the reservoir, down a steep hill and through the park that leads to New York High School. I'm running late for work and I am pedaling in between groups of children on their way to school. Students are walking towards the building, some drearily and some excitedly, and look up when they see me whizzing past them. I see pairs, trios, and large groups of high school ninth and tenth graders. They prod each other as they see me riding past and make a few comments. Slow down mister, too much kinetic energy. Where's your car? Mr. E is crazy, riding a bike to school. As I approach the building, I hop off the bicycle and race towards my class. The day begins. Students file into the classroom and sit down in the same place they did yesterday. They nod the same good mornings and hellos to each other that they did the day before and wait for me to teach the lesson. The pairs and trios that walked together in the morning sit together in class. The buzz of conversations about yesterday's gossip and last night's television shows slowly decreases as I start my daily routine. I break up the groups, separate friends, and start my lesson. A couple of hours later, the day comes to a close. I begin my ride back home and see the students engaging in the same process they did earlier that day. Pairs and trios with smiles on their faces engaging in conversations that obviously resonated with something within them that generates positive emotional energy. As I rode home and thought about the day, something struck me. Why did I spend so much time breaking up the groups in the classroom? Why was it important for me to be the creator of order in the classroom? I settled my issues with these questions by saying that I was doing what I was supposed to be doing in the classroom. I was teaching Physics the way it was supposed to be taught. (Teacher Journal, September 2005)

Reflecting on my conversations with students throughout this study and re-reading the above excerpt, I am driven to engage in a close interrogation of corporate and communal practices as they relate to the classroom. The description of students engaging in the communal ritual of walking together before and after school clashes with the teachers' more corporate and structured belief that friends should be split up during class group work. This clash between varying allegiances to either corporate or communal blocs becomes apparent when I reflect on my ideological teaching stance as it relates to

how students enact the ritual of walking to and from school together. Critically addressing these issues leads me to a point where questions about my allegiances (corporate or communal) come into play, and leads to a troubling component of how teachers enact science pedagogy in the classroom. Allegiances to corporate or communal blocs can either be conscious or unconscious, and are evident in the practices that an individual enacts.

Contextualizing Corporate Practices: Beyond Urban Schools

In considering how these corporate and communal practices become manifested in schools, I conceptualize these two categories as existing in a hierarchical structure. Within this structure, corporate practices have more value than do communal practices. In the classroom, a teacher who exhibits corporate understandings of classroom management and teaching is valued highly by the school's administration. Those who teach in a communal fashion are described as lenient or uninterested in the students. In classrooms, the corporate and communal are nested within larger contexts of what is corporate and communal, and these transcend the scope of inner city schools. These contexts involve more global approaches to interactions between oppressed people, indigenous populations, and their colonizers. In the global context, certain ways of knowing and being are valued while others are supported and accepted. Similarly, corporate ways of knowing are accepted while communal ones are not.

In other words, what is corporate in the classroom is demonstrated by the implicit power certain people have over others. This includes the belief that the teacher is always right, the administrator sets all the school rules, and the student needs to be subservient. As evidenced by students' interactions with teachers in this study, and as described later

in this chapter, the imposition of a culture valued over another and the subsequent devaluing of particular cultures is prevalent within urban communities and schools. A culture that is viewed as dominant has the power to dominate other cultures both within and outside of the classroom. This domination is often viewed as normal and can be described as hegemonic.

The nature of hegemony and its ethos of dominance over others sets the stage for the valuing of a preferred ideology in urban science classrooms. The hierarchy that exists between the corporate and communal carries a deep-seeded history of an imposition of a strict adherence to regulations that function to undermine the characteristics and dispositions of certain populations to learn. This history is evident in the United States with the passing of laws that forbade slaves from gathering to receive an education and the propagation of the belief that African Americans lack intellectual ability (Woodson, 1919).

Motivating Students with Corporate or Communal Practice

In discussions about science education, corporate ideologies play out as conversations support the that notion schools are the ultimate providers of knowledge and the sole medium by which students are trained for success in society. This is evident in the ways teachers motivate students, and is illustrated in the following excerpt from a 9th grade Chemistry lesson.

> *Teacher: You have to learn these things (atomic structure), or you will not be a doctor or nurse or whatever you want to be. If you don't learn this, you won't be anything.*

The above statement corresponds to a main component of corporate thought, which equates learning within the corporate structure of schools with success in life; and

the inability to succeed in school to failure in life. This ideology is one that comes with an allegiance to the corporate bloc. The explication of a corporate sensibility that does not value learning as an activity one engages in for its inherent value, but rather as one that is engaged in because it is valued by society (success or failure), becomes the self that is donned by the teacher. Curriculum in New York City science classrooms is geared specifically towards the state exam and does not allow for students to study aspects of science in which they develop some special interest or need extra help. In a corporate classroom, the teacher acts on a corporate mindset in his or her interactions with students. Chomsky described this process when he wrote that teachers instill "beliefs and doctrines that will serve the interests of those that have real power" (Chomsky, 2000, p. 24) in classrooms. This stance includes motivating students to meet societal needs and success by standards that value assimilation and controlled behavior at the expense of inquiry.

Power Differentials in Corporate and Communal Practices

The rationally motivated approach to pedagogy is stripped of feeling and humanness and is therefore merely focused on giving information as input and replication of the same as an outcome. Henry Giroux discusses the nature of authority and democracy as they relate to schools in his work as he differentiates between "community life in which the moral quality of everyday existence is linked to the existence of democracy" and authority, "where the interplay between domination and power takes precedence" (Giroux, 1997, p. 99). What Giroux does here is clearly differentiate between corporate and communal practice, which he names as authority and democracy. In Giroux's description, it becomes apparent that "communal action refers to that action

which is oriented to the feeling of actors that they belong together." Weber (1958) noted societal action (which I deem as corporate action) "is oriented to a rationally motivated adjustment of interest" (Weber, 1958, p. 113).

As the corporate faction wields its power by making decisions that are almost instantaneously implemented in schools, communal discussions are consistently disregarded and considered empty discourse by the corporate faction. When Giroux wrote of everyday existence in his discussion of the democratic nature of out-of-school fields, he laid a foundation for an investigation of practices guiding community and communal customs, and their opposition to corporate and authoritative structures. This analysis prepares us to discuss the corporate and communal dialectic as it relates to practices in urban science classrooms.

Corporate | Communal

I situate science education research, science teaching, and policy into a two-tiered grouping. This varies from a traditional dialectic where there is often a recursive relationship that holds equal value to objects on either side of the dialectic. In the tiered grouping I present, the tiers represent the relative power of the corporate or communal. With the situation of the corporate above the communal, I show that societal/traditional understandings of teaching and learning value the corporate more than the communal. This stance often varies from what students value. I focus on this two-tiered category system with an awareness of the limiting nature of closed categories. Therefore I use these tiers as a means to characterize interactions within science classrooms and science education research as a single entity with two major divisions. As a result of my grouping of these varying blocs under the umbrella of school, schooling, and educational research,

I make allowances for instances where certain ideologies and practices go beyond the structures of the configuration I have laid out when they share allegiances to both divisions. I also focus on the tiered structure that I discuss here as a hierarchical organizational unit where corporate practices are situated above communal practices in the eyes of teachers and administrators. This structure can be utilized to explain why so much dissonance occurs between students and teachers in classes, and why students' strengths are limited in the classroom but exposed in other fields.

The corporate | communal hierarchy

If students in cogenerative dialogue groups define their practice of obtaining a general consensus as a communal practice, the opposite action becomes labeled as corporate. If students agree that their approach to learning science involves ensuring that everyone understands a topic, then when a teacher rushes through a topic and certain students still do not understand, his or her practices become corporate (see Figure 1). The trouble within the enactment of culture by teachers is the valuing of the corporate above the communal rather than having them equally valued.

Figure 1. Heuristic describing a relationship between corporate and communal practices.

CORPORATE	Yelling out orders	Allotted time for a specific topic
COMMUNAL	Getting a general consensus	Ensuring everyone understands a topic

The situating of ideologies in this tiered system and ensuing privilege of the corporate over the communal is a function of the closeness of a preferred ideology to macro societal established notions of the "appropriate" or best approach. In other words, the value placed on corporate approaches to teaching and learning are supported by the fact that they are viewed as the best way to teach and learn by factions outside of school.

While I am fully aware that the categories we use to describe also delimit because of varying factors, it is evident that who and what constitutes the higher valued group is always at play. The role of hegemony instills a power over the other that is presented as normative. Consequently, the fact that corporate ideologies are valued over communal ones has been accepted as the way that schools run. Despite this fact, I function with the belief that "the very human endeavors that may be seen as normal and commonsensical are culturally bounded" and "the search for an approach to research that better represents indigenous and community knowledge remains a worthwhile one" (Ladson-Billings, 2003, p. 51). Approaching teaching and learning with a value for communal understandings presents a viable way to approach the science classroom for students in urban science classrooms.

The amount of detail spent in describing the corporate | communal hierarchy is intended to clarify a new theoretical tool for looking at urban classrooms. Through the descriptions above, I show that the value of investigating communal approaches to teaching and learning is a viable but undervalued option for teaching students who are engaged in communal practices. The positioning of the communal as abnormal or unconventional in comparison to the corporate often causes communal teaching practices to be dismissed as a viable approach to teaching in urban classrooms.

Theorizing Corporate and Communal Practices

Utilizing Bourdieu's (1990) theory for the enactment of social life is helpful for further envisioning the corporate and communal blocs described in this chapter. Utilizing a Bourdieusian lens, we can see that these blocs form two different fields, each possessing varying types of culture. Since culture is composed of both schemata and

practices (Sewell, 1999), corporate and communal fields can be identified by enacting specific cultures within each field. Therefore, the way that culture is identified and expressed within one field helps to define it as corporate or communal. These fields have porous boundaries that facilitate the exchange of culture (despite the fact that structures within certain fields may not support this exchange). In other words, culture from communal fields is exhibited in corporate fields but may not be valued within them as a foundation for learning.

Impact of Cogenerative Dialogues on Corporate Structures

As a result of engaging in cogenerative dialogues, I have discovered the value of engaging in communal practices with students. Consequently, I consistently make an attempt to engage in more communal practices with students in the classes I teach. An integral part of this process involves utilizing feedback from students to structure the classroom. I gather feedback (critiques, opinions, perspectives) from students through cogenerative dialogues, and use the cogenerated plans of action to improve my next lesson.

After discussions with students in a physics class, the students and I decided the structure of the class was not working well. Students complained that I was too distant from them and that they would prefer if the PowerPoint presentations I used in the classroom could be delivered in a more intimate fashion.

> *Joey: "Why can't you be closer to the students, like move nearer to me so I can be more interested and see you explain.*
> *Leidys: Then he'll be over there and what are we going to be looking at?*
> *Emdin: If I moved close to you Joey, then I would be far away from someone else. How can I do that?*
> *Joey: I don't know.*
> *Niqua: Why not do it like kindergarten? Take off the projector, and have us all sit in a circle.*

Figure 2. Students and teacher in a communal structure within a physics class.

In response to this conversation, the students and I decided to move the class into a tightly knit circle. I taught the lesson while sitting on a desk and spun around to show students notes on my laptop. As a result of the cogenerative dialogue, a communal practice had developed in the classroom. Students were engaged in the lesson and exhibited new forms of agency in response to the changed structure by exhibiting mutual focus on the laptop, the teacher, and their peers.

In the following weeks, whenever we had a section in the physics lesson that required my explanation of a concept (when I would have normally used the projector), students requested that we all sit in a circle similar to the one displayed in Figure 2. One student described my proximity to the class as the difference between perigee and apogee. “You’re the closest to us now at perigee. Don’t go back to apogee.” Another described our classroom setting as similar to a rap cipher where students would stand huddled in a circle listening to each other rap. It was a communal practice they certainly liked. Weeks into our use of this practice, one of the school’s administrative staff walked

past the classroom, saw me sitting in the classroom in this new seating arrangement, and reported to the principal that something was going wrong in the class. She was concerned with the fact that students were not sitting in the traditional four person groups or in rows focused on the front of the room. As a result of the creation of this particular communal practice within the classroom, I had disrupted the normative existent corporate classroom structure and had become pitted against the corporate ideology of the school administrator.

As the former traditional classroom structure in which students faced the projector became redefined by students, it developed into a communal practice. Students preferred the new arrangement to sitting upright, facing the screen, and having to be engaged despite my distance from them and their distance from each other. As students continued to request the new seating arrangement, I continued to implement it. Once again, my sitting in the circle aroused the attention of the school administration. I was called to the principal's office to justify what was going on in my classroom. During my conversation with the principal, he reminded me that it was important to maintain order in the classroom and asked me to return to the former class structure.

This instance serves as an example of the dialectical relationship between corporate and communal practices, and how situating one ideology over another gets enacted in urban science classrooms. The corporate ideology of the school administrator serves as a structure that impacts the students' exhibition of communal practices. In order to maintain what had developed into a successful communal practice, I had to invite the principal into the classroom to observe the level of engagement students exhibited with the communally structured classroom. Eventually, he agreed that I could use this

new classroom structure "only when it was absolutely necessary." I was reminded not to use the structure as everyday classroom practice. I assume that this was recommended so that I would be able to avert the other school administrator who for some reason did not understand why I would choose to structure the classroom in such an unconventional manner.

In this instance, my initial practice of changing the seating arrangement in the class had become a ritual (because of its consistency) that was a component of the new, more communal classroom. The existence of this new ritual was supported by students, and it demonstrates how enacting certain practices within a field defines it as either more corporate or more communal.

The Confluence of Student and Teacher Practices: Investigating Varying Ideologies

> *Teacher: I don't understand why you don't want to show up. This is here to help.*
> *Zion: I would rather go home. After school (tutoring) is just like regular school. (As the teacher walks away). That's why I don't go. It's the same thing as school. Not worth it.*

In the above excerpt, a teacher expresses frustration with a student when she recommends that the student attend a tutoring session and the student refuses. The teacher perceives the tutoring session as the answer to the student's poor test grades and a way for the student to catch up with her academics. The student, on the other hand, views the tutoring session as another version of school. I argue that she does not find the tutoring session helpful because it is a corporate field that is similar to her classes during the school day. As the conversation ends and the teacher walks away, and then as the student walks out of the classroom and out of the school door, I am left wondering if either of them understood the other's perspective. Does the student realize that the teacher wants

her to succeed? Does the teacher know why the student did not want to attend the tutoring session? In this case, I argue that the answer to both of these questions is no.

Unfortunately, this is a common occurrence between teachers and students in schools as answers to questions of this nature usually go unexamined. More often than not, scenarios such as these do not even come into the critical consciousness of researchers, teachers, or students. Instead, their impact and outcomes are accepted as a part of the normal enactment of schooling. The student's choice not to attend the tutoring session would equate to a belief by the teacher that she did not want to learn. The student would leave the exchange with the teacher believing that the teacher does not understand or want to know why she thinks school "is not worth it." The statement that the student made could have opened up avenues for deeper conversations about what the "it" the student mentions when she says school is not worth it. In cogenerative dialogues, the teacher and student could discuss what "it" should be worth, and what the school day and the tutoring sessions would have to look like for the time to be worthwhile.

Student Dispositions as Unexamined Practices

The statement Zion made in the interaction described above about the tutoring session speaks to the fact that classroom corporate structures were a reason for her choice not to attend tutoring. A similar frustration with the corporate structure of school was evident in conversations with other students.

Over the course of this study, I interviewed many students and will often reference my conversations with an African American young man named Erin about his experiences with school and what his teachers described as his poor attitude towards school. This portrayal was not only applied by a teacher to describe Erin to his peers, but

was also written on his report card. Erin's unsuccessful interactions in his science classes, as well as his embodiment of communal ways of knowing and being, serve as exemplars for the ways students embedded in communal practices interact with the corporate structures of schooling. In classes, Erin often exhibited behaviors that may have been misconstrued as a lack of interest in science. His role and sub-identities (see Chapter 1) reflected behaviors that may be described as a disposition to act that are rampant in research. However, after engaging in cogenerative dialogues with him, role identities that supported an interest in science became apparent. In the section below, I present the ways that negative perceptions of urban youth evolve into cultural motifs that inscribe negative identities on urban students.

Understanding and Deconstructing Motifs that Describe Urban Students

Educational research is rich with studies that describe and theorize the existence of dispositions to act of black students. Ogbu's work with African American youth (Fordham & Ogbu, 1986) and Boykin's (1999) work on African American psychology have yielded heartfelt debates and discussions about counter-cultural identities and motivational tendencies of African American youth that are often pitted against each other. The mainstay in these discussions is the perception of these youths' ways of being (whether described as opposed to school/schooling or not) by others as deficient.

In the present study, it became apparent that African American and Latino/Latina youth often exhibit behaviors that are perceived negatively by teachers and researchers as indicators of an inability, or lack of desire, to be successful in science. As we will discover, these characteristics are in many instances not indicators of students' dispositions to be uninterested in school but are rather indicators of teachers'/researchers'

negative outlooks on students. These outlooks are formed without an investigation of where students' responses to the structures of school originate. An allegiance to a corporate ideology therefore determines the ways that teachers think of students. Students therefore feel as though they are "obliged to submit ourselves [themselves] to rules of conduct which are sometimes even contrary to our most fundamental inclinations and instincts" (Durkheim, 1965, p. 227) and judged based on their reactions to these structures, rather than on their true dispositions.

Durkheim described how individuals become in service to societal ideals and prescribed ideas despite their personal inclinations, and the deleterious effects of such practices on the individual. Instances such as these translate into buying into a belief about people (in this case, urban students of color) and making assumptions about who and what they are based on their perceived negative reactions to a system that is oppressive to their sense of self rather than on their resilience and savvy in maneuvering communally through these structures.

Investigating Unexamined Practices Exhibited by Urban Students: From the Physics Classroom to the Cogenerative Dialogue

On a Wednesday morning in the first semester of the school year, I began teaching a unit on kinematics in my physics class. I became so involved in my teaching that I failed to recognize that a lot of the students were lost. I saw a few puzzled faces but I thought they were only a small part of the class and continued finishing my point. However, mid-sentence I finally realized that almost the entire class seemed to be confused. In response, I walked over to the back of the class and asked Erin the following question, "What do you think about what we've been talking about today? Speed, distance, any thoughts?" I

didn't get a response from him. In fact, he didn't even look in my direction. He turned his head away from me and placed it on the desk.

After class, I invited him to join me in a conversation about the science class with a few other students. I asked him if we could meet during lunch the next day, to which he nodded "yes." He then asked, "Is this because of my bad attitude in class?" When I responded "no," he seemed puzzled and looked as though he wanted to ask another question. The bell for the next class rang, and he walked out of the room.

The next day, I sat in my physics classroom with four students who I invited to participate in a cogenerative dialogue as we waited for Erin to join us. He slowly walked into the classroom, sat in the only empty seat and stared into space as we began a conversation about the students' classes. As we discussed homework, I looked towards Erin hoping to obtain a response from him, but he remained silent just as he did the day before in the physics class. Eventually, the conversation progressed to a discussion about attitudes towards school and he finally showed some interest by commenting on his general disinterest in school.

> *Emdin: So, E (pause) like what's the problem, what's up with you and science and math or whatever?*
> *Erin: Basically, I hate getting up in the morning, coming all the way over here just… (long pause)... I just don't like school. It's like everything we're doing this year they did last year and the year before that?*

After this discussion, I attempted to understand how Erin could possibly perceive what he was learning in the 9th grade as being the same as what he has learned in the 8th or 7th grade. In 7th grade he had taken Life Science, in 8th grade Earth Science, and in 9th grade he was taking Physics. The math curriculum from the 7th to 9th grade spanned completely different topics. As I thought about these questions the bell rang, indicating

the end of our session. However, I had to ask Erin about his comments. I needed to know what the similarities between the classes were, and what was feeding his dislike of school. Instead of immediately asking these questions, I made a plan to meet with Erin the next day at lunch.

One-on-One Cogenerative Dialogue as a Tool for Student Interactions

The following day, I scheduled a one-on-one cogenerative dialogue discussion with Erin and discussed his classes. During this discussion, I mentioned the lackadaisical attitude that teachers claimed he exhibited in his classes. He smiled when I asked him why he dismissed teachers and slept through their classes. Under his breath, he murmured, “it’s my attitude” and then he remained silent. I then mentioned a specific teacher and all of a sudden his demeanor changed.

> *Erin: Look, every year, every science class, it’s like… (making a fist and striking it against his palm) you got to do this and you got to do that, and then you got to do that and basically all these teachers need to breathe a little bit… damn, relax.*

It became clear that the mainstay in Erin’s academic career was not the subject matter per se; it was the method by which the subject matter was delivered. In classes, he was repetitively ordered to do specific tasks. As a result, he was not being engaged academically and was resistant to teachers. In response, Erin decided to disengage from his school work. As a result of existing classroom structures, he enacted agency by being passive in the classroom. He said, “They keep on like that [giving repetitive orders], and that’s why I don’t pay them any attention.”

Erin’s response to the corporate structure of the classroom is precisely what was labeled as a poor attitude in class by his teacher and on his report card. I argue that Erin’s ostensible lack of interest in his science classes was not directly linked to an uninterested

disposition, but was tied to a reaction to the type of schooling or instruction that he had received up until that point. In (Barton, Ermer, Burkett and Osbourne, 2003) students' resistance to teacher authority and disciplinary action and students' use of this practice to create spaces for themselves within the structures of school science are described. As we frame this resistance within corporate and communal practices, we see that Erin's response and the responses of other students in science classes are actually responses to the corporate structures of science classrooms.

It is therefore imperative that readers of this chapter proceed from this point by shifting perspectives on students' behavior and performance on corporate measures. There needs to be an awareness that students' behaviors, lack of performance on corporate measures, and interest in classrooms are responses to the corporate structures of classrooms and are not necessarily a reflection of urban students' dispositions. The way students act (practices exhibited in isolation or over time) should serve as points for further study to help develop a full understanding of the misrepresentations of students in urban schools.

Investigating Students' Perspectives of the Urban Science Classroom

As this chapter reveals, the reality is that student dispositions and ways of knowing vary greatly from teachers' perspectives of them. This variance does not always necessarily equate to an unawareness of students' intelligence or creativity. By this, I mean that teachers often understand that African American and Latino/Latina students exhibit a dynamic interest in learning. However, the fact that "…power and science intersect in both children's lives and science practices" (Barton et al, 2003, p. 81) reduces opportunities for students to actively engage in science and display their abilities. This

occurs because the power of corporate practices within urban schools silences teachers and students and "function as a mechanism of socialization. The goal is to keep people from asking questions that matter about important issues that directly affect them and others" (Chomsky, 2000, p. 24). Through this process, teachers are socialized and trained to maintain practices of not challenging authority; not being able to voice, ask, or express the questions that really matter; and not supporting students in critical questioning. This indoctrinated silencing functions to maintain hegemony and in turn silences opportunities for inquisitiveness and questioning by students. Critical questioning, inquiry, debate, and inquisition are requisite elements in a communal classroom environment and for engaging in science. Upon viewing a videotape of my lesson on kinematics, I realized that I had ignored students' questions. The teaching was not an organic process. I responded to a hand being raised in the back of the class by saying "No, not right now" and unknowingly supported a corporate silencing of the student's voice that may have served as a further divide between the students and myself. When Erin ignored my question in a way that I thought was disrespectful. I could certainly have used this experience as a reason to affirm his supposed disinterest in learning. In the following section, I will explain how the corporate structures of classrooms allow this to occur.

Finding and Naming Doxa

> When there is an accidental correlation between cultural prejudices and social observation (no matter how casual) a theory is born, and it may refuse to die even after the chance correlation has vanished without a trace (Sen, 2006, p. 104)

The quote above describes the ways perceptions that individuals have about others develop into theories about them. Urban students' poor performance on standardized

exams or behaviors that are reactions to corporate classrooms and schooling are used to form negative theories about their interest in school. Teacher perceptions of students in some instances are so far removed from reality that they are even based on students' appearances or demeanor. In Erin's case, a teacher grouped his actions in class along with his appearance. In describing Erin, the teacher said "He walks in the classroom with his hat over his eyes, six foot whatever tall, and this big tee shirt on and doesn't do anything I ask him. It's ridiculous. What is he here for?"

Erin's ignoring me or falling asleep in class is an individual action that may be unquestioned and ascribed to a desire to not want to learn (consistent with teachers' comments on his report card). Perceived characteristics or attributes and the consequent perceptions they garner in teachers are often unquestionably accepted, taken for granted, and developed into theories grounded in prejudice and doxa. Pierre Bourdieu described doxa as unexamined dispositions, behaviors, and practices that are exhibited by participants in a field. They also can be viewed as the accidental correlations people make between an individual and certain behaviors. I use doxa in this study as tools for investigating under-discussed dynamics that are important to understanding teaching and learning in an urban science classroom.

As represented in the quote above, the teacher assumed Erin was not interested in school and drew conclusions about him based on factors such as physical attributes and appearance. Doxa therefore directly applies to student behaviors both inside and outside of school; attitudes, reactions, and responses that are misjudged and not fully explored. Addressing these doxa and undergoing a critical analysis of student behaviors and interactions within schools through cogenerative dialogues leads to a deeper

understanding of the structures within schools that shape students' behaviors in classrooms. This process also assists in helping teachers and researchers see that students' life worlds in many instances support teaching and learning.

Facilitating the Use of Doxa in the Science Classroom: Challenging Doubts and Misconceptions

The quest therefore should be for an analysis of the structures within schools that promote the frequency of actions that grow into "dispositions" that are not seen as conducive to schooling. The next step that needs to be investigated is how to transform what is perceived as doxa into issues that are investigated for understanding students' reactions to school. Within a hegemonic structure, this takes a constant re-visitation of practice and investigation of perspectives. As a teacher, I had to acknowledge that what I believed was integral to the relationship between teacher and student (an intentional divide between teacher and student, including a distinct lecture portion and then a question and answer portion) was just as unimportant as Erin's teacher mentioning his big tee shirt.

I use doxa as a tool for analyzing the faults and potential strengths of a particular science class structure rather than a signifier of student dispositions that are perceived as resistant to school success. These doxa are an integral component of my study of communal practices and the practices that constitute them. Consequently, as we address these unexamined student attributes within and out-of-school fields, we can investigate the ways they can be utilized to ensure student success in science classrooms.

Investigating Doxa through Cogenerative Dialogues

> *Emdin: So what do we do about this (doing poorly in class), how do we get you to get going in class?*

Erin: Basically, I'll just have to fit in, do what they keep saying, to get my grades up and get out and do me.
Emdin: What do you want to do with yourself, your life? When you say get out and do me?
Erin: (excitedly looks up and cocks his head back) I want to design video games or play ball. That's what I like to do. That's what I do. Play ball, play videogames, study and homework.
Emdin: That's what's up. You study and do homework everyday?
Erin: Hell yeah, I pass my tests, I pass my grades, no A's and all that but I do enough. The teachers didn't tell you that though right?

Erin was absolutely correct, I had been told about his lack of attention and focus in class, his ignoring the teacher in class, and even told about his wardrobe and oversized tee shirt, but I had not been told that he turned in almost every homework assignment and passed all his exams. Furthermore, his interest in basketball and the fact that he was well-liked by almost everyone he encountered outside of the classroom had not been discussed by his teachers.

A justification for the fact that I had only been told negative things about Erin may be that his teachers only see him in the classroom. However, this in itself poses a problem and signifies the existence of a corporate approach to teaching that does not go beyond the classroom. A communal approach to teaching regards all aspects of the student's life as just as important as what occurs within the classroom and utilizes what is gathered from outside fields to improve the quality of teaching and learning in the classroom.

Erin's ability to multi-task, as exhibited by his ability to play a basketball game, settle an argument, and greet his peers (described below) is capital that cannot be used in the classroom, because if he chose to multi-task in class, he may have been reprimanded for having a lack of focus. The nature of the two-tiered system earlier discussed in reference to corporate and communal fields explains how an attribute valued in one field

can be identified as oppositional to culture in another and sets the stage for a closer investigation of student practices.

Investigating Student Practices: Gaining New Perspectives

One day after a cogenerative dialogue session, I took Erin up on an invitation to play basketball in his neighborhood. I was surprised at how articulate, jovial, and friendly he was with everyone because his behavior was the exact opposite of the behavior he displayed in the classroom.

The light from a lamppost danced on the basketball court and a roar of laughter followed a quick crossover dribble by Erin as another player stumbled to the ground. Erin made his shot, stopped to help the other player up, and the game continued. The players exchanged heated discussions during the game that might have led an outsider to believe that there was going to be a fight at any second. One of these arguments came from an incident where one of the basketball players was called "out of bounds." In an instant, there was an argument between ten young men and in fewer than 30 seconds, they all agreed to respect the call and continue the game. Erin then settled another quick argument between two players, shook hands with some young men who just walked to the court, and continued the game. After each game, the players exchanged handshakes and commented on the previous game as new players walked on the court. Erin commented about "making it down the court in almost no time. That's speed." I smiled as I realized that this was the answer to the question I had asked him in class the week before.

After the third game, I was exhausted and told everyone on the court I was going home. The young men from the court yelled their good-byes as I walked away and caught

my breath. I watched the last game from my car and noticed that Erin was central in all the interactions on the court.

I took a sip of water and reflected on my cogenerative dialogues with Erin. Our conversations had become a portal through which I could cross the physical barriers of the classroom and get an opportunity to be informed about his ways of being in out-of-school fields. The ways other teachers and I had perceived him were almost opposite to his identity outside of school. In a sense, the comment on his report card and the comments by his teachers were accurate. He had been exhibiting a poor attitude. Where the teachers were wrong is that Erin's attitude was not towards school or learning but towards the structures in the school. In more communal fields, he reflected an opposite disposition.

These experiences have led me to the conclusion that the communal practices of students and the rituals that encompass their practices in out-of-school/classroom fields often vary completely from the actions accepted in schools as appropriate behavior. This lack of acceptance of students' actions and practices breeds cultural misalignments. Erin had not been provided with opportunities to lead or organize discussions or teach students within the corporate structured classroom. He had been shut down from exhibiting his science identity. He was not given the opportunity to fluidly transact with the structures in the physics classroom, and so he chose to just ignore the teachers (see Chapter 2). In addition, the need for a rousing debate in order to challenge and then fully understand an occurrence (as was evident on the basketball court) was not allowed in Erin's classes. When these strengths are exhibited in the classroom, the field becomes less corporate.

Investigating Student and Teacher Perspectives: Becoming More or Less Corporate

Teacher: Sometimes they get so loud and rowdy that I have to just shut them up.
Student: Every time we get really into the lesson and start asking questions and stuff we get shut down.

The quotes above are a juxtaposition of two comments that were shared in different spaces and times over the course of my research. I present them together in this section because they speak volumes about the perspectives of the student and the teacher. While the teacher deems it necessary to stop the students from making noise, the students perceive instances where the classroom structure facilitates active discussion as an opportunity to learn. The teacher's perspective reflects a corporate way of knowing that does not view interest in science as being vocal and animated. The nature of communal practices often involves discussions that feed debate or opportunities to question with the goal of attaining full understanding. In such a structure, students need to be vocal about the subject matter. A corporate ideology, on the other hand, functions under the assumption that the noise that accompanies debate equates to disorder or chaos in the classroom. The corporate ideology stands in opposition to my experiences as a teacher, where students are most engaged when there is fluid discourse about a topic or when the information is not simply delivered, but presented in a context that requires probing it for full understanding (Ladson-Billings, 1994).

Structure|Agency in Corporate and Communal Classrooms

When students are accustomed to communal practices outside of classrooms, the impact of corporate practices affects their school performance. Transitioning between the two practices results in a discontinuation of fluid discourse with learning and the subject matter. In the following vignette, we see the impact of corporate practices on students who are accustomed to communal practices.

Mr. S: You're failing Chem.? How is that possible? You did so well in physics last year.

Pia: Well, in physics we had big projects like making your own car, I mean we had materials and we had to make the car move, do your thing to make it happen. We found out stuff with people. In Chem. It's like (long pause) nothing to discover, or make up, it's just instructions. I like to be creative and that helped me in Physics. In Chem., it's no creativity, no imagination, just work.

Teacher: Chem. can be just as creative. You can… (interrupted by Pia)

Pia: You try mixing some chemicals in that class and see what happens, Mr. S (the teacher) will go crazy.

The differences between the classes described in the vignette above show how the classroom structures mediate students' agency. The relationship between structure and agency corresponds to the way in which structures within a field directly affect the agency of the participants within the field. In essence, a physical, symbolic, or ideological structure can inhibit or support a student's ability to act. Enacting communal practices in the physics class served as structures that provided Pia with the agency to be successful in physics. Once she began to engage in physics, the communal structures in the class (working in groups, engaging in discussions) supported her learning. Furthermore, the vignette illustrates how students learn to engage communally within a classroom when the classroom structure supports their learning.

In a classroom with a different structure, new schemata and practices need to be developed. The new structure impacts the students' interests and changes the possibilities (either positively or negatively) for students participating in the classroom. In this instance, when Pia began to feel like there was no room for her to actively transact within the chemistry classroom, she began to express disinterest. If she were given the opportunity to access chemistry in a more communal classroom, the new structure of the classroom may facilitate her expression of agency to do better in chemistry.

As the school year progressed, cogenerative dialogues were implemented in the chemistry classroom. These impacted not only the structures of the chemistry classrooms, but also the expression of agency by the students.

Misconceptions of the Collateral Results of Communal Practices

In urban schools, when students perform well in certain classes (e.g., score higher on tests or participate more in class) and do poorly in others, the wrong questions are asked. Rather than investigating the structures that facilitate students' high or low performance, students, the subject matter, and the teacher are viewed as responsible, rather than the corporate or communal nature of the classroom. When students in New York High School performed poorly in the chemistry class after they had been successful in physics, teachers and administrators asked four main questions:

1. Is chemistry more difficult than physics?
2. Is the chemistry teacher teaching poorly?
3. Was the physics class taught poorly?
4. Are the students not working as hard as they did last year?

The simple answer to each question is "no." However, this response barely scratches the surface of the larger issues that affected students in the science classroom. The key to understanding the difference in student performance in the physics versus chemistry classrooms lies in the structure of the classes and the tendency for the instruction in the physics classes to be more communal than the initial structure of the chemistry classes. Students' academic performance in more communal classrooms reflected increased performance on corporate measures.

Structure|Agency in the Physics and Chemistry Classrooms

In a cogenerative discussion with students about communal practices, students described key components of their interactions, including spontaneity, large group activities, and spending time with each other. These practices were embraced and ran rampant in the physics class. While students had to pass examinations and prove their mastery of the subject matter, the main focus was to create a class-wide learning experience. In the chemistry class, the teacher was preparing the students specifically for success on a statewide exam (New York State Regents). As a result, he felt like there was no time to allow students to individually or collectively investigate chemistry.

In the physics class, students generally performed better on tests, did more homework, and participated more than they did in the chemistry class. The communal structures in place in the physics classroom helped the students enact their agency in ways that allowed them to do better in the class. As a result of the more corporate structures of the chemistry classroom, students enacted agency in ways that caused them not to academically succeed. Students either intentionally disrupted lessons by arguing with the teacher or completely disengaged from the class session.

It is important to recognize that the goal of comparing the physics and chemistry classes here is not an indicator of whether each teacher was or was not effective in this role, nor is it to equate the more corporate teacher with being the bad teacher and the more communal teacher as being the good teacher. Such an approach would be simplistic and would miss the point of the outcomes of this study. However, it is important to recognize that a teacher’s ideology and allegiances to either corporate or communal practices impact the pedagogical approaches taken in the classroom. Consequently, these

mediate the way students enact their agency within the classroom and whether or not they push towards success at corporate measures like standardized exams.

In the present research, the macro structure that made teachers and their classrooms more corporate was the focus on passing a standardized test. When a large macro and corporate structure is the focal point of the class, corporate meso and micro structures ensue. The teacher's focus on the statewide exam (macro structure) translated into a specific amount of time being spent on a topic despite questions or objections from students, no time being allotted for student investigation, laboratories being more procedural than investigatory (meso structures), and the teacher taking on a linear (almost purely lecture) approach to the delivery of instruction in the classroom (micro structure). The question then is, can communal practice be utilized to attain corporate goals such as passing exams and graduating?

I focus on how this question can be answered by exploring the larger fields that encompass this study and the student rituals within these fields. An additional goal is to identify the means by which the misalignments between the corporate and communal can be bridged in science classrooms.

The Purpose and Use of Cogenerative Dialogues

I have deeply articulated the existence of corporate and communal blocs in urban science classrooms yet nimbly discussed the transformative practice of cogenerative dialogues as a means to address the existent misalignments within these fields. At this juncture, I expound more deeply on cogenerative dialogues to provide a deeper analysis of their use in this study.

The conversations and plans of action generated by cogenerative dialogues invoke the feeling of a kibbutz, where both the work produced as an outcome of the group is just as important as the domestic/internal/group work being done. If the corporate goal is to have success on a report card or standardized exam, the cogenerative dialogue can work in support of that objective. However, it simultaneously functions with the goal of maintaining a positive internal environment that is as highly valued as a corporate outcome.

In the cogenerative dialogue, participants share experiences and develop a plan of action to benefit the field where they interact (Roth, Lawless & Tobin, 2000). Establishing the cogenerative dialogue creates a scenario where allegiances to either corporate or communal practices are set aside for the benefit of attaining a common goal for all participants in the conversation. The absence of structures like these dialogues creates instances where gross misalignments and the consequent quenching of a particular group's agency will occur. Such an occurrence is inevitable in conventional urban classrooms, where students are heard *about* but often are not heard *from* when there are discussions about why they are not learning in classrooms (Leistanya, 2003). In other words, when students are unsuccessful in science classes, teachers speak to each other and describe deficit constructions of students' abilities as reasons for their lack of success. Students are not allowed to voice their opinions regarding why they are not successful. Consequently, the shortcomings of the teacher or the corporate structure of the classroom are not discussed.

Prior to the implementation of cogenerative dialogues, students and teachers agreed that the chemistry class was not functioning properly, but not to each other.

Students told me "I can't stand this class. It's a waste of time." The teacher noted "These kids aren't learning anything, some of them can't learn anything." With these types of discussions already in place, cogenerative dialogues become necessary to illuminate and deconstruct the hierarchy that exists between students and teachers. The teacher's and students' thoughts on the classroom and each other are presented, dissected, and critiqued with all actors present with the goal of reconstructing the class in a more equitable manner.

Addressing Frustration Through Cogenerative Dialogues

> *Mr. L: We covered the last topic and now it's time to move on, the way this class is, I follow a curriculum set by the state. One step and then the next step, and on… You guys just don't seem to listen.*
> *Katherine: Look, understand, I want to listen and you're just going on, and it's not affecting you, it's affecting me. Because, not only am I getting frustrated but it upset me and it ruined my whole day (a lesson where Katherine did not understand the topic).*
> *Mr. L: Sometimes it's frustrating to me because I think kids are at a certain level. It's not only that you're frustrated; I'm frustrated because SPDF (topic discussed in class) was a month before. In the middle of the class you just screamed, out of nowhere, how can I teach like that.*
> *Katherine: You can slow down, more examples, relate it to me… relate it to us. We can still keep up.*

In instances like the lesson on electronic structure that preceded the lesson described in the above vignette, students respond to their lack of success in science with indifference and bad behavior. The teacher then focuses on the students' reactions to the established corporate structure of the class and not the root cause of their expressions of indifference or anger. Erin's teachers never questioned why he responded with indifference in class. However, they equated this indifference as a reaction to the class and not the structures of the class. I argue that viewing Erin's reactions to the classroom as indifference rather than a response to the classroom is a direct function of varying

allegiances to corporate and communal ideologies. Similar scenarios in present themselves in the physics and chemistry classrooms, and support my hypothesis.

In the vignette above, the student clearly expressed her frustration with the hyper-structured enactment of the curriculum. The teacher also expressed his frustration with the class. The illumination of the dynamics at play within the chemistry classroom was then discussed in a cogenerative dialogue and cleared a pathway for developing an approach to teaching and learning that will improve the classroom for both the student and the teacher.

Communal Practices Within Multiple Fields

Viewing cogenerative dialogues as a physical and symbolic space for critical cultural exchange (Roth & Tobin, 2005), and viewing inner city classrooms as fields riddled with fodder for such exchange (because of the confluence of multiple cultures with allegiances to either corporate or communal practice within classrooms), the necessity for "break away fields" that support newly-developed lenses and practices is a necessity. These break away fields take the students' culture outside of schools and places them on equal footing with the school's more corporate practices. The intent of an engagement in this process is to create avenues where a newly-formed culture is established to meet the needs of the representatives of both communal and corporate practices.

New Perspectives on Science Education

As school officials blame teachers for poor student achievement, and teachers blame students for not learning, ideologies and curricula that stifle the science teachers' abilities to positively impact students are set in place and enacted in urban schools. The possible insightful and transformative possibilities of utilizing the ideas that are generated

by and for the community within schools are lost in the sea of voices that discount doing and learning science as an organic process, and favor memorization of facts, regurgitation of material, and strict adherence to archaic protocols in teaching and learning.

The result of this practice is that teachers who become agents of corporate structures because of their closeness to communal practice through the nature of their work (close interaction with students and inner city communities). Since being communal is perceived as not being “a good stern teacher,” they attempt to shift negative portrayals of themselves by school officials and society at large by acting more in line with corporate, hegemonic practices. Consequently, teachers are often perceived as (and become relegated to) being proponents of research conducted by think tanks and of decisions that are made by individuals who are far removed from interactions with inner city students and schools. The corporate faction frequently notes that the current inner city educational system is in a state of utter disrepair and needs to be re-designed. While I agree with a sentiment that echoes the necessity of renewing approaches to science teaching and learning in schools, my research in schools causes me to question the assumption that urban schools are in a state of complete disrepair.

I consider the current corporate perception of the science education system to be ignorant about the seldom-utilized beneficial aspects of contextual and communal science. Similarly, I believe the corporate perception of the ways students learn within inner city schools is misinformed. While the buildings may be in disrepair, the inner city culture that dictates the way students learn science is so rich and complex that it is a seedbed for transformative teaching and learning experiences. I further argue that the initiatives that are put in place to “fix” the system, such as a curriculum geared strictly

towards standardized exams and workshops for teachers that enclose their thoughts and ideas of how to teach and learn science, support teachers in archaic modes of instruction and view the students' cultural otherness as learning deficiencies. Consequently, the corporate realm concurrently constructs and reaffirms the notions that accompany the results of standardized assessments, which reflect poor science achievement by inner city youth.

The plans in place serve the purpose of rejuvenating specific negative aspects of the current system's structure. However, what is needed is a move from professional development meetings that re-iterate the necessity of teaching students to pass standardized exams, coordinated lessons across classrooms that vary in culture and context, and rigid, hyper-structured classrooms. Expanding the scope of science beyond these linear ideologies about teaching, learning, and being in the classroom equates to an expansion of student conceptual grounding and increased success in meeting the requirements of standardized markers. The teachers' and students' roles in becoming cultural brokers need to be expanded.

As I engaged in conversations with students about their experiences in school, they echo the sentiment that they know what to do to make their science classes better. The students can create a means for moving science teaching and learning towards a more complex standard that extends beyond the status quo, toward a social and intellectual space that empowers them and supports their contributions to science, teaching, and learning. This expansion of the actors' roles in science classrooms is necessary. Teachers' roles must be expanded to include cultural broker, researcher, and catalyst for the change of pre-existing notions about science education and urban

students. They must be equipped with both corporate and communal sociocultural schemata and emerge as cultural brokers. Students must also emerge to become teachers of communal practice and researchers of their own practice. With the actualization of this role expansion, we can forge an alignment of varying perspectives on science education classrooms, policy, and research.

I have embarked on an inquiry into various forms of culture and the ways in which they are manifested in urban science classrooms. I did so under the premise that not only larger structures like corporate and communal factions, but also classrooms, are fields with porous boundaries that may be permeated by culture from outside fields (Bourdieu, 1990). Having an awareness of the multiple forms of culture and the capital that these forms of culture provide for their participants in specific fields, I show that socioeconomic/sociocultural networks that serve as a backdrop to students' social and cultural capital are foundations for how they maneuver through space and time in various fields. The act of uncovering how social relationships and social capital help people achieve success in society is integral to discovering how to motivate students and teachers to generate plans of action to achieve this success (Stanton-Salazar, 2004), and has proven to be a key to transforming the science classroom.

CHAPTER 4

Using the Macro as a Lens to Unpack the Corporate|Communal Dialectic

Eileen's Opening Remarks to the Reader: Although the intellectual content of the exchanges focuses upon the deconstruction of the corporate|communal, the reader is privy to the implicit but nonetheless existing tensions both among the authors and, as evinced in some contradictions, *within* (personally) the authors. Because research involving what Ogbu (1986) calls caste-like minorities impacts either directly or indirectly the ideologies that surround and are held by such groups, I deem this kind of critical re-examination not only necessary but also crucial.

Chris' Opening remarks to the Reader: By engaging in critical conversations about my work, I am presented the rare opportunity to address thoughts, ideas and criticism of my work as a part of the work. I see this as a process that not only benefits my research and scholarship but also provides deeper insight for the reader. I hope that through this forum, deeper understandings of the ideas and research I have laid out and will develop.

Ideologies, Structure, and the Levels of Social Life

Eileen: Early in the piece, Chris raises an issue about the deficit perspective from which research on people of color is conducted but he does not explicitly describe the nature of such a perspective. When we review the decades of research examining the performance of people of color in relation to their European American counterparts, three deficit explanations dominate. Either implicitly or explicitly, three positions are entertained in the research positioned from a deficit view: 1) the differences in academic performance are due to the inferior genetic endowment of people of color, 2) the gap in academic

performance is a result of the maladaptive home and community environments of people of color, and 3) the academic performance differential emerges from the deprived, depraved, and dysfunctional culture of people of color. The recommendations emanating from research done from a deficit perspective often describe efforts to target the micro level (e.g., ways to "fix" people of color); such work rarely addresses the need to alter structures that exist at the meso and macro levels.

Wesley: This raises the notion that research related to people of color is often *on* and not *with* people of color. It is important that the voices of people of color are central in the stories being told about their experiences. These deficit perspectives that permeate the education literature about people of color have their roots in biological racism that emerged with the age of Enlightenment. This laid the foundation for and is manifested in the current modern era as a form of cultural coded racism.

This is a form of racism that hides in civic nationalism and views segments of the population as less than capable and unable to assimilate into the mainstream culture. Part of this civic nationalism is the ideology of meritocracy that holds that all wealth, income, education, and a piece of the proverbial pie are earned from hard work and not from social and political privileges. The confluence of cultural coded racism and the ideology of meritocracy are used to prop up the deficit perspectives mentioned by Eileen above. The gap in academic performance is usually argued to be in direct correlation with the deficit prescription of the maladaptive home, community environment, and dysfunctional culture of people of color.

This reminds me of the work of Robert Hill (2003) and others who have debunked these myths. In particular, Hill challenged the erroneous inferences that are often made

about negative functioning on the basis of the extent of deviant attitudes or behavior exhibited by African American children. These national schemas are manifest in practices that span and structure micro, meso, and macro levels of social life. Chris's objection to the manner in which African American and Latino students are labeled "other than" because of their deviation from macro norms lays the foundation for his notion of corporate and communal practices.

Eileen: Wes, I agree with much of what you say. I would like to interject regarding one point you made, the statement regarding cultural-coded racism that positions some segments of the population as less than capable and unable to assimilate into the mainstream culture. Implied in the statement is an assumption that assimilation is a desirable outcome. As highlighted by the debates surrounding the success or lack thereof of *Brown vs. Board of Education* and calls for neighborhood schools, many challenge this notion (assimilation as a desirable goal) but we can argue this point at a later time and in a different venue. In any event, I understand your position.

The corporate | communal dialectic that Chris addresses, in my opinion, is part of a larger structure, if you will. When I speak of structure, I'm drawing from many of the ideas espoused by Sewell (1992). That is, a set of schemas and resources that are somewhat symbiotic in nature constitute structures. Sewell (1992) speaks of these schemas as unconscious and conscious procedures and protocols that enable and permit productions of social life to be continually re-enacted. The schemas can also be dysconsious (King, 1991); that is, an uncritical state that accepts the status quo as given by justifying its existence. These schemas, in turn, generate resources which includes any

means that are facilitative. These resources subsequently substantiate, fortify, and reproduce schemas.

For example, Chris described a situation where students entering a physics class did not touch non-traditional rulers placed within their reach. A student's response to Chris's question of why she and other students did not touch the rulers is an example of a schema. As the student's reply indicated she had learned from past experiences that "you watch and don't touch" in science class. "Watch, don't touch" is a schema at the micro level but schemas at both the meso and macro level of social life are implied and contribute to the student's existing schema. For instance--getting back to Wes's comment that takes us back to the societal level--one such schema at the macro level pertains to beliefs about who is capable of doing what kind of science and the allocation and distribution of resources in accordance with those beliefs. If this student's story is similar to many of the stories shared by students of color, specifically African Americans, then this student's science experiences consist of the teacher forbidding students to touch materials as one way to control what happens in the classroom populated by students who, the teacher perceives, do not know how to behave. In my opinion, when research investigates the micro with little consideration of the meso and macro it can easily lead to assertions (implied or otherwise) of deficiency on the part of the student. Chris, considering the importance of the macro, could you speak to the corporate|communal dialectic at that level? In your paper, you provide many examples of its manifestations in the classroom which I consider to be representative of the meso level.

Wesley: Before you respond Chris, how are we using "micro," "meso," and "macro"?

Eileen: I'm using micro, meso, and macro in a very general sense to designate a level at which relationships exist and interactions occur. The way I use the terms is a simplified version of Bronfenbrenner's (1979) notions of microsystem, mesosystem, and macrosystem. The reference point for designating the level is circumscribed by the most relevant contexts surrounding the phenomenon of interest. For example, if we are discussing the schooling of students with respect to culture then the micro may be represented by the students' homes and associated events, the meso as the classroom and its events, and the macro may be the school and its events. If we are discussing students' participation in a community-based program then the program may represent the micro, the community in which the program is implemented the meso, and the larger region in which the community is located the macro. With respect to the issues addressed by Chris in his article, I consider the students' homes and communities (and the events therein) as comprising the micro, the institutions (classroom and school) in which the students are involved on a daily basis make up the meso, and the larger U.S. society constitutes the macro.

Chris: I am using the terms micro, meso, and macro in much the same way as Eileen described above. I describe how these terms play out in my work below. I will also provide some illustrations of how I use the corporate|communal dialectic but will build to that point by expressing that in my work, the corporate|communal dialectic has served as both a structure and a structuring resource.

Critiquing and Unpacking the Corporate|Communal Dialectic

Chris: As I have laid it out, the construct serves as a way to frame macro issues like the existence of institutionalized deficit ideologies outlined by Eileen in her initial comments

in the forum and also meso practices like teacher and student transactions or interactions with each other. Furthermore, the corporate|communal dialectic it helps to frame micro enactments in praxis that individuals enact. This is accomplished because on each level (micro, meso and macro), there is an awareness by marginalize/oppressed populations of the fact that they exist in relation to those who oppress. Students in urban schools experience the effects of racism daily within and outside of schools. What they often do not recognize is that the chief means by which this oppression is accomplished is through a normalizing of deficit ideologies through corporate structures. This normalizing occurs because the micro, meso and macro all exist at the same time and reinforce each other. Within each (micro, meso, and macro), there can be an explicit corporate or communal stance taken by the oppressor, the oppressed or the structures that are oppressing. I will now address Eileen's question and provide an example of how the corporate|communal dialectic plays out on the macro level. Through the implementation of federal policies like the No Child Left Behind Act, which is presented as a means to help urban schools but functions with a corporate, test driven, agenda, the hierarchy implicit in the corporate|communal becomes evident. Within schools that focus on an agenda that varies from the test and data driven agenda, their goals would stand in opposition to the act and its corporate structure. As a result of the existence of a corporate-communal hierarchy and the situating of a perspective that varies from the corporate, as not only having less value but also being reprimanded for such a perspective, schools that are not focused on the corporate federal agenda, these schools run the risk of loosing funding and closing.

Finally, I will close my responses here by making clear that the aim in this work is not assimilation of the communal into the corporate but a true recursive and reciprocal dialectic between the corporate and communal.

Wesley: Chris, I see the dialectical relationship between corporate and communal practices (corporate|communal) as one of the central constructs in the chapter. In a dialectical relationship, one construct presupposes the other. They are brought into a *both/and* relationship instead of *either/or*. That is, in this case we cannot analytically think about corporate culture without thinking about communal culture. Corporate|communal exist as a referent to think about the unfolding of social life.

Contradictions are also inherent in this dialectical relationship. Chris describes the corporate and communal schema as ideologies (law, customs, beliefs, and understanding) that are manifested in the meso level structures of social life in urban science classrooms. He analyzes the corporate and communal from an agency|structure framework. Corporate and communal cultures must exist simultaneously side-by-side. While the emergence of corporate and communal culture give rise to corresponding corporate and communal fields (bloc) nested within the classroom field, they are also structured by micro and macro level activities. Classroom participants experience the structure and act on these structures. The corporate bloc is described as consisting of structures that propagate notions of success and achievement that are tied to unyielding, flawed and unapologetic benchmarks such as standardized and communal blocs and the communal bloc as focus[ing] on approaches to teaching and learning that sees the doing of science as a social process and values students' ways of knowing and being as integral to school and

schooling. How students and teacher come to appropriate culture and locate themselves within the corporate and communal is a point of interest.

According to Chris, "identifying communal and locating the generalized other as corporate creates the communal and corporate fields. Inscribed within and in between the corporate and communal fields there exist gender, age, ethnic, and other intersecting social boundaries. In the classroom, the boundaries between the corporate and communal field are porous and can be crossed with varying degrees of ease. For example, how a participant works across gender boundaries within the corporate might be different than when she is working across the gender and corporate-communal boundaries simultaneously. On the other hand, a participant located in the communal field might decide to cross gender boundaries by enacting schemas and practices native to the corporate field. Because of the porosity of the corporate|communal, participants can appropriate schemas and practices within and from both fields simultaneously. As such, "the corporate can be enacted (produced, reproduced, and transformed) in the communal and vice versa in very nuanced ways." The contradiction in the corporate|communal dialectic then arises from the generalizing of others and the impulse to align with the institutional domain of schooling within both the communal and corporate culture.

Eileen: Before I share my thoughts on the corporate|communal dialectic, I would like to respond to two comments presented by Wes. First, in Chris's work you highlight that when individuals appropriate schemas and practices, which can be, but not necessarily, associated with various social markers like gender then the corporate and communal are enacted in nuanced ways. I think it is important to keep in mind that these subtle, distinctive ways as viewed from an individualistic or somewhat micro level, in many (*not*

all) cases, are reproductions of much larger and hegemonic patterns that exist at macro levels.

Second, you emphasize that because of the porosity of cultural field boundaries, individuals can cross boundaries by appropriating schemas and practices. Again, I think a qualifier should be interjected because even at the meso level of social life in Chris's science classes the macro is ever-present in often subtle, but very powerful ways. Whether or not the field boundaries can be crossed even at the meso level depends largely upon the cultural fields and the positionalities of individuals in respect to those fields.

Lastly, in your comments, you briefly mention the agency|structure dialectic but I think the significance of how agency and structure are viewed is implied. On one hand, I applaud the work on agency and it aligns philosophically with both my professional and personal stances. On the other hand, I shudder when I think about the possibilities that could be realized if agency is heralded without addressing structures and the structuring of the macro-- the real impacts of power, privilege, and the like upon it. Efforts that do not acknowledge and appreciate the relationships and interactions among the micro, meso, and macro will inevitably perpetuate the deficit ideologies that dominate the research on various groups.

As a member of such groups (I'm a Black female from the working poor who reside in the Appalachian regions in the South), my individual agency and, even the agency I garner from being a part of a collective, is bounded within and by the larger societal context (Tate, 1997; Ladson-Billing, 1998). Because of power hierarchies that are inherent and protected in the United States (US), there is a point where I reach

ceilings. Even though I challenge many of the premises and assertions of John Ogbu's work, some of my sentiments about ceilings resonate with the notion he calls Black epistemology (Ogbu, 1986). These ceilings (reinforced by implicit understandings and informal practices) are constructed from perceptions, dispositions, expectations, and behaviors that emerge from the dysconsious, conscious, and subconscious. At these ceilings, my fate as a member of the previously described groups (regardless of whether or not I self-identify with the social groups pertaining to race and sex where my membership is physically ascribed) is largely determined by some generalized other whose positionalities in US society engenders a more fruitful and influential agency. It is here, at these edifices where agency is differentially impacted by various social markers, that I desire to learn more about the transformative potential of Chris's work.

Let me return to the corporate|communal dialectic. I see the corporate|communal dialectic as central to Chris's paper and as such, the main argument is unclear to me because I'm unable to read the paper from the theoretical lens Chris probably intends. The theoretical frameworks that I employ in my own work (the work of Wade Boykin more recently situated within critical race theory) create interference to the point I am confused by the positioning of the corporate and communal as dialectic. In many ways, I see the operation of the corporate at the meso and macro levels as normative and somewhat essentialistic. That is, the corporate is often invisible and viewed how things are and should be; consequently, the corporate and communal *are* not dialectic but must be problematized so they *become* dialectic.

When I read the term "corporate" and process the subsequent descriptions of the construct Chris provides throughout the paper, I think of a conglomerate of sorts (people,

institutions, or whatever) conjointly working cooperatively either as individuals or as groups to achieve a materialistic end that does not consider or include the interests of others outside that conglomerate. If translated into Boykin's ideas, the corporate would be a mechanism through which specific aspects of mainstream culture are reified and become the prevailing hegemony particularly for African Americans. (As an aside please let me iterate that I'm using "culture" with a specific definition in mind which acknowledges that "culture" is not monolithic, static, immutable, etc.) Boykin's work not only critiques mainstream values but positions African American values as fundamentally incompatible and incommensurable with them. One of the African American values Boykin describes and investigates in his work is communalism which seems to align with the communal construct in Chris's paper. Communalism (Boykin, Jagers, Ellison, and Allbury, 1997) captures the ideas of group affiliation *as* individual identity; within a communalistic orientation, individuals act in the best interest of the group by sacrificing their own rights, privileges, and interests. If I read the paper from the stance that mainstream values via the corporate is a form of social domination of African Americans then I am unable to comprehend the corporate-communal as a dialectic (an "and" relationship as posited by Wes in his earlier comments) but perceive it as a diametric opposite (an "either/or" relationship). I also think the examples and commentary provided throughout Chris's paper supports an "either/or" dichotomy. Can you help me interpret the paper from the intended perspective?

Chris: In my papers, the instances where I may appear to lean towards an either/or structure are a function of my dealing with practices within the construct of a hegemonic field. In this case there is a hierarchy in relation to the corporate|communal that forces an

either/or dichotomy and favors the corporate. However, I do in many instances refer to the corporate|communal as it should *ideally* be, in a pure dialectic where the corporate|communal would occur as either corporate or communal, communal or corporate, or both occurring within a field at the same time. This is the point that Wes made in his earlier comment.

While utilizing the work of Boykin serves the purpose of helping to provide a lens to view the constructs of the corporate and the communal from a perspective of race and power relations, I think the major piece that Eileen wishes to interrogate lies in the fact that a description of the corporate and communal through Boykin's lens presupposes an almost inevitable and unchanging bifurcation between the oppressed and oppressor that is founded on the historical and ever present role of hegemony in society. To discount the macro implications of such realities would be absurd and to discount the implications of such realities on the urban science classroom would result in a research study that serves the purposes of outlining inequities without challenging or addressing them. With that being said, my choice to use an either/or (dialectic approach) to the corporate and communal relationship stems from the fact that in the urban science classroom, the ability to affect change through cogenerative dialogue allows for an almost immediate addressing and attacking of the effects of hegemonic practice that is not afforded in social life. Consequently, attaching a fixed identity to a corporate or communal practice makes no allowances for the possibilities for future change in either that may be possible if we are attacking hegemony through transformative research.

Attaching a fixed identity also makes no allowances for the effects of context on each of the constructs. In social life, we cannot teleport to a space where we can attach

value to marginalized voices and so we function to attack hegemony as Boykin does by naming it and explicitly doing so in order to understand it. The complexities of social life on the macro scale are so complicated that the process of understanding is in itself an exhausting task. On the more meso level, with the creation of an avenue like cogenerative dialogues, we can, change context from the traditional more corporate classroom and therefore can more readily engage in a fluid corporate|communal relationship. Here, the corporate can be re-keyed to become more communal and conversely, the communal can be reassessed in relation to the corporate.

My point is that while mainstream values may result in the exhibition of corporate practices that serve as a form of cultural domination, the dialectic makes allowances for such values to attain a malleable characteristic that allows for communal practices to flourish. The dialectic opens up possibilities for multiple communal practices to occur within a corporate structure and coalesce to form larger communal and cosmopolitan goals. In such an instance, communal practice on a macro level can develop to combat corporate structures on a macro level.

Eileen: When I read the responses that more thoroughly explain the corporate|communal dialectic to be created by cogenerative dialogues, I can say, “I get it.” I understand that the corporate cannot exist without the communal and vice versa; even the very absence of one, substantiates and amplifies the presence of the other. In the end, I ponder the implications of corporate|communal as *truly* dialectic--a critical examination of the corporate-communal relationship whether that relationship takes the form of accommodation (corporate *and* communal), assimilation (adoption of corporate *or* communal), or some combination of the two.

Wes: We all agree here that assimilation is not the desired outcome of addressing oppressive structures and would not be a productive way to think about corporate|communal. In fact, a more sophisticated construction comes out of the work of Stuart Hall and his discussion of creolization in understating the concept of diaspora. I think it is very useful to nuance the work of Boykin with the work of Hall and Emdin.

Boykin discusses nine dimensions of African American Culture: spirituality, movement, verve, affect, communalism (as Eileen mentioned above), expressive individualism, oral tradition, and social time perspective. Although he does not claim that all nine dimensions are distinct to only African American culture or expressed by all members of the Black community, he argues that these dimensions are complex cultural manifestations that are expressed "stylistically" or combine in ways that are distinct to African Americans. Parts of each manifestation are very stable while other parts have a tendency to shift and change. They exist in a power relationship between the African American and mainstream White culture. One of Boykin's main points is that unlike European Americans the three realms of the triple quandary-mainstream, African-rooted Black culture, and the status of oppressed minority- that must be negotiated by African Americans are not congruent with mainstream hegemonic White American culture. As Eileen explained, communalism-oriented individuals act in the best interest of the group. Although there are distinct communalistic tendencies (culture) in the African American community, we observe the creolization (a mixing up) of mainstream White culture with these distinct communalistic tendencies. As such, African Americans are separate but a part of the manifestation of mainstream White culture.

Bringing this back to the concept of corporate|communal alerts us to the understanding that there is a set of power relations that is manifested within the tensions of a privileged ideology. The communal culture is creolized with the corporate (and other tendencies), therefore the corporate culture creates necessary and sufficient conditions that structures the communal tendencies. Parts of the corporate and communal cultures are stable and harder to change while other parts are shifting.

I find Eileen’s earlier comments about problematizing the corporate and communal so they become a dialectical relationship very interesting. There is overwhelming evidence that the hegemonic structures and schemas (on all social levels) that privilege mainstream White America have created a segmented social order in American life (Franklin & Moss, 1994). This can be traced to ideologies (e.g., we live in a free market society or education is color blind) and structures that created dependencies and underdevelopment in the African American community. The incompatibility of these two communities emerges from their essential dependencies on each other. As Amos Wilson points out (1990), the African American community has become a defining reference group for mainstream White America and vice versa. This "dichotomy" that also locates hegemony in the corporate ideal of mainstream culture and locates communal ideal in the African American culture must be "problematized" or, in other words, brought into a radical doubt. This tension necessitates that we place the corporate and communal ideal in a dialectical relationship. In similar fashion the corporate ideal has become a reference standpoint for the communal and vice versa. That is, one cannot think about the corporate ideal analytically without thinking about the communal. Next, I

would like to turn to the issue of placing the corporate and communal dialectical relationship in a permanent hierarchy.

While corporate culture tends to dominate in many areas of social life, it does not dominate in an omnipresent manner. Participants in a field can enact culture that is more communal even if they are nested in a large field structured by thick corporate boundaries. Even within the classroom setting, as Chris describes, there are communal practices that trump corporate practices within a group of students working together. This can be embodied through putting in place schemas and practices that enact resistance (e.g., a different way of solving problems or sharing answers). If by placing the dialectical relationship in a hierarchy then the allowance for alternate constructions inherent in a dialectical relationship must be made explicit. This is of theoretical and practical importance because fields can be created, as Chris points out, where communal culture is more prevalent and valued than corporate culture. In this way, the hierarchical relationship that Chris initially posits can change. This is the point of creating cogenerative dialogues. In other words, sharing perspective about a shared experience in order to generate new schemas and practices that can address oppressive hegemonic structures is an important outcome of cogenerative dialogues. The agreement to enact cogenerated communal culture even when corporate structures are overwhelmingly present is also an important outcome.

Eileen: I see the potential of cogenerative dialogues to alter structures and to create spaces for the enactment of agency; I am anxious to learn more about the role of cogenerative dialogues in transforming the *actual* status of the cogenerative dialogue

participants within the larger meso and macro contexts of social life. Perhaps, insights from more of Chris's work will alleviate my anxiety.

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CHAPTER 5

The Role of Rituals in Fostering Transactions in Urban Science Classrooms

Students' lives outside of school are a complex set of identifiable rituals. I define rituals as any consistent patterned action that occurs over a period of time. For example, if a student walks to school with a friend every day for a week, those students are engaged in a ritual. The role of the ritual in social transactions is closely tied to the cultural experiences of humans. In fact, archaeologists have discussed the practices that our early ancestors engaged in daily (which can be named as rituals) as highly complex actions and behaviors in response to their environments (Mithen, 1996). These responses to either physical or symbolic structures occur not only when people engage in cultural and capital transactions with each other, but also when they communicate with and within institutions. In the case of urban students, rituals develop with (in response to) and within (in transactions with) schools. These ritual transactions function with the expectation of reciprocal feedback and fluid exchange with structures in a field. In general, a transaction is characterized by an *exchange* of capital (social, cultural, symbolic). However, when an individual consistently strives to engage in transactions where his or her needs are not met and an exchange does not occur, the need and non-attainment of a transaction may regress into a fundamental interaction.

In instances where these regressions occur, a fundamental interaction can be viewed in the scientific sense of forces that exists between particles. It is an existent force that exists, is acknowledged, but does not necessitate exchange. Varela (1999) refers to actions such as these as the process of "immediate coping". While he describes this process as what individuals do in certain scenarios to help others, I believe it is a process

that occurs when dealing with any situation. It is a process that does not develop from judgment or reasoning but is rather a reaction to a scenario one is facing. An example of this was identified in Chapter 3 when I described my experiences teaching a physics class in which students and a teacher shared a classroom, but there was no exchange between the teacher and students despite the fact that they were in close physical proximity to each other. The teacher spoke and asked questions, but the students did not respond.

In other classes where the structures in the field are changed, the same students are engaged in an exchange of thoughts and ideas in a transaction. I find that in both transactions and interactions, students respond in specific ways. These responses/reactions often exhibit themselves as rituals that mark the ways students act in, or in relation to, a field.

In urban science classrooms, responses to the structures of a field depend upon whether or not students are allowed to exchange their capital fluently (transact) or merely be in proximity to and have to deal with others in the field (fundamentally interact). In communal science classrooms, transactions are welcomed and students develop rituals that support fluid exchange of capital with the classroom structure. For example, students consistently ask questions that relate science topics to their lifeworlds. Through these exchanges, students move towards a full understanding of science topics discussed in school. Conversely, in more corporate classrooms where students' voices are silenced, they merely interact and consequently exhibit rituals that give the illusion they are not interested in learning science. A student described this as "when the teacher is talking and talking and we're all just sitting there in another world." This seeming disinterest, or the enacted ritual of a solely interacting classroom (as opposed to a transacting classroom), is

an often overlooked yet pivotal moment in a student's educational life. In many students' experiences in science classrooms, these moments occur often and cause students to exhibit negative reactions towards schooling and science. As students exhibit these behaviors, they evolve to become rituals that students enact in classrooms.

During conversations with students, they explained that they often tried to engage in the science classroom but did not always feel like they had an opportunity to do so. While viewing videotape of the class, I noticed that students often tried to exchange with the classroom structures by asking questions or providing examples in class. These were instances where they were attempting to transact with the structures of the classroom. A transaction involves the exchange of students' capital with that of the teacher in order to gain canonical science knowledge.

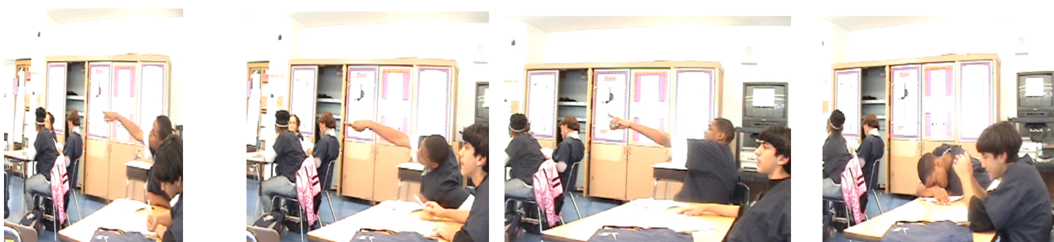
I find that when students push towards participating in the science class (even when their ideas are not directly related to the lesson), they are searching for opportunities to participate in the lesson. If students' questions are not answered or acknowledged in a classroom, or if a student feels like his or her needs are not met, he or she fails to ask questions in the future and does not engage in the classroom.

While studying videotape of science classrooms, I observed that students' searches for opportunities to participate in the science classroom continue over the course of a class period. In these instances, students began by actively searching for transactions. For example, they may have talked out of turn, raised their hands vigorously, or sat upright in their seats when the teacher said something that intrigued them. However, when they were not allowed to transact (whether they were not allowed to participate or

did not feel comfortable participating) the students slouched in their chairs or put their head down in the class.

This phenomenon (regression from transaction to fundamentally interacting) has also been apparent when I studied students in a classroom over the course of a school year. In these observations, students' body language gave intonations of interest for a few weeks of the school year as they attempted to transact with the structures of the classroom. This enthusiasm for learning slowly dissolved as the school year progressed. I charted this regression by using Turner's (2002) description of interaction as relating to words, body, facial expressions, and movements. I focused on expression and movement and investigated the occurrence of these phenomena as markers of either transactions or a lack of transactions in the classroom. In the photographs below (Figure 3, I illustrate a student's unsuccessful attempt to transact within a chemistry class. In the photographs, it is evident that as the class progresses the student becomes so frustrated that he places his head on his desk down and shuts off to the class. If a visitor to the class had walked in during the last frame, he or she would believe that the young man in the chemistry classroom was uninterested in chemistry. However, the previous photographs clearly show that he was looking to transact with the structures of the class prior to putting his head down.

Figure 3. A student raises his hand to transact in class, and then drops his head on his desk after multiple unsuccessful attempts.



Based on vignettes like the one described above, I argue that poor reactions to schooling are not endemic to urban populations. Rather, they are responses to the more corporate/less communal nature of the classroom and are a reaction to whether or not students are fluidly transacting with the field.

Capital Exchange Pre and Post Cogenerative Dialogues

In this study, teachers and students collectively created a classroom culture where students were allowed to exchange their capital fluently with the structures of an urban science classroom. By capital, I mean the knowledge (social, cultural or symbolic) that individuals (students) carry with them (Bourdieu, 1990). Through the creation of a socially-sanctioned space other than the classroom where teachers and students exchange capital through discussions about their lives and the science classroom, they co-produce new science knowledge. Consequently, newly-developed science learning culture can be established. The existence of fields where social life is enacted and the porous boundaries of such spaces facilitate the creation and transfer of culture from the cogenerative dialogue yields transformative science teaching and learning.

Cogenerative dialogues are the spaces where rituals that support students' science achievements are discussed and enacted. In cogenerative dialogues, teacher and student co-defined notions of success are created, and later transferred into and met within science classrooms.

Rituals: Exploring the theoretical underpinnings of communal practices

At this point, it is important to review the definition of rituals as any consistent patterned action that exhibits itself over a week. My work provides evidence that rituals

serve as a backbone to social interaction within classrooms. I have also discovered that rituals exhibit themselves most profoundly within interpersonal situations in which they rely on the context where they are performed and on the individuals who are engaged in them. As I target and name student practices as rituals, I show how closely they are related to communal practices and the exchanges that encompass them. The main argument of this chapter is that rituals are an integral component of students' out-of-school worlds that can be utilized to either support or disrupt the teaching and learning of science.

Student Behavior within and Outside of Cogenerative Dialogues

As a teacher in corporate science classrooms and a participant in cogenerative dialogues, I find that the rituals students exhibit in communally structured spaces like cogenerative dialogues vary greatly from those exhibited in corporate structured classrooms. Within communal fields like cogenerative dialogues, I see "…human ritualized behavior (that) promotes smooth social functioning and does so… by improving communication, channeling aggression and affecting the cohesion of pairs or of groups" (Dissanayake, 1979, p. 29). In communal fields, students engage in rituals such as respectfully greeting each other when they meet, sharing concerns relating to school and their neighborhood on the bus and train, and engaging in specific activities together after school.

In cogenerative dialogues, students demonstrate communal behavior because the structures of the cogenerative dialogues vary from the corporate structures of the classroom. In cogenerative dialogues, students consistently discuss plans of action with the teacher and each other, discuss their practices in out-of-school fields that impact their

learning of chemistry, and close the cogenerative dialogue by shaking hands. These consistent actions in which students engage within cogenerative dialogues can be viewed as rituals.

Students' actions are marked by specific rituals they exhibit that are in opposition to the chemistry classroom. These rituals include talking whenever the teacher talked, not paying attention in class, or not completing assignments. I identify these practices as rituals because they are consistent patterned action enacted by students.

Pre-Cogenerative Dialogue Behavior

Prior to introducing cogenerative dialogues to students, they engaged in transactions with each other but did not exchange with the structures of the classroom field. The lack of transactions with science or with the teacher in the classroom was marked by the display of disinterested glances, smirks, frowns, and non-responses to the teacher. These events therefore served as evidence of fundamental interactions (rather than transactions) with the teacher and they occurred even though students engaged in transactions with each other. These student responses to the teacher and science developed over time into rituals, and did so in reaction to the corporate structures of the classroom.

I analyzed videotapes of multiple classes before cogenerative dialogues were implemented. In particular, I paused the videotape as soon as the teacher entered the classroom and noted the students' faces in response to the teacher's entry. While slowing down the videotape I saw students' smiles turn to frowns, noted students looking towards the floor of the classroom, and observed an exchange of disappointed glances among

students. These reactions occurred whenever the teacher entered the room and could therefore be labeled as ritualistic behavior.

Forging Connections to Communality: Ritual Chains and the Lifeworld

Students who walk to school together everyday share rituals. They talk, make decisions about what to do together, and are engaged in multiple capital transactions daily. When they decide to go to a certain store or to the park together, their rituals become mutually sustaining (i.e., each student's ritual is supported by his or her friend's rituals) and develop into what Collins (2004) describes as *a ritual chain*.

Collins' (2004) view of rituals and ritual chains is a departure from more conventional descriptions of rituals. Goffman's (1971) view of rituals is similar to that expressed by Collins, as he argued that rituals performed in the service of religious and supernatural beliefs have undergone a societal dismissal/decay, and have been replaced by rituals individuals perform for and to one another. Collins' and Durheim's (1912) (view of the ritual align with the definition of the ritual I described earlier in the chapter.

The rituals that students engage in bind them in their conjoined communal lifeworlds where they share similar cultures. These cultures are transferred into schools through the porous boundaries of the school/classroom field. However, when communal culture from out-of-school fields becomes pitted against corporate schema and practices in urban science classrooms, students' ways of knowing are not accepted in the classroom. Students who work well together (engaged in communal practice) outside of the classroom are not allowed to sit together in class, or ask questions outside of the Regents curriculum.

The nature of hegemony dictates that communal approaches to teaching and learning are not valued in corporate fields and consequently, students are not always allowed to exchange their capital within the classroom field (i.e., transactions are truncated). In response, students react by enacting practices (that eventually become rituals) that do not support the learning of science. These practices then become ascribed descriptors or markers of urban students' attitudes towards schooling, rather than descriptors of their reactions towards the corporate nature of the classroom. I therefore propose that we treat students' rituals as doxa (unexamined practices) that need to be interrogated and utilized to help them succeed in science.

Student Rituals as a Key to Transactions

If the locations where students' rituals are enacted are fields other than the science classroom or the school (e.g., at home, in the park, on the street), I interrogate these out-of-school rituals and attempt to make connections to what happens in the science classroom. I look at students rituals' because I realize they exchange these consistently. Furthermore, I realized it was important to investigate the ways students engage in transactions outside of school in order to use what I learned to generate transactions with the science classroom.

In cogenerative dialogue, Erin explained that his main after-school rituals were playing basketball and videogames. While these rituals did not seem to be related to his physics class, I realized that if he mentioned these topics in class he was looking to transact in order to become involved with the lesson. When allowed to utilize his out-of-school capital in the classroom, he provided the following example to describe the concept of momentum.

Erin: When you're going up for a dunk, you're running, you're trying to gain momentum to jump higher.

Katherine (a student in a chemistry class who is described by peers as a social butterfly and is proud of her ability to remember the names of just about all of the students in the school) made the following statement:

Katherine: With the nomenclature it's like trying to put the names together. Like my mom didn't want to just lose her last name, so she used the hyphen and put them together. Like magnesium dioxide. Magnesium and two oxygens are coming together so rather than say magnesium and two oxygens, we say magnesium dioxide. You know what I mean? (In chemistry lesson on nomenclature)

These examples demonstrate instances where information from students' rituals helps them to understand science concepts. It is in this process by which students exhibit capital in the science classroom that I see exemplars of fluid transactions. As a teacher who acknowledges examples such as these, I was able to see that the student understood the fundamental science concepts being taught. I could then use the students' knowledge to return to provide her with relevant information and points of entry into the material for further exchange.

When capital transaction is not facilitated, the rituals that students engage in or the information these rituals carry may not function for the benefit of the urban classroom. As I explain in the following section, when there is a regression from transaction to fundamental interaction, rituals are exhibited where students assume a level of control over the corporate structures of the classroom. These rituals often lead to their success in fully navigating the corporate classroom (managing not to have to transact with the teacher) but not in learning science.

Investigating Rituals: Transforming Doxa

In a physics class I taught, Erin repetitively ignored my questions and often did not look at me when I asked him questions. In another instance, a student consistently refused to attend some of my classes. In these situations, structures that I had established in the classroom did not facilitate the fluid exchange of student capital. Accordingly, the students opted not to engage in transactions with me. By choosing not to engage in transactions with me, the students enacted rituals that did not support their learning of science. Ignoring the teacher and cutting class were rituals that students enacted in response to the corporate classroom. "The training… implied by rituals of this kind enables vulnerable groups not only to control their anger but to conduct what amounts to a veiled discourse of dignity and self assertion within public transcript" (Scott, 1990, p.137). This move towards self-assertion by the students functions as a barrier to their success in the classroom because they shut themselves off from opportunities to learn in the class.

Through cogenerative dialogues and discussions on the communal nature of rituals, students learn about the rituals that they enact that do not support their learning in class. Furthermore, teachers learn that these rituals are responses to structures within the classroom that either do not allow students to transact or that students are uncomfortable transacting within. Within cogenerative dialogues, students and teachers can discuss practices that support fluid transactions in the learning of science. The end goal is to move students to a space where they no longer fundamentally interact with the structures in the classroom but comfortably transact with them.

Moving from Practices to Rituals

> *The first day of school, I was nervous, I didn't know anybody so I just stayed in the park across the street and waited for the school to start because I was early. Then I saw another girl with a school uniform and we started talking. We were from almost the same neighborhood so we just became friends, now we meet in the park everyday before school.* (Excerpt from student's journal)

Figure 4. Student waits for her friend so they can start the school day. In the background, groups of students already in their school uniforms await the start of the school day.

As stated earlier, the starting point of any ritual is the enactment of a particular practice. In Figure 4 (above), we see a student engaged in the ritual of waiting for her friend in the park while other students (in the background) wore their school uniforms, had formed groups with each other, and were ready to start their school day.

When the student described in the vignette above walked to the park on the first day of school, she enacted a practice. When she and her friend met at the same park everyday after school the next week, the practice became shared. Over time, the students met each other in the park everyday before and after school. The practice each student enacted had evolved to become a ritual and formed a chain to another student's ritual. As the school year progressed, neither student in the example above left the park until her

friend showed up. Sometimes, this led to both students being late for their chemistry class.

Meeting these students in the park on the first day of school became a ritual that affected other fields where they were actors. The communal nature of their daily meeting and the mutually-sustaining nature of their ritual caused both of the students to arrive to class late when one of them was waiting for the other. Despite the negative impact being late for class had on the students' performance in chemistry, I observed that their tardiness became a practice that strengthened their out-of-school bonds. They walked into class late and smiled as they entered or maintained eye contact with each other when they were reprimanded. In these instances the students maintained solidarity with each other that was supported by the negative experience of being yelled at by the teacher. In other words, their rituals created bonds between students that were strengthened by negative experiences in the corporate classroom.

The Establishment of Student-Student Bonds Through the Ritual

Every obstacle that the students engaged in and successfully prevailed over strengthened their connections to each other. These obstacles may be their dealing with the teacher that yells at them, pooling their money together to buy food when they are hungry, or helping each other baby sit. These bonds, established in out-of-school fields, naturally transfer into the classroom and can be utilized to benefit students in their chemistry class (having students sit together or work together on class assignments) but become interrupted by corporate structures.

In the chemistry classroom, one of these structures was assigned seats that separated students who had established out-of-school bonds in classrooms. The

separation of students in the classroom became another obstacle they collectively had to overcome. Over time, the process of overcoming or dealing with the structures of the classroom developed into new rituals that students co-enacted, such as intentional moves to disrupt the lesson by talking across the room. In effect, through the establishment of corporate structures, I had strengthened students' bonds to each other while simultaneously signifying school or chemistry class as an enemy. Furthermore, I had facilitated the development of practices like speaking across the room to a friend that slowly became a ritual.

Identifying Existent Rituals and Creating New Ones

Through the research in this study, it became apparent that both conscious and unconscious moves to counter corporate structures are enacted by students. When videotape from the classroom was brought to cogenerative dialogues, students were able to remember enacting a particular practice that disrupted the classroom and provide a justification for their behavior. Students made statements like "I did not understand what he was saying so I just went to sleep." However, students did not always realize that they enacted rituals that disrupted the lesson. When they studied videotape from the classroom in cogenerative dialogues, they would express surprise at the fact that they enacted the same practices daily. In cogenerative dialogues, it also became clear that students could identify ritual chains in their lifeworlds and made deliberate moves to modify, develop, or change them.

In one cogenerative dialogue, I invited two students who had been late for chemistry to have a conversation with me about their grades in chemistry. In this conversation, the students told me they were consistently late because they wanted to

avoid the chemistry classroom. When discussions about the importance of being successful in the class were related to being in class on time, one of the students decided, "…we can't keep being late for this class. We have to at least make it on time." Her friend solemnly nodded in response and after this conversation the students co-established an amendment to their existent ritual of meeting in the park in the mornings by deciding to meet earlier and make it to class on time.

In another cogenerative dialogue, Erin became aware of his ritual of repeatedly putting his head down when I asked him questions in Physics. He attributed this behavior to his frustration with the class. As we both studied videotape of the class, he decided to replace this behavior with the act of taking a deep breath and initiating eye contact with the teacher, despite his frustration. This response led to Erin's teachers and peers viewing him in a different way in his science class. In future cogenerative dialogues, he discussed how he was being viewed differently by his teachers in other classes because he tried not to display frustration in class.

As earlier discussed and discovered in cogenerative dialogues, Erin's out-of-school interests surrounded the basketball court and playing video games. In cogenerative dialogues, he described how he made it a point to either play basketball or video games for at least two hours a day. He mentioned that another student in his class plays video games almost as often as he does. In addition, he discussed how they play the games in each other's homes, spend a substantial amount of time discussing the games, and consequently have established mutually- sustaining rituals that surround basketball and videogames.

When given the opportunity, Erin creates opportunities for himself and his friend to learn Physics. In a classroom journal I gave him so he could write about his out-of-school rituals, he documented how various phenomena in videogames related to topics discussed in class like Newton's Laws of Motion, momentum, or inertia. He explained that:

> *If you let me learn and teach my way, we (Erin and his friend) can both pass physics with no problem. As a matter of fact we would be studying everyday. We can have a whole videogame physics class and we can work on it when we play. Just about everyday.*

He also shared that "If you want Brian (the friend with whom he plays games) to learn physics you have to make him think about what's next. That's how he plays the videogames, he is always thinking about the next move." As a result of this conversation, Erin brought his videogame console to the classroom and he engaged in a physics lesson with his friend after school.

In Figure 5 Erin and his friend Brian discuss the relationship between Newton's Laws of Motion and basketball through a videogame. In the vignette, Erin describes how the Laws of Motion do not always apply and how momentum is related to an object that is accelerating. In the conversation, he makes allowances for Brian to finish the sentences that he starts. By doing this he utilizes the communal relationship they have built to help him to think about physics while he teaches.

Figure 5. Erin and his friend Brian teach and learn Physics principles as they share their ritual of playing videogames

Through cogenerative dialogues and the reformation of the boundaries between what is corporate and communal in the teaching and learning of science, I show that these connections can occur not only among students but also between students and the science classroom. In the next section of this chapter I will discuss a study with students in an urban high school in New York City, and the emergence of rituals and new notions of success in the learning of science in science classrooms.

The Emergence of Student-Researchers: Studying Their Own Rituals

In a chemistry classroom at New York High School, I observed students exhibiting poor science achievement (little participation in discussions, low scores on exams, lack of effort in the classroom) and realized that it was necessary for students to discuss why they were so unsuccessful in the classroom. I opened up an avenue for students to engage in these discussions by addressing a class of 26 students after a chemistry lesson, and asking them if we could talk for a few minutes after class. Almost as soon as I extended the invitation, a bell rang, signifying that class was over. About 18

students pushed towards the door and charged down the stairs to the cafeteria. Eight students remained in their seats and waited for me to start the discussion.

Raising my voice over the murmurs of the students that remained in the class, I asked how they were doing in chemistry and what they thought we could do as a group to improve the class. My colleague, who co-taught the class with me, almost immediately took this opportunity to share his frustration with the entire class. He said:

> *They don't have their homework, they're not listening, they're not answering questions and so they're not passing. The way they're acting, they just don't get it.*

By using the word "they" his comments seemed to refer to the students in the class who decided to run out of the classroom as soon as it was over. However, the students who remained in the classroom responded to his statement very personally. They seemed aware of the fact that the "they" that the teacher referred to included them. Students responded by making statements like, "I know I'm not passing but this class is boring" and "We just don't like chemistry, it has nothing to do with anything."

The conversation was not going the way I had planned. The fact that students were rallying around negative statements was an odd response to me because I believed they truly wanted to do well in the class. After all, these were the few students that decided to stay after class. What I had failed to recognize was that all students were dealing with the same issues in the chemistry classroom, and because of the corporate structure of the classroom, their inability to have fluid transactions within this field was a shared experience. Through the nature of communal practices, almost all students had formed a bond that pitted them against the teachers and the corporate structures of the classroom.

As the students' responses poured in, the use of collective language in their responses prompted me to once again take stock of the communality exhibited by students. When I addressed a specific student about what she didn't like about the class, three or four students responded with statements like "*We* just don't like it" or "It's just not working for *us*." Because of these statements, the necessity to engage in future cogenerative dialogues became apparent.

Engaging in Critical Discussions: Cogenerative Dialogues for Science Classroom Analysis

Prior to the next cogenerative dialogue, I brought in some digital video of the students' chemistry classes that I had compiled from the beginning of the school year. My goal was to have students look at these vignettes from their chemistry classroom so that we would be able to have discussions based specifically on classroom experiences. I presented the videotape to the students on a laptop computer and asked students to point out parts of the videotape they wanted to discuss.

Once these dialogues began, students identified instances where they felt like the class was not going well. They picked out points of the lessons where the teacher seemed to be raising his voice, instances where they were uninterested or did not understand the lesson, and other parts of the classroom they felt needed improvement (the location of the teacher, the resources available in the classroom, students being disruptive to the lesson). Students either described these experiences verbally or cut clips of these portions of the lesson to save on the computer.

The more communal setting of the cogenerative dialogues allowed students to discuss their thoughts on classroom experiences and expectations. They asked about their

grades on class exams and issues in the classroom that they thought needed improvement. Students who had exhibited nonchalance in the classroom about the grades they received on exams were asking specific questions about past lessons and exam questions. This change in demeanor was an apparent function of the structure of the cogenerative dialogues and its variance from the more corporate classroom. In the cogenerative dialogues, the distance between students and teachers was smaller than it was in the classroom. In addition, all participants in the cogenerative dialogue seemed to be working toward the same goal. As seen in Figure 6(a) and (b), the students' proximity to the teachers in the cogenerative dialogue fostered their ability to participate in the discussion.

Figure 6(a). Five students focused in different directions.

Figure 6(b). Five students engaged in a cogenerative dialogue, intently focused on teacher.

In Figure 6a (in the chemistry classroom), students' eyes were all focused in different directions despite the fact that the teacher is speaking at the front right corner of the room. In Figure 6b, the same students from the classroom are all focused on the teacher and both the students and teacher are involved in fluid verbal exchange. These

two diagrams speak to the mutual focus and communality fostered by the cogenerative dialogue, which is the first step in creating a shared culture in which students and their teacher are engaged in a similar activity. Focusing on the person who is talking was a behavior that students exhibited in their conversations with each other but had not expressed in their communications with the teacher in the classroom. This behavior had become extended to the teacher once a communal field where they could engage in fluid transactions with the teacher had been established.

Practical Uses of the Corporate | Communal Dialectic

At this juncture, the corporate | communal dialectic was introduced to assist both the students and teachers to shape the classroom into a more communal/less corporate field. The corporate | communal dialectic was a tool that students actually used to describe different scenarios in the classroom. Using the corporate | communal dialectic also helped the cogenerative dialogue group to collectively define success in the classroom as neither exclusively corporate nor communal.

Studying the Videotapes of the Classroom: Moving Towards Success

As teachers and students combed through videotape of the chemistry classroom after being engaged in cogenerative dialogues for a few weeks, students realized that despite the difference in ideology (which often was merely a perceived difference) about teaching and learning between students and teachers, they both had to learn to achieve their goals within the existent macro structures that dictated that students pass their state exams in chemistry. The teachers had to find ways to amend the corporate structures of the classroom that were successful for students and concurrently, students had to amend

their existent practices in ways that would support their experiences in the chemistry class.

In an activity within a cogenerative dialogue, where both students and teachers picked vignettes from videotapes of the classroom that were examples of success or successful teaching (where the teacher was teaching and the students were learning), the teacher picked vignettes where students appeared to be sitting upright and facing the teacher at the front of the classroom. Conversely, students picked vignettes where the classroom structure was less formal and there were active discussions about chemistry. These different notions of success in the classroom between teachers and students proved that more explorations of cultural misalignments were necessary because students often, and importantly, commented that the teacher-selected vignettes did not indicate that students were learning. In one instance, a teacher pointed at a vignette from the classroom and commended a student for paying attention in the class. The student responded by saying, "it looks good but I wasn't really listening." The student explained that she had learned that when she sat a certain way in class, she would not attract the teacher's attention. She learned that establishing this ritual had helped her to avoid having the teacher ask her questions in class. Additionally, she indicated, "I was acting in a more corporate way so you (the teacher) would think I was learning. All I had to do was sit there." This deliberate action by the student equates to the necessity for a thorough investigation of students' rituals both within and outside of the classroom, and the need for spaces like cogenerative dialogues where these rituals can be interrogated.

With an apparent difference in the ways students and teachers define good teaching arrangements and students' reactions (which become rituals) to such

arrangements, I began to study students' perceptions of success and how they varied from conventional notions of success.

Deconstructing and reconstructing notions of success

The teacher equated success in the chemistry class with students passing the statewide Regents examination in Chemistry and students developing an interest in the sciences. Conversely, many students' notions of success focused primarily on being able to relate Chemistry to the real world and explain concepts to each other. Success on the state standardized exams was a secondary concern for the students, because passing the Chemistry Regents was not a state requirement for graduation for all students. Many students decided that they would take the mandated exam in science in Biology the next year. It is worth mentioning that the teachers' definition of success as hinging upon student test scores is a fundamental example of the corporate nature of schooling. This is to say that despite any individual teacher's beliefs regarding high-stakes standardized testing, their credibility as a teacher is usually dependent upon the percentage of their students who pass the standardized exam.

Expansion of New Notions of Success

> *Poochie: "If I can get it and then help someone else get it, then I know for a fact I know it. If Mr. L is just teaching straight up and none of us knows it. No one is a success."*

On our journey to discovering what success is and how it is defined, students repetitively shared what they felt was important for them to be successful. The resounding theme was that it was important for students to be able to understand the chemistry concepts enough to be able to explain them to someone else and use the concepts in real life. At this juncture, I began to consider why students chose these

definitions of success. Through discussions with student-researchers, I concluded that the decision to equate success with helping someone understand is related to the communal practices and mutually sustaining rituals that students engaged in outside of school. For students who had been engaged in rituals with their peers outside of schools, they had developed a co-responsibility for one another that included ensuring each other's success. When a student was asked about her grade on a classroom exam, she responded by saying "we did well" or "we didn't do so great". In addition, the students related the chemistry topic to an example in the real world in order to ensure she understood the concept.

In addition to being able to help someone understand science concepts, students also mentioned that being successful within the chemistry classroom meant being recognized for your work. By working with a peer to help her understand, the students could be immediately recognized for their efforts. Both the student who explained a topic and the student being tutored described what they learned and who they learned it from. At times, students took pride in being able to teach or learn a concept from a peer when the teacher was unable to get the students to understand.

While discussing notions of success in cogenerative dialogues, almost all of the students involved agreed upon a unified vision of what it means to be successful. However, they believed that the means to attaining this goal was sometimes out of reach because the structures of the classroom did not always facilitate reaching their goals for success. This discovery led to an investigation of ways to change the existent classroom structure.

Establishing Change in the Classroom Structure

> *"We both need to make changes, students and teachers" (Student comment in cogenerative dialogue).*

As the teachers learned more about student perspectives and the roles corporate structures played in preventing students from attaining success, the cogenerative dialogue group agreed to change the classroom structure to allow students to become engaged in practices within the classroom that varied from the norm. Since students' notions of success included teaching each other and relating chemistry to the real world, the teachers decided to help them be successful at reaching their goals. The teachers agreed to take students' suggestions into consideration and try to change the classroom structure, but the teachers also challenged students to make some changes in their approaches to learning chemistry that would help them pass their upcoming state exam. What inadvertently happened in this conversation was the pivotal point where students and teachers moved to attain a co-created definition of success in the chemistry classroom.

This definition involved a perspective of classroom success that required positive results on pre-assessment tests given by the teacher, and students demonstrating their chemistry knowledge by explaining to peers, co-teaching, and devising unique approaches to explain chemistry topics such as building models and constructing lessons on PowerPoint.

With this new definition of success in hand, and as the teacher discussed the need for students to study and practice to meet their goal of success in the classroom, the conversation focused on what students did when they left school. Students discussed their extra-curricular activities and the frequency of their engagement in these activities. Most of them described various responsibilities like cooking, cleaning, working, and taking

care of siblings. They also described leisure activities like spending time on the block (their street) and talking on the phone. Students rarely described taking the time out to engage in chemistry as one of these activities. An awareness of the absence of academic work in the students' out-of-school rituals was apparent and the group began to discuss the activities students engaged in outside of school that inhibited them from studying. It appeared that the time that students spent on their out-of-school rituals often did not leave enough time for them to engage in activities related to learning chemistry. However, students were quickly able to respond that they could spend time focused on their academics if they wanted to or "feel like it's worth it."

Investigating Daily Practices and Rituals in Cogenerative Dialogues

In cogenerative dialogues, students often presented their connections to each other by making similar statements like the ones in the vignette below. In other cases, they shared intimate details about their relationships with each other that spoke to the socio-emotional connections they had developed.

> *Eve: " I roll with Kathy to pick up her sister then we just go to the block and chill, if its cold outside or whatever we go to her crib or my crib and watch videos till her moms gets out of work."*
>
> *Kathy: Yeah, that's it. First I wait for her after school then we go and get my sister then we just go to the block and that's it."*

As they made these statements, they also began to discuss what they did everyday within and outside of school that did not relate to their science classes. This discussion then led to students documenting their daily practices each day to bring back to the cogenerative dialogue sessions. As the cogenerative dialogue group participants began to study each other's daily practices more closely by discussing written accounts of what these practices were, it became apparent that almost all students engaged in similar

general rituals daily (hanging out on the block, visiting friends' houses, watching videos), but also engaged in more specific rituals like walking to the same block, visiting a particular friend at a certain time, and watching the same music video show daily. The students' practices had evolved into rituals that linked to form ritual chains that involved other students. One particular group that consisted of four students attended a tutoring session after school together, walked to the bus stop, took the bus, visited each others' homes, separated to go home and then watched the same television show at their respective homes, talked on the phone to each other, went to sleep, and then met each other the next day.

These connections have led me to argue that the emotional bonds that have been formed outside of the classroom need to be supported within the classroom. Two students who were often reprimanded for talking in class shared the following experience with the teacher that spoke to the importance of valuing the communal connections that the students have to each other.

> *"When [x] was pregnant, she didn't know what to do, she couldn't talk to her mom because she was already stressed with life, she couldn't talk to none of the teachers. She could only talk to me. I took her to the clinic, I told her it was going to be okay and she stayed with me at my house for like weeks. We have been through all the problems in the world together so why can't we solve a chemistry problem together. That makes no sense" (Student in cogenerative dialogue).*

Disregarding the connections that the students have to each other (such as the one documented in the vignette above) exacerbates the misalignment between the corporate and communal blocs in education and breeds angst against the corporate structure of the classroom.

When conversations about students' activities and out-of-school connections were discussed in the cogenerative dialogue group, practices such as spending time with friends after school, meeting at specific locations like the park or a local hang-out spot, picking up and taking care of younger siblings, watching music videos, going to each other's homes, going to sleep, and then meeting with their peers the next morning were described. The communality they exhibited in their daily interactions led to the need for a deeper analysis of student practices and an investigation into how they impacted students in the chemistry classroom.

In the following vignette, students in a cogenerative dialogue discussed their after-school rituals and how working on their school work fit into their existent rituals.

> *Zion: I go to my friends' house to do homework, and we don't do homework. We just end up chillin'.*
>
> *Isisha: Yeah you go to your friend's block there's something mad interesting and you just don't want to do it (homework). It just doesn't come up.*
>
> *Jessica: I know, I know, I know, you don't want to do it.*
>
> *Zion: I try to do work at my house but ...just be annoying me.*
>
> *Cynthia: I come in my house everyday and just throw my book bag somewhere and go on with my life.*

The above vignette provides students' descriptions of their after-school rituals and provides a general summary of the types of responses received from students. From this vignette, we see that not doing homework or putting academics aside is a ritual that all four students in this vignette shared. The one student who stated that she tried to do homework on her own responded that at some point, doing the homework assignment annoys her.

These responses prompted conversations that strictly focused on the nature of rituals and whether or not the communal activities and rituals they engaged in could possibly help them in school. The main question that arose was, “How can we meet our agreed-upon goal of being successful in chemistry despite our current rituals?”

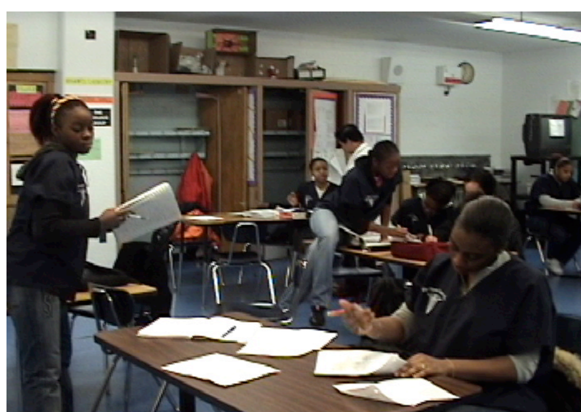
Eventually, one student began to change the tide of the conversation by making the following statement, “What can we do, we know it’s all different and they don’t respect us but what can we do?” This student’s statement summarized many of the feelings that students had about their teachers in the school, and his statement appeared to generate a need for action among the group members. Almost as soon as he finished speaking, the group shifted gears and began working on establishing new rituals or changes to their existent rituals that they could engage in to improve their chemistry performance. The rate at which the conversation switched focus was amazing and speaks to the ability of students to focus on an existent goal once they shared a collective need for it. I sat in amazement as the students transitioned from topic to topic and began to discuss various rituals they engaged in. I felt like I had no choice but to oblige when they asked the other chemistry teacher and me if we would allow them to make some changes in the classroom if they promised to stay focused on chemistry.

The students cogenerated a proposal that would allow them to work with peers with whom they typically engaged in rituals outside of school. Students would pair up with each other and work together to learn chemistry in class. I agreed to this suggestion and it was presented to the class the following day.

New Practices and Rituals within the Classroom

Desks screeched across the classroom floor for the first two minutes of class as students moved their seats closer to their friends. Students also began to share notes and sit on desks or tables when they explained topics to their friends. In some instances, students asked the teacher to stop his lecture to clarify something they did not understand and explained the lesson to each other when they thought the teacher was not clear. Students established five-minute break periods within the class in which they created examples of the concept being discussed and made plans to go over the topic after school. Figure 7shows instances where students have established a classroom structure in which they concurrently enacted multiple communal practices that supported their learning in the classroom. In this vignette, the teacher is working with a student in the background, a student is teaching a peer about the lesson while sitting on a desk, and the two students in front of the class are quizzing each other.

Figure 7 Students coteaching in a classroom break period. Two students in the front of the class quiz each other, a student sits on a desk tutoring two of her peers, and the teacher is in the background answering a student's question.



For the teachers involved in the study, this meant changing the structure of the class to allow more opportunities for communal practices that facilitated student-student transactions. The teachers repeatedly asked the class if they were ready to proceed on a topic before they moved on with the lesson. With the implementation of this practice over time, the more communal structure of the classroom allowed for multiple opportunities for students to enact their agency. Students walked to the board to answer questions when they would not have done so before.

Furthermore, they received recognition from their peers (clapping, cheering) when they solved a question correctly or explained a concept clearly. The practices that had been set in place by the students in the classroom had translated into rituals that brought positive emotional energy and increased student agency. The students' agency was usually enacted as co-teaching.

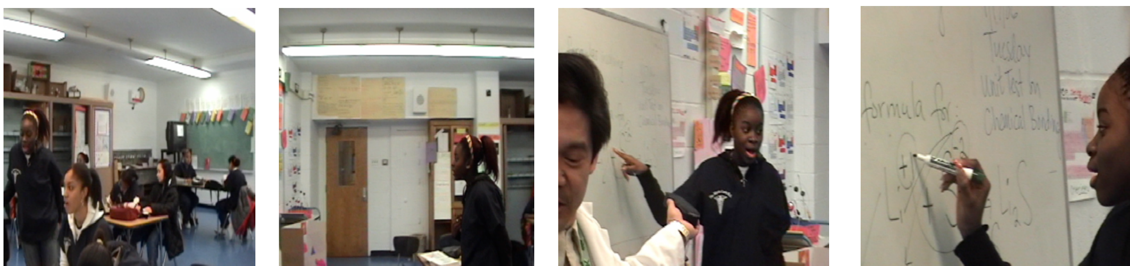
In Figures 8a-d, I present an instance where a student responded to a question her friend (with whom she engaged in rituals outside of school) did not understand by walking to the blackboard and co-teaching the lesson. In Figures a and b, she responds to what she perceives to be the teachers' inadequate response to a question by walking to the board. In Figure c the teacher introduces her to the classroom as she explains the concept, and in Figure d, she explains to the class.

Figure 8(a). A student asks what happens when Lithium and Sulfide are combined. Her friend stands up to add to the teacher's explanation of the answer.

Figure 8(b). The student walks to the board.

Figure 8(c). The teacher symbolically gives the student the floor

Figure 8(d). The student begins explaining the concept to the entire class.



As the structures in the class changed to allow for more communal practices (teaching each other, working with friends from outside school, planning their day together, learning the subject matter together), opportunities for fluid science discourse, science retention, and scientific literacy were dramatically increased.

In addition, the newly established classroom structure allowed the boundaries between outside-of-school and in-school fields were expanded and students' out-of-school partnerships began to enter the chemistry classroom field more often. Students debated approaches to solving certain questions during the classroom until a consensus was reached and drew in peers to explain concepts when they were confused.

Figure 9 illustrates what happened when a student was asked to find the electron configuration of an element. When she struggled with the question, two other students approached the blackboard to help her. The new classroom structure allowed students to feel comfortable enough to walk to the board and solve questions together. The students worked together until all three students understood the concept. After the class was over and students were dismissed for the day, students returned to the classroom to finish their discussion of the problem. They repeated this practice (returning to the classroom to

discuss chemistry) for the rest of the week, and eventually it became a part of these students' after-school rituals.

Figure 9 Students in the chemistry classroom discuss the electron configuration of atoms. This practice evolved into a ritual that the students enacted after school for the rest of the semester.

Student Enactment of New Practices as a Key to Developing New Rituals

In cogenerative dialogues, the students and I discussed the new rituals they established (staying after school to review notes, helping their peers) and how these rituals evolved from new practices. This conversation led us to discuss the rituals they engaged in after school.

In prior cogenerative dialogues, students had already studied these out-of-school rituals. They had identified specific rituals they engaged in that did not contribute to their science success. In this discussion, they focused on infusing newly cogenerated practices into their existent rituals. The group made suggestions about what practice they would try to infuse into their current rituals and shared the viability of implementing these suggestions with the rest of the class.

These practical suggestions about possible new rituals that would blend in with their existent rituals included spending an hour reviewing class work for every two hours watching videos, walking with a review sheet of class notes (students devised a method of giving each other impromptu quizzes based on the notes), attending after-school tutoring sessions with their out-of-school partners, and studying from self-created flashcards while they were in the cafeteria, on the bus, or on the train. Students decided to enact practices they felt would not disrupt their existent rituals but could help them succeed in chemistry.

Not all students who were engaged in rituals together were in the cogenerative dialogue group. In fact, most of the students who were involved in cogenerative dialogues engaged in rituals with students from outside of the group. However, the mutually-sustaining nature of rituals allowed other students to easily take part in the newly designed rituals.

. Over time, many students in the chemistry class reported to the cogenerative dialogue group they had implemented the new rituals and that they were working well. As the study progressed, I began to see students studying from chemistry cards or playing games they developed with the cards when they were outside of school. In Figure 10 a student and her friend with whom she engaged in the ritual of waiting for the school bus after school decided to sit in the park and study from chemistry cards that they created while they waited for the bus. This new practice emerged to become an integral part of the students' out-of-school rituals and eventually extended to their quizzing of each other on their bus ride home.

Figure 10. Two students engage in a ritual of reviewing notes from their chemistry classes while they wait for the bus after school.

Initially, students reported they spent five to ten minutes reviewing their notes or studying from their cards between other activities. As days passed, they reported that the time spent engaging in these activities increased. These out-of-school rituals also began to work in conjunction with the in-class rituals that students had developed.

As they worked together in the classroom, students referred to the out-of-school rituals with their peers. They would made statements like “Don’t you remember we talked about this when we were waiting for the bus?” The communality of the experiences both within and outside of the chemistry classroom fostered the development of rituals that became a staple of the students’ lifeworlds.

Further evidence of the creation of the new ritual that supported the students in the chemistry classroom is demonstrated in the vignette below, I transcribed the conversation in a cogenerative dialogue where the two students who waited for each other in the mornings before school had decided to study together instead of meeting in

the park and walking around the school. The students had enacted the newly cogenerated practice and then subsequently met to discuss whether or not it was meeting their needs in chemistry.

> *Zion: So we were talking about trying to study in the morning instead of just walking around so I tried that like twice. It was aight.*
>
> *Jessica: Yeah but we didn't know what to study though, we need to focus on what we're going to study.*
>
> *Zion: I think I definitely remember some stuff though but maybe next time we have to say were studying one thing. Like nomenclature or whatever, get that poppin then when we got it, we just move on.*
>
> *Jessica: Yeah, that works, I'll bring my cards (index cards students developed to help them study) tomorrow morning.*

This vignette shows the transformation of a newly infused practice into a ritual as students discussed their new practice of studying in the morning and their plan to continue to study the next day. These conversations resulted in both of the students engaging in the new modified ritual over the remainder of the school year and resulted in both students performing better on classroom exams and both of them co- teaching a chemistry lesson.

The Use of Modified Rituals in Out-of-School Fields: Back on the Corner

In this study, students were able to display the possibility of transferring deliberate practices into daily rituals and infusing the practices with the existent rituals when they were in fields physically very distant from the school. A daily ritual such as "hanging out on the block" after school usually entailed students being involved with rituals with students who did not attend the same school and that would not necessarily support these newly-developed rituals. Despite the possibilities of outside forces deterring students from engaging in these new practices, they identified specific

deliberate actions they could enact while in their neighborhoods to create rituals that would help them in their chemistry class. The students also used the communal nature of their relationships outside of school to support each other in their new rituals. This is evident in the following vignette from a cogenerative dialogue session.

> *Jessica: If you going out on the block to go chill… just take your (chemistry) book, just grab it.*
>
> *Zion: I'll do it and I'll let you know if I open my book or not. I won't.*
>
> *Jessica: … I know you might not open it, but still bring it with you…. There will be a time when you will (open the book) trust me. Especially if you're with me.*

Whenever they spent time together in their neighborhood, these two students talked about the classroom chemistry content from a small chemistry notebook into which they had transcribed the notes from the classroom. The students reported they often looked at the book whenever they had time and then slipped it into their pockets when they were done with it, but they always made sure that they had the book.

A student once described an instance where one of her friends who did not attend the school was curious about the content of the chemistry book and tried to learn what her friends were talking about. This student actually showed up to one of our cogenerative dialogues and shared some of her ideas about possible practices to infuse into existent rituals.

Utilizing rituals as a springboard, student researchers have incorporated new praxis into their rituals in a constant and deliberate fashion. This move towards deliberateness began in cogenerative dialogues when students engaged in communal conversations about their daily practices, and about how practices in their out-of-school

lived worlds did not appear to be conducive to their success in the classroom but proved to be an integral part of working within the corporate structures of the classroom.

Students reported that the likelihood of inserting new practices into their existent rituals was highly dependent upon certain factors. These factors included regularity of the activity, cohesion of the activity to pre-existent rituals, and the level of involvement of their peers with the newly established rituals.

Contradictions

As I searched for the expression of students' successful rituals, I also looked closely at instances where there were patterns of incompatibility to the general observations I made. My search was for patterns within these exceptions that are helpful in gaining a deeper understanding of teaching and learning in the science classroom. These contradictions are points of doubt that, as Sen quotes from Bacon in the *Treatise of Learning*, function for "initiating and furthering a process of inquiry, which can have the effect of enriching our understanding" (Sen, 2006, p. 122).

In one such situation, there was a transfer student from another borough of the city who had not established connections with students that were in the chemistry class. As the study progressed, this student decided to work with a pair of students who had been working well together and to join them in generating a plan of action for her out-of-school rituals. Despite her joining a group, the student often expressed discouragement with the fact that she could not find anyone to engage in out-of-class rituals with because she lived so far away.

Although this problem persisted for a few weeks, over time the student began to work with another student who mentioned that her out-of-school ritual was instant

messaging over the Internet. These students began quizzing each other over the Internet using instant messenger. The student also consistently received assistance from the teachers whenever she felt she did not fit in with the pairs or trios of students working together in class. This situation developed into an investigation into resources that could assist students in this type of situation and opened up avenues for future research. The possibility of situations where students do not live in the same neighborhoods as their peers, share similar interests with the rest of the class, or have peers to engage in rituals with must be taken into consideration.

Significance of Investigating Corporate | Communal Practices and Rituals

Cogenerating Successful Practice

The transformative nature of cogenerative dialogues allows for students to develop an awareness of the similarities and differences between norms within in-school and out-of-school fields. In this study, engaging in cogenerative dialogues with students allowed them to not only see the differences between corporate and communal practice, but to see the necessity to find ways to be successful within the corporate school structure by targeting their rituals. In other words, students had to move beyond fundamentally interacting with the classroom structure and learn to transact within the field. In addition, students and teachers became aware that the existent school structure is flawed and does not support true learning and inquiry. The challenge to students to co-construct new ways of teaching and learning science is just as strong as it is to teachers and researchers.

Contrary to the opinions of many, students are well aware of the need for success in their science classes and want to find avenues where they can successfully transact with the structures in these fields, despite the misalignments between the corporate and

communal that occur in the classroom. As a student frankly stated: “You can’t just say f--- school or chemistry. You have to graduate. There are no options to that.” From this research, the students concluded that, “We know that schools will be the same way they are. But now at least we can do something about it. Talk to these teachers and do what we’ve got to do. Figure how we can work through it.”

The purpose of our work (teachers, researchers, students) is to hone in on the fact that students are aware of the importance of success within a corporate structure and to work towards developing rituals that support students’ success in science.

Valuing Students’ Knowledge in Urban Science Instruction

In addition to the explication of the importance of looking at corporate and communal practices in science education and urban science classrooms, this study has also shown that teacher instruction benefits from the information that comes from student rituals and cogenerative dialogues. As students employ distinct daily rituals in fields outside of school that either maintain or disrupt their lack of success in school, they create a lived curriculum that science teachers can use to improve their practice. Teachers can learn how to teach communally by watching the ways students transact with each other. It is imperative that teachers ground their pedagogy in communal practice that values the voice of students. The emergence of culturally relevant analogies and other phenomena that arise as a result of studying student rituals are some of the keys to achieving success in science for African American and Latino/Latina students in urban schools (Emdin, 2006).

With this being said, I hope to make clear that the awareness that students’ “struggles for recognition in response to their lack of recognition from the dominant

culture … is part of the pathology of oppression and domination" (Oliver, 2001, p. 23) and that I do not argue strictly for a recognition of student voice through ritual or other communal practice as an absolute approach to improving pedagogy. However, through my explication of the theory that supports this practice and my description and analysis of a study that participants viewed as successful and beneficial to their success in science, I provide a means to attacking injustice and supporting student agency from within the urban science classroom.

CHAPTER 6

A Metalogue on Urban Schools and Science Classrooms: Student Voices on Research Products

Lasleen Bennett, Jessica Collins, and Christopher Emdin

Chris: In previous chapters, I presented outcomes of a research project that was going on at New York High School. In the chapter, I presented the themes that I observed in the Physics and Chemistry classes in the school. Furthermore, I looked to show how the strengths that students like Lasleen and Jessica come to the table with, positively affect the ways that teachers teach and students learn in urban classrooms. To meet these goals, I utilized a few theoretical frameworks that illuminate the problems that run rampant in urban science classrooms.

Since the three participants in this metalogue have had discussions about the theoretical frameworks that I use in chapters 3 and 5, I would like to start with getting your take on urban science education research and pedagogy in general. As we continue in our metalogue, our discussions should allow for references to the theoretical frameworks that were used to interpret the research study. I will begin with getting Lasleen's perspectives on urban science education and the research produced in her classes.

Lasleen: The first issue that I would like to discuss is the test scores of African Americans and Latinos and the way that they are usually presented. Whenever I read about urban students and their education, the first thing that the authors present are "facts" about student achievement and test scores. People are consistently talking about the low scores that African American students have on standardized tests and how they

cannot achieve in science. When I hear these statistics, it always makes me feel like people are saying that because of these low scores, we are not as intelligent as whites. It's like these people are being negative without really knowing the damage that they are doing by stereotyping students. Even Chris begins his first paper with all these negative statistics. I see that he was trying to explain the reasons why the statistics look the way they do but when that comes first in a paper, it's like starting off on the wrong foot and giving me the same feeling I get when I hear other people speak about us.

Jessica: I agree with Lasleen's statement. I have heard stories about Einstein and how his teachers thought that he was a weirdo because he thought about things differently than everyone else. He was born with the ability to think outside of the box and I'm pretty sure he wouldn't have had high scores on tests like the Regents, the SAT or ACT. Despite his test scores, he is still known today as a genius. If he took tests and got low scores after he was regarded as a genius, people wouldn't start to believe that he is not a genius. My point is that tests do not determine how knowledgeable a person is. All the tests do is put you in a category and the category that we are placed in as Black and Latino kids are that we are dumb. After a while, you just don't care anymore about what they say. I believe that even if we scored higher on tests, the opinions that people have of us would probably be the same.

Lasleen: We both feel like the way the statistics are shown is definitely stereotyping. People don't see that the statistics that show low test scores or whatever negative aspect of urban students are the way they are for a reason. The main reason is teachers don't really teach students in urban settings the way that they should be taught. I don't mean this in a negative way but teachers don't have high expectations. If you don't think

someone can do something, you will not get the results you're looking for. In fact, if you don't expect students to pass to begin with, you obviously won't teach them like they are intelligent human beings with the ability to succeed.

Chris: Do you think that students are aware of teachers' low expectations? I can imagine that a teacher would not come into a class and say. Listen, I know you can't pass this class so don't bother. I am curious at to where the students get these ideas? Are they just a known fact or do students believe that teachers have these low expectations?

Lasleen: First of all, you would be surprised at what some teachers say to students that show that they have low expectations. They may start off a topic saying something like, I know this is going to be hard for you guys to figure out but I'm going to try to explain it to you anyway. Imagine yourself sitting in a class and hearing that, you're going to immediately think that if the teacher thinks this is too hard for me, I can't do it. Sometimes you get a chance to prove a teacher wrong but then imagine all the times that you don't get something on the first try, you're crushed because you were expected not to understand and you don't.

In science sometimes, the problem is that we learn something in an easy way because the teacher does not want to make things difficult and then when it gets worded different on a standardized test like the Regents, we get it wrong because we haven't been exposed to the challenging questions in the class.

Jessica: Another big aspect of what Lasleen just mentioned is the issue of respect. If you don't treat someone with respect and like they have something to say, how do you expect them to be successful or to listen to you? It all boils down to the fact that if you give respect you're going to get respect. If you give effort, you're going to get effort and if

you expect a lot, you will get a lot back. I think that if you give respect you're going to get students who care about you or your subject. I have done poorly in classes just because I had no respect for the teacher. It was obvious to me that he didn't like me and I made it clear that I didn't like him by disrespecting his class and not caring about anything that was going on in there. I know that people think that this means that I end up as the loser with a bad grade but at a certain point, I could not see myself working hard in someone's class when it is obvious that they don't think positively about me or have any respect for me.

Lasleen: While I agree with Jessica to a certain extent, I think that respect from the teacher is only a part of what is needed for a student to do well in a class. A big part of it is also an open mind not only from the teacher but from the student as well. I feel like if students don't have an open mind, they won't allow any transactions between themselves and the teacher. I think respect works in the way that if a student does not respect him/herself, then their attitude towards learning will be one that does not really help transactions. If there are no transactions, there won't be much learning going on. Sometimes it's a matter of who is willing to show respect first or take the first step. Schools and teachers should never be at odds because both of them are there for each other's use. I mean they are there to work together so that the students learn. If a student does not care about a class and then ends up failing, the teacher still has their job, still has their degree, what does the student have? All the student has is a failing grade and a bad reputation with other teachers. I just believe that sometimes a student has to show some responsibility as well.

Chris: I like the fact that you're using the term transaction here. I also find it interesting that you're challenging Jessica's point about responding negatively in a class when she feels that the teacher does not think highly of her. The idea of a student not being involved in the class in response to the teacher is troubling. I would hate for a student to leave a class that I teach with just "a failing grade and a bad reputation." I do agree with Lasleen that this is something that happens. However, I don't think experiences like Jessica's happens because a student lacks respect or responsibility. There are a lot more complex issues at play.

This whole notion is something I would like to focus on in more detail in the future. The idea of finding out whose responsibility it is to start things rolling. Is it the teachers' responsibility to show respect to the students? Is it the students' responsibility to have an open mind when they feel disrespected by the teacher? I agree that someone has to give in first but I'm not sure whether it's the student or teachers' responsibility to always do that. Either way, the communication has to start somewhere. There has to be a back and forth exchange between the students and the teacher otherwise the students are not really learning. This is what I meant by developing communal practices and what Lasleen described earlier as a transaction. I would like you to explain a bit more about the idea of the transaction and perhaps discuss communal practice. What you mean by that?

Lasleen: It's like the story that you discussed in your first paper about the students that liked to sit in a circle to do their work and how it turned into a problem. In that situation, it was obvious to me that the students were learning. That was an obvious communal classroom. Sometimes it is hard to describe. It's just a way a class is when you know that you and the teacher are in the same boat and you understand each other. When you're in

this type of situation, everyone is looking forward to sharing what they think and picking up something new from someone else. That is what I meant by transaction- when the topic is science or teaching science and everybody has something to share and everybody is learning from each other.

Jessica: I think the way that the communal classroom gets established is through the teachers being willing to change things. Teachers don't realize how important it is to switch up your style. If one way of teaching fails, try another one. Try anything to bring the communal setting and feeling into schools. I mean look at the situation where the student was always asleep in the physics class and then he was allowed to bring his videogame to school, just look at how he started combining physics and basketball and videogames. I mean he would never sleep in that class again. When I talk to him, he keeps talking about physics and momentum and inertia till I get tired of hearing it. That is an example of a transaction, it is the exchange of what he knows for what the teacher knows and then having them just keep exchanging till he knows so much more than he knew before.

Lasleen: I was talking to Tisharna (another student) about this and she said that the whole transaction thing starts with just acknowledging someone by doing something that gets their interest like jeopardy and letting people know that they count. Once you are combining something that someone else is an expert in with what you are an expert in, you see changes in each individual.

I really want to go back to the point that part of the responsibility for this process is based on the student as well. They have to be willing to accept a teacher and their efforts and let their feelings be known.

It's like how my mom sometimes tells me that my attitude is going to get me nowhere. In my head, I'm asking, "why do you think I have an attitude to begin with?" Usually it's because I'm upset about something she said or something that happened. After a while, I realize that she doesn't know what's going on so it's partly my fault that she reacts the way she does.

When you have a person acting a certain way and they are being judged for the way they are acting, the person needs to explain what's going on in order to stop the opinions being formed about her. You have to build up to getting an opinion to change. A teacher is not going to just start understanding you out of the blue. It doesn't just happen on its own.

Chris: I think this is where the cogenerative dialogues have such a large impact. Unresolved issues get addressed and no one has to have their ego bruised by being the first person to ask what's going on? Or express what they're thinking or feeling. I believe that the cogenerative dialogues are the space where teachers really learn about students and how to teach them. It becomes a place where students can have the opportunity to explain what they're thinking about or discuss why they are upset or disinterested in the classroom. I don't think it's a blame game where we can say it's the teachers fault all the time but I also don't think that it's never the students responsibility to explain the way they're feeling. The problem is the creation of a space where these conversations can happen. My work in your classes has shown that the place where these conversations can happen is the cogenerative dialogue.

Jessica: This is a part of my point. Usually, we don't have the cogenerative dialogues so we can't just come out and share these feelings. When I was reading the paper that talked about corporate and communal practices it really explained a lot about how classes get

run sometimes. If things are more communal, you don't have to worry about who is talking first or who is putting themselves out on the line. We all just talk, figure things out and learn because the classroom is more like part of life. People can get upset or in a bad mood but still figure out how to learn a concept. The communal is pretty much connecting to the students' environment. You start to see that science is all around you. All of a sudden, everything you see, eat, taste, or hear has something to do with what you're learning in school when it all gets connected.

Under normal circumstances, the teacher gives you information then you have to give the information back. It feels like you are never really learning anything or thinking about it. It's like we are machines that need to keep doing the same thing over and over again. There are no feelings and no emotions. I feel like if you don't take care of a machine, it will eventually break down. The process works the same way for students. If you're treated like a machine, some people will definitely just quit.

For some other people, we learn to be more independent. It's like we are treated like machines but because we go through that, we become strong enough to fix ourselves when we break down. That is how we learn to survive.

Lasleen: The major idea that I am getting from what you've just said is about the communal and how it's separate from the corporate. It's the idea that what we do everyday does make sense and does count and can help the classes. I agree with that point completely. I also see how some people just don't bother with school being related to the whole idea of being treated like machines.

That is why I like being involved in co-teaching. It gives me a chance to show that I can understand chemistry or biology enough to pass a test but also lets me teach my

friends in a more appropriate manner. I believe that co-teaching can definitely be an example of using the communal for the corporate because I co-teach in order to prepare my friends to pass their exams but I also make jokes, ask questions about their day and tell them things about myself. More importantly, I listen to what they have to say and figure out where they lost their way. The reason that co-teaching is effective is because students know what the confusing parts are for their peers. They know how a student can get lost because they know the parts of the lesson that gets someone lost. There is not just a constant back and forth. You can take breaks to figure things out.

Jessica: I definitely see the benefits of a student being taught by another student. I also see the importance of teaching another student. It makes me feel proud and like I have accomplished something. I can imagine that it's hard for a teacher sometimes to capture the same thing a student does. In high school, it can be really frustrating because students in my class don't take science classes seriously. I think that a lot of times, it's because they don't understand the subject. I know that in college, students don't act so immature. I feel like sometimes, high school students just need to grow up and see what it's like to pay for an education. I really think that we go around in circles with the teachers and students because they don't understand each other.

Chris: I definitely understand the point you're making. In my paper, I tried to focus on that same issue by exploring the effects of corporate ideologies on both teachers and students. When I spoke about the fundamental interaction, I was discussing how students just get so shut off that they are just in the class without being a part of the class. They either go to sleep, or put their head down but as Jessica is saying, they can also just

choose to be disruptive. This is also a way that the fundamental interaction gets played out. I am curious to hear how you think teachers can address this problem.

Jessica: To me it's like naturalistic observation. This is a topic I learned in my psychology class that means that you just observe people in their own homes or communities. Naturalistic observation helps teachers become better at what they do because they open up themselves to their students by discovering their lives. I guess it's a step further than naturalistic observation. The teacher has to be with students and learn their likes and dislikes and then bring what he learns to school to better the lesson. It means that you have to be involved in their lives.

The corporate way is different and it really is the way that most of the classes that we are not interested in get run. If we take a poll of students in the school today and ask them what classes they are the most interested in, you most likely will be able to see which classes are corporate or communal. The students don't like the corporate classes and that will mean that they won't like the subject. At the end of the school year, the teachers start wondering why the students fail their Regents exams. It's obvious that the reason is because the class was set up in a way that the students did not want to learn. I feel like you need the communal to meet more corporate goals like the Regents but you don't really need corporate ways to meet corporate goals. Teachers should teach students in the way that is best for the students. Otherwise, what is the purpose of teaching? The way to teach is about getting your point across in whatever way it takes for the student to understand. For me it's like, teachers have to see the light whenever they stumble upon the key to their students' comprehension.

Chris: Jessica, your last statement is so powerful. The notion of stumbling on the key to students' understandings is one of the main purposes of ethnographic research like what we have been doing in your classes. The idea is to look at what happens and then take what happens in the research that is positive and try to replicate it in the classroom. Thank you very much for participating in this metalogue, I have certainly learned a lot and I'm sure our readers will as well.

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Jessica Collins is an 11th grade high school student who lives in the Bronx, New York. She has been a student researcher in her science classrooms for two years. Her favorite subjects are Physics, Biology and English. She hopes someday to be a medical doctor.

CHAPTER 7

The Effects of Globalization on Othered Populations in Urban Science Classrooms: Attaining Neo-Indigenous Cosmopolitanism

As a science educator who works in predominantly urban schools, much of my research examines the complex relationships in urban settings that affect the teaching and learning of science. I view the science classroom as an extension of the school and in turn, view the school as an extension of the neighborhood where it is located. This approach adds a rich and complex dynamic to the interrogation of the relationships within the classroom and offers deep insights into ways that students and teachers communicate.

Oftentimes, my extension beyond the classroom rests at the school. In these instances, I explore the local dynamics that influence the students' thinking and comfort with science, and work towards improving science teaching and learning within the classroom through the context of the school. When I have conducted these types of investigations, I have gained incredible insight into issues within the school (availability of science materials, cultural misalignments between teachers and students, and lack of science resources) that negatively affect the urban science classroom.

However, in certain instances, limiting the research to the school inhibits deeper understandings of the dynamics within the science classroom that transcend local contexts like the school. I have discovered that engaging in scholarship within urban contexts means teaching and learning about students who are from different countries all over the world. These students "retain[s] a special ideological link to a putative place of origin" (Appadurai, 1996, p. 172). In other words, they hold allegiances to their lands of origin and hold national identities as not only Americans, but as hyphenated Americans.

Appadurai suggests that conceptions of Americanness include many trans-national identities that hold hyphenated Americans (Asian-American, African-Americans and thousands of other variations). These individuals carry global and local histories they bring to their present locations within the United States that have an impact on how they engage in exchanges within the urban science classroom. These are the populations that I name as the neo-indigenous. The term refers to populations that have either developed or are developing deep roots to their current locations in urban areas. As they navigate the structures of urban settings, they develop complex relationships to each other that are seen in the urban science classroom.

Hyphenated Americans in the Physics Classroom: The Clash within the Class

While conducting research in a physics classroom at New York High School, I witnessed certain reactions students had towards each other that I believed were inappropriate. I paid attention to these responses when these comments were made and responded with general comments about their inappropriateness. However, a lot of what was happening was overlooked. I attributed many of the students' responses to the tendency of students to tease each other and dismissed them as just "the way that kids get sometimes." I greeted the rolling of eyes and whispers when certain students spoke as empty and insignificant responses, and subconsciously made excuses for what was happening in the classroom. As the months passed, I grew more sensitive to the negative responses students made about each other, but only did so when I realized they were affecting particular students' academic performance and science agency.

I observed that when students rolled their eyes or made negative comments, it was often particular students responding when Spanglish or Caribbean Patois was spoken. I

listened closely and heard students mimicking each other and making fun of each other's accents when they answered questions in class, and slowly began to realize that the prime victims of these negative practices were also the students who were having the most difficult time engaging in the classroom or enacting agency in science. In the neo-indigenous populations within the classroom, there was a hierarchy that had developed that caused certain students to have a difficult time enacting their science agency. These were also mostly students whose families were new to the school's neighborhood. This was a phenomenon that had become more apparent as the school year progressed that linked the dynamics among the neo-indigenous outside of the school to their experiences within science classrooms.

Spanglish Laws of Motion

One day as I taught a class about Newton's Laws of Motion, a Dominican student responded to a question I had posed in class about which of the two objects I had in my hand had more inertia by responding, "The one that is mas heavy, pero the one that is mas heavy has mass, and inertia." An African American student in the class responded by saying, "Speak English, too much mas mas. What's the point?" As she made this statement, the eyes of the student who had been trying to answer my question fell to the floor. Another Dominican student looked in her direction as if to sympathize with her, and then quickly looked away as the rest of the class moved on as if nothing happened. Finally, another Latina student said loudly, "She just did speak English." A Caribbean American student responded by asking, "Did she?" Another voice mumbled a response and then another until I yelled for silence.

The students seemed as confused and shocked by my yell for silence as I was with the comments that had been made. In this scenario, the young lady who had spoken had been othered by her peers and her response to my question had been dismissed as invalid despite the fact that she was right. As the class sat in silence, the echo of my yell reverberated for long after its sound had dissipated and we all sat in the class, looking at each other, tension building until the bell rang.

Understanding the Nature of Othered Populations

In the case of all the “hyphenated Americans” that inhabited the classroom where this research study is based, a collective history of being othered connects the different ethnic groups. This notion of being othered or considered to be other than the norm is one that carries with it a positioning of groups or individuals into classifications that they often have no power to move from. The othered are inscribed with whatever being othered means as it is established by a person or group who has power. In the physics classroom, the student who answered my question about mass and inertia had been othered by her peers because she was Mexican-American. Certain students in the class did not give her the opportunity to properly answer a question in class because of her ethnicity.

To classify an individual as “Other” is to hold the belief that one person represents a race, class, or ethnicity and embodies all the negative connotations that being from that group means. In addition, to classify an individual as Other requires that the classifier holds the belief that the Other does not have equal value to, or is not worthy of, the gaze of the looker. The looker in this scenario is the power wielder, or the person or persons supported by a given context as being the norm. This looker is often a member of, or is supported by, a dominant group with the power to give or take value from the Other. As

we proceed in this chapter, I capitalize the word "other" when I refer to an individual or group named as such in order to differentiate between use of the word for conventional purposes. In addition, capitalizing the word when a group or individual is being named is a conscious decision that explains the naming of an individual or group as Other. This distinction is valuable for categorizing groups oppressed by being classified as varying from the norm.

Theorizing the Other and the Oppressive Nature of Othering

Approaching this notion of the Other from an admittedly provincial science educator's perspective, I utilize Oliver (2001) as a conduit to analyzing how the notion of the Other and Othering has been interrogated by many scholars. Sartre "describes the alienation that results from the look of the Other that fixes him as an object and denies him transcendence"(Oliver, p. 41). The "him" referred to by Sartre is the victim of oppression. However, Sartre speaks from the oppressed person's perspective and views the imposer of oppression as the Other. This stance presents a mutualism in the relationship between the victim of oppression and the looker, as it allows the victim of oppression the ability to view the imposer of the oppression as the Other. Oliver presents a critique of this mutualism and argues as Fanon (1963) does that control over the Other that the dominant group (looker) imposes does not allow for the victim of oppression to view the looker as the Other.

Gordon (2005) states that Othering is a normative view of others, held by representatives of dominant society, that is "used as the basis to define perceptions, evaluations, assumptions, and beliefs" about those who are not perceived as the norm. Merging the analyses of the scholars I quote from in this section, I provide a definition

that merges the work of Gordon (2005) and Fanon (1963) that sees Othering as victimization resulting from a variance from a perceived norm. My definition lays the groundwork for a key theme in the work that follows.

I utilize the notion of the Other in conjunction with an approach to research outlined in the following section to study the effects of globalization on Othered populations in various social settings. I argue that divisions among students that occur when students devalue another student's answer affect who learns within urban science classrooms. I also argue that these divisions are closely tied to globalization.

Using the Global Scale to Understand Actions on the Contemporary Local Scale: Structure | Agency Dialectic to Examine Racism and Xenophobia Throughout History

In his essay *The Color Line that Belts the World*, W.E.B Dubois (1906) discussed many points that speak to research in the vein of the work produced here. Of these points, two stand out as approaches to this study and avenues for inroads into this chapter. Firstly, he discussed the problem of race and color as a world issue. He then presented them within a historical context as issues at the local and the global levels (The United States, and nations across the world). This transitioning and historicizing approach will be employed in this chapter as I investigate globalization through its roots in colonization on both global and local stages. My aim is not to study race and color as Dubois did but to utilize his approach to investigating these issues.

Secondly, Dubois discussed the fact that "the white races have had the hegemony of civilization- so far that white and civilized have become synonymous in everyday speech" (Dubois, 1906, p. 42). This second point speaks to the normalizing of civility as

an attribute of a specific group and the power granted to such groups to validate or choose to extend civility to whomever they perceive as the Other.

With the possession of this power comes the dispossession of power from all other groups, which results in a persistent and pervasive viewing of the Other as less than the norm. The loss of power that the Other experiences impacts how he or she is perceived by society. Once one is perceived as the Other, he or she experience a loss of agency or an implicit passivity. Once a student in the urban science classroom is othered, he or she does not feel comfortable answering questions in class or participating. He or she experiences a loss of agency. Agency can then be viewed as the power to act and the loss of agency can be directly related to the structures in place that determine how and if agency gets enacted. The idea of a loss of agency that relates to the structures in place is one that influences multiple social fields in which the Othering of particular individuals becomes commonplace. Consequently, I present a structure | agency dialectic and place it in the context of the multiple fields that impact social life. The main theme here is that if the structures in place in a field cause certain individuals to be Othered, the individuals within the field will experience a loss in agency.

In presenting this dialectic, I utilize Dubois' approach and travel from a macro perspective of examining the world in a historical and global context, and transition back and forth to local contexts in the United States, New York City, the Bronx, New York High School and the Physics classroom in that school. By transitioning, I demonstrate how the urban science classroom is nested in the multiple contexts that give us the world stage we inherit from globalization, and how the process of Othering plays out on both a

world and local stage as racism and xenophobia. In each context, the structures in place impact the agency of participants within the field.

Exploring the Global Village

The world stage, often referred to as the global village (McLuhan, 1964), holds distant (geographically, culturally or otherwise) nations of the world and molds them into a single space. This means that distinct and separate nations are often lumped together into one. According to McLuhan, this space is one that was initially connected by communication / technological advances like the telephone. Over time, the connected, global world became compounded by what McLuhan refers to as our "collective electric nervous system" that abolishes space and time on our planet (McLuhan, 1964).

For the purposes of this chapter, I go beyond McLuhan's notion of the global village as an output of communications technologies and include the historical, social, global | local phenomena that allow people to cross seemingly insurmountable global boundaries with ease. Just as people cross global boundaries with ease, so does the process of Othering. As the global village gets larger, the world is forced to respond to once foreign people and issues that were once indigenous to distinct locations but are now shared worldwide.

The dynamic between those who are Othered and those who are perceived as the norm is evident in the global village. In this field, power relations and economic motives guide the process of Othering. In this field, certain nations are viewed as the social and economic giants while others (third world nations) are viewed as the Other. In addition, the global village holds varying structures that impact the agency of those who are Othered in different parts of the globe.

As a newfound global society brings individuals together to co-inhabit a single space, we must be aware that at all times the global village is an amalgamation of separate worlds, each with structures that impact the agency of those Othered within these distinct social spaces.

This process is similar to what occurs in urban classrooms as students from all over the world come together to inhabit single spaces like the classroom. Bourdieu (1990) refers to these spaces as the fields where we enact social life. As a result of globalization, we live in a single field that holds varying smaller and local fields. In other words, we exist in our immediate worlds in spaces that are merged and separate at the same time. We are aware of the structures within our local fields yet conversant of our place in the larger field of the global village. Even in our smallest and most tightly knit communities, we are connected to larger fields that may be beyond our immediate grasp.

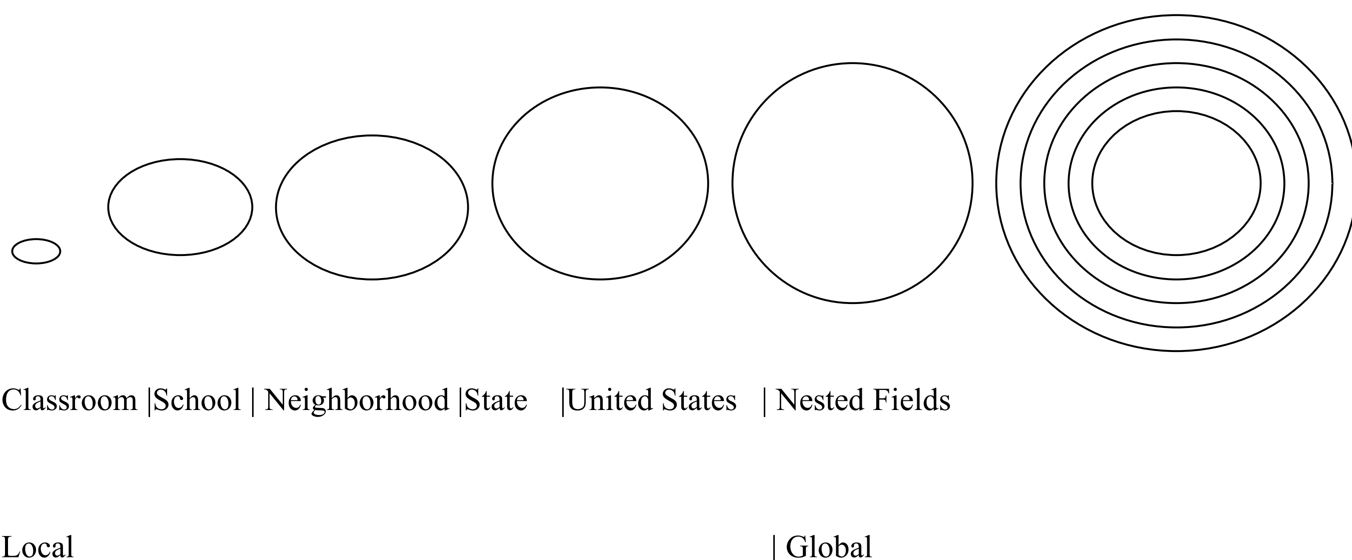
Theorizing the Global Village: The Existence of Amalgamated and Nested Fields

According to Bourdieu, the position of each person in a field is the result of interactions between the specific rules of the field and the individual. Therefore, the ways to act within each field are dependent upon the specific structures that the field holds. In the process of globalization, a sea of fields rest side by side with an endless number of additional fields that each holds distinct, ideas, customs, cultures and dispositions. Within each component of field is a structure that affects a group's agency. In the creation of the global village, these fields crash against each other in a disjointed and haphazard manner. A structure that causes a particular group to be relegated to the role of Other in one field may crash against a structure in another that says that the group is valued. Consequently, groups that may have had limited agency in a specific field may become engaged with

structures that liberate them in a new global field. In the urban science classroom, where students come from various global fields, they come together in the classroom and recreate structures that impact their agency in the classroom field. The classroom becomes an amalgamation of local fields and a microcosm of a larger global field. However, structures have the possibility to be changed more readily within the classroom.

In this global field, there is a viewing of the local fields as one larger field despite the fact that the local fields that make up the larger one are each distinct. They are nested globally, nationally and locally within each other and hold specific structures that cause individuals to be power wielders or Othered within them.

Figure 11. A visualization of the dialectical relationships between multiple fields and description of how local fields stand as independent fields that are part of a global field.



The diagram above describes local fields like the classroom, school, neighborhood, and country and shows how they come together to form a global field that holds all the local ones. Between these fields are Sheffer (|) strokes, which indicate that each field is dependent on the other and includes the other. There are multiple additional fields that may fit within it as they amalgamate to form a larger field.

Cosmopolitanism as a Counter to the Othering Process

Cosmopolitanism is a construct that necessitates the extension of camaraderie to those who may be considered the Other. This notion can be extended to include the fact that groups in one local field can realize the oppression that others around the world (in other fields) have suffered and look to extend what Dubois (1906) describes as "freedom and friendship" to those not recognized as the norm. In a global village, the possibility for a cosmopolitan society where all are valued and no looker exists appears plausible because there is no other or looker established in this new field. This would be an example of a cosmopolitan field. However, instead of reveling in the wonder of this beautiful chaos where all groups are valued for their difference and equally valued and respected, an approach that values uniformity and modernity springs from within the global village. This approach calls for the different groups of people within the single global field to be neatly divided between the looker and the Other. The force behind this ideology is named as the norm and consequently, reshapes the structures within local fields. The social dynamics that guide processes within the larger global field are also found in the structures of the local fields and cause the dynamic between the Other and looker to be present within local fields. In the urban classroom with students from various ethnic backgrounds, certain students are perceived as the norm and their peers are Othered. When cosmopolitanism is established in the classroom, the students find value in each other and create structures within the classroom that facilitate their drawing of connections to each other. Once these connections are established the Othering process is not allowed to function.

The outline I have presented above provides an explanation of how being Othered and Othering influence the power relations that are the foundation for colonization. In the following section, I describe the historical roots of how the divides between those Othered and those Othering are established on a more pragmatic level on a historical and global stage. I describe how certain groups' ability to wield power on the contemporary global stage stem from the processes of imperialism and colonization. An awareness of this historical backdrop sets the stage for discussions about the Othering process in the United States, New York City, and an urban science classroom within New York City.

Imperialism, Colonization and Globalization

The age of imperialism, which began in the mid 1800s was a time period when globalization as we currently know it was non-existent. The notion of a connected world where communication and travel across the globe was commonplace was unimaginable. For the most part, nations on each of the continents maintained a sense of insularity that was most likely a function of a lack of access to others. As multiple fields around the world coexisted with little to no communication with each other, traces of the global system that we have today were present in certain locations that were geographically close to each other. In these fields, a spirit of competition with neighboring nations, tribes, or cultures was present. In Europe, competition for the acquisition of wealth swept the continent. European nations engaged in fierce competition with each other for affluence and power and began looking beyond their shores to attain them. This quest for wealth and power caused many of them to embark upon an imperialist agenda that led them to extend their economic and military forces into Africa.

Over time, what began as an expansion of economic bases into African nations transformed into a forced control over African nations. The imperialist agenda had given rise to colonization, and in the process generated the seedbed for creating divides between groups based on their race and ethnicity. The European (the colonizer) in various African nations, Othered and marginalized the colonized and in the process caused the African populace to feel worthless and like the outsider in their own lands. Fanon (1963) describes the "sweeping, leveling nature of colonial domination" and marginalization of indigenous populations by the occupying power that removed value from the colonized. He further describes how the European standard was seen as the norm and the African was viewed as the Other. The events Fanon analyzed in the French colony Algeria were mirrored in many African nations by other European colonizers.

If we view these nations as different fields, we see that the proliferation of European power over indigenous peoples occurred in multiple fields with similar outcomes. In each field, the structures in place impacted the agency of indigenous populations. Through the process of being Othered, they were seen as mere subjects of the colonizer. They were ruled politically, economically, and socially and through their treatment as the Other, became victims of oppression in their own lands. In the science classroom where I conduct my research, a similar process of victimization of the Other was apparent. Certain students were hindered from learning science and socially ostracized from the rest of the class because they were viewed as the Other.

By the late 1950s and 1960s European nations began to succumb to increased pressure from both within the colonies and in their own continent to grant the colonized nations independence However, ideas about European ways of knowing as the norm

persisted as the political systems in the newly freed African countries emerged. The perception of the indigenous as intellectually inferior to the colonizer resounded in scholarly work from the most highly respected scholars of the time. In addition, the post-colonial era ushered in a time period where the colonizer's access to the material and economic resources of their former colonies persisted despite their nation's symbolic independence from their colonizers.

Around this same time, slavery in the United States (a precursor to colonization and itself a process of Othering captive Africans) also created multiple fields where structures negatively affected the agency of particular populations. Whether the Othering process was occurring in the nations of Africa or the United States, an Othering based on phenotype occurred in various fields throughout the world. With the confluence of these varying fields into a single global village (see diagram above), oppressive structures in the smaller fields converged to create stronger, unified structures. These structures were laws and policies that ensured that those who were considered the Other were not allowed to be agentic in the social and political realms. These structures came together to affect the agency of indigenous populations on a larger global field by grouping them all in the category of a single inferior Other. This same process is visible in urban classrooms as urban students in science classrooms are often perceived as a single inferior Other in comparison to their peers in schools from different settings. Consequently, I describe populations within urban classrooms and neighborhoods as the neo-indigenous. I utilize the word indigenous here because it describes a collective that is historically perceived to be the inhabitant of a certain place and has been victimized by the process of colonization or imperialism. Tuhwai-Smith (1999) in her description of the Maori indigenous

describes this population as those oppressed by colonization and taken advantage of by a dominant Other. I appropriate Tuhwai-Smith's notion and use the term neo-indigenous as a viable way to identify the urban populations who historically and presently reside in the poorest areas of the inner city and are the victims of being Othered through structures like classism and racism in their lifeworlds. I will expand on the correlation between the indigenous and the neo-indigenous later on in this chapter when I describe the local field of the urban science classroom in more detail.

Globalization for Othered Populations: Looking to the United States

As African nations began to gain their independence in the 1950s and 1960s, their indigenous populations began to look for economic and educational opportunities that they were not provided in their nations. They had developed an economic and psychic dependence on the colonizers and their western ideology through the years of colonization and began to look towards life in other countries as a means to financial and social betterment. It was difficult to look within their nations because they had grown accustomed to looking outside for validation and self worth.

In the United States, African Americans were working towards taking advantage of the 1954 decision to de-segregate schools and were reaping the benefits of an economy that provided jobs for anyone with a high school diploma. Around this time, African Americans were suddenly able to have jobs that were once closed to them and were, for the most part, able to maintain a decent standard of living. The structures of American society had changed because of the laws against segregation and consequently, the agency of the African American populace had changed as many of them worked hard to take advantage of their newfound opportunities. "The American economy was showing

early signs of change such that anyone, including blacks with a high school education or more would be expanded into the expanding layers of American society)" (Cross, 2006, p. 271).

The Indigenous Other

Despite these advances, the African American populace was still considered the inferior Other by Whites in the United States. The independence of Africans from their colonizers and African Americans from segregators could not trump the labeling of these groups as the Other in the eyes of the established norm. The Othered populace was not discouraged from chasing the possibilities of opportunity in the United States. In fact, the possibilities for success stood as an ideal that indigenous populations around the globe had heard about and wanted to experience. The idea of global village had begun to take shape and word of the opportunity in the United States had spread to formerly colonized populations. The formerly colonized wanted to attain a piece of this "American dream" and consequently, many of them crossed the boundaries of their local fields to the new global field and took root in the United States. The crossing into a global field occurs because in the United States, many individuals from different countries of origin come together. In an earlier discussion, I described how the urban science classroom became a microcosm of the larger global field. The experiences of the neo-indigenous (contemporary populations in urban areas who are victimized by a dominant society) groups within the classroom replicate the process described above when indigenous populations crossed local boundaries and came into the United States.

The Effects of Globalization on the Othered: Immigration and Deterritorialization

The new global world that brought many of the formerly colonized and Othered into the United States also caused many industrial jobs to leave the country and travel to third world or "developing nations" (Othered by first world nations) on distant locations of the globe where wages were lower than in the United States. This process, in which money and commodities move and are chased by people is referred to by Appardurai (1996) as deterritorialization. The caveat in this chasing of commodities and resources in the global village is that in reality, the ability to attain the sought-after financial or social stability or agency is dependent upon the structures in place. In later sections, I discuss how this process directly impacts students in urban classrooms and their interactions with each other.

By the 1970s it had become apparent that the relationships between the colonized from nations around the globe and the United States were becoming complicated by the shift of jobs to other nations through deterritorialization. Financial security had become consistently outside of the grasp of the Other. In essence, the formerly colonized people who looked to maintain a better life in the United States could not readily do so because they had been already tagged as the Other. Notions of their intellectual deficiency preceded their steps, just as perceptions of the intellectual deficiency of certain populations in urban classrooms precede students. As the formerly colonized chased the American dream, opportunities for success were consistently placed beyond their reach and moved to places where corporations could make the most money. As a result of deterritorialization, the African American population that had been able to maintain a higher standard of living in urban areas after desegregation had lost the jobs that they had

as "millions of decent paying union jobs with good medical and health benefits simply disappeared from America's borders" (Cross, 2006, p. 270). With the disappearance of jobs and benefits, the populations that remained in urban areas began to fight among one another for the few resources that remained. This fighting for resources among formerly indigenous populations and African Americans is seen today in the divides among ethnic groups within urban areas and is also seen in urban classrooms.

Globalization, Territorialization and Globalism in Urban Areas

By the late 1970s, globalization and territorialization has given rise to globalism. This construct is similar to deterritorialization because of its focus on the movement of jobs and industry from one country to another, but it is specifically concerned with the effects of the movement of jobs on particular groups of people. Globalism occurs as a result of deterritorialization. In urban areas, the effects of globalism became pronounced by the distribution of class, power, and economic status that caused all Othered populations to become physically grouped into certain neighborhoods where poor and "minority" groups lived. Redlining also facilitated the process of being grouped as Other. In this process, groups of certain races were denied services such as loans, insurance, and access to jobs. In these grossly overpopulated areas, the neoindigenous were formed. In the contemporary era we are faced with the stark outcomes of globalization and globalism inherited from the experiences of past neoindigenous populations.

The Movement of the Othered to the Bronx

Like many urban areas in the United States, the inhabitants of the Bronx are a mix of various ethnic groups with aspirations for economic stability and a strong work ethic. A

historic look at the borough shows an eclectic mix of ethnicities inhabiting various neighborhoods. Ultan and Hermalyn (1992) presented a historical account of the borough from 1935-1965 that tells the story of a large White population (Irish Americans, Italian Americans, a large Jewish population) and a small African American population, each living in specific parts of the borough and confined to distinct areas.

With the influx of populations across the globe settling in urban areas in the late 1960s and early 1970s came a wide array of people settling in New York City. They merged with the African Americans from the southern United States who had begun to populate areas like the Bronx because of their search for financial and political freedom. A large number of Puerto Rican people traveled to the South Bronx and joined immigrants from across the world in the borough.

As a result of this dramatic shift of people to newfound areas, the population of the Bronx began to change. Filled with a fear of the new African American and immigrant Other, most of the Whites in the South Bronx began to leave the area in droves. It appeared as though the infiltration of this new population into the borough brought a resurrection of the notion of the Other that now included Blacks (a phenotypic grouping of African and African American) and Hispanics (mostly Puerto Ricans). As this new population began to move into the South Bronx, they were perceived as the worst thing that could happen to the formerly White borough. In addition to the dramatic move of Whites out of the area (referred to as White flight), businesses closed in the area and as a result of the increased presence of the Other, insurance companies and banks refused to write new policies and invest in the upkeep of existent properties (Jonnes, 1986). In response, property owners often burned down their buildings in order to get insurance

money back for their properties. By the mid 1970s, almost all of the previous populations of the South Bronx had moved away. The few buildings that remained standing after the fires had been stripped of wiring and metal and were abandoned. The buildings stood as empty shells that eventually either got burned down or stood as empty remnants of the effects of globalization and the xenophobia that is an implicit evolution of the naming and believing that a group of people is the other. Globalization and xenophobia are both related because of the process of Othering. As particular groups are Othered because they are not perceived as the norm in the global village, the feelings toward them naturally progress into a hatred for the foreign, which is implicit in xenophobia.

Earning Stripes: The Formation of the Neo-Indigenous

It is imperative that science teachers in the urban classroom are aware of the histories of oppression that their students inherit. These histories have to be interrogated in order to understand the ways students exchange with each other and science in the classroom. In this section, I explain how these students become the neo-indigenous by describing how this population formed in the Bronx, New York.

As waves of people formed around the world, continued to descend on New York City, and moved into the Bronx, there was a shift in population towards the northern parts of the borough. Blacks and Puerto Ricans who had been confined to the South Bronx slowly began to move out to other areas of the Bronx. In response, Whites, in fear of the Other and what happened in the South Bronx, fled deeper north into the borough until eventually the Bronx became populated mostly by a new wave of Blacks and Puerto Ricans. Unfair lending practices, challenges in getting insurance, and police brutality

followed as new populations planted roots in their new land and survived the many hardships that came with living in the borough.

In the early 1980s and through the early 1990s another offshoot of globalization became rampant as the drug trade infiltrated the poorest areas of the nation. The hardest hit areas in the burning and looting of buildings in the Bronx suffered the most during this time of hardship and many people who lived in the Bronx developed even stronger roots to the borough.

As many populations established their existent connections to the borough, new populations were filling New York City. Some 2 ½ million out of 7 million traced their roots to the Caribbean: about 1 ½ million from the Hispanic Caribbean region (Puerto Rico, Dominican Republic, Cuba) and over 1 million from the Afro Caribbean region (mainly Jamaica, Haiti, Trinidad/Tobago) (Sutton, 1992). These immigrants became part of the city and many of them moved into the Bronx (Jonnes, 1986). These new populations met with many of the Blacks and Puerto Ricans who had come into the Bronx in the 1970s and had survived the worst of many scenarios that impacted the borough. By the 2000s, the older inhabitants had developed such deep ties to the borough that being able to say that one was from the old days of the Bronx had become a symbol of struggle and pride. Those who had been in the borough through the fires and other struggles began to look at the newcomers in the borough as the Other. These people had become what I term as the first wave of the neo-indigenous in the Bronx. While they were not all born in the borough, they had created structures that placed value on certain attributes, cultures and experiences. These structures have an effect on the agency of the different people that move into the borough. They dictate what streets people can walk

on, what neighborhoods one can live in, and where one can open a business. Above all these structures indirectly dictate who can learn and how they learn in urban schools.

Neo-Indigenous Populations and the Cry for Agency

Neo-indigenous cosmopolitanism is an approach/standpoint that works towards forging connections between Othered populations. In this chapter, I argue that such an approach can be utilized in the field of urban science education to provide structures that facilitate student agency. I am focusing on facilitating agency within urban classrooms because of the lack of a plan of action for providing voice to Othered populations in science classrooms. These Othered populations are often robbed of an opportunity to critically engage in school and schooling by a normative positing and positioning of negative ideas about their intellectual ability and efficacy within classrooms. Since this positioning of their intellectual ability is normative, there is rarely an awareness of the fact that students in urban classrooms cannot all be described as the same.

The multiplicity of the urban students' experience is often lost within the interplay between rhetoric and reality on multiculturalism and diversity in schools. The broad strokes that describe students as Black or Hispanic are valuable for certain descriptions but can also erase the experiences of the many students who fall within these categories. Grouping the many hyphenated Americans in urban areas into these two categories is often perceived as multiculturalism or equality for all. However, the reality is that "even in societies that are nominally democratic and racism-free the myth of 'colour blindness' is often shown to be false in daily life" (Stravenhagen, 1999). In reality, classrooms that are supposed to be free and democratic spaces for all do not look towards the ways that many students are restricted from enacting agency within them.

Agency refers to an individual's power to act. In classrooms, this power is enacted as students exercise the ability to appropriate the physical and material resources of a classroom (teacher, peers, blackboard, and lab materials) with a goal of engaging in science. Therefore, my goal is to create structures that provide agency for all students within the local field of the science classroom to help them engage in science.

This goal stems from the discovery that certain students oftentimes do not exercise the agency to engage in the science classroom while others readily do so. Certain students will come in the class and ask for materials to conduct experiments while others will come into the classrooms and just sit down quietly until the class is over. For the latter group of students, I call forth the relationship between structure and agency outlined earlier in this chapter and argue that there are structures in place that inhibit them from engaging in the class and enacting agency. Through my research, it becomes apparent that their ability to enact agency within the urban science classroom depends greatly not only on the structures within the classroom but structures from fields that are outside of the classroom that permeate the walls of the school and directly impact teaching and learning in the urban science classroom.

The Dynamics within the Classroom: Transactions, Fundamental Interactions, and Enacting Agency

This investigation takes place in a physics classroom (a local field) in the Bronx, New York, where 95-98% of the students are classified as either African American or Latino/Latina. These students are predominantly from families with low socio-economic status, are considered marginalized from attainment in science, and provided with inequitable resources when compared to their peers in more affluent schools. Within the

classroom, I was faced with the reality that the marginalization from science and lack of access to resources was unevenly distributed within the classroom. When there were resources in the classroom such as supplemental textbooks, or lab materials, certain students used them without hesitation while others did not. The students who used these resources would also exhibit fluid transactions in the classroom by expressing and exchanging their social capital for mastery of canonical science knowledge. In Chapter 5, I described how students either fundamentally interact or transact in classrooms dependent upon the structures of the classroom. In this research project, I was able to identify that certain students transact in the classroom by giving examples that related topics such as kinematics or Newton's Laws of Motion to their experiences in the street, riding the bus, or playing sports. These students consistently used their lifeworld experiences to understand the subject matter better and through their ability to engage in the science classroom, have positioned themselves as the norm.

While these fluid transactions between the students and science occurred with certain groups in the classroom, certain students generally did not respond as much or as often. These students generally expressed indifference towards the material resources and lab equipment and seemed generally disinterested in learning physics. In addition they rarely answered questions in class and would never get up to use resources in the classroom. As a result of these observations, my goal was to look for the reasons for this difference in transaction with science and the structures in the classroom.

As I attempted to achieve this goal, I discovered that the efficacy of providing agency to marginalized populations in the urban science classroom speaks directly to an interrogation of the Othering of particular groups and silencing of particular voices prior

to, within, and beyond the classroom. In other words, I came to understand that students' experiences both in and out of classrooms shaped their ability to either transact or fundamentally interact with structures within the science classroom. Since fundamentally interacting involves being in the classroom but not expressing the agency to learn science within the field (Chapter 5), and some students were readily able to express their science agency, there had to be a larger issue at play. Furthermore, I realized that addressing this point (some students transacting and some fundamentally interacting) would be the key to supporting the enactment of science agency.

My first step in attempting to impact students' science agency was to increase the disinterested students' access to the material resources in the classroom by addressing the most obvious issues. I made sure that I spent an equal amount of time with all students and in some instances, more time with students who expressed disinterest. I provided resources such as lab equipment, reference books and other tools for investigations readily to students who did not show interest by placing the materials closer to the students. I also made it a point to invite all students to participate in the classroom by inviting them to explain their thoughts and ideas either at the board or at their seats. My manipulation of these material resources and in class structures within the classroom only affected the students' agency minimally. Students who did not engage with the structures of the science classroom prior to my attempt to change them appeared to be just as disinterested in learning science as they had been before.

It appeared as though certain students would almost always express discomfort in even the most basic tasks like asking questions or accessing materials while others felt little to no discomfort in asking questions and engaging in transactions with the structures

of the science classroom. The correlation between the ability to engage in transactions and the ability to enact science agency had become pronounced as students who expressed their social and cultural capital in the classroom also had the confidence to experiment with the science resources (magnets, inclined planes or measuring devices) in the classroom. Their peers who exhibited limited science agency only fundamentally interacted with classroom resources. Oftentimes, they would sit in the class, avoid communication with the teacher or their peers, and exhibit what I described in Emdin (2006) as physical presence in the classroom but a mental and emotional absence from it.

By relating the structures of the urban science classroom to the students' agency, and documenting the lack of change in agency exhibited by certain students, I could have drawn the false conclusion that manipulating classroom structures do not affect students of particular ethnic backgrounds interest in learning science. I could have also drawn the conclusion that the presence of fluid transactions between certain students and the classroom structures were based on a student's being better at science. These conclusions would align with dominant perspectives of those Othered in fields outside the classroom because they appear to be apparent simple explanations to complex problems. However, at this juncture, I decided to further investigate the causes for the limited science agency enacted by students. This led to an interrogation of the macro issues and structures that affect students' agency in the science classroom and the role of globalization in the differences in students' agency.

Effects of the Macro on Agency

Within urban science classrooms, the relationship between structure and agency gets played out as: Who asks questions in the classroom? Who is silenced by the structure of

the classroom? Which students do teachers and students validate? And who is shunned and dismissed by their peers and the teacher? A deeper analysis of who expresses their capital and enacts science agency leads to an exploration of how responses to these questions, are ultimately tied to globalization and the nature of the urban settings that students come from.

Despite its roots in fields beyond the classroom, globalization serves as a structure that affects the students' agency within the urban classroom because the various populations within the classroom all come together as a result of globalization's impact on the economic and political climate in their countries of origin.

Globalization has proven to be a structure that directly impacts teaching and learning within the urban science classroom more than the material resources like laboratory materials and resource books that I initially attempted to manipulate in order to provide agency to certain students. Just as certain groups were Othered through colonization and globalization in the global village, certain groups within the urban science classroom are Othered.

Division without Decision in the Classroom

Within the physics class that provides the root of this investigation, the students divided themselves into groups along lines of race and ethnicity. A four-person group of young women from Puerto Rican descent sat at the far corner of the classroom directly opposite from a five-person arrangement of African American and Caribbean American students. The class was further divided by groupings of students of Mexican and Dominican ancestry. The novelty of the nature and distribution of groups within the classroom is somewhat expected and explored in depth in other work (Tatum, 1997). In

this work, Tatum discusses various issues that come with the division of ethnic groups in schools and describes the benefits of these divisions. However, the implications of such divisions on the teaching and learning of science and the resultant hierarchy created among students is profound. Certain students from particular ethnic groups became powerful enough to silence others and affirmed this strength over groups that they perceived as the Other. This process in turn affected who was learning science, how they learned it, and how the teacher taught it. The discovery of this ethnic division within the class and its impact on the teaching and learning in the classroom serves as a signal for the deployment of further intellectual resources and leads to a theorizing of who makes up the different groups within the urban science classroom.

Who are the Neo-Indigenous?

Through this study, I have uncovered the existence of a hierarchy that exists among groups of students that replicates similar hierarchies in fields like the students' neighborhoods. In this hierarchy there are groups of students that are the prime victims of silencing and Othering in the classroom. This group of students is challenged when asking questions, is not supported in accessing and utilizing the resources in the classroom or the laboratory, and is perceived as incapable of learning by their peers. The process these students undergo mirrors what happened to particular populations as a result of imperialism and colonialism as their agency was always in question in the classroom. The loss of power and absence of agency to fully participate in the economic and social processes mirrors a loss of power to participate in science teaching and learning in the classroom field.

Through my research, I find that the students who are treated as the Other within the classroom field happen to come from cultural and ethnic backgrounds that are new to the community in which the school is nested. Furthermore, the descendants of the populations in the Bronx that had been in the borough the longest were usually the group that perceived the newcomers as the Other. “Some groups then represent the pasts of others, some are social and political adults while others are children” (Gilroy, 2005). The adults represented in this statement are the groups that represent the veterans in the social field (who have been there the longest) and the newcomers are the groups that represent the newer groups in the social field.

The Hierarchy among Neo-Indigenous Populations

In science classes in New York High, students from different cultural backgrounds, all with collective ancestral histories of being Othered and indigenous to various areas across the globe, sat in the classroom in different groups based on their aligned cultural, ethnic, and social backgrounds. They answered questions about science, designed experiments, asked questions, and collectively (in each group) either acknowledged or discredited different groups based on their affinity for the group. A popularized brand of camaraderie among people who were familiar with each other and a distrust and distaste for the newcomer was prevalent despite the fact that the students all started the school year together.

Lines of allegiance had quickly been drawn and the fact that students in the class were all newcomers to the school or in the same class seemed to be of no consequence because the divides between groups had been clearly demarcated based on the structures established in the community outside of the classroom. The students in the classroom

carried roles with them from outside fields that became manifested within the classroom. The porous boundaries of the fields where individuals enacted culture were crossed and the Othering process from fields outside the classroom became replicated in the classroom.

In the local classroom field, the Caribbean American students often took the role of the model black student that (Sutton, 1992) described as quiet and obedient while the African American students appeared to be the most at home within the community and most comfortable with taking advantage of the resources provided in the classroom. Within the Hispanic American community, students with Dominican and Puerto Rican heritage engaged in a similar dynamic as the Caribbean American and African American students. Dominican students usually were the “model” students and Puerto Rican students were more comfortable within the classroom. Students who were Mexican American, Pakistani or African usually took the role of the quiet observer in situations within the classroom.

Within this dynamic, it became apparent that the time period that a particular group of people moved into the borough impacted the way they engaged with the resources within the classroom as particular groups were able to garner more social capital than others within the classroom dependent upon their ethnic backgrounds. I also realize that all these groups were perceived as the Other by a dominant society that controlled all fields outside of the classroom.

Naming the Neo-Indigenous: The Veteran and the Newcomer

I name the entire population within the neighborhood and classroom as the neo-indigenous. The newcomer in the community and the veteran members collectively make

up this group. The poor remain in the slums just as the indigenous are intimately tied to their lands. However, because of the shifting waves of globalization, new groups often replace the lowest in the social and economic hierarchy that exists within the neo-indigenous population. In a sense, there are different classifications of the neo-indigenous that occur as a function of time and experiences in the neighborhood.

The newcomer neo-indigenous are the most recent immigrants to a neighborhood. They are usually of the lowest economic class and are identified by their peers as being of the lowest social class until they "learn the ropes" and become able to call the neighborhood home. This population replaces the group that held this spot a few months ago, and inherits the distrust and disrespect of the groups that once held the space they now inhabit. They become the Other to all of the neo-indigenous who at some point were also of the lowest class until a new group came to fill the space they once inhabited. This process is a direct relation to "the globalization of capital, which reworks the scale and temporality of uneven development, [and] has serious deleterious local and embodied effects" (Katz, 2004, p. 57). The effects of such shifts cannot be ignored and their impact on social life in local fields is dramatic.

The reworking of scale and temporality that Katz describes, and that globalization facilitates, is the trigger for the formation of the neo-indigenous and explains the relatively short period of time it takes for a new group to become the neo-indigenous Other. This phenomenon is facilitated by a constantly shifting social order that manages to effortlessly find transient populations to inhabit the role of the most socio-economically deprived in an urban community. In a city like New York, touted globally as the site of economic opportunity, there is no shortage of people who come to the city

to economically and socially establish themselves. As populations move into urban areas and live there for a certain period of time, they no longer become the newcomer. They slowly become indoctrinated into the existent practices of the neo-indigenous group and end up repeating the Othering process with newer groups.

This Othering process is evident when one studies the divisions that exist in different neighborhoods. In the Bronx, the newly inaugurated indigenous population and the veteran neo-indigenous live in the same neighborhoods and apartment buildings but still find ways to ensure that they are separated from each other.

The Complexities of Neo-Indigenous Division

Within a five-block radius, it is not uncommon to see people from the Dominican Republic living on a different street than Puerto-Ricans or a group of Jamaicans living on a different floor in an apartment building than African Americans or Mexicans. In New York City, where there are often divides between people classified as "minorities and whites, segregation is mirrored within the minority groups themselves. "Asian groups are highly segregated from Blacks, but so are Blacks and Dominicans". In addition, "African Americans and Afro-Caribbean's have high levels of inter-group segregation and so do Dominicans and Puerto-Ricans" (Sassen, 2001, p. 64). I see the segregation that is present in neo-indigenous communities as the outcome of the collective struggle that each of the groups within it have experienced at the hands of a dominant society. Since each group within the neo-indigenous has been Othered at some point, they exhibit anger, frustration, and fear towards each other.

Those who have been in the Bronx since the 1970s carry with them the experiences of being Othered by the rest of the city and the nation. As a result, they hold a belief that the

newcomers in their neighborhoods have not earned the right to life, liberty, and economic comfort because they have not struggled for these luxuries as the neo-indigenous populations before them have.

In addition, there is a dynamic of "root shock" described by Fullilove (2001) that takes effect with the neo-indigenous populations that have been in a location the longest. Root shock describes how land and neighborhood dispossession affects African Americans as a result of urban renewal projects that cause them to move from neighborhoods they call home. I argue that the effects of this process are multiplied through globalization and are activated when populations rapidly move into particular geographic regions that veteran neo-indigenous populations inhabit. In response, these groups exhibit xenophobia and enmity towards newcomer groups who they perceive to be the Other.

Within the science classroom, the geographic regions that particular neo-indigenous groups inhabit serve as indirect causes of enmity among groups. In other words, while it appears that it does not matter that different ethnic or racial groups live in different floors of the same apartment building, the effects of these divides are felt in the classroom. Students have learned to disrespect or be distrustful of each other. The attempted divides created outside of the classroom come to heated points within the classroom because the children of the neo-indigenous are in the same public schools and classrooms that serve the entire neighborhood despite the fact that they may separate from each other outside of the classroom.

For educators and researchers who engage in teaching and research without consideration for the neo-indigenous dynamics, the superficiality of our perceived

notions of students' relationships to each other and science becomes pronounced. We fail to recognize and address the feelings of alienation, melancholy, shame, sublimation, idealization, forgiveness and affect that Oliver (2004) argued are at the core of this dimension. Furthermore we ignore the fact that globalization converts the feelings mentioned above into xenophobia and hatred of the Other. Ignoring neo-indigenous dynamics equates to a dismissal of dimensions integral to teaching a populace formed by the effects of globalization.

The Neo-Indigenous Community: Understanding the Newcomer and Veteran Dynamic

Over time, a neo-indigenous population that consists of both newcomers and veterans become the chief occupant of a geographical region. The newcomers learn the ins and outs of a particular social field and learn to maneuver through the field's structures. The veterans, who have been in the social field for a longer amount of time, become part of the structures that inhibit the agency of the newcomer. The children of the newcomer and veteran come together in the urban science classroom and replicate the relationship between the two sub groups of the neo-indigenous that occurs outside of the classroom. The newcomers undergo struggle, victimization and oppression within the classroom structure. They look to the veteran neo-indigenous as if to ask permission before they answer questions or speak in class. They also do not argue or dispute comments made by the veteran group, even if they are wrong.

The Looker and the Other within the Neo-Indigenous

If I transition back to my earlier discussions on colonization and the ways that groups of people indigenous to various parts of the globe were Othered by their colonizers, it is

apparent that the Othering process that takes place with a merging of different groups from various social fields into a single group of Other is one that has a detailed history. It plays out on a contemporary stage as a divide between all of the neo-indigenous and a dominant group that has a higher socio-economic standing.

The divide between the neo-indigenous and the group that Others them is consistently maintained by the looker. This divide occurs because the permeation of any ethnic group within the neo-indigenous population into the echelon of the more socio-economically established threatens the ability of the dominant group to name the entire neo-indigenous as the Other. For example, if Jamaican immigrants are able to work hard and have the same economic resources as Whites in New York City it would be difficult to say that all Blacks do not work hard and cannot be successful. For the populace who has historically been given the right to the liberties that the neo-indigenous strive for, their social order is threatened by the socio-economic development of the neo-indigenous. This process is replicated on a different scale within the neo-indigenous population as the veteran neo-indigenous exercise the same Othering process they have experienced at the hands of a larger dominant group on the newcomer neo-indigenous. There is a process of divide and conquer which indigenous populations have historically experienced in their search for economic and social stability that is replicated within the neo-indigenous. In this process the looker within the neo-indigenous is the veteran

Philosophical Underpinnings of Neo-Indigenous Division

When this larger division and hierarchy between the looker and Other are maintained, “an overriding of older categories for analysis and older hierarchies of scale” (Sassen, 2001, p. 345) become facilitated by globalization. This change in categories and

'hierarchies of scale' speak to the way that the neo-indigenous dynamics are formed from the relationships between the looker and Other. Neo-indigenous power wielders, "instead of striving for liberation, tend themselves to become oppressors, or sub oppressors" (Friere, 1998, p. 45) and in the classroom, where all neo-indigenous populations come together, "the muscular tension of the colonized (oppressed) periodically erupts into fighting between tribes, clans, and individuals" (Fanon, 1963, p. 17).

Cosmopolitanism: Accepting and Validating Plurality

Earlier in this chapter, I described a scenario in a classroom where a Mexican American student had responded to a question I asked in class about the mass and inertia of an object by responding in Spanglish (mix of Spanish and English). In response, students in the class dismissed her answer and an argument among students in the class ensued. In this instance, the response to the student was as a result of perceptions of the student that came from outside of the classroom.

The nature of social life outside of the classroom had seeped through the boundaries that separate it from the classroom and had forced me to address it. The strength of the dynamics with fields outside of the classroom had awakened me to the reality that that this was not just a class of ninth graders that needed to be learning physics. These were a new generation of the neo-indigenous, primed to continue the pervasive wars that exist among the different groups in the community. Just as veteran neo-indigenous populations had mirrored the oppression inflicted upon them, students in the class were mirroring the divides that exist in the community within the class. This realization warred against my need to establish a unified neo-indigenous community

geared towards learning science and spurred on my need to find a way to provide science agency to students in the classroom in spite of the structures inherited beyond it.

Investigating the Local Effects of Globalization

The next day, the students walked into the classroom and I invited them to have a conversation with me about the issues that were going on in the class. My intention was to have students discuss the emotions they displayed in class the day before and how they felt about each other. After a few minutes, it became obvious that the kind of conversation that I was trying to facilitate was not going to happen in that class. At certain moments, a sporadic conversation would start but would stop just as quickly with a glance or look from a particular group of students. Constant junctures of silence interspersed any attempt of an analysis of the problem at hand or the few statements the students had made. Statements like “My mother said that Puerto-Ricans are lazy and they don’t like us,” or “My cousin got robbed by like three black guys” and “Mexicans take all the jobs” were spewed by students and needed to be understood and deconstructed. Critical dialogue about the origins of the feelings of anger, hate, and distrust that students carried needed to be investigated. Without engaging in a critical dialogue about these issues, there was no way that I could move my students beyond their ways of knowing that were obviously shaped by misrepresentations of each other. These misrepresentations had manifested themselves as the decisions, words, and actions that had grown into structures that limited the science agency of certain students in the classroom. These structures that limit students’ agency are the results of globalization from local fields where there are “reactions to globalization from those populations from geohistoric areas of the planet that suffer the consequences of a global economy”

(Mignolo, 2002, p. 157). This global economy forces the neo-indigenous to compete for low skilled labor with low paying wages and causes their children to express dislike for each other because of this competition. This dislike and devaluing of the Other then develops into structures that students create to inhibit the agency of their peers. In the following section, I will describe the competition among the neo-indigenous that facilitates the Othering process within them.

The Impact of the Economic Effects of Globalization

Blacks and Latino/Latinas in urban areas are consistently victimized by economic policies that relegate them to lower paying jobs than their counterparts from other racial backgrounds. Anyon (2006) describes how this process plays out in the distribution of jobs, access to transportation, to jobs, and a wealth of structures that negatively impact the neo-indigenous. For this group, the realities of globalism and the shift of jobs to other nations are evident as prospects for reasonably well paying, stable employment, and meaningful work are always on the decline (Jenkins, 2006). When wars for limited resources and opportunities are necessary for survival for a group that is divided by ethnicity, a troubled relationship among groups is almost forced. Furthermore, "certain sectors of the host country's population [the veteran neo-indigenous] may feel threatened by the increased presence of foreigners in their midst who look and behave differently, speak an intelligible language" (Stravenhagen, 1999). In urban areas, students bring all these feelings about the Other into the classroom. Therefore, it is almost inevitable that these issues will become evident in the classroom.

Addressing Neo-Indigenous Divides: Cosmopolitanism and Cogenerative Dialogue

Mignolo (2000) suggested that embracing critical cosmopolitanism addresses the effects of globalization like the ones mentioned above. Critical cosmopolitanism interrogates the ways globalization affects particular groups and uses cosmopolitanism as a tool for recovery of humanness in relationships among groups. In response, I call forth my stance on cosmopolitanism and its guiding ethos of belonging to a single community with responsibility for others outlined by Appiah (2006) and Brock and Bringhouse (2005). I utilize this perspective to address the inequities within the urban science classroom that are offshoots of globalization.

Cogenerative Dialogue

In order to foster cosmopolitanism in the urban science classroom, I employ cogenerative dialogues as a tool for addressing the divides among students. These dialogues are conversations that students and teachers have about the classroom with a goal of co-constructing ways to improving it (Tobin, 2006). In these conversations, four to five students can have a conversation with their teacher in a field where the structures are different than the classroom.

Within cogenerative dialogues, a field smaller than the classroom is created where structures are constructed to scale upwards towards benefiting the larger classroom field, rather than downwards in accepting existent structures. In this study, I used these dialogues to address the feelings that people have that are as a result of the oppression they are subjected to or inflict on others. Investigating this dimension by unearthing the roots of these feelings necessitates the resurgence and recovery of “a sense of agency among a downtrodden people,” which West argues is the key to bridging tribal/ethnical

disconnections (West, 1994, p. 29). In order to recover agency for individuals that have been Othered, it is necessary to change the structures that Othered them. The transformative nature of cogenerative dialogues allows for opportunities to address these structures.

The First Cogenerative Dialogue Meeting

In an attempt to bring students together to discuss the social dynamics of the physics classroom, I invited students from each of the different ethnic groups in the classroom to join me after school for a cogenerative dialogue about the classroom. My hope was that the conversations that we embarked upon would be a step towards the students understanding and accepting each other. In this first conversation, we discussed the tenets of cogenerative dialogues--having no voice privileged over another, having equal turns at talk, and leaving the meeting with a plan of action for improving the class. Students listened as I explained what cogenerative dialogues are and why I thought it was a good idea for the class to use them. In response, the students looked at each other awkwardly but agreed to remain a part of the cogenerative dialogue group. I then scheduled another meeting for a few days later and the students agreed to join me.

The Second Cogenerative Dialogue Meeting

The first cogenerative dialogue meeting came at the heels of months of dealing with the negative reactions students had to each other in the classroom. The second meeting came after these same issues surfaced and a rather challenging lesson on forces and free body diagrams (FBD's) which seemed to be difficult for many students. Unbeknownst to me, this physics lesson would serve as a hinge that connected the students to each other

because the students' frustration with the lesson became an entry point for them to speak across the divides that existed in the classroom.

Reflexive Cosmopolitanism through Cogenerative Dialogues

With the implementation of the cogenerative dialogue about FBD's came a momentary temporality that was facilitated by the challenges of the classroom lesson. Students listened to each other's challenges with the class and their usual retorts to each other in the class were replaced by recognition of each other albeit in collective frustration with the physics lesson. This moment had developed into an enactment of a reflexive cosmopolitanism where a cosmopolitan moment is unintended yet lived (Beck & Sznaider, 2006). This fracture in the frame of existent social life became a moment that I could utilize as a seedbed for the growth of a cosmopolitan ethos within the classroom. Physics therefore stood as a structure that affected participants' collective agency in the cogenerative dialogue that could possibly affect their agency within the classroom field. The subject (physics) itself could be manipulated and used as a means to affect the students' agency in learning it. Physics stood as a structure in the classroom and a structuring resource in the cogenerative dialogue. The subject became a topic that students in the cogenerative dialogue and the classroom could use to form allegiances to each other that temporarily transcended the divides among them. Through cogenerative dialogues, a structure was created that could possibly assist the students in learning science but at the very least had impacted the students' ability to communicate with each other.

Entering a social space where it is explicit that no voices are privileged over the other and that all participants help to shape the nature of the conversations was abetted by the

fact that there was a mutual concern and focus that the students could rally around. Cogenerative dialogues therefore stood as a completely different space from the traditional urban science classroom where the hierarchy implicit in both schooling and students' lifeworlds dictated how participants communicated with each other.

In my preparation to referee a heated discussion about ethnic differences and how and why they were manifested in the classroom, I had not factored in the fact that the classroom lesson was a major piece of the conversation. I was stuck on the belief that any attempt to bring these varying groups of students together outside of the physics class would focus more on the social aspects of their relationships to each other than on their comprehension of science. However, as the dialogues progressed, I noticed that students who did not speak to each other within or outside of the classroom began to talk about their collective frustration with the physics lesson. Students explained that they did not understand how to draw the free body diagrams presented in the class earlier in the day while others discussed the challenge of my transition from a previous lesson on the different forces acting on an object to the pictorial representations of the forces acting on objects. Through their collective struggle with the physics lesson, I was able to identify a point for building a cosmo-polis, which Mignolo (2002) described as a space where the possibilities and the capabilities of people (populus) to live together are expanded.

As the cogenerative dialogue progressed, the student participants complained about the previous lesson. As this was happening, a Mexican American student who had struggled with talking in class and had been reluctant to participate in classroom activities showed that she had understood how to draw and explain the FBD's even though the rest of the class struggled with the concept. She listened to her classmates complain about the

lesson and as soon as there was a lull in the conversation, softly began to explain how she drew the diagrams. The other five students looked at her in awe as she proceeded to explain how to draw the FBD's and how the diagrams were related to the classroom discussion about the forces acting on an object. Other students in the cogenerative dialogue appeared to be surprised by the fact that she knew what she was doing but listened attentively as she explained.

There was an extension of the short-term temporality or "reflexive cosmopolitanism" that occurred when she began to explain and then began answering questions from her peers. This was a critical point that was necessary for breaking away from oppressive structures. Deutsch (2006) referred to the extension of this fracture in space and time as a period of rapid social change that questions the legitimacy of traditional myths and values and places the existent neo-indigenous hierarchy in question. The outcome of the dialogue was six students who ended up understanding the concept of FBD's and one who was finally enacting her science agency and being validated for it. Students started to make statements about how well the concept was explained and began to take notes based on each other's discussions. I closed the meeting with the students by making a general statement about the value of listening to and valuing each other and closed the dialogue for that afternoon.

The cogenerative dialogue created a shift in the beliefs that these students had about the ability of this young woman to understand physics, and opened my eyes to see that in the nature of oppression "the repeated everyday experience of being treated as an inferior produces a public image of being an inferior" (Deutsch, 2006, p. 18). The student who explained the physics lesson was a brilliant young woman who had been perceived as

unable to understand the lesson because she had been perceived as the Other. With this public image embedded in the psyches of various groups within the classroom, the Other is dismissed as stupid, not having anything worthwhile to say or incapable of having a positive impact on the classroom. Concurrently, a self-image of inferiority develops within the students who are considered the other. The collateral result of this group-imposed oppression is the limited enactment of agency in science, which often plays out as brilliant students do not engage in the classroom because they and others believe they cannot be successful.

As multiple ethnic identities encounter each other in the classroom, the primary responsibility and function of the cogenerative dialogue group is to engage in the process of moving towards a group identity that is rooted in the experiences that the group has in common. This process allows practices that promote symbolic nationalism (the antithesis of cosmopolitanism and a focus on one's own group) to succumb to the collective goals of a group.

In this case, the collective goal was to understand a specific scientific concept. As the cogenerative dialogue group focused on developing strategies to help participants learn better, the idea that "no voice is privileged over the other" naturally became established as the recursive and fluid nature of identity became activated in the cogenerative dialogue. In other words, the multiple group identities from outside the classroom came into contact with each other and merged to create a new identity just as various fields merge to form the global village. Once a cosmo-polis has been established outside of the classroom, the next function of the cogenerative dialogue group is to work towards the

development and deployment of this collective identity and newly established cosmopolitan ethos into the classroom.

Transporting Cogenerated Cosmopolitanism into the Science Classroom

This deployment or export of a seemingly collective group's connection or momentary value for each other is not a simple process. After being privy to the cogenerative dialogue where students began asking each other questions about FBD's and watching them learn science together, I observed the challenges of maintaining this relationship in fields beyond the cogenerative dialogue. In the classroom the next day, each of the members of the cogenerative dialogue group returned to their in-class groups. As the classroom lesson progressed, I gave the class a group assignment that involved drawing FBD's. I was hoping that some remnant of what had happened in the cogenerative dialogue the day before would be evident in the classroom. However, as students expressed their frustration with the concept, each of the members of the cogenerative dialogue group from the day before coached the rest of their group on the topic without acknowledging their experience in learning the concept in the cogenerative dialogue the day before.

This occurred despite my speech to close the last cogenerative dialogue meeting about the benefits of valuing and listening to each other. As I walked around to different groups as they worked, I asked students where they learned how to draw FBD's and none of them acknowledged that they had learned what they were doing in the cogenerative dialogues. Although I was disappointed in the results of my inquiry, it opened my eyes to the fact that "one cannot develop cosmopolitan thinking simply by cultivating ties of recognition and concern for other human beings or by implying sympathy for distant

lives through narrative imagination" (Gregoriou, 2003, p. 264). Engaging in cosmopolitanism that challenges globalization and its adverse impact on urban science teaching and learning must move beyond recanting words about a guiding ethos of belonging to a single community. Rather, it involves a thorough navigation of the terrain of neo-indigenous divides. This multi-layered process involves an informed science pedagogy, regular cogenerative dialogues, and a consistent critical deconstruction of oppressive structures that impact science agency.

Implementing Cogenerated Plans in the Classroom: Planned Revolt

In order to actively work towards attaining cosmopolitanism in the classroom, I scheduled another cogenerative dialogue with the students who had joined me for the initial meeting. By inviting the same group, I hoped to recreate the solidarity they shared with each other in the last cogenerative dialogue meeting and to resuscitate the reflexive cosmopolitanism they exhibited. As the students walked in, it was clear that they felt comfortable returning to a space where they had developed some comfort with each other because they spoke to each other as they walked in. As they sat down, they began to discuss a classroom lesson that was based on understanding the centripetal acceleration of an object in circular motion. An African American student complained that I did not use any examples in class and that one was necessary. In response, one of the Caribbean American students in the class suggested tying a piece of string to a metal ring to describe the process. A Mexican American student undid her shoelace and placed it on a table and the student who made the suggestion took the ring off her finger, attached it to the shoelace and spun it in a circle. I explained that if the knot around the string became loose, the ring would fly off with tangential motion. One of the students mentioned that

the same thing would happen if we cut the string and the entire group began to discuss centripetal motion and how the formula discussed in class related to how fast or slow the string was being spun. Once again, the cogenerative dialogue group engaged in an almost self-taught physics lesson that displayed a mutual respect for each other.

As the lesson in the cogenerative dialogue group continued, I pointed out to the students that they were actually working together. I also explained to them that this was the second time that they had done this. When I asked them how this happened, the students who were usually othered in the classroom responded by saying their peers were finally friendly and listening to them. The students who usually took the role of the looker mentioned that the students in the classroom were not “the way that we thought they were because they were smart and wanted to help us.”

When I asked if they thought that the way they worked together could be brought into the classroom, the group decided that one possible way that the rest of the class could learn how to work together was if the videotape from the cogenerative dialogue group were presented in the class. The students realized that their perceptions of the Other in the classroom and the community could be mediated when the normative Othering in fields outside of the cogenerative dialogue were challenged by examples that showed people in ways that were different from how they were usually perceived.

Introducing New Structures in the Science Classroom

The next day, after presenting a review lesson on the last two topics discussed in the cogenerative dialogues, I played clips from the cogenerative dialogues showing the students working together. The entire class looked in amazement as the events unfolded that led to the cogenerative dialogue lesson on FBD’s. As their peers spoke to each other

and learned physics on the screen, some students watched intently while others took notes. The cogenerative dialogue group had created a structure that impacted the entire class. The explanation of FBD’s by the Mexican American student was so clear that all students who had been struggling with the concept were interested in what she had to say. Students representing different ethnic groups were asking questions about the explanations she gave on the video clips and as they asked, she responded confidently. As she spoke, members of the cogenerative dialogue group chimed in with more explanations.

Since this review lesson happened so successfully, I started the next class with a review of centripetal motion based on the videotape from the cogenerative dialogue session on the topic. By creating a panel of experts from the cogenerative dialogue group that reflected the different groups in the class, I was able to circumvent existent structures that Othered particular students.

As the semester progressed, I continued to play videotape from cogenerative dialogues where groups worked together in the classroom. When I played this videotape, the students used them as reviews for past lessons and avenues through which they could ask their peers from other groups clarifying questions.

The usual insults that were commonplace in the classroom were replaced with questions about physics. Students could not insult students from other groups because their friends had become invested in the other group’s well being and learning in the cogenerative dialogues. The creation of this new structure had positively affected the agency of students in the classroom as students who initially did not exhibit much agency in learning science became much more involved in the classroom.

Once a classroom was established in which the Othering of particular students occurred due to the value students realized their peers possessed, cogenerative dialogues followed that explicitly discussed the perceptions of the Other that students brought to the classroom. These dialogues included discussions of false notions about the Other, including statements students heard about each other outside of the cogenerative dialogue and the classroom. They also discussed topics in physics. The interpolation of these socio-cultural dimensions into science pedagogy develops classrooms where engaged teaching and learning by all students is fostered and misalignments often implicit in the relationships between the teacher as community outsider and students as collective insider are mediated.

Establishing Neo-Indigenous Cosmopolitanism: Revolt Before Resolve

As a result of this study, the importance of moving beyond reciting empty words about the need to engage in a respect and value for those viewed as the Other was established. In my presentation of the Othering process as a historical, multi-field phenomenon, I have been engaged, and hope to engage readers, in a personal conflict about the notion of cosmopolitanism and the act of revolt from the norm that has proven to be necessary in order to situate it in areas where significant ideological divides exist among groups. This process involves a combating of the need to oppress the Other by providing an almost forced awareness of the realities of an oppressive structure on all actors in a particular social field. I therefore see a cosmopolitan existence as an act of revolt against a normative oppression of the Other.

In my utilization of Dubois' approach to addressing oppression on a global scale, I have charted how the process of Othering has played out on historical, global, national

and local fields. However, the ways that globalization has affected the dynamics within the most local fields in the global village remains uncharted for many researchers that explore the dynamics within urban classrooms. Through my research, and my charting of one of the paths of globalization, I present the quest for a cosmopolitan ideal as a means to address ideological divides among groups in both global and local fields.

In my work in complex and dynamic local fields like urban science classrooms, I resolve my quest for a cosmopolitan ideal by constantly working towards what the science classroom would look like if the deficit-laden identities that students inscribe on each other were absent. I believe that if the urban science classroom can stand as a cosmopolis—where the enactment of a cosmopolitan ethos is evident in the practices that students enact, then a cosmopolitan school or community is a possibility.

In a science classroom where physics for *all participants* is the overarching goal that guides the work, the efforts to ensure that such an ethos is lived is the onus of the teacher, researcher, and students within that field. Otherwise the quest for cosmopolitanism succumbs to an inverse square law effect where efforts and resources from local fields get transmitted sparsely towards a wide macro global goal that it barely reaches. Rather, I suggest a thick focus on attaining cosmopolitanism on a mesoscopic level within the classroom.

In my theorizing on cosmopolitanism in urban science classrooms, I envision multiple local fields where all efforts are exerted towards attaining communality with the goal of attaining communality and living a cosmopolitan ethos. Once this is in place, a larger cosmopolitan field becomes a possibility. Within a science department in a school, this may mean all the science classes work towards a cosmopolitan class and an eventually a

cosmopolitan science department. Within a school district, this could mean that all schools within the district work towards attaining a cosmopolitan ethos within their specific field.

The call for adjoining resources for the many groups across the global village that have been Othered by socioeconomic and political forces is one that has presented itself on many occasions in our collective history. These vary from the cries for a united Africa in the days of colonization to calls for Black and Brown love and unity in the Bronx. However, this collective movement has rarely been sustained to a level where it affords visibility and replication. Through the paths drawn in this chapter, I hope to resurrect this call and give it voice in contemporary studies of the effects of globalization on local fields like urban science classrooms. Through the work done in these local fields, scaling up to affect the Othering of populations in the global village becomes a possibility

CHAPTER 8

Conclusion: Thoughts on Transforming Urban Science Education

On an unseasonably warm Wednesday afternoon about a year ago, I stood in the back of a chemistry classroom in the Bronx and watched a sea of half asleep black and brown faces painted with confusion, frustration, and indifference as a teacher practically did pirouettes in a dance of significant figures, chemicals, and atoms trying to get the students' attention, to no avail. Two minutes later, the sound of a rap song drifted through an open window from a passing car and practically all the students sat up and almost simultaneously began nodding their heads to the beat. Students looked up at each other and smiled. Some mouthed the words of the song under their breath as they gave each other knowing glances that were acknowledged with slight head nods and eye contact. There was an obvious emotional energy the song generated in the classroom that the teacher's lesson did not provide. As the car slowly drove past, the sound of the song dissipated into muffled bass and a faint drum pattern. Its distinctive beat faded into silence and was replaced by the repetitive ticking of the clock in front of the class. As the teacher returned to his lesson, the students' smiles transformed into blank stares and they slowly returned to their narcoleptic state. It was one of those surreal moments that signified a connection yet to be made but ready and necessary to be discovered.

The connection the students made to each other in that chemistry class was one that signified a collective value of a particular phenomenon. The song that played connected students in a way that was stronger than the chemistry lesson and any divides that may have existed among students in the class. Mignolo (2000) referred to this

moment as a cosmopolis. It is the moment of finding a connection that shows the possibility that populations can share a commonality even if it is only temporary.

Foucault (1982) referred to these moments as fractures. Jipson and Paley (1997) described Foucault's fracture as the moments in social life where interesting or non-conventional scenarios can suddenly develop. In a sense, they refer to a break in normal existence that allows for something different to happen. As I review the chapters in this dissertation, and reflect on the studies that led to the creation of this document, I find that one of the ties that binds them all is the search for fractures or moments of cosmopolis where students build the kind of solidarity, interest, and kinship around science as they did when the rap song drifted into the chemistry classroom.

My argument throughout the chapters in this dissertation has been that student interest and achievement in science can be fostered through breaks in practice within spaces that have proven to be detrimental to their achievement in science. These breaks in practice either occur naturally or can be created. When they occur naturally, they need to be targeted and expanded upon as they were in Chapter 3 (when the rituals that students engaged in were discovered as integral to their relationships to the science classroom). In the case that breaks in practice need to be created, spaces like cogenerative dialogues, (where teachers and students co-construct ideas about the classroom and build solidarity) need to be created.

With the creation of social fields like cogenerative dialogues, where the cosmopolis is created, the fractures of science interest are expanded and a cosmopolitan ethos is enacted. This is so because the creation of an optimal science classroom for the student and teacher is facilitated. Students and teachers become co-researchers that build

connections around the teaching and learning of science. Together, they interrogate how, why, and if successful teaching and learning of science will occur in the classroom. Students' capital from out-of-school fields is exchanged for canonical science understanding and insights into the science classroom. The newfound connections between teachers and students dismantle preconceived notions of who the teacher or student is and creates a scenario where all participants in a social field are teacher, student, and researcher working towards a common goal of improving science education. In Chapter 5, I discussed scenarios like this as transaction because of the exchange of social and symbolic capital between student and teacher necessary for them to be maintained.

Coteaching: The Outcome of Cogenerative Dialogues and the Enactment of Cosmopolitanism

The re-conceptualization of student and teacher roles discussed in the section above allows students to express embodied practices such as verbal fluency and high energy in the urban science classroom (Elmesky, 2005). It also allows students to enact an interdependent approach to science that is an integral part of the sense of self of urban students. Markus and Kitayama (1991) described interdependent construals of self as focused on emotions and actions that focus on others. The Markus and Kitayama descriptions reflect the types of practices students exhibit in their mutually sustaining rituals (see Chapter 5).

Through my research, I have discovered that students' ways of knowing and being are expressed differently in different contexts. In the classroom, where structures support an independent student-focused pedagogy with individual outcomes, the agency

to act interdependently is truncated. However, when the provision of agency (or the manipulation of existent structures to facilitate agency) occurs in the classroom through discussions in cogenerative dialogues, students' dispositions to be interdependent manifest themselves as coteaching.

Underlying this body or work, and as presented in Chapter 1, coteaching is the process where there is more than one teacher in the classroom that holds a co-responsibility for the classroom. In this structure "the purposes of coteaching are to experience forms of teaching that are different and to learn from them, not only at the conscious level through cogenerative dialogues and micro and meso analyses, but also by simply teaching with other teachers" (Tobin 2005, p. 318). In order to experience a structure that is different and be willing to learn from it, a value for the other is a necessity. Conversely, a value for difference is necessary in order to fully experience and learn from someone/thing that is different. It is therefore necessary to function with a cosmopolitan ethos that values difference in order to engage in coteaching. Furthermore, enacting coteaching requires a valuing of the ways of knowing and approach to thinking of the coteacher. This value comes from a process of valuing the coteacher that is attained in cogenerative dialogues.

My aim here is not to complicate the relationship that connects cogenerative dialogues, coteaching, and cosmopolitanism. However, it is to describe how the triad they form has proven to be a key component of science education research. This was most evident in Chapter 4 where student-researchers expressed the importance that coteaching has to their interest in, and efforts to transform their science classrooms. In Chapter 7, the attainment of a cosmopolis occurred when a student in the class felt comfortable enough

to teach a physics concept to her peers within a cogenerative dialogue. This scenario provides a vivid example of the connections between cogenerative dialogues, coteaching and cosmopolitanism

The exhibition of coteaching-like behaviors in fields outside of the classroom discussed in Chapter 3 (on the basketball court, with students' explanations of ideas to each other) led to my theorizing about the corporate | communal dialectic. This dialectical relationship was interrogated in Chapter 4 in a metalogue with Wesley Pitts and Eileen Parsons and I present it as an additional tool for investigating the urban science classroom. The notion that the communal is the dialectical opposite of the corporate describes the misalignments between coteaching and the traditional teaching model. By presenting these models I introduce new tools to investigate urban science classrooms.

Studies of Context in Urban Science Education: From New Approaches to New Tools

I do not present the work in this dissertation as completely isolated from any existent investigations into science education. In fact, much recent research in science education has begun to deeply investigate issues that can arguably be described as more contextual than traditional research in this field. The recent emergence of the *Cultural Studies of Science Education* journal and the high caliber of scholarship in this journal speak to this fact. In this era of science education research, I have discovered that studies share connections to some of my work that I will summarize below. I do so in order to present where the work in this dissertation lies in the spectrum of comparable research.

Olitsky (2005) embarked on a highly sociological investigation of group membership and identity that investigates how these factors impact the effectiveness of the teaching and learning of science. Similarly, Seiler (2002) investigated the nature of

cultural misalignments and group dynamics between students and teachers surrounding the valuing of students' social capital. In these studies, investigations of group dynamics that do not necessarily rest at the confines of the school are thoroughly investigated.

Elmesky (2004) describes how the existence of weak cultural boundaries can be used as a means to develop transformative teaching and learning, and Martin (2004) investigated the social and cultural dimensions of urban high schools by discussing how the relationships between students and teachers are dependent upon the cultural boundaries between them. In a similar vein, Brown (2004) investigated the need for an alignment between student discourse and science discourses in order to attain scientific fluency. In these studies, issues of cultural alignment between students and teachers bind the research products as the authors interrogate ways to ways to bridge them.

The main themes in the work of each of the researchers discussed above resound in my work. Their descriptions of the variance between urban students' lifeworlds and the culture of the classroom are at the core of the issues that plague urban science education. In their focus on group dynamics and their relationship to the urban science classroom, their respective analyses are integral to addressing gaps in science achievement for students of color in urban settings. I acknowledge the brilliant research that the authors have engaged in and reference their work because of the aligned outcomes of their research with the work I have engaged. However, in this dissertation, I present new tools for urban science education research that have not been explored previously. I also focus on issues within urban science classrooms that have traditionally been overlooked.

In Chapter 2, I present cogenerative dialogues and the philosophical tenet of cosmopolitanism as tools for ethical research practice. While cogenerative dialogues have

grown in use in contemporary science education research (Tobin, 2000), cosmopolitanism has not been utilized as an approach to science education research. As I engaged in my research, I found that the creation of spaces outside of the classroom where student and teacher voices are equally valued (cogenerative dialogues) required an understanding that there is value in difference between participants. Once this recognition became shared within the cogenerative dialogue, opportunities for a shared responsibility for teaching in the classroom became evident.

I presented the corporate | communal dialectic as a new tool for theorizing the cultural misalignments in urban science classrooms in Chapter 3. I believe that the use of this tool is not only important for researchers of urban classrooms, but is valuable for student-researchers to use in their evaluations of the social fields in which they engage. This theoretical approach to the classroom was provided to students and it worked to blur the lines demarcated by theory that create divides between researchers and practitioners. While I believe that other theoretical lenses could provide the same results if presented to research participants properly, the simplicity of the corporate | communal dialectic and its ability to clarify and identify issues within the classroom is invaluable.

In Chapter 5, I focused on the ritual as an under-investigated phenomenon in science education research. The use of the ritual as not only a phenomenon to be studied but also as a facilitator of coteaching and means to attain culture brokering between out-of-school and in- school worlds became evident. As student researchers explored strategies that facilitated successful science rituals, I was able to gain insights into new approaches to address cultural misalignments within urban classrooms, while ensuring the development of content knowledge.

These cultural misalignments are often explained in research within urban schools as occurring between middle class White teachers and urban poor students. In my research, I was able to demonstrate that divides within urban science classrooms between students also impact the science agency of students in the classroom. Both the notion of science agency (the power to engage in transactions with the structures in the science classroom and the nature of the divides in urban areas) are phenomena that are not explicitly discussed in science education research that have been illuminated through this dissertation.

In essence, I present three major points for the exploration of urban science classrooms but closely develop a web of new theoretical frameworks (transaction and fundamental interaction, corporate | communal, a redefinition of the ritual, and neoindigenous cosmopolitanism), a deeply nuanced but necessary ethical approach to research and multiple research outcomes through the chapters.

Expectations of the Research / Implications

I do not expect the research presented in this dissertation to involve a macro change in science curriculum or other corporate structures like standardized tests. Rather, I focus on ways that co-constructed approaches to success within existent curriculum in varying locations can benefit from exploring similar studies to the ones described in this dissertation. The other expectation that I hold is that the theoretical approaches employed in this dissertation (original theorizing on the neo-indigenous and neo-indigenous cosmopolitanism, the corporate | communal dialectic, my appropriation of the transaction and interaction, existent sociocultural theory and the various hybridized and multilayered approaches) be looked at as viable tools for studying the urban science classroom. I hope

to counter the "damaging and self-defeating assumption that theory is necessarily the elite language of the socially and culturally privileged" (Bhabha, 1994, p. 28). It has become abundantly clear that the actors within a particular social field can define conceptions of what is privileged within their local field. The hierarchy that privileges some and dismisses others is implicit in many urban settings, but exhibits itself in various contexts in different ways and can be attacked in local fields with specific theoretical and philosophical tools. The tools that are necessary for the investigation of these varying contexts are presented in this dissertation, accessible to researchers and practitioners and valuable across local fields.

Through the research conducted that produced this dissertation and the metalogues that provided insight and deep analysis of the work, I hope to make clear that for all the distortions, myths, and misrepresentations of urban youth as disinterested in school and science, they provide prolific analysis of school and schooling that surpass that of any single researcher within a study. I hope to have shown that the voice of a societally created underclass or Other cannot be silenced and dismissed, for the individuals in these groups can always present a worldview and frame of reference. The existence of an avenue to express one's view is the key to the transformation of science education. It is the means by which people not only comprehend their situations in local contexts, but also fight injustices within them. It is the means of voice for those who have been forced to be passive and the path to opening science education to those who have been marginalized from it.

Glossary

Agency: The power of an individual to act in a certain field. Often referenced to as being dependent on the structures that impact the field.

Cogenerative dialogue: Conversation that individuals who are in the same field are engaged in where the goal is co-creating a plan of action to improve future experiences in the field.

Communal: A way of knowing and being that focuses primarily on inter-personal relationships, community and the collective betterment of a group as the fundamental tenet.

Corporate: A way of knowing and being that focuses primarily on a factory or production model to social life. The primary goal surrounds maintaining order and achieving specific (often quantitative) results.

Cosmopolitanism: A philosophical /moral ethos that emphasizes a value and respect for all based on our collective humanity. A connection based on valuing the difference among people.

Doxa: An individual/group's practices that form perceived dispositions but are not investigated or explored for cause or authenticity.

Dialectic: The relationship between two seemingly opposite and interacting ideas that pronounces the fact that they are dependent on each other in order to exist. The sheffer stroke (|) is placed between the two concepts to indicate the existence of the two parts on either side of the sheffer stroke as constituting a whole.

Field: A physical and temporal place where individuals interact with each other. This may include a two-person conversation or a city full of people. A field may be nested within other fields. Culture in one field will always try to be enacted within others. Fields are structured with resources that support the expression of agency.

Hegemony: A social system where one group's power over another is established and accepted without questioning its origin or implications. In a hegemonic system, the power imbalances are oftentimes so ingrained into the social psyche that attempts to uncover them are resisted by the victims of its oppression.

Hierarchy: A form of social organization that implicitly places individuals into a pecking order where certain groups are placed below others based on societal norms.

Interaction: Traditionally perceived as communication between two or more people, In this paper it is referred to as the combined action of two or more things that effect each

other with the absence of reciprocity or exchange. Can be perceived as (fundamental interaction)-one of the fundamental forces acting between elementary particles

Lifeworld: Refers to one's lived experience prior to reflective processes and analysis. The summation of all everyday experiences as they are being enacted combines to become the lifeworld.

Metalogue: A written forum for reflecting on various parts of an experience or phenomena. In this dissertation the metalogues are based on chapters 3 and 5.

Neo-indigenous: Populations within urban settings with distinct experiences and connections whose oppression at the hands of a dominant group mirror the oppression of the indigenous throughout the world

Practice: Actions that an individual performs. Multiple patterned actions become practices and multiple practices become rituals.

Ritual: Any consistent patterned action (practices) that lasts over a specific period of time (in chapter 5, the allotted period of time is one week).

Structure: Used in this paper with a dual meaning. In reference to agency, it is the physical, symbolic or temporal resource that causes an individual or group to enact its power to act in a certain way.
Structure also refers to a system or unit that has been set in place as the norm.

Transaction: Communication between two or more people that influences and affects them all. The transaction is hinged on reciprocity, exchange and communication and is a marker of communal communication.

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