Exploring the Impact of the Implementation of Reality Pedagogy: Self-efficacy, Social Capital, and Distributed Cognition

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ABSTRACT

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As our current society becomes more and more dependent on science and technology, it calls for our students to be more science-oriented and involved in science. However, as statistics show, our urban students are not as engaged in science classes, resulting in poor performance in science. With this fact in mind, this study explores a recently developed pedagogic approach called reality pedagogy. In this qualitative ethnographic case study, the yearlong experience of six urban students enrolled in a science class of an urban public secondary school where the pedagogic tools of reality pedagogy were being implemented is examined. The study examines reality pedagogy via the lens of self-efficacy, social capital, and distributed cognition frames in order to understand the contribution the tools of reality pedagogy offer.

Participants in this study included immigrant and non-immigrant urban science students as well as students with learning disabilities (LD) and students with no learning disabilities (NLD). Findings of this study revealed that participating in reality pedagogy facilitated the development of self-efficacy in science of three of the four students, where one was an LD student and two were NLD students. The experiences of all four of these students are discussed in detail. The study also revealed that the two immigrant participants of reality pedagogy were positively impacted, in that both students’ shared social capital was positively impacted and the frame of distributed cognition played a role in their science classroom participation.
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Chapter I
INTRODUCTION

Purpose of the Study

The purpose of this study is to investigate an approach called reality pedagogy. Reality pedagogy builds on the ideologies and theories of critical pedagogy, culturally relevant teaching, and culturally responsive teaching. The central goal of this approach is to provide support in an urban academic environment for both teachers and students toward improving the experiences of both groups in the teaching and learning of science (Emdin, 2009). In this study, I particularly examined reality pedagogy via the lens of self-efficacy (Bandura, 1977) in order to understand its impact on the development of self-efficacy among urban students toward science. I also investigated the impact of the implementation of reality pedagogy via the lenses of social capital (Bourdieu, 1977; Portes, 1998) and distributed cognition (Hutchins, 2006). The latter two lenses are used in order to understand what role reality pedagogy plays in the classroom experiences of immigrant students in their science class participation and science learning when implemented in their urban science class.

Researchers in the field of urban education (Atwater, 2000; Freire, 1998; Gay, 2000) indicate that the focus of urban education for the past several years has been on establishing instructional content and also designing and executing curricula based on the cultural background of urban youth. Teaching with an understanding of the cultural backgrounds of urban youth has become one of the foci of urban education toward its
efforts to improve the academic achievement gap that exists among urban students, which reality pedagogy also aims to bridge. Research (Seymour & Hewitt, 1997; Wright, Standen, & Patel, 2010) indicates that despite the greatest efforts to close such gaps, academic achievement gaps have been most prominent in the subjects of mathematics and science.

With regard to immigrant students, research reveals that the number of immigrants in the United States has steadily increased over the past 30 years (Elbel, 2009) into urban areas across the country. As a result, our current urban classrooms and schools include a significant percentage of immigrant students, which calls for our attention to address the particular needs of this group of students.

“Immigrant students conceptualize [class] participation in ways that differ from the bulk of the literature, and these differences have important ramifications for current teachers and future research” (Patchen, 2005, p. 44), as research in the field of education of immigrant students indicates. Also, “care” from peers and teachers, as defined by Noddings (1984, 1992) and Valenzuela (1999), helped to increase immigrant students’ participation, as suggested by research in this field. Here, an open communication between the teacher and students, where the teacher inquires with the students about themselves, their lives, and then offers thorough input, fostered a sense of care among students from their teacher. Also, students felt a sense of care when their teacher protected them from the scrutiny or ignorance from other students (Patchen, 2005, p. 45), which not only fostered a sense of care but also resulted in an increase in class participation among immigrant students. Further regarding class participation of immigrant students:

According to these students, the mere act of participating in a classroom space (e.g., answering questions when asked, offering opinions, presenting group work, or asking questions) has the potential to expand an awareness to self, increase the capacity for tolerating dissent, and broaden the ability to support others while generating a more practical sense of community and safety. (p. 44)
In consideration of the above, research in the field of culturally responsive teaching supports that it is important for teachers to have a profound understanding of the cultural background of their students in order to be effective teachers in urban settings (Emdin, 2011; Johnson, 2009; Kind, 2009), which reality pedagogy also aims to support. Given this is the case, part of the focus of this study is to investigate what role reality pedagogy plays in the classroom experience of immigrant students.

Coming back to self-efficacy, Bandura (1977) defines self-efficacy as a function of an individual’s behavior and their level of confidence, which, when developed, allows the individual the facility to accomplish all the necessary tasks (as in, gather any necessary resource or information, organize all information, and then finally execute the action) in order to achieve their desired outcome. Pajares (2006) further explains that “these self-efficacy beliefs provide the foundation for motivation, well-being, and personal accomplishments in all areas of life” (p. 339). Pajares’s research also designates that when it comes to academic performance and achievement, one’s academic self-efficacy plays a powerful role. Considering that the development of self-efficacy influences academic achievement and the efforts of reality pedagogy also aim to enhance the academic experience in urban science classrooms, this study also explores the contribution, if any, reality pedagogy makes to developing urban students’ self-efficacy toward science.

**Research Questions**

This study attempts to shed light on the impact of the implementation of reality pedagogy on urban students’ self-efficacy and urban immigrant students’ classroom experiences in an urban science (Biology/Living Environment) class. The following research questions were designed to gather some insight toward the impact of the implementation of reality pedagogy.
1. How does the yearlong experience of participating in reality pedagogy contribute to the development of self-efficacy in science within urban science students?
   a. Which facets of the experience of participating in reality pedagogy are most valuable to urban science students in developing their self-efficacy?
   b. What differences in self-efficacy can be noted in urban science students who fully partake in the tools of reality pedagogy?

2. Which facets of the experience of participating in reality pedagogy are most valuable to the immigrant science students?
   a. How does reality pedagogy contribute to the social capital of immigrant students?
   b. What role does reality pedagogy play in the distributed cognition process within the urban immigrant students in the progression of the study?

**Organizational Overview of Chapters**

In Chapter II, I review background literature relevant to this study overall and present the theoretical framework of the study. The literature review encompasses science education in current urban schools and barriers to science instruction in urban school. It then discusses the details of the reality pedagogy approach and what it offers. The theoretical framework is noted following this discussion and includes literature that outlines self-efficacy, social capital, and distributed cognition.

Chapter III explains in detail the methods and methodology for this study. The study is a qualitative, ethnographic case study that draws on aspects of a grounded theory approach, particularly constructivist grounded theory. This study was conducted at a New York City public school over the course of the Fall 2010-Spring 2011 academic year with 22 10th grade students, of whom 6 were primary participants. The sources of data for this
study included classroom observations, interviews with the 6 primary students and the participating teacher, and focus group-like dialogue sessions called cogenerative dialogue sessions. The researcher’s role had some elements of participant observation (Guba & Lincoln, 1981), which is addressed in this chapter.

The findings of this dissertation are written in the format of two publishable papers, without references (Chapter IV and V). Each of the two papers has its own literature review, findings, and discussion that explore the related themes and ideas in depth. The first findings paper, Chapter IV, examines reality pedagogy via the lens of self-efficacy (Bandura, 1977) in order to understand its impact on the development of self-efficacy among urban students toward science. Chapter V investigates the impact of the implementation of reality pedagogy via the lenses of social capital (Bourdieu, 1972) and distributed cognition (Hutchins, 1980, 2006). In Chapter V, these two lenses are used in order to understand what role reality pedagogy plays in the classroom experiences of immigrant students in their science class participation and science learning when implemented in their urban science class.

Lastly, Chapter VI reiterates the significant findings of this dissertation and discusses implications for science education.
Chapter II

REVIEW OF THE LITERATURE

In this chapter I discuss the literature relevant to my study in addition to describing the theoretical perspectives and assumptions underlying my work. I have divided the literature review into two major sections, consisting of subsections that support the overall literature of each section. Here, I first describe how researchers discuss and investigate the existing need for equity in science education and the complex ways by which the multicultural perspective has so far attempted to meet this need. Following this, in the second section of the literature review, I introduce and discuss reality pedagogy, a newly developed approach within the multicultural perspective that also takes part in this effort and is the focus of my current study.

Following the two literature review sections, the theoretical frameworks are divided into three sections, which address the perspectives on self-efficacy, social capital, and distributed cognition.

Multicultural Education and the Need for Equity

“Multicultural science education is a field of inquiry with constructs, methodologies, and processes aimed to provide equitable opportunities for all students to learn quality science” (Atwater, 1996, p. 822). Unfortunately, the current implementation of a “science for all” model toward the multicultural perspective falls short of this vision. With consideration of equity in science education and progress toward scientific literacy
in an equitable manner, Okhee Lee (1997) discussed some inconsistencies in the “scientific literacy for all” model. Lee argued that the model failed to recognize students from diverse cultural backgrounds and their challenges within Western cultural norms in schools. Lee pointed out that according to *Science for All Americans* (American Association for the Advancement of Science [AAAS], 1989), Western science is the proper domain of science, and scientific literacy is to be defined by Western science only.

Lee stated, “If scientific literacy is defined in the Western science tradition, this may have serious negative impact with students from non-Western cultures and languages” (p. 220). Lee also pointed out that the Western instructional practices on some levels are quite different from the instructional practices of students from diverse backgrounds and can be “incompatible” with the style of learning of the non-Western students.

Since Western science tradition does not take into account the learning style of students from diverse backgrounds, there arises a conflict on many levels within non-Western students, leading to resistance to learning science. I concur with Lee in stating that non-Western students are already challenged with learning and adjusting to the discourse and interaction patterns of the mainstream culture. If on top of that they are put in a position where they are to choose between their own worlds, understandings, and cultural values and ways of the mainstream culture, it will in turn discourage them from learning science.

**Toward the MTCE Perspective**

Toward accomplishing the goals of multicultural science education, Aikenhead and Jegede (1999) note a study by Costa (1995) that discussed the factors affecting the success students with diverse cultural backgrounds will attain in science courses. Costa described the importance of the closeness of the students’ life-worlds to the culture of the science classroom, how smoothly students can function and move between their own
culture and the culture of their school science, and the level of assistance these students receive in this back-and-forth transitioning process. Costa’s research also discussed that if these three factors are maintained appropriately, a student who is a “potential scientist” will carry on even if their science instruction is poor. But how do we go about creating appropriate science instruction for our students from diverse cultural backgrounds?

According to Atwater (1996), communication is the key and “central theme in multicultural education” (p. 824). However, various factors play a role on which types of communication (verbal and non-verbal) are successful. Eight discrete components of the communication process were identified by Samover, Porter, and Jain (1981), who state in a step-by-step manner how communication unfolds between the sender and the receiver of the message being communicated. Starting with the need of the sender to send a message to the receiver, the authors laid out the step-by-step process of the components of communication, ending with receiver’s response to the sender and the sender determining whether his/her way of sending the message was effective. Since the method of communication for certain people can sometimes be culture-specific, cultural factors may affect the components of the communication process, which may lead to miscommunication.

Because the chief goal of science education is that students learn science, Atwater’s (1996) discussion of the cultural-specific method of communication of students is crucial to science educators, who work to better comprehend and instruct students with diverse cultural backgrounds. In this process, socialization plays an important role, as it allows the participants to learn both verbal and non-verbal methods of communication (Irvine & York, 1995). Socialization in the science classroom must involve interaction not only between students and their teacher, but also between student and student, as such interactions also play a major role in the classroom environment. This is particularly the case, since the student-student interaction would be between students from different cultural backgrounds or from different ethnic groups (Atwater, 1996). Thus, toward the
multicultural science education perspective, creating a space for such socialization is of importance.

It is also of crucial importance to teachers to understand the dynamics of the student-teacher interaction and socialization. Several studies show that teachers give more favorable treatment to students who have cultural backgrounds similar to those of their teachers due to commonality in their social norms (Eller-Powell, 1994; Oakes, 1985; Page, 1987; Reck, Reck, & Keefe, 1987; Rist, 1970; Spindler, 1974). Considering this fact, it becomes understandable how a student from a background dissimilar to that of the teacher may feel marginalized. The proposition here, to bridge this gap, is to enable teachers to become familiar with the students’ culture and vice versa so that there is a better understanding of each other’s cultural norms; to do so, communication is needed.

**Teachers’ Role in Student Engagement**

In elaborating further on the necessity of teacher-student communication, it should be noted that the teacher plays a crucial role in the students’ engagement with the class.

A 1993 study by Skinner and Belmont discussed the relationship between students’ motivation and engagement and the teacher’s behavior with the students. Here, the authors’ research suggests that there is a reciprocal relationship between the teacher’s behavior in terms of his or her involvement with the students and their learning processes and the students’ emotional and behavioral engagement and involvement in the classroom. In this study, involvement is defined by “the quality of interpersonal relationship with teachers and peers…. Teachers are involved with their students to the extent that they make time for, express affection toward, enjoy interaction with, are attuned to, and dedicate resources to their students” (p. 573). Engagement is defined as having both behavioral and emotional qualities. In that,

Children who are engaged show sustained behavioral involvement in learning activities accompanied by positive emotional tone. They select tasks at the border of their competencies, initiate action when given the
opportunity, and exert intense effort and concentration in the implementation of learning tasks; they show generally positive emotions during ongoing action, including enthusiasm, optimism, curiosity, and interest. (p. 572)

The study ends by promoting further studies within educational reform toward a focus on teacher behavior and teacher interaction with students, as positive interaction by the teachers in this study resulted in students’ engagement in the lessons. I include this study here, as I feel that it is important to note how valuable the role teachers play in students’ engagement, which is a prerequisite for learning to take place. Simply, the interactions the teacher has with a student can create an effective or ineffective learning environment for the students.

**Breaking Barriers to Make Connections**

As noted by Calabrese Barton (1998), teachers must pay attention to breaking down the barriers of students whose language and experiences are different from what school science considers legitimate in order for these students to successfully participate in school science (Anderson, 1991; Delpit, 1993). Considering that there are students who believe they are incapable of doing science or believe they do not know what science is (Cobern, 1996; Hill, Atwater, & Wiggins, 1995; Kahle & Meece, 1994; Waks, 1991), “teachers need to understand and act on the starting points of their students” (Calabrese Barton, 1998, p. 528), which may be the students’ culture, language, or something completely separate that is creating a barrier between the students and acquisition of school knowledge. It is only then that students can succeed in school science with full engagement and enthusiasm, as at that point science becomes more approachable and a place where students can gain knowledge and develop skills (Anderson, 1991; Rosebery, Warren, & Conant, 1992; Tobin & McRobbie, 1996).

In order for the science learned in school to be relevant to students, it must connect to the students’ life-world outside of school (Ladson-Billings, 1994; Lave & Wenger, 1991; Rosebery et al., 1992; Rosser, 1990). In this way, students’ particular and even
perhaps culture-specific ways of knowing and learning are taken into consideration (Atwater, 1996; Roychoudhury, Tippins, & Nichols, 1995). Thus, to help students find connection between science and themselves, the major focus of science education from a multicultural perspective, as proposed by Calabrese Barton (1998), should be that “science is open to multiple ways of knowing, doing and communicating” (p. 528).

Concurrent with Calabrese Barton’s view, Lee and Fradd (1998) point out that teachers and students are able to “develop congruent ways of communicating and sharing understanding” (p. 13) only when teachers and students share language and culture (Au & Kawakimi, 1994; Trueba & Wright, 1992; Villegas, 1991). Further, toward understanding the barriers facing students of Non-English Language Background (NELB) (Lee & Fradd, 1998) and toward establishing instructional congruency, Lee and Fradd uphold the following notation by Fradd et al. (1997):

> Teachers need to know (a) who the NELB students are, (b) how the students acquire literacy and English-language proficiency, (c) what the nature of science is and what kinds of language and cultural experiences the students bring to the learning process, and (d) how to guide and enable the students to understand science. (p. 13)

In this process, Fradd et al. suggest that it is through understanding how NELB students approach literacy and science that teachers can develop a dynamic process of instruction that supports learning in both areas for these students. Thus, yet again, communication between the teacher and students is being emphasized toward science education from a multicultural perspective.

**Empowerment as a Constant Goal**

Also, within the multicultural perspective, Atwater (1996) suggests that “science teachers must be committed to facilitating the empowerment of students” (p. 831). Atwater uses McLaren’s (1989) definition of empowerment, stating that it is

> the process by which students learn to critically use science knowledge that is outside of their immediate experiences to broaden their understanding of
science, themselves, and the world, and to realize the prospects for reforming the accepted assumptions about the way people should live in a scientifically diverse culture. (Atwater, 1996, p. 831)

This vision of empowerment endorses and parallels not only the MTCE perspective, but the goals of science education as a whole. Furthermore, Atwater denotes Cummins’s (1986) identification of the four areas science teachers should consider in empowering relationships:

(a) incorporation of students’ culture and language in the teaching of science, (b) collaborative participation of the community in schools and science classrooms, (c) orientation of science pedagogy towards reciprocal interaction, and (d) advocacy rather than legitimacy of failure as a goal for science assessment. (Atwater, 1996, p. 831)

**Implementing the MTCE Perspective in Practice**

Embedded within each recommendation mentioned thus far toward the MTCE perspective and culturally relevant teaching in science education is the need to communicate and understand the body of students we are teaching. Through knowing who the students are, educators can identify their needs and strategize the best way to teach them.

With communication as a tool at its core, I now discuss some advancements in science education within the MTCE perspective. The focus of my discussion is on science education’s utilization of the multicultural perspective coined by Emdin (2009) as reality pedagogy. This fairly recent perspective is one with which I have had the most opportunity to work closely.

Reality pedagogy acknowledges non-dominant standpoints and utilizes the position of those viewed as other as the point from which pedagogy is birthed, and once developed, transformative teaching and research continues to feed. Standpoint in this framework refers to “the social positioning of the subject of knowledge, [and] the knower and creator of knowledge.” (Smith, 2005, p. 76) This process involves a positioning of the other to the norm. This re-positioning of standpoints in favor of the other is valuable in enacting pedagogy that is responsive to the needs of the marginalized …
reality pedagogy begins from the standpoint of a particular population in order to teach that population. (Emdin, 2009, p. 72)

In this context, the students are the most valuable informers of the design of the appropriate pedagogy or means of instruction of their teaching and learning process. In recognizing this, the focus then becomes the students and their culture and what the students and their distinct cultures bring to the pedagogic structure. Thus, the reality of the student is taken into consideration in formulation of a reality pedagogy.

The vision of reality pedagogy promotes and enacts social justice and equity, as this perspective focuses on and keeps as its center the realities of students. Specifically, in an urban setting where there are more students from a vast diversity of ethnic backgrounds and many also from low SES groups (more so than in non-urban settings), the implementation of reality pedagogy is a necessary practice.

Tools of Reality Pedagogy: The 5C’s

In taking students into consideration, the research in reality pedagogy involves a triad of tools. The first of these five tools is known as cogenerative dialogue (Tobin, 2006), which in its practice in previous research has proven to bring about the utilization of the next two other tools: coteaching (Roth & Tobin, 2005) and cosmopolitanism (Emdin, 2006, 2007b). Context and content (Emdin, 2009) are the last two of the tools and have been very recently developed.

Cogenerative Dialogue. According to Emdin and Lehner (2006),

The cogenerative dialogue has been defined as a conversation participants have about a shared experience (Tobin, 2005). By creating a field to talk about classroom learning, they provide participants an opportunity to reflect on shared experiences and they open arenas where participants can take collective responsibility for the results in the classroom. (p. 1)

The end result of a cogenerative dialogue is a plan of action aimed to improve teaching and learning in a given classroom. Cogenerative dialogue changes both the teaching and learning practice due to its “co-planning” nature, where both the teacher and students
collaborate in developing strategies that parallel both student learning and teaching practices. The design in cogenerative dialogue is such that four to five students at a time meet with the teacher and a researcher (if the teacher himself or herself is not the researcher) either after school or during a free class or lunch period. After the same group of students meets two to three times, one of the students would opt out and a new student chosen and invited by the group to the session would join. This process allows for all the students in the class to take part in the dialogue with the teacher. On occasion, students can also choose to have a cogenerative dialogue session without the teacher. Here the point would be to have a dialogue among themselves and to possibly cogenerate a plan of action for themselves for a more functional classroom in accordance with their own needs for overall learning. Recent research has shown that cogenerative dialogue has allowed students to have an active role in making decisions that directly affect the way they learn (Roth & Tobin, 2005; Emdin, 2007b).

**Conditions of cogenerative dialogues.** To assure maintenance of order during the implementation of the dialogue sessions and an overall progress in each meeting, some conditions are agreed upon by all participants and are as follows:

- Participation in cogenerative dialogue is voluntary and rotational. Students are invited to participate but can always opt out. When they choose to do so, they are asked to invite a peer to join the dialogues in their place. Over time, this process allows for every student in the class to be part of the dialogues at least once over the course of an academic year.
- All participants in the dialogues have equal turns at talk.
- All talk is respectful of other participants. (All participants are asked to listen attentively and allow their peers to complete their thoughts before responding.)
- A plan of action for addressing issues raised in dialogues must be generated in one dialogue. In this case, all plans of action generated in a dialogue have to be implemented in the upcoming classroom session.
- Topics of the next dialogue should be based on the results of the previous cogenerated actions and how successfully or unsuccessfully they were implemented in the classroom.
- All participants collectively share responsibility for enacting all agreements arising out of the dialogues. (Emdin, 2009)
Coteaching. In his 2007 study, Emdin found that the agency (the power to act) of a student is developed during cogenerative dialogues, and it gets mobilized in the form of coteaching. In one scenario of Emdin’s research, a Dominican American student who was socially ostracized by her Black American peers in the physics classroom was able to share her physics problem-solving approaches during some cogenerative dialogue sessions with the same peers, who found the physics problems to be challenging. The dialogue session allowed a space for her to enact her agency, and as a result she looked to more coteaching opportunities as her peers’ reactions encouraged it. It also resulted in a more comfortable classroom learning environment for the student.

The coteaching tool can also function such that the students coteach the curriculum along with the teacher. In that, students co-plan the lesson to be taught in advance and review the plan before the teacher’s instruction in class. The students and the teacher work together before, during, and after the lesson has been implemented to optimally maximize students’ learning instances. As a result, it opens up yet another motive or opportunity for students’ involvement and engagement in the lesson and encourages empowerment. Following are the detailed components of coteaching.

Components of coteaching.

Buddy system:
- Invitation of students in the classroom who have been a part of cogenerative dialogues to participate in the Buddy system. (This invitation focuses on the purposes of the project, which is to maximize students’ strengths in the classroom and the fact that participation is voluntary.)
- Students’ self-disclosure about their strengths and/or weaknesses with regard to the science content (test score averages, understanding of topics in place in class, and general comfort with the class are discussed, and students are encouraged to begin to view their test scores as merely a component of their understanding that can be used to quantify whether or not they are “strong” in science content).
- High-performing students partner up with lower-performing students, and a space is created in the class where these groups can target their specific strengths and weaknesses.
- Students are supported in creating plans of action for maximizing their strengths and teaching the content to each other.
• A structure is set in place so that students who are strong in content have their test scores increase the same amount of points that the students who they are partnered up with improve.
• This process continues for the course of a school trimester, and then the entire process is repeated as a new school trimester begins. (Emdin, 2009)

Student as teacher project:

(Before class)
• Three to four students who have been in cogenerative dialogues are invited to co-plan with the teacher.
• The student-teachers review a lesson with the teacher prior to teacher instruction in class.
• The teacher teaches the lesson to the student-teachers and then receives feedback from students on the lesson.
• Student-teachers are allowed to ask questions explicitly surrounding content that will be clarified by the teacher.
• The teacher modifies the lesson based on student-teacher feedback.

(During class)
• The teacher or student-teacher introduces the lesson to the whole class and delivers the content.
• The teacher splits the class into groups that allow the student-teachers to have a group of students that they are in charge of teaching.
• The teacher goes from group to group to reinforce content and study the ways that students teach their peers.
• The teacher utilizes the feedback received as part of a toolkit for future instruction. (Emdin, 2009)

Cosmopolitanism. The interactions the students had with one another and the teacher and the level of communication and connection the students made with each other during cogenerative dialogue sessions and coteaching led a deeper relationship to develop within everyone involved in Emdin’s (2007a, 2007b) research. Emdin (2009) explained that though this was not part of the research agenda, it turned out to be one of the outcomes. Students became more comfortable with each other and shared their own experiences with science, whether day-to-day or their overall cultural experiences. Topics ranged from an ailment due to spray paint and graffiti to the focus on Western sciences in science classrooms, leading to challenges finding science themes in connection to the students’ backgrounds (Emdin, 2009). Such topics were welcomed, as they allowed students to gain insight into each others’ lives and make an even deeper connection with
each other, fostering a sense of community. In this way there was a facilitation of the sense of collective responsibility and obligation within the students to achieve goals that fulfilled their collective needs as they became aware of each others’ needs and the needs as being collective.

The philosophical construct of cosmopolitanism is framed not only as valuing individual differences but also having a collective responsibility for one another (Appiah, 2006). Emdin (2011) translates cosmopolitanism within his reality pedagogy frame as a tangible approach while “transforming human roles in social settings” (p. 290). Cosmopolitanism here functions to support a smooth operation of the classroom, where roles that are sometimes non-traditional in nature are identified for students by the teacher or by students themselves. Here, the students’ role in the classroom requires them to take ownership and responsibility of duties that are required for the classroom to run in a smooth manner. Thus, their role is not just the role of a learner but more involved. These roles also facilitate development of the desire to learn within the classroom and allow students to feel more connected to their class. Such roles, as Emdin (2011) explains, “[allow] students to become invested in the daily operation of the classroom, which, in turn, allows the teacher to be more effective in the delivery of the content” (p. 290).

The roles may be alternated among students as desired, including and not limited to: greeter of any visitors (teachers, administrators and any other guests); material and equipment distributor, who distributes handouts and equipment; classroom material manager, who maintains the books and instructional equipment; computer/technology manager, who looks after the technology (computers, laptops, LCD projector, smart-board) in the classroom; discussion leader and “even comedian, who is a designated person to provide comic relief in a class” (Emdin, 2011, p. 290).

Context. Context in the framework of reality pedagogy refers to the incorporation of the context of the students in the classroom curriculum and pedagogy. This process
focuses on the teacher’s use of both physical and symbolic artifacts from the students’ life-worlds into the classroom. “Physical artifacts” refers to items from students’ neighborhoods, like rocks from a park, pictures from a local park, or a subway map. “Symbolic artifacts” refers to the use of non-tangible artifacts from students’ life-worlds, like the ways students speak, references to their culture, or even specific terms.

**Content.** The final C of reality pedagogy refers to the content or the science topics in the particular syllabus or curriculum the teacher is to cover. The focus of the fifth C thus involves the teacher and his/her “willingness to both expose and embrace the limitations in their content knowledge within the classroom” (Emdin, 2011, p. 291).

Here, a space is created for codiscovery of the content knowledge. Emdin (2011) describes that “once the understanding that science or any other discipline being taught is but an infinite body of knowledge ripe with interrogation, the willingness to exchange within the classroom and support the teacher in the codiscovery of new knowledge begins” (p. 291).

In this study, I mainly focus on and am interested in the outcomes of the implementation of the first three tools of reality pedagogy. Impact of all five Cs is of interest for further studies in the future.

**Practicing Reality Pedagogy**

Reality pedagogy focuses on teaching that is based on deep understanding of the students’ communities and the use of this information in the teaching and learning of science. The goal for the teacher who enacts this pedagogical approach is to immerse oneself so deeply in student culture that it becomes second nature to develop student interest in, and natural affinity for science. Embarking on the journey towards enacting this pedagogy is an opportunity for science education to bear witness to the realities of those within urban settings. (Emdin, 2009, p. 73)

Focusing on such pedagogical practice is based on acknowledging that traditional science education practices have negatively affected urban youth and youth in general of diverse cultural, racial, and ethnic backgrounds in their ability to connect to science both
within and outside the classroom. Reality pedagogy, therefore, is an approach that incorporates elements both within and outside the classroom that are part of the youths’ surroundings and are necessary to connect them to science. In practicing the approaches toward reality pedagogy, there are some noted steps that a participating teacher can choose to take part in, either fully or partially, as they may feel needed in achieving such a connection between the urban science classroom and their students.

**Steps Toward Reality Pedagogy in the Classroom**

*Out of class:*
- Teachers visit student neighborhoods once a week and communicate with people in neighborhoods, such as store owners and other staples of the neighborhood.
- Teachers observe and take notes on phenomena in the neighborhood and work toward using them as examples and analogies that relate to the science curriculum.
- Teachers spend time listening to, and participating in, hip-hop culture/music and focus on specific conversations and music lyrics that directly relate to schools.
- Teachers verify the accuracy or effectiveness of their observations, examples, and analogies with students.

*In class:*
- The teacher delivers the lesson based on studies of student lifeworlds and feedback from students.
- Teacher videotapes the classroom.
- Teacher invites students into cogenerative dialogues and uses the videotape of the classroom as the point of discussion. (Participants in the dialogue view the videotape of the classroom, identify part of the lesson that needs to be improved, and develop plans of action for improving the lesson.)
- Teacher and students identify points in the lesson that relate directly to student lifeworlds and how effective the teacher was in the lesson delivery. (Emdin, 2009, p. 79)

As reality pedagogy is a fairly new perspective, there is currently no literature on how it specifically impacts students in terms of their self-efficacy, their social capital, and how distributed cognition plays a role in the process of the implementation of reality pedagogy. This study thus attempts to contribute to literature about reality pedagogy in this regard.
Theoretical Framework

Below I describe the theoretical perspectives on self-efficacy, social capital, and distributed cognition. These perspectives shape the lens through which I approached my research questions for this study.

Self-efficacy

Rooted in cognitive psychologist Albert Bandura’s (1977) social cognitive theory, self-efficacy is defined by one’s level of confidence and is the prime factor responsible for his/her ability to execute actions toward achieving a desirable outcome for a given required task. Further, “self-efficacy beliefs determine how people feel, think, motivate themselves and behave. Such beliefs produce these diverse effects through four major processes. They include cognitive, motivational, affective and selection processes” (Bandura, 1994, p. 72). In distinguishing an individual with a strong sense of efficacy and an individual who does not possess such efficacy, Bandura (1994) further noted that “an efficacious outlook fosters intrinsic interest and deep engrossment in activities” (p. 72). In that, persons with a strong sense of self-efficacy are more willing to set challenging goals for themselves while maintaining a strong commitment to accomplish these goals.

Self-efficacy can have an impact on everything from psychological states to motivation to behavior, as Bandura and other researchers have demonstrated. One’s self-efficacy plays a major role on how they approach challenges and execute a task at hand or a goal. Bandura (1994) explains that individuals with a healthy sense of self-efficacy, in comparison to a person with a poor sense of self-efficacy, tend to have a stronger sense of commitment to their interests and activities, develop a deeper interest in the activities in which they participate, see challenging problems as tasks to be mastered, and recover quickly from setbacks and disappointments. In contrast, individuals with a poor sense of self-efficacy tend to focus on personal failings and negative outcomes, quickly lose
confidence in personal abilities, avoid challenging tasks, and tend to believe that difficult tasks and situations are beyond their capabilities.

There are four sources that allow for the development of self-efficacy, according to Bandura (1994), and they are: mastery experience, vicarious/social modeling, social/verbal persuasion, and physiological/affective state.

Mastery experience or mastering a task successfully allows to strengthen self-efficacy. Bandura (1994) explained that mastery experience is “the most effective way of developing a strong sense of efficacy.” Vicarious/social modeling involves witnessing other people successfully complete a task. “Seeing people similar to oneself succeed by sustained effort raises observers’ beliefs that they too possess the capabilities master comparable activities to succeed” (Bandura, 1994, p. 75).

Social/verbal persuasion entails being encouraged socially or verbally to believe that one has the skills and capabilities to succeed. Here, getting verbal encouragement from others helps people overcome self-doubt and encourages them to focus on giving the best effort to the task at hand. Lastly, the fourth source of self-efficacy focuses on one’s physiological/emotional state. Here, by learning how to minimize stress and elevate mood when facing difficult or challenging tasks, people can improve their sense of self-efficacy. Along these lines, Bandura (1994) notes, “It is not the sheer intensity of emotional and physical reactions that is important but rather how they are perceived and interpreted” (p. 78).

Also, according to Bandura (1977), “the concept of self-efficacy is assigned a central role for analyzing changes achieved in fearful and avoidant behavior” (p. 193). In this case, one could make a reasonable argument that the study of science elicits fearful and avoidant behavior in some students. In this study, I investigate whether the self-efficacy of students in science can be impacted while utilizing the tools of reality pedagogy.
Social Capital

Portes (1998) explains social capital most directly while stating, “Whereas economic capital is in people’s bank accounts, and human capital is inside their heads, social capital inheres in the structure of their relationships” (p. 7). Studies indicate that the utilization of students’ social capital facilitates an effective learning environment and shows that students’ social capital has a considerable impact on their ways of knowing and learning (Field, 2005). Thus, one theoretical framework this study is structured under is the frame of social capital.

Researchers (Calabrese Barton, 2002; Emdin, 2009) in the field of urban science education also ascertain how increasingly critical it is to explore the role social capital plays in the classroom lives of urban science students. In his research, Emdin (2009) has also concluded that the ways in which urban students approach science is greatly influenced by the social and cultural capital they bring to the classroom environment. It is thus greatly important that educators look into what social capital and its intricacies (while social capital is built in the classroom) have to offer to the science classroom environment and the science learning process.

In explaining the concept of social capital, Coleman (1988) uses the term “dense network,” which he explains is formed when the individuals in a given network are very deeply connected, disallowing outsiders from penetrating into this network. Coleman further explains that in such a network, group needs and concerns as co-defined by participants are being met and fulfilled while simultaneously fostering trust. Burt (1992) introduces the concept of “structural holes,” which he defines as the resulting factor of breaches in existent social networks. Structural holes, Burt explains, allow for the development of more complex forms of social capital through the diffusion of information. In this study, I explore classroom dynamics that involve such dense social networks and structural holes in order to further understand the experience of immigrant urban science students.
Portes (1998) further states that “to possess social capital, a person must be related to others, and it is those others, not himself, who are the actual sources of his or her advantage” (p. 7). Toward this end, I use the social capital frame in this study to theorize how the two immigrant participants of this study obtain social capital while they socialize and work with their non-immigrant urban classmates in order to make the classroom environment functional for themselves.

**Distributed Cognition**

Hutchins (2006) describes the concept of distributed cognition as being synonymous to a group of people working together. “In such a case, cognition is distributed across brains, bodies, and a culturally constituted world” (p. 376).

Tomasello’s (2001) research suggested that the activities in the human mind are woven and interwoven in a complex manner with the material and social world. In that, the human mind does not evolve in isolation from the social and material world. As our bodies interact with the physical environment, our brains by design take advantage of the minute-to-minute details of our bodies and how they interact with the outside environment (Clark 2001; Quartz & Sejnowski 2002).

Researchers in the field of distributed cognition also suggest that a person working alone with, and even without, materials or tools is considered an example of distributed cognition. In defining distributed cognition, Hutchins (2006) states that “it is a perspective on cognition” and that “distributed cognition sees real-world cognition as a process that involves the interaction of the consequences of past experience (for individual, group, and material world) with the affordances of the present” (p. 377). In relation to culture, Hutchins suggests, “culture is built into the distributed cognition perspective as at least a context for cognition” (p. 377).

Further, in regard to culture and distributed cognition, Hutchins (2006) suggests that cognition is distributed in three ways from a cultural point of view. First, from a
cultural point of view, cognition is distributed between a culturally constructed environment and a person; secondly, it is distributed through time; and lastly, it is distributed in socially organized settings (among the people in that setting). All of these sorts of distribution and interaction take place simultaneously when it comes to real-world interaction and activities.

The distributed cognition perspective thus suggests that along with the individuals in a given environment, the environment itself and the materials/tools in that environment are a source of support and knowledge. Thus, to form a system of distributed cognition, all parts of the culture of the learning environment come together. In this specific case study, toward setting up a system of distributed cognition, the culture and the pedagogic tools themselves of reality pedagogy are studied to understand what role they play in the distributed cognition process.

The findings of my study encompass the above mentioned theoretical frames, and in the following chapter I discuss the methods via which data were collected and analyzed in order to gather the findings of this study.
Chapter III

METHODOLOGY AND METHODS

Overall Research Design Approach and Rationale

Given that reality pedagogy (Emdin, 2007a, 2007b) is a very recent pedagogic approach in the field of education, there has not yet been literature or research on the impact of its implementation, particularly its impact on individual students and their perceptions of the implementation of reality pedagogy. Specifically, in this study, I implement reality pedagogy and focus on the experiences and perceptions of individual urban students and their classmates, including immigrant students and students with learning disabilities.

My research approach in this study involves some ideas from grounded theory (Charmaz, 2006; Strauss & Corbin, 1998). Though the grounded theory approach typically seeks to explicitly develop a new theory, my approach in utilizing grounded theory does not seek this venture. Here, I inductively approach my research study while carefully studying the data I collect, carrying out repeated, consistent, and ongoing data analysis throughout the study, which are all features that align with the grounded theory approach (Charmaz, 2006; Creswell, 2007).

“Constructivist grounded theory” (Charmaz, 2006), which originates in social constructivist epistemology, is also utilized in my data analysis. Constructivist grounded theory maintains that “both data and analyses are social constructions that reflect what their production entailed” and “any analysis is contextually situated in time, place,
culture, and situation” (p. 131). Aligning with this conception, I approached my study via “interpretive inquiry,” in which “researchers make an interpretation of what they see, hear, and understand” (Creswell, 2007, p. 39). Given that “any theoretical rendering offers an interpretive portrayal of the studied world, not an exact picture of it” (Charmaz, 2006, p. 10), I acknowledge my influence as a researcher in this study on the interpretation and construction of the data I collected. I also recognize here that the shape and structure of the design of the study, data collection, data analysis, and the overall writing of this study were fully influenced by my position as a researcher, a teacher, and an individual (Creswell, 2007, pp. 178-179).

In order to gather “complex, detailed understanding” (Creswell, 2007, p. 40) of this pedagogic approach, I chose the most appropriate research method that allows for such a level of understanding—an ethnographic qualitative research method. Considering that my study focuses on the experiences and perceptions of six individual students in a 10th grade urban science class of 28 students, the case study method was appropriate to utilize within the ethnographic qualitative research approach.

**Case Study**

The case study qualitative research method was utilized in order to get a deeper and focused understanding of a smaller group of students in this class.

Case study research is a qualitative approach in which the investigator explores a bounded system (a case) or multiple bounded systems (cases) over time, through detailed, in-depth data collection involving multiple sources of information (e.g., observations, interviews, audiovisual material, and documents and reports), and reports a case description and case-based themes. (Creswell, 2007, p. 73)

Furthermore, “a case study design is employed to gain an in-depth understanding of the situation and meaning for those involved. The interest is in the process rather than outcomes, in context rather than a specific variable, in discovery rather than confirmation” (Merriam, 1998, p. 19). Case study is a powerful research method that can
provide “thick description” that “involves literal description of the entity being evaluated, the circumstances under which it is used, the characteristics of the people involved in it, the nature of the community in which it is located, and the like” (Guba & Lincoln, 1985, p. 119). Case study allows an “experiential perspective ... that emerges from the context itself” (p. 376). This aspect of the case study approach is important in an attempt to fully comprehend the experience of the participants throughout the year. Lastly, according to Merriam (1998), the distinct properties of a case study research allow exploration of the role of multiple variables within the given phenomena being studied and present possibilities for future research, while expanding on the body of knowledge within a given field.

Specifically, my research study is a single instrumental, bounded system [ethnographic] case study (Stake, 1995), bounded within the issue of science education for diverse learners. As noted above, the study focuses on a 10th grade urban science classroom, including immigrant students and students with learning disabilities, at a New York City public high school.

Although I collected ethnographic data on all 22 student-participants in the science classroom, 6 of them became the focus of the study, building two separate cases: one case discussing the experiences of four non-immigrant urban students and a second case discussing the experiences of immigrant urban students, selecting to focus on two immigrant students in this class. This was done in the process of the implementation of the set of pedagogic tools of reality pedagogy. Thus, within the case of these six urban students, a group of four and a group of two were singled out for focus within the case, as “subcases,” to offer “an even deeper understanding of processes and outcomes ... and a good picture of locally grounded causality” (Miles & Huberman, 1994, p. 26). Therefore, “there is a focus, or ‘heart’ of the study, and a somewhat indeterminate boundary that defines the edge of the case: what will not be studied” (p. 25). All 22 student-participants were observed in class and took part in cogenerative dialogue sessions and coteaching
activities; however, only the focal six students fully participated in all interviews. The teacher was also interviewed in order to gain multiple perspectives and delve deeper in understanding the impact of the 3C’s of reality pedagogy.

**Setting and Participants**

This study was conducted in a New York City public school inclusive of grades 7 through 12. It is a comparably small public high school and prides itself in having approximately 90 to a 100 students per grade. The school was in its 7th year at the time of the study and consisted of a vast majority of students of racial and socio-economic backgrounds that are traditionally underserved in New York City’s public schools. As this school is a zone school, a majority of the students attending here live in the surrounding nearby neighborhoods whose locations fall in the same designated zone of the school. Though this may be the case, some students, wanting to specifically attend this school, commute from neighborhoods much farther from the school’s location and travel up to one-and-a-half hour to attend the school.

An approximate breakdown of the school’s demographic statistics from the school’s website indicates the following regarding its student population at the time of this study: 63% Latino/Latina, 32% African American, 3% students of Asian/Pacific Islander, 1% American Indian, and approximately 1% White. Here, 75 % of the school’s population is female, and approximately 88% of the students qualified for free or reduced lunch at the time of the study. Also, 80% of this public school’s students generally entered the ninth grade scoring below grade level in English and math, while approximately 10% of the students qualified for special education services and 95 of the students qualified for ESL services at the time of the study. Though the school includes special need students and students qualifying for ESL services, there are no special
arrangements for students with special needs, nor are there ESL classes or content classes specifically designed to cater to ESL students.

The school aims to prepare its students for the health and medical professions and focuses on these fields in its curriculum. Students in this school participate in weekly internships in local health facilities, nursing homes, and hospitals. Students here also have uniforms consistent with the health professions theme of the school, which are medical scrub tops with colors specific to and indicative of their grade levels, and the teachers also wear white lab coats.

The specific 10th grade cohort of this study was chosen as per recommendation of the teacher with whom this study was conducted. I had previously conducted a pilot version of this study with this teacher in a previous year, so that the participating teacher in this study was familiar and comfortable with this study.

All participants of this study came from this 10th grade Living Environment class. Twenty-two out of the 28 were full participants in this study, though all 28 students were invited to join the study, only 22 completed and returned consent forms. The most common approach in qualitative research in terms of sampling, “purposeful” or “purposive” sampling (Merriam, 1998, p. 61) was practiced here, as the 22 students who fully participated maintained adequate attendance in this class and school attendance overall and thus were able to consistently participate in the dialogue sessions leading to the interviews. Each of the 22 participants of this study was part of a weekly 5-8 person cogenerative dialogue session. There were 23 dialogue sessions in total.

As noted previously, 6 out of the 22 students were the focus of this study and were interviewed in order to gain multiple perspectives of the diverse population of this class regarding the impact of reality pedagogy. Along with these six students, four other students were also interviewed. Interviewing all ten students throughout this study served two purposes here: (1) It avoided visibly singling out just 6 students out of the class of 28, allowing for a larger number of interested students to be involved. (2) It allowed data
to be gathered on the perspectives of multiple students regarding the impact of reality pedagogy for future separate studies. Table 3.1 displays the distinct information of each of the six participants.

Table 3.1. Study Participants

<table>
<thead>
<tr>
<th>Pseudonym</th>
<th>Nationality</th>
<th>Age</th>
<th>Gender</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maria</td>
<td>Dominican</td>
<td>15</td>
<td>Female</td>
<td>Non-Immigrant, Has No Learning Disability</td>
</tr>
<tr>
<td>Christian</td>
<td>Guyanese</td>
<td>15</td>
<td>Male</td>
<td>Non-Immigrant, Has Learning Disability</td>
</tr>
<tr>
<td>Nicole</td>
<td>African American</td>
<td>16</td>
<td>Female</td>
<td>Non-Immigrant, Has No Learning Disability</td>
</tr>
<tr>
<td>Tara</td>
<td>Gambian</td>
<td>15</td>
<td>Female</td>
<td>Non-Immigrant, Has Learning Disability</td>
</tr>
<tr>
<td>Rabina</td>
<td>Nigerian</td>
<td>14</td>
<td>Female</td>
<td>Immigrant, Has No Learning Disability</td>
</tr>
<tr>
<td>Ilia</td>
<td>Puerto Rican</td>
<td>15</td>
<td>Female</td>
<td>Immigrant, Has No Learning Disability</td>
</tr>
</tbody>
</table>

Role of the Researcher: Participant Observer

Qualitative researchers recognize and support the importance of considering “how the researcher can identify those effects [of being a participant observer] and account for them in interpreting the data” (Merriam, 1998, p. 103). In this study, my position as a participant observer called for me to assume two roles: one as an observer and the second as “a genuine participant … [having] a stake in the group’s activity and the outcomes of that activity” (Guba & Lincoln, 1981, pp. 189-190). In assuming the role of a participant observer, as the primary researcher of this study, it allowed me not only to observe and interview participants but also to participate as the initial facilitator of the cogenerative dialogue sessions. Further, my role as a participant observer allowed me the opportunity
to intimately gain understanding of the experiences of the participants, which in turn helped guide data collection and analysis of those data.

**Data Collection Methods**

Within the qualitative research approach of ethnographic case study, the methods of data collection, such as participant observation, individual participant interviews, and also cogenerative dialogue sessions themselves, were utilized to collect data for this study. Though cogenerative dialogue sessions were one of the three C’s being implemented in this study, these sessions were also key in understanding the participants’ development (via their interactions with other participants in the sessions) throughout the progression of the year. Table 3.2 summarizes the data collection methods utilized to address the research questions of this study.

**Table 3.2. Summary of Data Collection Methods**

<table>
<thead>
<tr>
<th>Research Questions</th>
<th>Data Collection Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>How does the yearlong experience of participating in reality pedagogy contribute to the development of self-efficacy in science within urban science students?</td>
<td>CD, PO, SI, TI, ICP</td>
</tr>
<tr>
<td>Which facets of the experience of participating in reality pedagogy are most valuable to urban science students in developing their self-efficacy?</td>
<td>CD, PO, SI, TI, ICP</td>
</tr>
<tr>
<td>What differences in self-efficacy can be noted in urban science students who fully partake in the tools of reality pedagogy?</td>
<td>CD, PO, SI, TI, ICP</td>
</tr>
<tr>
<td>Which facets of the experience of participating in reality pedagogy are most valuable to the immigrant students?</td>
<td>CD, PO, SI, TI, ICP</td>
</tr>
<tr>
<td>How does reality pedagogy contribute to the social capital of the immigrant students?</td>
<td>CD, PO, SI, TI, ICP</td>
</tr>
<tr>
<td>What role does reality pedagogy play in the distributed cognition process within the urban immigrant students in the progression of the study?</td>
<td>CD, PO, SI, TI, ICP</td>
</tr>
</tbody>
</table>

NB- Cogenerative Dialogues (CD), Participant Observations (PO), Individual Student Interviews (SI), Teacher Interviews (TI), Informal Conversations with Participants (ICP)
I utilized the first two to three weeks of September 2010, the beginning of this study, to determine which science class of the participating teacher, Mr. F, would be a good fit to conduct this study in, in terms of the students’ and teacher’s schedule and also making sure that the class selected would fulfill the criteria necessary for my study, for example, that it would include a sufficient number of immigrant students as required for my study. I had previously conducted a pilot version of this study with Mr. F, and so he was quite versed and comfortable with the study. With Mr. F’s recommendation, this 10th grade cohort was selected for this study.

Appendix B displays the schedule of this study in detail, including the activities that were conducted during the given weeks within the Autumn 2010-Spring 2011 school year. The schedule was designed with consideration to the school’s holidays, semester breaks, and schedules of the statewide, standardized (regents) exams. In total, the study was 34 weeks in length, and as I visited the school once a week, 34 classroom days of this particular class were video-recorded and used for this study.

All observations, cogenerative dialogues, and interviews were video-recorded, and additional field notes were collected. I also made memos and notes of these observations while transcribing the video data I collected. Data were also collected via informal conversations with the students intermittently during my weekly visits. Here, field notes of these informal conversations were also noted at the end of a given visiting day if such a conversation took place on that day. These informal conversations were not video- or audio-recorded, as they took place sporadically. To collect field notes during classroom observation, I utilized a chart I created (see Appendix A).

**Participant Observation**

Fourteen class sessions were observed in the autumn 2010 semester, beginning during the week of September 20th and taking place once a week until the week of December 20th. In the spring 2011 semester, 20 classroom observation sessions took
place beginning in January 3rd to June 6th, 2011. All 34 classroom observation sessions (weeks of observation sessions noted in Appendix-A) were video- and audio-recorded. While video-recording, the camera was stationed in the back of the class in order to capture the view of the whole class, while also keeping away from distracting students and allowing for the natural course of the class to take place. Four small audio-recorders were also strategically placed around the classroom in order to assure data was collected toward fulfilling the data asked for in the sixth, seventh, ninth, eleventh, twelfth, and thirteenth columns of Appendix A.

**Cogenerative Dialogue Sessions**

Nine cogenerative dialogue sessions took place in the Autumn 2010 semester, and 14 sessions took place the Spring 2011 semester. My study thus includes 23 video-recorded cogenerative dialogue sessions. The cogenerative dialogue sessions were guided using the questions in Appendix C and led to more specific conversations regarding the classroom issues and concerns. Cogenerative dialogue sessions generally included 4-5 students, Mr. F, and me. Here, the video camera was stationed in a location to enable capture of the view and voices of all participants. In the initial sessions, I generally initiated and facilitated the dialogues, but as the study progressed, Mr. F and also sometimes participating students initiated and facilitated the entire dialogue sessions.

**Individual Student Interviews**

In total, I interviewed each of the six focal students six times in the course of the year, three interviews being in the Fall semester (at the end of October, at the end of November, and toward the early end of December) and three in the Spring semester (at the end of March, at the end of April, and the final interview at the beginning of June). Each interview was approximately 15-20 minutes in length.

All interviews were semi-structured in nature, guided by the interview questions noted in Appendix D; however, mostly depending on the responses, more probing
questions were asked, leading to deeper conversations. Sometimes such deeper conversations were more informal in nature, which at times was necessary in order for some students to feel comfortable during the interviews. There were also additional questions and conversations toward gathering clarification as needed. These deeper, sometimes informal conversations and additional clarification dialogues also allowed for the data gathering via interviews to be “flexible” and “personal” (Guba & Lincoln, 1981, p. 164).

Teacher Interviews

The interviews with Mr. F were also conducted using the interview questions noted in Appendix D. Each of the four interviews was approximately 20-30 minutes in length. Similar to the individual student interviews, depending on his responses, more probing questions regarding relevant topics that arose were asked, leading to more in-depth questions and conversations with the teacher. I interviewed Mr. F four times in the course of the year, two times in the Fall semester (at the beginning of November and the beginning of December) and two times in the Spring semester (toward the end of March and at the end of May). These conversations were also carried out further through intermittent, informal conversations with the teacher in non-interview settings during the weekly visits and thus were not video-recorded and were only included in field notes for those given visiting days.

Data Analysis Methods

In the following section, I discuss how data were analyzed across my two findings chapters. I first discuss the ways in which data were analyzed within the self-efficacy, social capital, and distributed cognition frames. I then discuss how the classroom
observations and cogenerative dialogues were also analyzed during the data collection process. Lastly, I discuss how the interviews were analyzed in this study.

**Analysis of Data within the Theoretical Frames**

All of the transcribed data were thoroughly analyzed “line-by-line” (Charmaz, 2000, p. 517) while using the qualitative data analysis software called Atlas.ti (Muhr, 1997/2005). Parallel to the data analysis methods of grounded theory (Charmaz, 2006; Strauss & Corbin, 1998), I iteratively analyzed the data via an inductive approach (Charmaz, 2006; Creswell, 2007), while carefully studying the data throughout the study. Though the grounded theory approach seeks typically to explicitly develop a new theory, my approach in utilizing grounded theory is not in this direction.

“Constructivist grounded theory” (Charmaz, 2006), which originates in social constructivist epistemology, is utilized in my data analysis. While applying “constructivist grounded theory,” where “any analysis is contextually situated in time, place, culture, and situation” and where “both data and analyses are social constructions that reflect what their production entitled” (p. 131), the “initial coding” allowed for analytic categories of data to form toward categorizing the data in order for themes to emerge from the cases (Guba & Lincoln, 1981). “Initial coding,” using Atlas.ti to code all transcripts and field notes, allowed me to be “open to exploring whatever theoretical possibilities we can discern in the data,” while “stick[ing] closely to the data” (Charmaz, 2006, p. 47).

Following initial coding, “focused coding” also allowed to “synthesize and explain [these] larger segments of data” (p. 57) or analytic categories. While forming these analytic categories, the frame of self-efficacy, social capital, and distributed cognition surfaced. The theoretical frame of social capital was also discerned when the pilot version of this study was conducted two years prior to this study. Following this emergence, I closely studied the data and categories again to see what aspects of the data identified
with the categories of self-efficacy noted by Bandura (1994), social capital (Bourdieu, 1977; Portes, 1998), and distributed cognition (Hutchins, 2006).

**Analysis of Classroom Observations and Cogenerative Dialogues**

In the analysis of the data collected from each of the classroom observation sessions, I was in essence interested in and looking for an overall progression over time of the implementation of the three C’s. In that, in observing the two immigrant students (both females), for example, if, over time, one of the two students appeared to be more engaged in class, where, for instance, the classroom observation table (Appendix A) over time in column 6 showed that the student was talking in regard to the science content being taught in class more and more as the semester progressed, it allowed for a point of interest to investigate. In this case, in a consecutive interview, I inquired with the student about this behavior and looked for in the student’s response an affirmation or negation of whether they felt this increase in engagement in the science class was a reflection of the implementation of the cogenerative dialogue and coteaching.

Also, in the specific student’s cogenerative dialogue sessions, I looked to see whether she was either more or less engaged in the dialogues as the year progressed and later asked them in their individual interviews whether they felt this increase in engagement in the science class and the dialogue sessions was a reflection of the implementation of the cogenerative dialogues themselves and coteaching. This either confirmed that the implementation of the cogenerative dialogues and coteaching had an impact on the student becoming more engaged in the class or confirmed that the set of pedagogic tools did not have an overall impact on this specific student. This is also the method via which each of the three sources of data was triangulated.

**Analysis of Interviews**

The responses of each of the three interview questions (Appendix D) of each of the two students were transcribed and analyzed while using emergent coding to develop
categories and then themes from those categories using Atlas.ti (Muhr, 1997/2005). The first of the three questions focused on exploring whether or how cogenerative dialogues sessions held outside the classroom may impact students inside the science classroom and their science classroom life. The second question explored the possible impact of the practice of coteaching in the science class. Students were not asked the second question until after the implementation of coteaching in the classroom. Thus, the first two interviews did not include the second question. The third question attempted to explore whether the implementation of cogenerative dialogue and/or coteaching is progressively developing a sense of cosmopolitanism or cosmopolitan ethos within students.

The responses of each of the three interview questions of the teacher were also analyzed while using emergent coding toward developing categories leading to themes using Atlas.ti. Similar to the questions to the students, the first question to the teacher focused on cogenerative dialogues. However, here the focus was on the teacher’s perception of cogenerative dialogues and how he felt it may have impacted his science class and science students with whom he held the dialogues.

The second interview question to the teacher focused on coteaching and explored the teacher’s perception of the implementation of coteaching. Also, the first interview with the teacher did not include the second question, as the teacher was not asked the second question until after the implementation of coteaching in the classroom.

Finally, the third question explored whether the teacher felt that the implementation of cogenerative dialogue and/or coteaching brought about an overall change in the class in comparison to his other classes (where the three C’s had not been implemented) toward perhaps progressive development of a sense of cosmopolitanism among his students or a cosmopolitan ethos within students of this class.

All three of these data sources—classroom observations, cogenerative dialogues, and interviews—also served to establish triangulation with respect to the responses to the research questions.
Validity and Rigor

To ensure that my analyses and interpretations have “confirmability,” “dependability,” “credibility,” and “transferability” (Guba & Lincoln, 1989, pp. 236-243), I used five methods of rigor: “peer debriefing,” “member checking” (Merriam, 1998), “prolonged engagement,” “persistent observation” (Guba & Lincoln, 1989, p. 237), and “progressive subjectivity” (p. 238).

While practicing peer debriefing, I discussed my interpretations and emerging findings with others. Member checking was practiced after each of my interview sessions with my interviewees. This was essentially practiced to verify the accuracy of what I understood with what the participant was actually communicating.

I also practiced prolonged engagement in my research setting and persistent observation while observing the class once a week for an entire academic year. “Transferability” (p. 241) was established by the “thick descriptions” of the details of my research, such as its participants, settings, and analysis of findings.

While supporting how an individual case can contribute to understanding a larger phenomenon, Merriam (1998) explains that a phenomenon may be better understood while investigating and understanding the specifics and particulars of a single case. That is, understanding a particular case can offer details that can lead to obtaining general approaches and ideas applicable in separate but similar situations.

Lastly, in practicing progressive subjectivity, I made frequent detailed records of my ideas, interpretations, reflections, and observations toward keeping track of my “own developing construction” (Guba & Lincoln, 1998, p. 238).

Progressive subjectivity describes the process of the researcher scrutinizing and contemplating his or her prior and emerging assumptions and interpretations in relation to the project. Thus, the researcher records in his or her field log initial assumptions as well as what he or she expects to find during the process. If, during analysis, too much privilege is afforded to these expectations and assumptions, the researcher is too focused on
imposing her or his own assumptions and values, and not on attending to the constructions. (Coleman, 2001, p. 2)

Coleman further deliberates that if this sort of “contamination” (p. 2) is not looked into, then the results will be inaccurate and will not properly depict the realities of the participants but rather will only reflect what the researcher expected to find.
Chapter IV

EXPLORING THE TOOLS OF REALITY PEDAGOGY:
UNDERSTANDING THE IMPACT ITS IMPLEMENTATION HAS
ON PARTICIPANTS’ SELF-EFFICACY

Abstract

In this case study, the yearlong experience of four urban students enrolled in a science class of an urban public secondary school where the tools of reality pedagogy were being implemented is examined. The study examines reality pedagogy via the lens of self-efficacy in order to understand whether the tools of reality pedagogy contribute to the development of self-efficacy among these four urban students towards the subject of science. Two out of the four students in this study had a learning disability (LD) and the other two did not (NLD). One of the two LD students was more high functioning than the other. This study revealed that participating in reality pedagogy facilitated the development of self-efficacy in science of three of the four students, where one was an LD student and two were NLD.

Introduction

Building on the theories and ideologies of culturally relevant teaching, culturally responsive teaching, and critical pedagogy, this study investigates an approach called reality pedagogy. With its central goal being to support both teachers and students toward improving the experience of both groups in teaching and learning science in an urban academic environment, reality pedagogy (Emdin, 2009) in this study is particularly examined via the lens of self-efficacy (Bandura, 1977) in order to understand its impact on developing self-efficacy among urban students toward science.
Academic instructional practice that focuses on designing curricula and the execution of curricula and instructional content based on the cultural background of urban youth has been the focus of urban education for the past several years (Atwater, 2000; Freire, 1998; Gay, 2000). The reason for such a venture is the academic achievement gap that exists among urban students, which reality pedagogy attempts to bridge. Of particular concern is the existence of achievement gaps among urban students in the subjects of science and mathematics, despite greatest efforts to close such gaps (Seymour & Hewitt, 1997; Wright, Standen, & Patel, 2010). Researchers in the field of urban education refer to approaches such as reality pedagogy as culturally relevant pedagogy and culturally responsive pedagogy, where the teacher is informed of the cultural background of the population he/she is teaching and enhances the instruction while incorporating this knowledge in the execution of the lesson (Gay, 2000; Ladson-Billings, 1995). It enhances the execution of the lesson with consideration to the notion that “teachers are only effective if they know how to deliver content in a way that resonates with their students and causes their students to take ownership of that content and explore it more deeply on their own” (Emdin, 2011, p. 285). It is important for teachers to have a profound understanding of the cultural background of their students in order to be effective teachers in urban settings (Emdin, 2011; Johnson, 2009; Kind, 2009).

As defined by Bandura (1977), one’s self-efficacy belief is a function of their behavior and level of confidence, that when developed allows them the ability to achieve desirable outcomes while doing all that is necessary, i.e., gather necessary information or resources, organize the information, and finally execute the action. “These self-efficacy beliefs provide the foundation for motivation, well-being, and personal accomplishments in all areas of life” (Pajares, 2006, p. 339). Research also indicates that one’s academic self-efficacy plays a powerful role in their academic performance and achievement (Pajares, 2006). Given that the development of self-efficacy influences academic
achievement and the efforts of reality pedagogy also aim to enhance the academic experience in an urban science classroom environment, this study explores the contribution, if any, reality pedagogy makes to developing urban students’ self-efficacy toward science.

Theoretical Framework

Reality Pedagogy

Coined by Emdin (2007), reality pedagogy is an outgrowth of his research in urban classrooms and focuses primarily on understanding urban students and their culture within a particular social space, such as the science classroom. Parallel in some ways to critical pedagogy, reality pedagogy functions to develop students’ consciousness about the sociopolitical factors that impact their teaching and learning (Emdin, 2011). Toward meeting its goals, reality pedagogy engages five pedagogic tools that involve students and their teacher collaborating together to improve the teaching and learning of science. With its focus on the culture and realities of urban youth, while offering culturally relevant science pedagogy, reality pedagogy incorporates the culture and cultural influences of urban youth, such as some nuances of the hip-hop culture. In this manner, science instruction and content are presented and discussed in a fashion familiar to urban youth, particularly to those engaged in the hip-hop culture.

The five pedagogic tools are: cogenerative dialogue (cogens), coteaching, cosmopolitanism, and—more recently developed—context and content (Emdin, 2009). In this study, I focus on the implementation of the first three pedagogic tools.

Cogenerative Dialogue. Cogenerative dialogues are in essence dialogues that students have with their peers and teacher to co-create a plan of action for their class. The primary goal of cogens is to make collective decisions about the responsibilities, roles, and rules that preside over students’ lives (Roth, Tobin, & Zimmermann, 2002). Cogens
“lend themselves to discussions with students about inhibitors to their engagement in the classroom” (Emdin, 2011, p. 287). The structure of a cogen session that was implemented in this study included having four to six students (this number of students is ideal for cogens, as this size allows for both intimate and robust discussions) and their science teacher gather together during their lunch period in having a discussion focused on their science class. Here, the group gathered engages in critically deconstructing and reflecting on the occurrences of their science classroom, following which the group collaboratively decide at least one thing related to the teaching and learning in their classroom that can be improved upon when they return to the classroom. Thus,

In these dialogues, a small group of students are given the opportunity to reflect on their classroom learning, and, most importantly, provide teachers with an insight into what can work well in the classroom from the students’ perspective. (Emdin, 2011, p. 287)

Emdin (2011) further relates cogens to hip-hop cyphers, “which are a complex form of group communication that hip-hop youth engage in” in private settings or within their community (p. 288). This form of communication is similar to how cogens are structured in that, much like cyphers where rap (a type of music within the hip-hop genre) artists or rappers communicate with each other following a set of rules of engagement that are structured, in cogens students exchange dialogue and communicate with one another while also following a set of rules.

First, all participants are positioned in a circle with equal space among participants. Second, there are equal opportunities for rappers/participants in the cypher to perform. Third, there is a consistent effort to reference the collective experiences of all participants as the dialogue/exchange continues. Like the cypher, participants in cogens are positioned in a circle, have equal turns to talk, interact with no voices being privileged over others, and work together to create a plan of action for improving their shared experiences in the classroom. (p. 288)

Such form of communication as cogenative dialogues allows teachers to teach in a more culturally relevant manner, as it allows teachers to hear and “take part in conversations that can shift teaching practices in ways that reflect student standpoints and
insight into the inner-workings of the classroom” (Emdin, 2011, p. 288). Next to the instruction being more culturally relevant, it is more effective, as it is “based on students’ thoughts and ideas instead of teachers’ conceptions or assumptions about their students’ culture” (p. 288).

**Coteaching.** Reality pedagogy defines coteaching in two scenarios. In the first scenario, coteaching methods call for a role reversal between the teacher and the student. Here, the student (or a small group of students) delivers the content in the way they feel is relevant to their peers in the class, who share the same cultural background. The student is deemed more knowledgeable here and an expert on how to best deliver the content so as to best reach the rest of the class, who share a similar background with him/her. The teacher thus plays the role of a novice learning to teach (Emdin, 2011). In developing the lesson-plan and preparing the content to teach, the teacher also plays a role in helping the student while providing and giving access to any necessary teaching materials, textbooks, or web resources, like lesson plans and any other instructional or content-related materials. Here, while the student-teacher is allowed the opportunity to prepare and teach the lesson, the teacher is positioned both “physically and symbolically ... to learn from the student” (p. 289). Moreover, within this form for enacting coteaching, the teacher is allowed the opportunity to learn from the ways in which his/her students would enact pedagogy. Here, the teacher is able to observe the lesson, take note of the ways in which the student enacts pedagogy, note the ways in which students explain certain concepts, specific examples the student uses, ways in which the student interacts with their peers while teaching and overall “learn[s] how to teach in ways that reflect the realities of student experiences” (p. 289).

In the second coteaching scenario, students co-teach science content to one another on a one-to-one basis during class activities in the science class. Here, students are matched up based on their strengths and weaknesses with a given content. The focus in this scenario is to allow students to establish and develop their academic strengths while
allowing them to teach what they understand and know well. Here also, focus is placed on addressing content deficiencies of students who are struggling with a specific topic, where students help teach their own peers with content knowledge their peers are struggling with. Thus, the scope of coteaching “focuses on youth who feel responsible for each other’s learning and the collective success of all students within the classroom” (Emdin, 2011, p. 289). This sense of collective responsibility is also what encompasses cosmopolitanism, the third pedagogic tool of reality pedagogy, which I will discuss further shortly.

Research indicates that both of these types of coteaching play a role in empowering urban students toward not only the subject and contact of science (particularly the specific content the students teach) but also encourages them to consider teaching and the field of science as career options (Emdin, 2009). Other research support that a good way to introduce youth to future professions is to expose these to them (McGee & Keller, 2007), and coteaching in this manner does just that by allowing students firsthand experience in teaching. Both of these types of coteaching (student as student-teacher and more than one student as science teacher) were employed in this study.

**Cosmopolitanism.** Appiah (2006) frames cosmopolitanism as valuing individual differences but also simultaneously having a collective responsibility for one another. Within the frame of reality pedagogy, Emdin (2011) translates this philosophical construct into a tangible approach while “transforming human roles in social settings” (p. 290). Within the urban science classroom, Emdin’s third C, cosmopolitanism, functions to support a smooth operation of the classroom, beginning with the teacher identifying roles for students that may be non-traditional in nature. Here the student’s role in the classroom is not just the role of a learner, but he/she must be more involved in nature and is required to take ownership and responsibility of duties that are required for the classroom to run in a smooth manner. These roles also allow the students to feel more connected to their class and facilitate development of the desire to learn within it. Such
roles may be alternated among students as desired and include but are not limited to: material and equipment distributor, who distributes handouts and equipment; classroom material manager, who maintains the books and instructional equipment; greeter of any visitors (teachers, administrators, and any other guests); computer/technology manager, who looks after the technology (computers, laptops, LCD projector, smart-board) in the classroom; discussion leader and “even comedian, who is a designated person to provide comic relief in a class” (p. 290). Such roles, as Emdin explains, “[allow] students to become invested in the daily operation of the classroom, which, in turn, allows the teacher to be more effective in the delivery of the content” (p. 290)

**Context.** Context, the fourth C of reality pedagogy, considers the students’ contexts and lifeworlds outside the classroom and aims to incorporate them into the classroom. The teacher here is encouraged to utilize and integrate into the classroom both physical and symbolic artifacts from the students’ lifeworlds. Physical artifacts, such as a rock from a local community park or a picture of a local eroded building from the students’ neighborhood, are more familiar, relatable, and significant examples of weathering rather than information from texts and websites far removed from students’ lives. Symbolic artifacts refer to the use of non-tangible examples, such as utilizing terms and ways of communication from the students’ lifeworlds and culture. In this case, references from the urban and hip-hop culture are familiar to students and integrated by the teacher. This practice also allows the teacher to become aware of, if not immerse himself/herself into, the students’ contexts and culture via actual physical presence in those contexts, allowing him/her to have understanding or least exposure into the complexities of students’ background (Emdin, 2011). “It almost forces the teacher to look at the lesson and the way it is prepared through the lens of its significance to the students” (p. 291). Also, while utilizing this pedagogic tool, students are able to make connections to the artifacts in their lifeworlds while viewing them through the lens of science. Lastly, the overall application of this pedagogic tool “allows the teacher to
display an effort to make science relevant for students that students can both appreciate and admire” (p. 291).

**Content.** The fifth and final C of reality pedagogy refers to the Content or the science topics in the particular syllabus or curriculum the teacher is to cover. Here, the focus involves the teacher and his/her “willingness to both expose and embrace the limitations in their content knowledge within the classroom” (Emdin, 2011, p. 291). In this way, a space is carved out for codiscovery of the content knowledge. “Once the understanding that science or any other discipline being taught is but an infinite body of knowledge ripe with interrogation, the willingness to exchange within the classroom and support the teacher in the codiscovery of new knowledge begins” (p. 291).

**Self-efficacy**

Coined by cognitive psychologist Albert Bandura (1995) within his social cognitive theory, the concept of self-efficacy refers to “the belief in one’s capabilities to organize and execute the courses of action required to manage prospective situations” (p. 2). It is one’s belief in their own capabilities to produce results, which in turn provide incentives to overcome difficulties and persevere to complete a given task. In other words, “self-efficacy beliefs provide the foundation for motivation, well-being, and personal accomplishments in all areas of life” (Pajares, 2005, p. 339).

In regard to youth, Pajares (2005) further explains, “unless young people believe that their actions can produce the results they desire, they have little incentive to act or to persevere in the face of difficulties that inevitably ensue” (p.339). Particularly, young people can be persuaded to participate in assigned activities or coaxed to complete a given task; however, without self-efficacy beliefs, they will choose, if given an option, an activity or task that is within their capabilities while evading those they feel are difficult and beyond their perceived competence.
Pajares (2005) further denotes that a poor sense of self-efficacy gives rise to self-doubt, which in turn causes the person to shy away from any task they perceive as difficult, eventually considering these tasks as a “personal threat.” A low sense of self-efficacy also results in “low aspirations and weak commitment to the goals they choose to pursue” (p. 2). Moreover, a person with a low or poor sense of self-efficacy “when faced with difficult tasks, [will] dwell on their personal deficiencies, on the obstacles they will encounter, and all kinds of adverse outcomes rather than concentrate on how to perform successfully” (p. 2). Also, they are a lot more relaxed in their efforts and tend to give up much quicker when facing difficulties compared to a person with a healthier self-efficacy. Finally, “because they view insufficient performance as deficient aptitude, it does not require much failure for them to lose faith in their capabilities” (p. 3). Thus, they are “slow to recover their sense of efficacy following failure or setbacks” (p. 2).

Considering that even approaching a task, a person with a poor sense of self-efficacy, due to self-doubt, tends to evaluate and re-evaluate whether they can even begin to take part in the task, it can be concluded that a weak sense of self-efficacy on some levels can be very debilitating. Therefore, I would consider addressing and helping to develop a healthy sense of self-efficacy among youth of high importance as it has the potential to have vast impact on youngsters and their psychoses (Bandura, 1977), not only in their academic lives as they grow and develop academically in schools, but also as they grow and develop as participants of our world.

Many noteworthy contributions have been made by researchers toward understanding and recognizing self-efficacy and its connection to motivation and also achievement (Pajares, 2005). Pajares explains that one’s self-efficacy helps foster the outcome one expects from oneself. Thus, a student who is confident would expect successful outcomes in their social interaction if they are confident in their social skills, and good academic performance if they are confident in their academic skills. The reverse is true with students who lack confidence. Students who lack confidence and
“doubt their social skills often envision rejection or ridicule even before they establish social contact. Those who lack confidence in their academic skills envision a low grade before they even begin an exam or enroll in a course” (p. 342). With regard to academic self-efficacy, Pajares further explains that:

Academic self-efficacy influences cognitive strategy use and self-regulation through the use of metacognitive strategies, and self-efficacy is associated with in-class seatwork and home-work, exams and quizzes, and essays and reports. In psychology, “intelligence” (in the form of IQ) has typically been acknowledged the most powerful cognitive predictor of achievement. But when researchers tested the joint contribution of self-efficacy and intelligence to the prediction of achievement, they found that students’ self-efficacy beliefs made a powerful and independent contribution to the prediction of their academic performance. Clearly, it is not simply a matter of how capable you are; it is also a matter of how capable you believe you are. Self-efficacy explains approximately a quarter of the variance in the prediction of academic performances. Lest you think that a modest contribution, consider the many and varied factors that impinge on a student’s experience. Any psychological factor capable of explaining 25% of the variance in most academic outcomes merits attention and even a bit of awe. (p. 343)

Self-efficacy is distinct from other self-percept constructs such as self-concept, self-esteem and outcome expectations because it focuses on perceived capabilities (Zimmerman & Cleary, 2008). Perceived self-efficacy is defined as people’s beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives (Bandura, 1994). Further, perceived self-efficacy is noted as a particularly influential and powerful standpoint, as it allows the “beliefs in one’s capabilities to organize and execute the courses of action required to produce given attainments” (Bandura, 1997, p. 3). Several researchers suggest that motivation, or the willingness to initiate and sustain goal-directed activity, is influenced by self-efficacy (Bandura, 1993; Jinks & Morgan, 1999; Pajares & Schunk, 2005; Pintrich & Schunk, 2002; Zimmerman & Martinez-Pons, 1990).

Bandura (1994) explains that there are four main sources that can influence one’s beliefs about their self-efficacy: (1) mastery experiences, (2) vicarious/social modeling
experiences, (3) social/verbal persuasion, and (4) physiological/somatic and affective/emotional states. Mastery experiences are the most effective in creating a strong sense of efficacy. Here, Bandura explains that “successes build a robust belief in one's personal efficacy.... A resilient sense of efficacy requires experience in overcoming obstacles through perseverant effort” (p. 3). If a person is able to succeed while overcoming difficulties and setbacks, this experience allows them to learn and become convinced that they have what it takes in order to succeed. In being convinced, “they persevere in the face of adversity and quickly rebound from setbacks. By sticking it out through tough times, they emerge stronger from adversity” (p. 3).

Vicarious experiences provided by social models comprise the second way of creating and strengthening self-beliefs of efficacy. “Seeing people similar to oneself succeed by sustained effort raises observers’ beliefs that they too possess the capabilities to master comparable activities to succeed” (p. 3). Here, Bandura (1994) proposes that a person uses this sort of “modeling” as a social standard to compare and judge themselves against their own capabilities. The psychology here is that “people seek proficient models who possess the competencies to which they aspire,” and “through their behavior and expressed ways of thinking, competent models transmit knowledge and teach observers effective skills and strategies for managing environmental demands” (p. 3), which, in turn, helps increase the sense of perceived self-efficacy within the observer.

The third way of strengthening people's beliefs that they have what it takes to succeed is social/verbal persuasion. Bandura (1994) describes this source while explaining that “people who are persuaded verbally … possess the capabilities to master given activities [and] are likely to mobilize greater effort and sustain it than if they harbor self-doubts and dwell on personal deficiencies when problems arise” (p. 3). Here, such persuasion boosts one’s perceived self-efficacy in such a way that it leads them to try to work hard enough to achieve success. This, in turn, promotes the development of skills, and overall, it allows an opportunity for increasing one’s sense of personal efficacy.
Physiological/somatic and emotional states of an individuals also play a role in their judging their capabilities. Thus, the fourth source of self-efficacy is physiological/somatic and affective/emotional states. In that, the individual “interpret[s] their stress reactions and tension as signs of vulnerability to poor performance” (Bandura, 1993, p.4). Here, while taking part in strenuous activities, the fatigue, pains, and aches caused by the activities are judged as signs of physical debility. Also, mood is considered part of the factors that affect people’s judgments of their personal efficacy. “Positive mood enhances perceived self-efficacy; despondent mood diminishes it” (Bandura, 1994, p. 3). Thus, the fourth source of self-efficacy involves reduc[ing] people’s stress reactions and alter[ing] their negative emotional proclivities and misinterpretations of their physical states…. People who have a high sense of efficacy are likely to view their state of affective arousal as an energizing facilitator of performance, whereas those who are beset by self-doubts regard their arousal as a debilitator. Physiological indicators of efficacy play an especially influential role in health functioning and in athletic and other physical activities. (p. 3)

The personal traits of a person with a healthy sense of self-efficacy thus involve several positive qualities that take part in establishing a person who is confident, diligent, and capable. Thus, persons with a strong sense of self-efficacy are more willing to set challenging goals for themselves while maintaining a strong commitment to accomplish these goals. “They heighten and sustain their efforts in the face of failure while … quickly recover[ing from] their sense of efficacy after failures or setbacks” (p. 2). A person with a strong sense of self-efficacy also attributes failure to lack of skills and deficient knowledge, which are acquirable, and to insufficient effort. “They approach threatening situations with assurance that they can exercise control over them” (p. 2). These positive qualities, if attained, not only increase one’s opportunities to successfully accomplish personal goals, but also allow him or her to achieve the goal with less stress, ultimately lowering vulnerability to depression (Bandura, 1997).
Given that a strong sense of self-efficacy has such positive benefits and can potentially allow for desirable and positive outcomes, the instillation of a strong sense of self-efficacy, particularly at a young age, ought to be strongly encouraged. Toward this effort, we also ought to consider methods via which the development of self-efficacy can be encouraged and incorporated in schools where youngsters are presented with tasks and academic subjects that they oftentimes have difficulty with. The key here is to introduce such tasks or difficult academic subjects via activities that may potentially allow students to develop their self-efficacy. Within this effort, in this study, I investigate whether the tools of reality pedagogy and their implementation in an urban science classroom contribute to developing self-efficacy among the urban youth in that class.

**Research Questions**

This study seeks to shed light on the experiences of urban science students and their development of self-efficacy while they participate in the learning environment of reality pedagogy. Using the lens of self-efficacy and the four modes of developing self-efficacy (Bandura, 1997), this study examines the pedagogic tools of reality pedagogy to uncover the aspects of these pedagogic tools that may impact the development of self-efficacy within students in an urban science classroom. As studies indicate (O’Brien, Kopala, & Martinez-Pons, 1999), a higher sense self-efficacy within urban students in science is an important goal for science educators, since it may have far-reaching effects in their academic and professional futures. Here, a high sense of self-efficacy is encouraged among urban students, just as it is encouraged among non-urban students as this heightened sense of one’s capabilities plays quite an impactful role in their ability to execute specific tasks and then, moving forward, plays a significant role in future careers and endeavors (Bandura, 2007).
This study addresses one overarching research question with two sub-questions:
How does the yearlong experience of participating in reality pedagogy contribute to the development of self-efficacy in science within urban science students?

a. Which facets of the experience of participating in reality pedagogy are most valuable to urban science students in developing their self-efficacy?

b. What differences in self-efficacy can be noted in urban science students who fully partake of the tools of reality pedagogy?

Method

In this ethnographic case study, I examine the development of self-efficacy of four urban students in the process of the implementation of the 2 C’s (cogenerative dialogue and coteaching) of reality pedagogy. The first two C’s are implemented, while the emergence of the third C (cosmopolitanism) is observed in this study. Case study is appropriate here, as “the intent … is to determine how the culture works rather than to understand an issue or problem using the case [or cases] as a specific illustration” (Creswell, 2007, p. 73). In that, the case study method is appropriate here, as the objective is to understand reality pedagogy and its impact among urban students, and it is studied through the cases of the four urban students. As defined by Yin (1994), a case study is an empirical inquiry that investigates a contemporary phenomenon (reality pedagogy) within its real-life context” (p. 13).

Setting

I conducted this study at a New York City public school, which includes grades 7 through 12, enrolling approximately 540 students. The school’s curriculum focuses on the health and medical fields, as the school aims to prepare its students for careers in health professions and medicine. Consistent with the health professions theme of the
school, the students wear medical scrub tops with colors specific to and indicative of their grade levels, and the teachers wear white lab coats. Students also participate in weekly internships in hospitals, local health facilities, and nursing homes.

The school was in its 7th year at the time of the study. Approximately 88% of the students within this population qualify for free or reduced lunch programs. Approximately 10% qualify for ESL services, and 95 students qualify for special education services in this school. According to the school’s website, 75% of the school’s population is female, and the ethnic makeup of the student population includes: 63% Latino, 32% African American, 3% Asian/Pacific Islander, 1% American Indian, and approximately 1% White.

Participants

The specific cohort of this study was chosen as per recommendation of the teacher with whom this study was conducted. All participants of this class came from a 10th grade class of 28 students. Though all 28 students completed consent forms and were invited to join the study, only 22 were full participants. “Purposeful” or “purposive” sampling (Merriam, 1998, p. 61) was practiced here, as the 22 students who fully participated maintained adequate attendance in this class and school attendance overall and thus were able to consistently participate in the dialogue sessions leading to the interviews.

The participants included 18 females and 4 males (consistent with the school’s male to female ratio). The ethnicities of the full participants include: 13 Latino/Latina, 4 African American, 3 West Indian, 1 African, and 1 Middle Eastern. All of these students have been attending this school from ninth grade and were 15 or 16 years of age with the exception of one student who was 14. According to the school’s records, two students out of this entire class were noted as immigrants of the United States, entering and residing in the country for less than 5 years.
Out of this group of 22 students, the teacher randomly selected 4 non-immigrant urban students who were interested in participating in interviews. Data from working with these four students eventually helped formulate the self-efficacy frame for this study, which examines the impact of the implementation of reality pedagogy. The participants of this study were: Maria, Christian, Nicole, and Tara (all pseudonyms).

**Maria.** Maria, age 15, is a Hispanic student of Dominican nationality (from Dominican Republic) but was born and grew up in New York. Maria indicated at the very beginning of the study that she was interested in a career in psychology and wanted to obtain all the academic and professional degrees, including the highest degree necessary to achieve a career in psychology. She indicated that she had performed well academically in all her classes including science and wanted to continue to do well in order to achieve her career goal. Her science teacher confirmed this fact about Maria. Socially, Maria appeared to get along with her classmates in this science class.

**Tara.** Tara, age 15, is an African student originally from Gambia and moved to the United States, New Jersey specifically, when she was very young. She and her family moved to New York when she was 10 years old. Tara indicated that she was very interested in a career in the sciences or history and was unsure about her specific field of interest in either subject area. She indicated that she is determined to do well in school and eventually wants to complete a college degree toward her career. She also indicated that she likes to be organized in her work and in general. Tara was an inclusion student with a learning disability. Her science teacher indicated that Tara often came to class late but did her very best to make up missed work due to lateness. Her lateness was due to her long commute to school, and given that this class was her first period class, frequent transportation disruptions or changes (beyond her control) in her long commute to school resulted in her frequent lateness to class. According to her science teacher, Tara showed just average performance in science in the beginning of this study but always put in a lot of effort.
Nicole. Nicole, age 16, is an African American student born and raised in New York. She was one of the more vocal students in this class. Nicole did not particularly indicate an interest in the academic aspects of school but appeared to be fairly social with most of the students in the science class. She did not indicate a particular interest in science, and, as confirmed by her science teacher, her science performance was mediocre. Per her science teacher at the beginning of this study, Nicole has potential to do well academically in class, but she is not interested in putting in the effort.

Christian. Christian, age 15, is from Guyana and moved to New York with his family at a very young age. Christian was a very quiet and shy student in this class and generally opted to sit in the back of the class on his own. He mentioned that he liked playing video games and often stayed up nights playing. He mentioned that this was generally why he appeared to be tired in class sometimes. He did not particularly indicate or project an interest toward school, and his science teacher confirmed that he was struggling in science at the beginning of this study. His science teacher indicated that Christian often appeared to try to engage with at least one other classmate in this class but was never really accepted by any particular student or group of students. Christian was an inclusion student with a learning disability.

Teacher. Mr. F, age 27, is a New York City 7-12 grade certified science teacher who identifies himself as an Italian American. Born and raised in New York, Mr. F appeared quite familiar with the current urban culture most students in this class were immersed in, as he often made references to current musical artists and televisions shows that students in this class recognized. Mr. F took part in the pilot version of this study that I had conducted two years prior, and thus he was quite familiar and comfortable with the nuances of this study. Given that he was familiar with the needs of the study (that it required students to meet in groups during their lunch periods and required that they be interviewed periodically), his recommendation was key to selecting this 10th grade cohort of students. In selecting the class, Mr. F and I carefully decided on a cohort whose
schedules best suited my study’s schedule. He maintained a friendly, approachable, and supportive demeanor toward all his students throughout the study and was open to the various implementations of the study and the consequent suggestions of the students.

**Data Collection**

Data for this study were collected through classroom observations, cogenerative dialogue sessions, individual interviews, and informal conversations. These four modes of data collection allowed for “thick descriptions” (Guba & Lincoln, 1981, p.164) of the cases presented.

**Classroom Observations**

Beginning in September 2010, I visited the school once a week. In the initial two visits, I observed all cohorts taught by the participating science teacher. From the recommendation of the teacher, one cohort of 28 tenth grade students was selected for this study. The class selected was entitled “living environment, which was a year-long life science course, after successful completion of which students were required to take the New York State standardized Regents exam. This was an inclusion class, as it consisted of students with special learning needs as indicated by the teacher at the beginning of the study (the particular inclusion students and their particular special needs were not revealed to me per the school’s policy; however, I came to know and learn about some of the inclusion students throughout the progression of the study). Thus, there was a second teacher, an inclusion teacher, in this class. The inclusion teacher however, was only part of the class for the first few weeks of the academic year as, after her departure from the school, no other teacher was assigned to assist this class with its inclusion students. Each classroom observation session (34 weeks of observations) was video- and audio-recorded. The video camera was usually stationed at the back of the
class, making sure to capture a view of the whole class. Four small audio-recorders were also strategically placed around the classroom. The audio-recorders were placed in these locations as the audio capability of the video camera sometimes had difficulty capturing the conversations in these locations due to distance from the camera.

**Cogenerative Dialogue Sessions**

Cogenerative dialogue sessions began in the second month of the study (October 2010) and lasted until the week of winter break (December 20). Nine cogenerative dialogue sessions took place. The congens resumed after the New Year, and during the spring semester, 14 cogenerative dialogue sessions took place. The study thus includes 23 video-recorded cogenerative dialogue sessions with the four students, other students who had consented to the study, and their teacher. A question protocol was used to direct all cogenerative dialogue sessions (Appendix C). The protocol led to more specific conversations regarding the classroom issues and concerns.

**Individual Student Interviews**

In total, I interviewed each of the four students in separate interviews six times in the course of the year—three interviews in the fall semester (at the end of October, at the end of November, and toward the end of December) and three in the spring semester (at the end of March, at the end of April, and the final interview in the beginning of June). The interviews were semi-structured in nature, guided using the interview questions (Appendix D); however, mostly depending on the responses, more probing questions were asked, leading to deeper conversations with the four students. Sometimes such deeper conversations were more informal in nature, which at times was necessary in order for some particular students to be able to feel comfortable during the interview. This also allowed for the data gathering via interviews to be “flexible” and “personal” (Guba & Lincoln, 1981, p.164). Each interview was 15-20 minutes in length.
**Individual Teacher Interviews**

I interviewed the teacher four times in the course of the year, two times in the fall semester (at the beginning of November and the beginning of December) and two times in the spring semester (toward the end of March and end of May). The interviews with the teacher were also conducted using the interview questions in Appendix D. As I was interested in what the participants’ perceptions of the impact of the reality pedagogy were in this study, throughout the study, all participants, students and teacher alike were asked very similar questions regarding their perception of the implementation of reality pedagogy. Depending on the teacher’s response, more probing questions regarding relevant topics that arose were asked, leading to more in-depth questions and conversations with the teacher. Informal conversations with the teacher during the weekly visits were not video-recorded and were only included in field notes on visiting days. Each of the four interviews with the teacher was 20-30 minutes in length.

**Data Analysis**

Parallel to the data analysis methods of grounded theory, I iteratively analyzed the data via an inductive approach (Charmaz, 2006), while carefully studying the data throughout the study. All of the transcribed data were thoroughly analyzed “line-by-line” (Charmaz, 2000, p. 517) while using the qualitative data analysis software called Atlas.ti (Muhr, 1997/2005). Next to carefully studying all data collected throughout the study, at the end of the data collection period, when the whole data set was in my vision, I conducted “initial coding” using Atlas.ti to code all transcripts and field notes, allowing myself to be “open to exploring whatever theoretical possibilities we can discern in the data,” while “stick[ing] closely to the data” (Charmaz, 2006, p. 47). In applying the specific grounded theory method of analysis known as “constructivist grounded theory” (Charmaz, 2006), where “any analysis is contextually situated in time, place, culture, and
situation” and where “both data and analyses are social constructions that reflect what their production entitled” (p. 131), the initial coding allowed for analytic categories of data to form toward categorizing the data in order for themes to emerge from the cases (Guba & Lincoln, 1981).

Following initial coding, “focused coding” also allowed me to synthesize and explain larger segments of data, or analytic categories (Charmaz, 2006), which led to deducing the categories into four themes. These four themes allowed me to clearly visualize the impact reality pedagogy had on the participants of my study, which in turn connected with the theoretical frame of self-efficacy, as indicated in Figures 4.1 and 4.2. Following this emergence, the data were closely studied again to see what aspects of the data identify with the categories of self-efficacy noted by Bandura (1994).

**Credibility and Rigor**

In order to ensure that my interpretations and analyses have “dependability,” “credibility,” “confirmability,” and “transferability” (Guba & Lincoln, 1989, pp. 236-243), I used five methods of rigor: “member checking” (Merriam, 1998), “peer debriefing,” “prolonged engagement,” “persistent observation” (Guba & Lincoln, 1989, p. 237), and “progressive subjectivity” (p. 238). *Member checking* was practiced after each of my interview sessions with my interviewees. This was essentially practiced to verify the accuracy of what I understood with what the participant was actually communicating. While practicing *peer debriefing*, I discussed my interpretations and emerging findings with others. In my research setting and also while studying my data, I also practiced *prolonged engagement* and *persistent observation* while visiting the school, observing the class and working with the students during cogenerative dialogue sessions once a week for an entire academic year. Lastly, in practicing *progressive subjectivity*, I made frequent detailed records of my ideas, interpretations, reflections, and observations toward keeping track of my “own developing construction” (p. 238). “Thick
descriptions” of the details of my research, such as the participants, settings, and analysis of findings contribute to this study’s “transferability” (p. 241). Merriam (1998) states that a phenomenon may be better understood while investigating and understanding the
PART I

PRELIMINARY ANALYSIS THROUGHOUT DATA COLLECTION
- Wrote reflective memos based on daily observation table
- Wrote reflective field notes based on daily observation table
- Read transcript as a whole line-by-line
- Created list of salient analytic categories

Coded all Cogen and Interview transcripts using Atlas.ti

INITIAL LIST OF RELEVANT CODES
- Students' willingness to set aside personal difference
- Students collaboratively reaching out to difficult student
- Students interrogates another student in cogen respecting disruptive class
- Students interrogates another student in cogen respecting studying habits
- Increased communication in class between student and teacher regarding science content
- Teacher recognizes students more involved in science class activities
- Teacher indicates coteaching helped students improve overall academically
- Teacher indicates students are very interested in coteaching

Students' willingness to negotiate a plan of action to improve class
Students and teacher negotiate class attendance
Teacher listens to students' perspectives
Teacher praises teacher for his effort
Teacher recognizes students for their efforts
Student having need for classroom seating arrangement
Student voicing need for instructional changes
Students and teacher negotiate class lesson interaction "willingness" rules

Teacher indicates students come up with their own method of understanding science topics via coteaching
Student recognizes teacher's encouragement in class
Student recognizes teacher's encouragement in class
Student recognizes teacher's encouragement in class
Teacher recognizes students with attention in cogen
Student voicing need for change in text format
Student voicing need for deeper review before tests
Student more attentive in class due to teacher recognizing his opinion voice
Teacher recognizes teacher's encouragement in cogen
Students respecting each other's voice and opinion in cogen
Students respecting each other's inputs during coteaching
Students respect each other's perspectives
Students listen to students' perspectives
Students respect each other's insights during coteaching
Students respect each other's voice and opinion in cogen

Increased communication in class among students regarding science content
Increased communication in class among students regarding science content
Increased communication in class among students regarding science content
Increased communication in class between student and teacher regarding science content
Teacher recognizes students are more involved in science class activities
Increased communication in class between student and teacher
Students respecting each other's voice and opinion in cogen

Increased communication outside class (cogens) among students

IMPACT OF COGEN
- Increased communication in class among students and teacher
- Increased communication outside class (cogens) among students
- Students reporting each other's voice and opinion in class
- Students recognizing each other's insights in class during coteaching

IMPACT OF COTEACHING
- Increased class duration of class among students regarding science content
- Increased communication in class between student and teacher regarding science content
- Teacher recognizes students are very interested in science class activities
- Teacher indicates coteaching helped students improve overall academically
- Teacher recognizes students come up with their own method of understanding science topics via coteaching

STUDENTS PERCEPTION
- Students recognize teacher's encouragement and attention in class during cogen
- Students recognize teacher's encouragement and attention in class during cogen
- Student recognizes teacher's encouragement and attention in class during cogen
- Teachers encourage students to participate and speak up in cogen
- STUDENTS COMMUNICATION AND MODERATION
- Teachers encourage students to participate and speak up in cogen
- Teachers encourage students to participate and speak up in cogen
- Teachers encourage students to participate and speak up in cogen
- Teachers encourage students to participate and speak up in cogen
- Teachers encourage students to participate and speak up in cogen

TEACHER STUDENT COMMUNICATION AND MODERATION
- Teacher and students recognize a plan of action to improve class
- Students and teacher negotiate class attendance
- Teachers recognize students are very interested in science class activities
- Teacher recognizes students are very interested in science class activities
- Teacher recognizes students are very interested in science class activities

TEACHER STUDENT COMMUNICATION AND MODERATION
- Teacher and students recognize a plan of action to improve class
- Students and teacher negotiate class attendance
- Teachers recognize students are very interested in science class activities
- Teacher recognizes students are very interested in science class activities
- Teacher recognizes students are very interested in science class activities

STUDENTS' PERCEPTION
- Students recognize teacher's encouragement and attention in class during cogen
- Students recognize teacher's encouragement and attention in class during cogen
- Students recognize teacher's encouragement and attention in class during cogen
- Teachers encourage students to participate and speak up in cogen
- Teachers encourage students to participate and speak up in cogen

GROUPED CODES INTO CATEGORIES

Figure 4.1 – Part I – Process of data analysis leading to four themes

ACADEMIC SHIFT TOWARDS IMPROVEMENT
- Improved communication
- Increased participation and involvement in class

STUDENTS' FEELINGS OF ACCEPTANCE
- Increased participation and involvement in class
- Improved communication

VOICE AGENDA
- Students willing to set aside personal differences
- Students collaboratively reaching out to difficult students
- Students interrogates another student in cogen respecting disruptive class
- Students interrogates another student in cogen respecting studying habits
- Increased communication in class between student and teacher regarding science content
- Teacher recognizes students more involved in science class activities
- Teacher indicates coteaching helped students improve overall academically
- Teacher indicates students are very interested in coteaching

CONSOLIDATED CATEGORIES INTO FOUR THEMES
Figure 4.2 – PART II – Interconnection of the four themes with the 3C’s of reality pedagogy and the four sources of self-efficacy
specific and particulars of a single case. This can lead to obtaining general approaches and ideas applicable in separate but similar situations.

**Findings**

In the findings section, I discuss the major emergent themes as they connect to the self-efficacy frame during the implementation of reality pedagogy. These four themes are: “academic shift toward improvement,” “improved communication,” “student’s feeling of acceptance,” and “increased participation/involvement in class” and are discussed throughout this section while discussing the overall impact of the implementation of cogens and coteaching and through the cases of the participating students. I first provide some excerpts from cogenerative dialogue sessions and interviews with the participating teacher and students that support the impact cogenerative dialogues and coteaching had overall in this study. Following this, I discuss the impact both cogenerative dialogues and coteaching had on the participating students’ self-efficacy. Cosmopolitanism was not so much implemented as a tool in this study but rather observed to see whether such behavior emerges among any of the students throughout the course of this study.

The first two tools of reality pedagogy (coteaching and cogens) facilitated engagement in the science class and in the science content. Throughout the year, some of the cogenerative dialogue sessions were more formal than others. Depending on the group of students in a given dialogue session, the students and their teacher sometimes chose the topics they wanted to discuss. Topics ranged from classroom set-up, classroom environment, teacher’s instructional issues, student’s academic and behavioral issues, students’ academic and studying habits, Regents preparations, coteaching methods, student-student conflicts, favorite musical artists, future career plans, etc. For example,
the following is an excerpt from a cogenerative dialogue session where students first began discussing and brainstorming the topics they would be interested in coteaching.

Researcher: … So, Maria go ahead and continue what you were saying in terms of where we are with things now….

Maria: Well … last week we listed in the cogens the [science] topics we know we did [this semester] and what will be in the regents and then … from the list the kids will choose the topics they want to teach to the class…

Researcher: Yeah and Mr. F I think you said that you started a chart with a section for students to sign up next to the topic they want to do….

Mr. F: Yeah and its not fully complete … but getting there

Researcher: Okay…and then Karen had something to offer towards why she thought it would be beneficial if students taught the class…

Mr. F: are you sure? really? Karen (in a joking manner)

Marcy: yeah Karen Michaels! (smiles)

Karen: yep...(smiles)

Mr. F: great let’s hear it! (smile)

Karen: that if students taught the class then we would understand it better cuz that’s the way we speak…the way they gonna explain it…

Researcher: okay great…this is what you were saying earlier… okay now off the top of your head what would be a topic you would be most interested in teaching…you understood most…this is broad…it could be anything you learned with Mr. F this year….lets go around and each of you share…

Monique: I know already…

Karen: hmm…I really don’t know which one more…

Robin: I know what I want…

Researcher: okay…since Robin’s been dying to tell us…
All: (Laughter)

Robin: No Karen can go…

Karen: well may be when you say yours I can decide…

Robin: okay…Hypothesis…

Researcher: hypothesis….do you mean experimental procedure? scientific method?

Robin: yeah! Scientific methods and the steps to do experiments!

Researcher: okay…Scientific method…great…Monique?

Monique: I wanna do the female reproductive system

Researcher: female reproductive system….okay great!

Marcy: I wanna do the male reproductive system! (raises eyebrows to intensify interest in the topic)

All: (Laughter)

Researcher: okay…the male reproductive system …(smile)

Marcy: No! (laughs) I wanna do photosynthesis! (in a more serious manner)

Researcher: photosynthesis great…Maria?

Maria: Something that I don’t know and I wanna know…

Researcher: you can teach something that you don’t know and want to know….that’s what Mr. F was talking about earlier as well…not something you find easy and you want to talk about that…we’ll let you think on that a bit…so lets go to Tara…

Tara: genes or traits….

Researcher: good topic! Genetics!….you want to do DNA and DNA parts and structures?

Tara: (nods in agreement) yeah…I can do that...

In this excerpt, the dialogue began by Maria pointing out that a list of science topics is in progress from the cogen of the week before toward their preparation for the
Regents exam. The subject-specific Regents exams are state-wide standardized exams students are required to take. This list is to be composed by the students and will include all of the science topics that were taught in this class. Upon completion of the list, students will have the option of selecting a topic of their choice to coteach with other students and present the topic to the class as part of their review and Regents preparation. Following this, Karen noted that students coteaching these topics would be helpful, as students’ presentation of these topics would help “understand it [the science content] better” and students would explain the content in the way they naturally speak: “If students taught the class then we would understand it better cuz that’s the way we speak … the way they gonna explain it.”

Several things can be noted regarding efficacy in this cogen excerpt where students brainstormed ideas about coteaching. Both of these exchanges by Maria and Karen supports social and verbal persuasion, which play a role in encouraging the rest of the participants in the discourse that follows in this cogen. Following Karen’s comment, Robin’s enthusiastic response about wanting to coteach the scientific methods played a role in reducing the emotional (nervousness or hesitance) affects of her surrounding peers, encouraging them to participate, while setting the tone that this conversational space is a comfortable environment where they can freely express their science content interest. This is further encouraged via the playful ways in which Marcy first interacts with Mr. F and then in the way she expresses the science topic of her choice. Marcy’s interaction in the cogen persuades her peers socially while establishing that cogen sessions and coteaching are not elements to fear or stress about. As the students further collaborate in this cogen session, they tend to “feed off of each other’s energy” sort of as Monique and Tara volunteer to express their content interests.

Mastery experience in being able to successfully coteach these topics, later in the semester, not only vicariously encouraged other students to participate, but it also catered toward the affective/emotional state of the students one cotaught and the students who
were being taught. In turn, social and verbal persuasion in this entire process played a role in continually fueling students’ involvement. All four sources or modes of efficacy helped facilitate the self-efficacy of the students involved in the implementation of cogens and coteaching as both the cogenerative dialogue sessions and coteaching process provided opportunities to facilitate and foster a healthy sense of self-efficacy among the participating students.

In the following excerpt, students further suggested in the cogen session, which took place one week later, that they would like to consider coteaching the topics with their teacher along with other students, as in groups. Upon my suggestion in one of the cogen sessions, coteaching some Regents review topics along with their teacher was within one of the ways the students and teacher thought would allow for an enjoyable and effective method of preparation for the Regents:

Mr. F: We’ve been talking about student-lead discussions … coteaching … we’re setting up a sign-up sheet where students can sign up for a topic they want to discuss … they’ll then plan out the topic with me and then in class teach or review that topic in front of the class…

Researcher: So what do you guys think about that in terms of regents review as in you guys preparing the lesson with Mr. F and then teaching it … lets’ go around…

Britney: I think give us like a topic to teach that we’re struggling with … like not comfortable with instead of something we like…

Mr. F: So give the kids an option but they should choose something they’re struggling with…

Britney: Yeah.

Liz: (nods up and down in agreement)

Researcher: Oh!...why?

Britney: Cuz I feel like if it’s the other way around I already know the stuff … if its something I don’t know then by the end of it I’ll know it…
Researcher: Nice! What do you guys think about that?

Liz: I think what she said was good cuz….why would be wanna learn stuff we already know…

Researcher: Okay…what do you think Michalina?

Michalina: (Laughs…appears shy)...Can we do it in groups? …it’s better if we teach but like in groups…like we prepare it [the lesson] together…

Mr. F: I know you don’t complain or anything when we’re in group and you do the work assigned…in the group setting each person sort of brings in their strengths and when we do this activity in the end you’ll know more about the topic then what you started with…this is whether you do it in groups or alone…

Researcher: …And in the end this activity is focused more on you guys learning the topics like you said Liz so whichever way you do it… individually or in groups…

Michalina: …It’ll be good if we teach it in groups….I wanna like pass the Regents with flying colors not just like pass…

The spirit of the students here not only suggests an enthusiastic perception of wanting to do well in the science Regents and a sense of taking ownership of their own learning but also a sense of community and unity in wanting to work together.

Michalina’s last statement indicates that she wants to do very well in the Regents, and she seems to express that she can achieve that if she works on preparing for the Regents in groups, indicating her confidence in success while working with her classmates. In this cogen session, Britney indicated that she would like to prepare a topic to teach that she finds to be a challenge so that she is able to learn more about this science topic. Liz was also in agreement here. This instance both students shows confidence and self-efficacy motivated by a strong will to do well in science.

Successful coteaching where students worked together either in pairs or groups of three to four students and completed their tasks while communicating with one another regarding the science content was seen in the class. Students were asking each other and
the teacher science content-related questions, which was more evident toward the mid-late part of the spring semester (end of March to early April). Also, during this time, the cogen conversations began to be more focused on the upcoming science Regents exam. Students in the cogen sessions brought up ways in which they are considering preparing for the exam and along with their teacher decided the type of Regents preparation methods to implement in the class.

Though not all students fully participated in the presentation of the topic they co-planned to co-teach, most students contributed to the development of the topic presented and the lesson taught. Below is an excerpt from an interview with the teacher regarding coteaching followed by students in cogen sessions and individual interviews in coteaching lessons.

Researcher: Okay…moving back to coteaching now….how did you find it the first time you did it?

Mr. F: I thought it was really good….some of the models we used…I had actually also done it with my 9A class ….so I did incorporate it a bit with my other classes ….it was great… students came up with the Pacman method when they explained the enzyme substrate complex and then some explained with the little raps they came up with…it was good…

Researcher: Yeah…also in the beginning you also had your own method of coteaching where you had some of the students come to the front of the class and the end of class and sort of reiterate what they got out of the lesson….

Mr. F: Yeah…I was never really short of volunteers for that …everybody wanted to give it a shot and like when a student went up to discuss the lesson other students would help to sort of fill in the gaps so if there were any students who didn’t get the lesson through me they sometimes got clarification through this process….

The except above is from an interview with Mr. F regarding his thoughts on coteaching. He indicates here that while coteaching, his students came up with “models” of their own to help explain science content—used “Pacman” (cartoon/video game
character) to explain the “enzyme substrate complex.” He further indicates that this model, which was created by that coteaching group, was so helpful in explaining the science content to that class and that he ended up using and still uses the “Pacman” model to explain the “enzyme substrate complex” to his other classes.

From the coteaching method, Mr. F also practiced a modified version of coteaching as regularly as possible. At the end of class he allowed students to volunteer to reiterate the content that was just taught in class. This form of coteaching, he explained, allowed the students to explain in their own way what they gathered and comprehended from the lesson that was just taught while also allowing a space to clarify any misunderstanding with the help of other students and the teacher. It also helped the students who may not have fully understood the content when initially taught by Mr. F. Here they were able to grasp the material while having a peer explain in a more simplistic manner. Mr. F later further explained that this also helped him understand what students took away and comprehended from the lesson he just taught so that moving forward he could adjust his successive lessons to either further explain the lesson from the day before or modify the preceding lessons with a better understanding of how his students were perceiving the content. Lastly, he also expresses here that his students greatly enjoyed coteaching in this manner and that he “was never really short of volunteers” for this activity.

The excerpts from interviews and informal conversations below further depict the impact of coteaching. Here, students reflect on what they particularly found personally beneficial in the implementation of coteaching.

**Interviews and Informal Conversations with Students**

**Excerpt 1.**

Researcher: …My next question to you is: how is coteaching in your science class helpful or not helpful overall in your science class?
Nicole: I think it’s been helpful….cuz like seeing how other students understand it help us understand it even more….like explaining it to someone else sometimes actually helps you understand it more… like when I’m helping someone understand something or teaching it to them it sometimes makes more sense to me…. And then sometimes when someone else explains it to me besides the teacher it’s easier cuz students have their own easier way of explaining the same thing…

Excerpt 2.

Researcher: Okay… so my second question to you then: how is coteaching in your science class helpful or not helpful overall in your science class?

Maria: It’s helpful cuz it’s like we get another person’s perspective and see how they understand it and sometimes that opens up something and makes you understand it better…it’s also sometimes easier to understand from a student than the teacher…

Excerpt 3.

Researcher: How is coteaching in your science class helpful or not helpful overall in your science class?

Tara: …For some people they can talk it out and it may help them understand it better…and they can get more work done…that’s if they’re working and not chatting… and for those people who can get help from each other and move on it also makes the class move faster and we don’t have to stop and go back …we can just move forward… I think it would be helpful…because sometimes the way the teacher teaches may be difficult for some students to understand…I think the students like “dumb it down” for the students and hearing it from a student I think the other students would understand it better…

Excerpt 4 (Informal conversation).

Researcher: How is coteaching going?

Christian: I like working in the groups….I don’t really do the presenting part…I don’t like it…but it’s good working in the groups now….some of the stuff [science content] is more clear…
In the first example above, Nicole expresses that coteaching another student was particularly helpful to her as, while explaining the science concept to another student, she herself was able to get more clarity and understanding of the topic. She also adds that when the science topics are explained to her by her peers (and not the teacher alone), “it’s easier [to understand the content] cuz students have their own easier way of explaining the same thing.” Maria responded similarly while reflecting that “it’s also sometimes easier to understand from a student than the teacher” as, in having students coteach one another, it is beneficial to both students, as while learning from a peer, the student gets “another person’s perspective and see[ing] how they understand it and sometimes that opens up something and makes you understand it better.” Tara uses a phrase—“dumb it down”—to point out that students are able to explain science content to one another more simplistically than the teacher while they “talk it out” with one another.

Lastly, Christian focuses on the benefit he has had in working in a group setting that the coteaching activities require. Here, classroom observations indicate that Christian mostly observed and listened to his group mates as they “talked out,” deconstructed, and reconstructed the science content. He indicates here that “some of the stuff [science content] is more clear,” which can be attributed to the discussions that took place in front of him in his group.

In the implementation of cogenerative dialogues and coteaching, it can thus be deduced that cogenerative dialogue sessions and coteaching fostered a sense of self-efficacy within students (more detailed explanation of how it impacted the four particular participants in terms of their self-efficacy is discussed below). It can also be established that coteaching, which in this study emergently represented the mastery experience component within reality pedagogy toward supporting students’ self-efficacy, also contributed to students understanding science content more effectively.
Findings Regarding Self-efficacy of the Four Participants

Toward the development of self-efficacy in the implementation process of reality pedagogy, below I present a case for each student.

Maria’s Self-efficacy. Maria joined the cogenerative dialogue sessions about three sessions into the fall semester. From the beginning it was clear that Maria did well in science, as she was an active participant in the science class (volunteered to answer questions related to the lesson posed to the class) and was an academically determined student. Mr. F also confirmed that Maria was doing well in science and overall in all her other classes. She indicated that science was among her “favorite subjects.” She also added, “I actually want to be a psychologist … so, I have to do good in science.”

Given that Maria actively participated in science class, she felt confident in science, and her perceived self-efficacy was healthy in this regard. Thus, the implementation of reality pedagogy took part in continuing to foster her self-efficacy in science, as her experience through Bandura’s (1994) four modes of self-efficacy revealed.

Mastery experience was one of the most powerful components that fostered Maria’s self-efficacy in science. She did well in most of the science class assessments, and during coteaching group work sessions, Maria usually completed her part of the work well, which facilitated the proper completion of the assigned work of others in her group. In this way, Maria often played the role of facilitator in her group where she took on the responsibility of making sure her group members properly completed the group assignments. This behavior speaks to the cosmopolitan role Maria appeared to take on. Also, this afforded her praise from Mr. F and her group mates, which not only established mastery experience but also provided her with social and verbal persuasion. This in turn allowed her affective/emotional state to be confident and not anxious or nervous toward approaching science.
While taking part in coteaching activities, Maria appeared to carefully observe her classmates in their presentations and asked questions about how to go about enhancing her own group’s presentation. After one of the groups presented their lesson on ecology, Maria asked:

Maria: Which book did you guys get the redwood stuff from?

Lisa: We got it from the internet…

Maria: (looking at Mr. F) we could use the internet?

Mr. F: Sure….with your textbooks…yes…

Maria: (smiles) I’m looking my stuff up on the internet tonight!

Here, Maria appears to gather ideas for her coteaching presentation via the vicarious and social modeling of her classmates. She is encouraged by their model and is encouraged to search the internet for her group’s presentation.

Maria’s academic determination was also apparent, as the following two cogenerative dialogue sessions indicate:

Researcher: So what science did you guys take last year?

Nancy: Living environment

Researcher: And you’re all taking it again this year? Is it part 2 that you’re taking then this year?

Nancy: I don’t think so cuz it’s the same stuff.

Marcy: We’re taking it again cuz we didn’t take the regents last year … we all passed the class

Researcher: Okay…so you all took living environment last year and passed but since you didn’t take the regents you’re all taking living environment again?

All: Yes or nods in agreement…

Researcher: Okay, now why didn’t you guys take the regents?

Marcy: I don’t know…they didn’t give it to us.
Nicole: None of the D and E section people took the science regents…only 9A B and C…we only took math ELA and something else…

Robin: Yeah E and D didn’t take it last year…only A B and C

Maria: …I don’t think that’s fair that some students last year got to take the regents and some didn’t. I think they should have prepared us all together for the regents…we could have just moved ahead…

Maria’s responses here indicated that she would have liked to have prepared for and taken the science Regents in the previous year to be able to move forward. This statement supports that she has a healthy sense of efficacy. Her “efficacious outlook foster[ed] intrinsic interest and deep engrossment in activities” (Bandura, 1994, p. 2). She displayed her commitment to put in effort toward moving forward academically while wanting to take the Regents exam with her peers in the other sections of her grade, rather than waiting another year to do so. Maria wanted to work hard and wanted for others to do the same:

Maria: …Like people [classmates] should just like set all they differences aside, go to work…when the work is done (rubs palms together to signify ‘finish’)…that’s it…that’s how I’d do it…you gotta know your priorities… (smiles)

Maria indicated that her classmates should “set aside” their differences and give priority to their schoolwork as she does. Though Maria did not particularly appear to be in a specific group or clique, she indicates that if she were in a clique, her approach would be such that she would put priority to her school work while setting aside the social issues in the class. Here she “heighten[ed] and sustain[ed] … efforts in the face of” (Bandura, 1994, p. 2) distraction or difficulty, which was another indication of her sense of healthy self-efficacy.

Maria also provided some of the Regents review ideas in the cogens, which facilitated coteaching later in the semester. In two separate cogen sessions below, Maria contributes her ideas toward Regents preparation, which appeared to be well received by
her peers. Eventually one of her suggestions was put into practice in the class’s method of
Regents preparation:

Maria: They [teachers] dumb it down for us in class sometimes … which I don’t think is good cuz when it comes to the Regents we need to know the actual words and things… if you just give us the correct words from the get go and we learn what it is that would help more…

Stephie: And for the SAT…

Marcy: Yeah…

Maria: Yep…

Researcher: Okay how do you suggest to prepare for the Regents exam so that not only do you prepare for it and understand it now but also so that it stays with us until the exam…

Maria: I think we need to… out of the 5 days we take two days to review and the other 3 days we learn what we need to…

Stephie: Or…I like if we review everything we did the week before on the Monday and then start the week…

Maria: Like a quiz to summarize the week to see if we really understood what we learned in the week…

Marcy: That would be smart…that would help us a lot…

At a second cogen:

Maria: We could do a sybilis… I mean a syllabus…like we list all the topics, like in social studies she has a syllabus for the semester…but we could do ours for the regent…and then we just go down the list and review the topics for science….

Nancy: That’s good…it be all laid out then…

Mr. F: That sounds good…we gotta start listing then…

Researcher: That’s a great idea…

The list of science topics for coteaching, where students listed the science topics together and then signed up for the topic(s) they later co-taught, originated from Maria’s idea of listing out the science topics in formulating a syllabus and then following the
syllabus toward Regents preparation. Being recognized by Mr. F and her peers in cogens and in class for suggesting this method of Regents preparation, which was eventually implemented in the class, appeared to play a strong role in strengthening Maria’s science self-efficacy. Thus, the acceptance of her suggestion facilitated a confirmation of her mastery experience in science and additionally provided social and verbal persuasion.

**Tara’s Self-efficacy.** Tara attended the first cogenerative dialogue session in October. Tara was an inclusion student. I learned of this at the very end of the academic year when the class was preparing for the Regents (state standardized exam) in May. I learned that she was being given an extra hour to take the science Regents exam, and when I asked Mr. F as to why she was being given the extra hour, he only then revealed to me that it was because she had a learning disability. Due to school policy and privacy reasons, and also because he did not feel comfortable to do so, Mr. F did not disclose any further information regarding Tara’s disability.

Tara was randomly selected by Mr. F to attend the first cogen session along with three other students in the study and students who volunteered to join. One of the quieter students in the class, Tara indicated in one of her first interviews that it was difficult for her to engage in science class. She felt that she and the students in the class did not get along very well “cuz right now students in the class still argue about things that happened last year and petty stuff … so it’s a little hard to work.” She thought that the cogenerative dialogue sessions would help improve her science classroom environment, as she indicated in her interview below:

> But if they [students in the class] talk to each other like we do (in cogens) they’ll understand each other better and come to an understanding and not ignore each other…they’ll work better in the class…. Cuz right now Mr. F is having trouble with putting people in groups cuz they don’t wanna work together …so if they talk to each other like this they’ll communicate better… it’ll help….

She was always interested in joining in the cogen sessions, although she did not always volunteer to talk in the cogen sessions unless called up on.
Tara indicated that she was interested in teaching science, history, or social studies as a career in the future and liked very much the way in which her social studies teacher taught her social studies class. Particularly, she noted that the social studies teacher outlined the lesson and explained things in detail. Using the outline was the most helpful for her learning, and she felt this method was the most organized approach, which helped her clearly understand the content.

Like Ms. S, my social studies teacher … she outlines things … then gets into depth … and it helps me remember when she does that … that topic makes more sense … like I know where the topic came from … how it happened … the 5Ws … why, when, where….

Tara had a long commute to get to school everyday, and she was often late to her first period science class. Though she was late, she would always make sure to obtain the missed work and make up her work, as Mr. F confirmed. Mr. F often used Tara as an example in cogen sessions to try to encourage others to make up their work if they came late or were absent:

There is a difference between Karen and Tara coming in late….Tara will sit there and do her work diligently…I’m so happy with Tara because one of the first things she did was that she told me… “Mr. F I can’t believe I scored this…I’m gonna turn it around” …and then she apologized to me…I have the most respect for somebody who does that….

This mode of encouragement verbal persuasion worked toward Tara’s self-efficacy. This sort of persuasion helped encourage Tara to attend Mr. F’s after-school tutorials as often as she needed. Further, these tutorial sessions helped Tara perform to her satisfaction in her science assessments. The good grades she received were seen as mastery experience toward her science self-efficacy. Tara was also a fairly quiet student who was not very social in the beginning of the year with any particular student or group of students. She was not a fan of working in group settings and preferred to work on her own, as she felt more comfortable doing the science work assigned to her own satisfaction. Though this
was the case, she appeared to be open to learn from others in the class after she completed a few group activities and was approaching her coteaching:

Me I like working by myself cuz I don’t like putting the responsibility on somebody…. I don’t think they’ll do it in the way I want…like I’m the type of person who likes doing things a certain way…. But then again I know I need to work with others as well cuz I can learn from their ways to help myself and them… and it gets you more into it …like involved…

Part of Tara’s change about working with others was due in part from participating in the cogens and learning in the cogens that others shared similar academic goals as she did. After attending a few cogen sessions with Maria and Stephie, who also performed well in science, Tara seemed to communicate a bit more with them in science class. By the end of the spring semester, Tara considered Maria and Stephie her social peers. This alliance with Maria and Stephie also allowed her to feel part of a group. She appeared to like being part of the group and liked being recognized as being part of this group. Tara worked in groups with both Maria and Stephie and tended to collaborate with them in the content discussed in class. Furthermore, because Maria and Stephie achieved in science, their performance encouraged Tara, and this increased Tara’s science self-efficacy. In that, Tara felt encouraged by being associated with students who performed well in her science class, which appeared in turn to promote a mode of social persuasion toward her science self-efficacy: Tara stated, “I like working with Maria and them … we always get our work done…. Mr. F calls on us too to sometimes explain … and we like help the others with their work sometimes.”

The relationships that Tara developed with Maria and Stephie also contributed to Tara’s social and academic affective states and her confidence in science. Her association with these two students allowed her to continue to strive toward doing well in science, like in the after-school tutoring session with Mr. F and working with others in the classroom. This also further resulted in achieving mastery experience in her science assessments and receiving higher science scores. Though her later science scores were
only a bit higher than average (the average score was 70, whereas her score was 75) and also only a bit higher compared to her initial science performance (initial science score was 70), the cogens and coteaching allowed her to meet her science academic goals.

Regarding Tara’s cosmopolitan role, Tara often took notes during the cogenerative dialogue sessions. For example, she was the note-taker when the students listed the topics for coteaching for their Regents exam review. She initially began the notes for herself and later offered these notes to the cogen groups when they crafted the final list of review topics for coteaching. Tara was praised by Mr. F and other students for keeping good records. Tara’s cosmopolitan role as recorder appeared to afford her social and verbal persuasion, which further contributed to her academic affective state.

Nicole’s Self-efficacy. Of the students that participated in the cogens sessions, Nicole was definitely one of the more vocal. Nicole volunteered to participate in the cogen sessions from the start of the study. In most of the cogens she attended, she would introduce the new participants to the rules of cogens sessions and the content of what was discussed in the previous cogen session (if she had attended the immediate previous session). In initial class observations before the start of cogen sessions began in October, Nicole was one of the students who did not always cooperate with Mr. F and the students in the class. When she volunteered to take part in the cogen sessions, Mr. F indicated to me that he was concerned that Nicole may attempt to disrupt the sessions. To both Mr. F and my surprise, in the initial cogen where we established the rules to attend cogen sessions, Nicole did not appear to hinder the initial cogen session or any other cogen sessions she attended in any way throughout the study. In fact, after the first two cogen sessions, she appeared to take a lead role in vocalizing the issues in the class without being disrespectful or disruptive. She also offered constructive solutions in most cogen sessions. I define this cosmopolitan role of Nicole as facilitator of cogen sessions:

Researcher: What do guys think is currently an issue in the class that can be changed
Nicole: (Volunteers almost immediately) communication

Researcher: Communication… okay… how… like between whom?

Nicole: Students… like we don’t communicate properly or the proper way… talk in class… or just interrupt each other… that kind of thing…

Both Mr. F and I encouraged the cosmopolitan behavior of Nicole as facilitator, and I believe in understanding our encouragement and taking in the responses and mutual respect she was getting from the other participating students in the cogen session, Nicole’s behavior in class took a positive turn.

Nicole did not project a high interest in science. She was interested, however, in understanding and doing well in science and offered suggestions to Mr. F about making science more understandable. Some of her comments were “science is okay… too many big words”; “I don’t understand some of things in his class [science class] sometimes … but that don’t mean I don’t wanna pass”; and “Mr. F needs to go step-by step… like they do in math.”

When a discussion of seating re-arrangement took place in a cogen session, Nicole was also very vocal about her determination to do well in school no matter the distraction:

Researcher: Okay, so you guys really don’t have issues with any particular student… you just want to make sure that whoever it is you are seated with or assigned work with that they share the work…

Mr. F: (Points at Nicole)… she used to…

Nicole: Okay, what?.... Okay, we had a incident like that. Mr. F put me to work with this girl that I don’t really click with but we had to get the work done. So I’m like thinking to myself I don’t like her but then again this is school work… I’m not gonna let her get in the way of what I need to do. So, I did my work and if I had to conversate with her then I had to do but I did my work and when this is over I don’t like you… you don’t like me and that’s it but when it comes to work, you not gonna stop me from doing what I need to do…
Britney: …You go girl…say it! (smiles in an encouraging manner)

Researcher: Okay, how did she [the person Nicole worked with] take this?

Nicole: She did her work…it was like a working thing…I did my work and she did hers…

With Nicole wanting to “get the work done,” other students in that cogen session were encouraged to also stay focused and to do their work. Nicole received social/verbal persuasion from her peers, as depicted in the conversation above, where her classmate and teacher acknowledged and encouraged her determination to do well in school. Their feedback played a role in her establishing that it was socially acceptable for her to do well in school. It is important to note that this behavior—to set aside social issues for academic reasons—was not entirely part of Nicole’s behavior at the beginning of the study or before she began taking part in the cogen sessions.

Nicole was also at times instrumental in encouraging students to consider some of Mr. F’s suggestions:

Mr. F: What if for the genetics lesson we paired some of the stronger students with the ones who are not as strong…

Mary: …But then its like one person’s doing all the work and the other’s just there…don’t you think students sometimes work better when they work by themselves?

Mr. F: …Not every ones at the same pace… you gotta sometimes keep in mind people’s sentiments… Nicole, you said it yourself, school work is school work…even if you have issue with someone, no matter who it is you’re working with, you’re not gonna let them get in the way of your doing your school work and getting it done… maybe that’s the approach you guys want to take here…

Mary: But not everyone is like that…they do let other people get in the way…

Nicole: True…but we can try it and see what happens… maybe it won’t be that bad…
Mary: …We could see what happens …I guess…but I don’t wanna be doing all the work….

Mr. F: It won’t be like that…we’ll work on that…

In the cogen session above, Nicole’s subtle but strong suggestion was powerful in influencing Mary to consider Mr. F’s suggestion. Nicole appeared to have this effect on her peers, not only because she was vocal, but also because she was one of the more socially popular students in the class. Nicole’s popularity was not due to her academic standing but rather her social one. Along these lines, Nicole played a fairly influential role in the class. Her influence was also evident while Mr. F attempted to present the coteaching sessions as an enjoyable teaching tool to a cogen group. Nicole encouraged students to feel more open to coteaching:

Mr. F: Yeah, this will only be like 2-3 times a week when we do group work. You guys will get into your groups of fours, you’ll each have a job that you will be responsible for in the group and then you guys together on some days will teach the class… do a lesson… you can do it however way you want to…

Nicole: (Immediately) we can rap?…

Mr. F: you can have a rap, you can have a country song…

All: (laugh)

Researcher: Okay, what do you guys think about that?

Nancy: …Look at her (points at Nicole) she’s all excited (laughs)...it sounds fun…I guess…you gonna be helping us too though? (towards Mr. F)

Jerry: …I’m down …

Mr. F: We’ll plan the lesson you wanna teach together…

In the class, Nicole also became receptive to the science content being taught while engaging in class content-related conversation with Mr. F not only in class, but also more so in after-school tutoring. It appeared that by the spring semester, Nicole had built a good rapport with Mr. F and vice versa. By the spring semester, Mr. F began to recognize
Nicole as one of his “good” students, as he indicated in one of his interviews: “She’s [Nicole] been helping out with the other students…she’s actually now one of my good … more cooperative students.” Nicole also appeared to assume this role.

Nicole indicated in one of her interviews that she would also like to have cogen sessions with her other teachers and classmates in her other classes:

Nicole: …If we did cogens in my other classes I think it will help cuz sometimes students don’t want to talk to their teachers cuz they think they’ll be judged but if we do it like think were its like groups of fours then its fine and it’ll work…

Researcher: Okay…so you think cogen sort of make it easier and make it okay for you to talk to your teacher because you’re all doing it as a group …its not just you alone asking your teacher questions?

Nicole: Yeah, we’re all doing it...talking to him and each other

The excerpt above indicates that Nicole felt that the cogen sessions were a non-threatening environment where she did not have to fear being “judged” and could freely communicate with her teacher and peers.

Throughout the progression of the cogen sessions, Nicole also built a good relationship with Mr. F, who further encouraged and assisted her after school. Nicole was not interested in taking part in the after-school assistance Mr. F provided to students until late spring semester. The after-school tutorials, in turn, helped Nicole improve her science performance toward passing the course with a mediocre grade, whereas in the fall semester she was at the border of failing science. By the end of the school year, she had good communication and had built a decent rapport and relationship with Mr. F, and her grades had improved.

Nicole’s science self-efficacy developed through mastery experience and was facilitated in the spring semester upon attending some tutorial sessions with Mr. F for her science tests. After the tutorial sessions, Nicole’s exam scores were improved. Though not a huge change from her exam scores in the fall, Nicole appeared to be encouraged by
an exam grade in the low 70s rather than the low 60s. Her mastery experience was also facilitated in the coteaching sessions. As one of the more vocal students in the class, she tended to take on the lead role in presenting the lesson she prepared with her group members. She received praise—social/verbal persuasion—from her group members and Mr. F. The coteaching contributed to a good affective/emotional state toward increasing her science self-efficacy. Finally, also contributing to her affective/emotional state was the cosmopolitan role Nicole played as the facilitator of most of the cogen sessions she attended.  

**Christian’s Self-efficacy.** Christian was invited to join the cogenerative dialogues session due to recommendations from his classmates and teacher. For example, one student (Britney) commented, “Yeah…like he [Mr. F] could put [Christian] with a partner that could help who’s like smarter…like I’m not saying I’m dumb but sometimes I like slack off and it helps that my partner pulls me in and we do the work together…it helps when you work with somebody.” Another student commented, “Yeah…like he [Christian] could do his work but he doesn’t … he’s not focused … we can all keep an eye on him and help him out.”  

At a separate cogen, another student (Jerry) commented, “Or you know who sometimes doesn’t pay attention too…Christian.” In response, another student (Brian) stated, “Nah…I feel bad for him…he wants to be like Michael, Kelvin and part that group they just like make fun of him…they like ignore him like he’s not there.” Nicole, another student in the cogen added, “I don’t what he be doing…he need a role model or something.” Finally, Mr. F commented, “Christian, I think would benefit [from joining the cogens]…. I worked with him one on one and he listens.” Following this, Christian was asked to join the cogen sessions.  

Christian was an inclusion student with a learning disability, which was not disclosed to anyone in the class but the teacher. I was only informed of Christian being a special needs student in a casual conversation with Mr. F. Mr. F explained that he was
not comfortable and that the school does not authorize him to discuss the details and particulars of Christian’s learning disability. Therefore, I only came to learn that Christian was a special needs student late in the fall semester. The only detail I was made aware of concerning his disability was that he has a learning disability. I respected the school’s privacy policy and Mr. F’s decision to not disclose any further details about Christian’s disability.

Christian was very shy and quiet and did not appear to voluntarily participate much in class unless called on by the teacher. In the first cogenerative dialogue session with Christian, one of the conversation topics was what students felt their favorite subject was in school or in what subject they did the best in school. In his response, Christian indicated, “I don’t really have a favorite subject…science is hard.” This statement was an indication that Christian lacked academic confidence, particularly in science, as he found science to be difficult. Mr. F confirmed that Christian was struggling in science.

During the course of the year, and throughout the process of the implementation of the tools of reality pedagogy, Christian only minimally developed self-efficacy through the four modes of self-efficacy: mastery experiences, vicarious/social modeling experiences, social/verbal persuasion, and physiological/somatic and affective/emotional states (Bandura, 1994). It appeared that because of Christian’s learning disability, he could not grasp some of the content his group mates discussed in group activities, though he did appear to listen to group mates attentively. He also sometimes had difficulty keeping up with the science lessons. For example, Christian said that Mr. F’s lessons “goes kinda fast sometimes…. I try to copy it down but don’t really understand it sometimes.” Mr. F indicated that with Christian he tried to provide extra help while stopping over at his desk during his lesson and group activities. However, as there was not an inclusion teacher assigned to this science class, Mr. F felt that Christian was not able to receive adequate help to fully reach his potential in science. Mr. F also met Christian a few times a month after school for extra help. In his frustration, Mr. F
indicated that the inclusion teacher, who was part of the science class earlier in the school year, had left the school midway through the fall semester. From that time, Mr. F had a very difficult time strategizing alone how to go about helping Christian and the other inclusion students in his class. Unfortunately, a new inclusion teacher was never assigned to his class. The reason given was the school’s budget issues.

Christian’s physiological/somatic and affective/emotional states, in terms of his learning disability and anxiety in general toward science, mostly appeared to get in the way of his mastery experience of coteaching and also performing well on science tests. While not receiving adequate assistance via an inclusion teacher, he was unable to perform to his potential in his science assessments, which greatly affected his self-efficacy in science, which in turn raised his anxiety and affected his confidence. Though Christian appeared to experience vicarious and social modeling during group activities, in the coteaching implementation stage of the year, it did not appear to fully instill within him the confidence he needed to take part fully in the coteaching of the topic. However, he partially helped develop the coteaching lesson of his group with his group members.

Christian’s low perceived self-efficacy in science was revealed, though he was making attempts through the groups to work on understanding the science content: “I like working in the groups…. I don’t really do the presenting part… I don’t like it… but it’s good working in the groups now…. some of the stuff [science content] is more clear.”

A video-recorded classroom activity also showed that Christian received instances of social/verbal persuasion from his classmates. When he was called out by Mr. F to answer a question posed to the class, Christian hesitated to answer. However, upon Mr. F’s encouragement—“Come on, you know what an antigen is…. I saw your ‘do now’ answer”—and encouragement from his classmates, with a fellow student calling out, “You can do it… you already wrote it down,” and again another student saying, “Christian, Christian,” promoting support, Christian read aloud the answer he wrote down
in his “do now” from his notes. Here, this social and verbal persuasion facilitated his participation in class.

**Discussion**

The goal of this study is to examine how the yearlong implementation of the tools of reality pedagogy, particularly cogenerative dialogue and coteaching, impacted the self-efficacy of the participants. The study suggests that participating in cogens and coteaching activities are valuable, as in all four of the cases, the implementation of the tools of reality pedagogy took part in increasing the self-efficacy of the four students studied via one, two, three, or all four modes or sources of self-efficacy. The tools of reality pedagogy allow for opportunities and a space to facilitate self-efficacy of diverse urban students in their science class in four ways: while increasing participation/involvement in class, facilitating an improvement in communication among students in the class and between teacher and students, facilitating students’ feeling of acceptance in class, and facilitating an academic shift toward improvement.

In Maria’s case, the tools of reality pedagogy fostered and catered toward strengthening her science self-efficacy while allowing her to contribute her academic opinions and voice in the cogen sessions, such as her proposals about the methods for Regents preparation. Her mastery experience in science was facilitated not only via her performance in her science assessments, but also via the coteaching activities and the cosmopolitan role she played in these activities, which took part in affording her social and verbal persuasion while she properly performed her part in the coteaching activities and then took part in aiding others. She also maintained her science self-efficacy via the vicarious and social modeling she attained in the coteaching experiences of her classmates, which in turn positively impacted her emotional and affective state, further enhancing her science self-efficacy.
In Nicole’s case, part of what I argue encouraged her to become cooperative and involved in the class (whereas in the beginning of the study she was not very cooperative and involved) was the ability to voice herself and enjoy the receptive environment offered by the cogen sessions. This behavior solidified into a role that was cosmopolitan in nature—“facilitator of cogen sessions”—throughout the course of the study.

The cogen sessions played a strong role in this academic shift, in that they allowed Nicole and Mr. F a vehicle to reach out to one another. Simultaneously, Nicole received the verbal and social persuasion in cogens from her teacher, myself, and her fellow students. As a rule in the cogens, all participants were receptive and respectful of others’ opinions without being “judged,” and this kind of inclusion empowered all four students in building their self-efficacy in their science classroom.

Emdin (2009) states that urban students often shy away from communicating with their teachers in class regarding academic content, as they do not recognize this action as socially acceptable by their peers. Socially they recognize abiding authority and academia as not being “cool” or socially appealing. However, for the four students in the study, communication extended to their teacher and their peers.

In Nicole’s case, the cogen sessions allowed her to acquaint herself socially with her peers and reach a socially comfortable state where such pressures of maintaining a certain social status and feeling being “judged,” as she noted, were reduced, allowing her to collaborate more freely with her peers and teacher on discussing academic issues, science classroom environment issues, and overall mutual matters of interest and concern.

Both Tara’s and Christian’s cases allow us to consider the impact of reality pedagogy and the role it plays in science self-efficacy of students with a learning disability (LD). Klassen (2006) points out that, according to the Learning Disabilities Association of Canada (2002), “the term LD refers to any of a number of intrinsic disorders that interfere with the acquiring, organizing, retaining, or understanding of
information and that are caused by impairments to psychological processes such as phonological processing, executive functions (i.e., planning, monitoring, and metacognition), or memory” (Klassen, 2006, p. 182). Further, such disabilities can interfere with academic skills, including writing, reading, mathematics, and oral language, and can range in severity. Hampton (1998) investigated the self-efficacy of LD students compared to students without a learning disability (NLD students) in an academic setting. Hampton’s experimental group of LD students rated lower in all four sources of self-efficacy in comparison to his control group of NLD students. This conclusion in Hampton’s study has implications for and speaks more to Christian’s status than Tara’s, which could be attributed to the level and type of disability Christian has. Based on my observation, Christian has a greater level of LD than Tara.

Perceptions of one’s own self-efficacy, as we know, “influence choice of activity, task perseverance, level of effort expended, and degree of success achieved” (Klassen, 2006, p. 183). Two problems in this regard that are prevalent among LD students are the inability to properly analyze a given task and lack of proper self-knowledge, resulting in an inaccurate estimate of self-efficacy (Bandura & Schunk, 1981; Butler, 1999). Also, deficiencies in metacognitive abilities in LD students possessing significantly lower metacognitive skills than NLD students have also been reported (Pintrich, Anderman, & Klobucar, 1994; Wong, Butler, Ficzere, & Kuperis, 1996).

According to Butler (1999) and Wong (1985, 1986), such metacognitive skills include having self-knowledge, lack of which can result in faulty analysis of a given task. Here, students’ expectation or prediction of their performance can be an indicator of their metacognitive self-appraisal, as in their judgments of their own personal cognitive abilities or as indication of their self-efficacy to complete a task (Paris & Winograd, 1990). This may result in a lack of confidence and motivation and eventually a lack of self-efficacy in a given task. In this study, this is the category in which Christian is grouped. Christian, due to his disability, did not appear to attain the same skills as his
NLD peers. He tended to shy away and appear insecure in approaching certain class activities, indicating low self-efficacy. Therefore, participating in the cogens facilitated communication with his peers and teacher, which made him feel more comfortable to talk in class. He felt more part of the class while working with others in the coteaching activities.

Christian’s inability to read and write at his grade level (based on my observation), as well as his inability to fully engage in higher order skills necessary for comprehending the subject of biology/living environment, such as analysis, evaluation, synthesis, and application of topics such as cell biology, human body functions, and genetics, did not allow him to fully participate in building science self-efficacy via the four self-efficacy sources (Bandura, 1994). In an empirical study by Klassen (2006), LD students experienced more difficulty with academic tasks (i.e., writing, composing, application) and were less efficacious than were the NLD students. In Christian’s case, as Mr. F indicated in his frustration, Christian would have benefited more from this class and the implementation of cogens and coteaching had there been an inclusion teacher present throughout. This study thus also brings attention to the necessity of having present an inclusion teacher in an inclusion classroom not only to help facilitate learning for inclusion students but also to aid the teacher in strategizing and preparing lessons to engage inclusion students. The speculation here is that, if there had been an inclusion teacher present throughout, he/she may have been able to strategize with Mr. F ways in which Christian could have better participated (engaged more) in the coteaching activities, which perhaps would have facilitated an “academic shift toward improvement” and “increased participation and involvement” in the implementation of cogens and coteaching.

Furthermore, regarding the impact of the tools of reality pedagogy, in Christian’s case, as early cogen conversations of his classmates indicate, Christian was sometimes ignored by his peers. Eventually, his classmates came to accept him, encouraging his
participation and comments in class. In the cogens sessions, students got to know Christian better, and he them. He not only received support from his peers during group activities and coteaching activities; he also attained support in the form of social and verbal persuasion. These social and verbal persuasions that Christian received were facilitated by students getting to know and spend time with him in cogen sessions. Though Christian only minimally interacted with students, even in cogens, it was sufficient for his fellow students to understand his demeanor and what he could offer in the classroom. Students were more accepting of Christian socially in the science classroom.

Social and verbal persuasion alone does not fully impact one’s self-efficacy. However, cogens and coteaching play a role in and contribute to students’ feeling accepted and part of the class. Cogens allowed all four students a space to interact with their peers and allowed their peers to get to know them (improving communication), while coteaching allowed them to work together on science content with their peers. Both cogens and coteaching helped with students being more involved and participating more in science class, leading to learning more science content and thus facilitating increases in their grades, which I denote as the academic shift (toward improvement) in this study.

Tools of reality pedagogy play a role in attainment of science self-efficacy. Figure 4.2 depicts the interconnection between the four themes (academic shift toward improvement, improved communication, students’ feelings of acceptance, and increased participation/involvement in class) that surfaced after the implementation of reality pedagogy and the four sources of self-efficacy. Here, cogens contributed to the participants’ “academic shift toward improvement” while providing opportunities to discuss science content and ways in which science class could be improved for the benefit of the science learning experience of the participating students. While participating in cogens, students “increased their participation and involvement in class,” which in turn “improved communication among students and communication between
students and teacher,” while following the rules (respect each other’s opinions, etc.) of cogen. This form of interaction in cogen resulted in a healthy affective/emotional state of students, contributing to their self-efficacy toward approaching science.

Coteaching attributed to an “academic shift toward improvement” while providing opportunities to discuss science content in class in putting together the science coteaching activities. In preparing the coteaching activities, students became more “involved in class and their participation increased.” Also, while pursuing the common goal of preparing coteaching activities, students’ “communication improved.” Coteaching afforded three of the four sources of self-efficacy: Coteaching itself was the mastery experience students attained that promoted their self-efficacy. Observing their peers coteach also afforded self-efficacy among participants vicariously. Lastly, social and verbal persuasion facilitated students’ self-efficacy while they collaborated with their peers in coteaching.

**Conclusion**

The pedagogic tools of reality pedagogy in this study, particularly the first three tools—cogenerative dialogue, coteaching, and cosmopolitanism—proved to have an impact on developing self-efficacy in science. Better performance, as Bandura (1997) explains, is a result of the development of self-efficacy. The tools of reality pedagogy allow students to further develop self-efficacy in science and create a venue for social acceptance and encouragement from peers. Full participation and engagement in cogenerative dialogue sessions and coteaching activities demonstrated the most significant and effective impact of the two tools of reality pedagogy in developing self-efficacy for the students in the study. The four cases shed light on the implementation of reality pedagogy and how it benefits students with a range of academic abilities and their development of self-efficacy in science.
The lens of self-efficacy in understanding how reality pedagogy can potentially be beneficial if implemented in urban science classrooms in this study is powerful, as it presents a space and a way of constructing learning opportunities for urban science learners. Here, meeting once a week with their science teacher and classmates, developing and coteaching science lessons, and becoming more involved in the decision-making process of the class’s teaching and learning environment proved to be beneficial to the participants. The pedagogic tools of reality pedagogy in this regard are not specifically applicable only to science classrooms but can be implemented in any subject area.
Chapter V

EXPLORING THE IMPACT OF REALITY PEDAGOGY:
UNDERSTANDING ITS IMPLEMENTATION ON
URBAN IMMIGRANT STUDENTS

Abstract

This ethnographic case study follows two urban immigrant students in their yearlong journey in an urban science classroom where the first two pedagogic tools of reality pedagogy, cogenerative dialogue and coteaching, were implemented. This study examines the role reality pedagogy plays in the science classroom lives of these two students, while focusing on their social capital and the contributions the frame of distributed cognition makes in this process. The study revealed that both students’ social capital was impacted and the frame of distributed cognition played a role in their science classroom participation.

Introduction

Research in the field of education of immigrant students indicates that immigrant students conceptualize [class] participation in ways that differ from the bulk of the literature, and these differences have important ramifications for current teachers and future research…. According to these students, the mere act of participating in a classroom space (e.g., answering questions when asked, offering opinions, presenting group work, or asking questions) has the potential to expand an awareness to self, increase the capacity for tolerating dissent, and broaden the ability to support others while generating a more practical sense of community and safety. (Patchen, 2005, p. 44)

Furthermore, in regard to immigrant students’ class participation, “care” (Noddings, 1984, 1992; Valenzuela, 1999) from peers and teachers helped increase participation.
When teachers “communicated more openly, asked students about themselves and their lives, provided comprehensible input, and didn’t embarrass or ignore them, or allow other students to do so,” it fostered a sense of care and resulted in an increase in class participation among immigrant students (Patchen, 2005, p. 45). However, some authors argue that in a classroom setting while some immigrant students view peer groups as providing emotional and social support (Suarez-Orozco & Suarez-Orozco, 2000), others in this group “tended to view peers as hindrance to their educational advance, stability, and general sense of comfort within classroom” (Patchen, 2005, p. 45).

Since there can exist a level of social discomfort among immigrant students in a given classroom that can potentially hinder their learning and academic performance, research in this field encourages broader communication among immigrant students with their teachers and peers in order to alleviate this sort of discomfort. As Skuza (2005) indicates, “Underlying an immigrant’s acculturation is the communication process…. After all, communication is a central and fundamental mode of human learning and expression” (p. 394). Particularly regarding participation in school science, Calabrese Barton (1998), Anderson (1991), and Delpit (1993) note that barriers need to be broken down of the students whose language and experiences are different from what school science considers legitimate in order for these students to participate successfully in school science.

While considering the abovementioned about immigrant students, this study examines a recently developed perspective called reality pedagogy (Emdin, 2009). With its central goal being to support both teachers and students toward improving the experience of both groups in teaching and learning science in an urban academic environment, reality pedagogy in this study is examined via the lenses of social capital (Bourdieu, 1977) and distributed cognition (Hutchins, 2006). These two lenses are used in order to understand what role reality pedagogy plays in the classroom experiences of
immigrant students, and their science class participation and science learning when implemented in an their urban science class.

**Conceptual Framework**

**Reality Pedagogy**

Reality pedagogy engages five pedagogic tools that involve students and their teacher collaborating together to improve the teaching and learning of science. These five pedagogic tools are: cogenerative dialogue (cogens), coteaching, cosmopolitanism, and—more recently developed—context and content (Emdin, 2009). In this study, I focus on the implementation of the first two pedagogic tools and observe for the potential emergence of the third.

With its focus on the culture and realities of urban youth, while offering culturally relevant science pedagogy, reality pedagogy incorporates the culture and cultural influences of urban youth, such as some nuances of the hip-hop culture. In this manner, science instruction and content are presented and discussed in a fashion that is familiar to the urban youth, particularly to those engaged in the hip-hop culture. Coined by Christopher Emdin (2007a, 2007b), reality pedagogy is an outgrowth of his research in urban classrooms and focuses primarily on understanding urban students and their culture within a particular social space, such as the science classroom. Parallel in some ways to critical pedagogy, reality pedagogy functions to develop students’ consciousness about the sociopolitical factors that impact their teaching and learning (Emdin, 2011). Toward meeting its goals, reality pedagogy engages its five pedagogic tools.

**Cogenerative Dialogue.** The primary goal of cogenerative dialogues is to make collective decisions about the responsibilities, roles, and rules that preside over students’ classroom lives (Roth, Tobin, & Zimmerman, 2002). Cogens “lend themselves to discussions with students about inhibitors to their engagement in the classroom” (Emdin,
cogenerative dialogues are in essence dialogues that students have with their peers and teacher to co-create a plan of action for their class. Emdin relates cogens to hip-hop cyphers, “which are a complex form of group communication that hip-hop youth engage in” in private settings or within their community (p. 288). This form of communication is similar to how cogens are structured in that, much like ciphers, where rap (a type of music within the hip-hop genre) artists or rappers communicate with each other following a set of rules of engagement that are structured, in cogens students exchange dialogue and communicate with one another while also following a set of rules. “First, all participants are positioned in a circle with equal space among participants” (p. 288). Second, the rapper or participants are given equal opportunities to perform, and finally, “there is a consistent effort to reference the collective experiences of all participants as the dialogue/exchange continues” (p. 288). Thus, much like the cypher format, “participants in cogens are positioned in a circle, have equal turns to talk, interact with no voices being privileged over others, and work together to create a plan of action for improving their shared experiences in the classroom” (p. 288).

Such forms of communication as the cogenerative dialogues allow teachers to teach in a more culturally relevant manner, as they allow teachers to hear and “take part in conversations that can shift teaching practices in ways that reflect student standpoints and insight into the inner-workings of the classroom” (Emdin, 2011, p. 288). Next to the instruction being more culturally relevant, it is more effective as it is “based on students’ thoughts and ideas instead of teachers’ conceptions or assumptions about their students’ culture” (p. 288).

The structure of a cogen session that was implemented in this study is as follows:

Beginning with four to six students and a teacher (during lunch, before or after school) and focusing on a science class that they all are a part of, teachers and students engage in a critical deconstruction of what happened in the classroom. Then, they decide upon at least one thing that the group can do to improve teaching and learning when they return to the classroom. In these dialogues, a small group of students are given the opportunity to reflect
on their classroom learning, and, most importantly, provide teachers with an insight into what can work well in the classroom from the students’ perspective. (Emdin, 2011, p. 287)

**Coteaching.** Reality pedagogy defines coteaching in two scenarios. In the first scenario, the student is considered as having more knowledge and an expert on how to best deliver the content so as to best reach the rest of the class, who share a similar background with the student-teacher. Here, the student (or a small group of students) delivers the content in the way they feel is relevant to their peers in the class, who share the same cultural background.

Coteaching methods in this first scenario call for a role reversal between the teacher and the student. In coteaching, the teacher is both physically and symbolically positioned to learn from the student, while the student, or the student-teacher in this case, is allowed the opportunity to prepare and teach the lesson. In enacting coteaching in this manner, the teacher “takes notes on the way the student enacts pedagogy, documents the specific examples the student uses, records the way the student interacts with peers, and learns how to teach in ways that reflect the realities of student experiences” (Emdin, 2011, p. 289).

The teacher in the classroom thus plays the role here of a novice learning to teach (Emdin, 2011). In developing the lesson-plan and preparing the content to teach, the teacher also plays a role in helping the student while providing and giving access to any necessary teaching materials, textbooks, or web resources, like lesson plans and any other instructional or content-related materials.

In the second coteaching scenario,

The goal is to harness strengths (by allowing students to teach what they know well) and address content deficiencies (by allowing students to teach their peers who need help with content knowledge on specific topics).…. It focuses on youth who feel responsible for each other’s learning and the collective success of all students within the classroom. (Emdin, 2011, p. 289)
Here, students coteach science content to one another on a one-to-one basis during class activities in the science class and are matched up based on their strengths and weaknesses vis-à-vis a given content. This sense of collective responsibility is also what encompasses cosmopolitanism, the third pedagogic tool of reality pedagogy, which I will further discuss below.

According to McGee and Keller (2007), a good way to introduce youth to future professions is to expose them to those professions, and coteaching in this manner does just that by providing them firsthand experience in teaching (and the teaching profession) and the content of science (and science-related professions). Further, according to Emdin’s (2009) research, both of these types of coteaching play a role not only in empowering urban students toward the subject and content of science (particularly the specific contents the students teach), but also encouraging them to consider teaching and the field of science as career options. Both of these types of coteaching were engaged in in this study.

**Cosmopolitanism.** Within the urban science classroom, Emdin’s third C, cosmopolitanism, functions to support smooth operation of the classroom, beginning with the teacher identifying roles for students that may be non-traditional in nature. Cosmopolitanism is framed as valuing individual differences but also simultaneously having a collective responsibility for one another (Appiah, 2006). Within the frame of reality pedagogy, Emdin (2011) translates this philosophical construct to a tangible approach while “transforming human roles in social settings” (p. 290).

Here, the student’s role in the classroom is not just the role of a learner but one more involved in nature and requires taking ownership and responsibility of duties required for the classroom to run in a smooth manner. These roles also allow students to feel more connected to their class and facilitate development of the desire to learn within it. Such roles may be alternated among students as desired and include, but are not limited to: classroom material manager, who maintains the books and instructional
equipment; material and equipment distributor, who distributes handouts and equipment; computer/technology manager, who looks after the technology (computers, laptops, LCD projector, smart-board) in the classroom; greeter of any visitors (teachers, administrators, and any other guests); discussion leader; and “even comedian, who is a designated person to provide comic relief in a class” (Emdin, 2011, p. 290). Such roles, as Emdin explains, “[allow] students to become invested in the daily operation of the classroom, which, in turn, [allow] the teacher to be more effective in the delivery of the content” (p. 290).

Context. The fourth pedagogic tool, context, engages and encourages the teacher to utilize and integrate into the classroom both symbolic and physical artifacts from the students’ lifeworlds. Here, students’ contexts and lifeworlds outside their classroom are focused upon, while incorporating them into the classroom.

Symbolic artifacts refer to the use of non-tangible examples, such as utilizing terms and ways of communication from the students’ lifeworlds and culture. In this case, references from the urban and hip-hop culture are familiar to students and encouraged to be integrated by the teacher. Physical artifacts, such as a rock from a local community park or a picture of a local eroded building from the students’ neighborhood, are more familiar, relatable, and significant examples of weathering rather than information from texts and websites far removed from students’ lives. This practice almost forces the teacher to look at the lesson and the way it is prepared through the lens of its significance to the students…. Using this approach to instruction, the complex connection between the teacher and the learner are revealed when students start making connections to artifacts on their own and begin looking at other pieces of their lifeworlds through a science lens. Furthermore, it allows the teacher to display an effort to make science relevant for students that students can both appreciate and admire. (Emdin, 2011, p. 291)

Thus, the practice of the fourth pedagogic tool allows the teacher to become aware of, if not immerse him/herself into the students’ contexts and culture via actual physical
presence in those contexts, allowing him/her to have understanding or at least exposure into the complexities of his or her students’ background (Emdin, 2011).

**Content.** The focus of the fifth and final C, content, involves the teacher and his/her “willingness to both expose and embrace the limitations in their content knowledge within the classroom” (Emdin, 2011, p. 291). The final C of reality pedagogy thus refers to the content or the science topics in the particular syllabus or curriculum the teacher is to cover. The final pedagogic tool here creates a space for codiscovery of the content knowledge. “Once the understanding that science or any other discipline being taught is but an infinite body of knowledge ripe with interrogation, the willingness to exchange within the classroom and support the teacher in the codiscovery of new knowledge begins” (p. 291).

**Social Capital**

Social capital emerged as a theoretical frame when I conducted a pilot version of this study in the fall 2008-spring 2009 academic year, and so utilizing this frame as a lens to view this current study made the most logical sense to me in initiating this study. Current educational studies show that students’ social capital has a considerable impact on their ways of knowing and learning (Field, 2005). In researching the field of urban science education, it has become increasingly critical to explore the social capital of urban science students in research (Calabrese Barton, 2002). Based on his research, Emdin (2009) has concluded that in urban science education, effective teaching requires both a deep understanding of subject matter and a profound understanding of the cultural backgrounds of students in urban settings. In other words, the social and cultural capital that urban students bring to the classroom environment has a great impact on the way they approach science. Portes (1998) states, “Whereas economic capital is in people’s bank accounts, and human capital is inside their heads, social capital inheres in the structure of their relationships” (p. 7). Therefore, since utilization of one’s social capital
is shown to facilitate an effective learning environment for science, learning science requires productive teacher-student and student-student relationships. Thus, it is of great importance that educators look into the intricacies of the capital students bring to the science classroom.

According to Coleman (1988), the dense networks created by those who have shared social capital result in scenarios where everyone within a particular network is so deeply connected to everyone else in that network that the network is hard to penetrate by outsiders. He argues that within these types of scenarios, trust is growing, and group needs and concerns as co-defined by participants are being met and fulfilled. Burt (1992) defines structural holes as the result of breaches in existent social networks that allow for the development of more complex forms of social capital through the diffusion of information. Such classroom dynamics as dense social networks and structural holes are explored in this study to further enlighten the experience of immigrant urban science students. Figure 5.1 shows a representation of social capital as it is used in this study. For example, within the classroom structure, the social capital is formulated via social interactions. These social interactions foster dense networks, which may lead to negative social capital where outsiders of the dense networks are completely excluded and are unable to gain from the capital. In creating structural holes within these dense networks, negative social capital is alleviated, and where weak ties are allowed to be formed between new acquaintances, a new source of knowledge is found. Portes (1998) further states that “to possess social capital, a person must be related to others, and it is those others, not himself, who are the actual sources of his or her advantage” (p. 4). In the present study, I use the social capital frame to conceptualize how the two immigrant youths obtain social capital while attempting to relate to their non-immigrant urban classmates to make the classroom environment functional for themselves.
Distributed Cognition

The human mind does not evolve in isolation from the social and material world. Several researchers propose that our brain is designed to take advantage of the minute-to-minute details of our bodies and the interaction of our bodies with the physical environment (Clark, 2001; Quartz & Sejnowski, 2002). The activities in the human mind are very interlaced, even inextricably, with the material and social world (Tomasello, 2001).

Most simply put, an example of a system of distributed cognition is a group of people working together. “In such a case, cognition is distributed across brains, bodies, and a culturally constituted world” (Hutchins, 2006, p. 376). A person working alone with, and even without, materials or tools is also considered an example of distributed cognition.

The point is that distributed cognition is not a kind of cognition at all, it is a perspective on cognition. Its chief value is that it poses questions in new ways and leads to new insights…. Distributed cognition sees real-world cognition as a process that involves the interaction of the consequences of past experience (for individual, group, and material world) with the
affordances of the present. In this sense, culture is built into the distributed cognition perspective as at least a context for cognition. (p. 377)

The ways in which cognition is distributed from a cultural point of view are: (a) between a culturally constructed environment and a person, (b) through time, and (c) in socially organized settings, among the people in that setting. In real-world interaction and activities, all of these sorts of distribution and interaction take place simultaneously. The distributed cognition perspective thus suggests that, along with the individuals in a given environment, the environment itself and the materials/tools in that environment are a source of support and knowledge. Thus, to form a system of distributed cognition, all parts of the culture of the learning environment come together. In this specific case study toward setting up a system of distributed cognition, the culture and the pedagogic tools of reality pedagogy themselves played a role.

Alac and Hutchins (2004) propose that human interaction is a complex dynamic system and that “typical human-human interactions are composed of many elements, the meanings of which emerge from the network of relations among the elements” (Hutchins, 2006, p. 391). Vygotsky (1986) suggests in his theory of the social origins of mind that we need to know more about the distributed ways of thinking within our mental activities and our thoughts that are woven inextricably in the actions of the material and social world. Toward this end, Hutchins (2006) notes that with regard to human-human interaction, “much more work needs to be done to document the distribution of cognitive strategies across space, culture, and context” (p. 391).

Researchers of distributed cognition believe that the attention to microstructure of interaction from the distributed cognition perspective leads to a reconceptualization of the individual-environment relationship and suggests that this newly conceived relation has important implications for the way we confront many sorts of cognitive and anthropological problems. In particular, it provides a new place to look for mechanisms that shape both the ontogenetic and the phylogenetic development of sociality. (Hutchins, 2006, p. 395)
**Research Questions**

The following research questions sought to uncover the experiences of two immigrant students during the yearlong implementation of reality pedagogy in their urban science classroom in terms of their social capital and what role distributed cognition played in this process. This study addresses one overarching question: Which facets of the experience of participating in reality pedagogy are most valuable to the immigrant science students? Two sub-questions are: How does reality pedagogy contribute to the social capital of immigrant students? And what role does reality pedagogy play in the distributed cognition process within the urban immigrant students in the progression of the study?

**Methods and Methodology**

This ethnographic case study examined the implementation of the first two C’s of reality pedagogy—cogenerative dialogue and coteaching—and how they impacted two immigrant students, their social capital, and how distributed cognition played a role in this process. In this study, the first two C’s, cogenerative dialogue and coteaching, were implemented, while the emergence of the third C, cosmopolitanism, was observed for. A case study design was used to gain an “in-depth understanding of the situation [reality pedagogy] and meaning for those involved. The interest was in “the process rather than outcomes, in context rather than a specific variable, in discovery rather than confirmation” (Merriam, 1998, p. 19). I chose to conduct an ethnographic case study within the methods of qualitative research, as this approach offers not only “complex, detailed understanding” (Creswell, 2007, p. 40) through the ethnographic research approach but also a deep descriptive level of understanding that provides an “experiential perspective ... that emerges from the context itself” (Guba & Lincoln, 1981, p. 376) via a case study approach.
Setting and Participants

Utilizing ethnographic qualitative research methods in this study, I visited the school once a week. The school is a New York City public school (NYC Medical High, a pseudonym) that includes grades 7 through 12, with approximately 90 students in each grade. NYC Medical High was in its 7th year at the time of the study. According to the school’s website, 75% of the school’s population is female, and the ethnicities of the student population at the time of the study included: approximately 63% Latino, 32% African American, 3% Asian/Pacific Islander, 1% American Indian, and approximately 1% White. Approximately 88% of students within this population at the time of the study qualified for free or reduced lunch programs, with approximately 10% qualifying for ESL services and 95 students qualifying for special education services. NYC Medical High aims to prepare its students for the health and medical professions and focuses on these fields in its curriculum. Students here participate in weekly internships in local health facilities, nursing homes, and hospitals. Students here also have uniforms consistent with the health professions theme of the school, which are medical scrub tops with colors specific to and indicative of their grade levels, and the teachers wear white lab coats.

This study took place in the Fall 2010 and Spring 2011 academic year in the context of a 10th grade Living Environment science class in NYC Medical High. The school defined immigrant students as any student residing in the United States for five years or less. The class included only two such students, and with their consent, the study focused on them. For each visit, I conducted cogenerative dialogue sessions with the two students and their teacher during the school’s lunch period (all students in this class shared the same lunch schedule). As the year progressed, I also implemented coteaching in this classroom and looked for the emergence of cosmopolitan behavior among the two participating students, Rabina and Illia (pseudonyms) (described in detail below). I also observed the class once a week in order not only to gain knowledge of the classroom environment, but also to build a rapport with the students. This specific way of designing
the study allowed for enhancement of a number of features of trustworthiness of the study, such as triangulation of multiple data sources to substantiate claims, “prolonged engagement” (Merriam 1998) in the setting of my research study, and acquiring information to provide “rich, thick description” (Creswell, 2007; Lincoln & Guba, 1985).

This study focuses on the data of the two immigrant students, Rabina and Ilia, and how their data contributed to the theoretical frames of this present study.

**Rabina.** Rabina, age 14, was born in Lagos, Nigeria, and moved to New York at the age of 11 (three years prior to time of this study). She had resided with her mother in Nigeria and moved to New York with her older sister and now lives here with her father, step-mother, and two younger step-siblings.

Rabina indicated that, while in Nigeria, she was very involved in her church and used to sing in her church’s choir, which she dearly misses. She mentioned that her involvement at her church in Nigeria allowed her to make good friends, as her church choir group included students from her school, and she was able to get to know and spend time with them more intimately and frequently during weekly choir practices. Though Rabina and her family attended a church in New York, she was not involved in the church’s choir. The church her family visited was quite far from her residence, which limited her visits and participation in church activities, except for holidays.

In class, Rabina appeared to be a quiet and shy student, and, according to her science teacher, Mr. F, she was mindful of her academic performance. Rabina explained that after moving to NYC, she struggled with her Nigerian accent, particularly in school. She generally participated in her classes in Nigeria and recalled that when she volunteered to participate in her 8th grade class at NYC Medical High, the students ostracized her not only because of her accent, but also because she volunteered to participate. Rabina further indicated that she learned a lot about the American culture, such as how to speak with an American accent and using American expressions and colloquialisms while interacting with her younger step-siblings and watching television.
Ilia. Ilia, age 15, is a Hispanic student from Puerto Rico. She was born in Puerto Rico and moved to New York with her family at the age of 10. Ilia indicated that it was due to her father’s change of post in his job that she and her family decided to move to New York. Ilia indicated that her life here is not very different from the life she had in Puerto Rico, as the school system and environment in Puerto Rico are very similar to what she encounters here. The biggest difference in her life after moving here, she pointed out, was that she does not have nearby her extended family, to whom she is very close to who helped raise her (grandmother and aunts, particularly). She indicated that she used to visit her extended family every summer after moving to New York until last summer, when she joined a dance congress here in New York. Dancing, Ilia indicated, is a big part of her life that she greatly enjoys and considers as an outlet. She was involved in a dance group/congress from a very young age in Puerto Rico and was very happy that her mother was able to find a similar studio last year in New York, which she helped her join.

Ilia was one of the more talkative students in the class and appeared to communicate with only a certain number of students, to whom she seemed to sit in close proximity in this science class. Though the school system and environment in New York are similar to those of Puerto Rico, the cultural dynamics of the student population, Ilia indicated, were a noticeable difference she experienced when she first came here. Ilia expressed that she often felt excluded by other Hispanic students, particularly by students from the Dominican Republic, in her 7th grade class (when she first moved to New York), where the majority of the student population was from the Dominican Republic. Though this was the case, Ilia specified that over the year this difference in cultural background did not remain as pronounced as it first was as she became more familiar and accustomed to the culture in New York. Ilia pointed out that her “salsa dance” group now in Brooklyn, NY has individuals from various Hispanic ethnicities (Mexican, Dominican,
Puerto Rican), coming from all around New York, whom she enjoys and shares a common interest with, in dancing salsa.

**Data Collection**

Three data sources were used to inform the research questions. Specifically, the method of data collection involved triangulation through interviews with students and the teacher, weekly classroom observations, and weekly cogenerative dialogues sessions. All interviews, observations, and dialogues were video-recorded. Toward addressing the research questions of this study, classroom observations and interviews were the foremost sources of information and data. Data were also collected from the cogenerative dialogue sessions.

**Interviews**

The two immigrant students were interviewed in order to gain the perspective of the immigrant population of the class regarding the impact of reality pedagogy. The individual interviews of the two immigrant students took place three times in the fall semester and three times in the spring semester. All interviews were conducted using the interview questions on Appendix D. Each student and the teacher were interviewed at distinct times of the academic year. In total, Rabina and Illia were interviewed six times each in the course of the year, three interviews being in the Fall semester (October/November) and three in the Spring semester (March/April), and the final interview (June).

The teacher was also interviewed in order to gather his perspective on the impact of reality pedagogy. He was interviewed four times in the course of the year, two times in the Fall semester (November/December) and two times in the Spring semester (March/May). All interviews were 15-30 minutes in length and were semi-structured in
nature. That is, though all questions noted in Appendix D were asked and answered, additional clarification and at times conversational questions were part of the interviews. These additional questions and conversations made the interviewee feel more comfortable, and at times clarification of what was said was gained (Guba & Lincoln, 1981). Student interviews provided insight into the individual students’ experiences, and finally the teacher’s interviews allow for an addition perspective on the implementation of this set of pedagogic tools toward a more deep and rich understanding of the phenomenon.

**Classroom Observations**

Classroom observation began in September and lasted until the first week of June. In total, 34 class sessions were observed and video-recorded. The video camera was stationed at the back of the class, making sure to capture the view of the whole class. Four small audio-recorders were also strategically placed around the four corners of the classroom.

Additional field notes and memos were collected during transcribing the video data collected. Data were also collected via informal conversations with the students intermittently during my weekly visits. Field notes of these informal conversations were also noted at the end of a visiting day if such a conversation took place on a given visiting day. These informal conversations were not video- or audio-recorded, as they took place sporadically. To collect field notes during classroom observation, I utilized the chart shown in Appendix A.

**Cogenerative Dialogues**

Cogenerative dialogue sessions began in October and lasted until late December in the Fall 2010 semester. Nine cogenerative dialogue sessions took place and were video-recorded in the fall semester. In the Spring 2011 semester, 14 cogenerative dialogue sessions took place. The study thus includes 23 video-recorded cogenerative dialogue
sessions. The cogenerative dialogue sessions were guided using the questions in Appendix C; however, additional questions and topics were discussed as brought up by the teacher and the students themselves. Though the cogenerative dialogue sessions are one of the three C’s being implemented in this study, these sessions were also key in understanding the participants’ development (via their interactions with other participants in the sessions) throughout the progression of the year.

**Role of the Researcher: Participant Observer**

As a participant observer, the researcher assumes “two roles … an observer … [and] also a genuine participant … and has a stake in the group’s activity and the outcomes of that activity” (Guba & Lincoln, 1981, pp. 189-190). My two roles as the primary researcher of this study were those of observer and interviewer, and the initial facilitator of the cogenerative dialogue sessions. In this study, my role as a participant observer allowed me an opportunity to intimately gain understanding of the experiences of the participants, which in turn helped guide data collection and analysis of those data. Merriam (1998) recognizes and supports the importance of considering “how the researcher can identify those effects [of being a participant observer] and account for them in interpreting the data” (p. 103).

**Data Analysis**

Some ideas from grounded theory (Charmaz, 2006; Strauss & Corbin, 1998) have been incorporated into this research approach. The ideas from grounded theory I incorporate in my research here involve inductively approaching my research while carefully studying the data I collected, and carrying out repeated, consistent, and ongoing data analysis throughout the study, which are all features of the grounded theory approach (Charmaz, 2006; Creswell, 2007). Though the grounded theory approach seeks
typically to explicitly develop a new theory, my approach in utilizing grounded theory is not in this direction. “Constructivist grounded theory” (Charmaz, 2006), which originates in social constructivist epistemology, is also utilized in my data analysis.

Constructivist grounded theory maintains that “both data and analyses are social constructions that reflect what their production entailed” and “any analysis is contextually situated in time, place, culture, and situation” (Charmaz, 2006, p. 131). Parallel to this notion, I approached my study via “interpretive inquiry,” in which “researchers make an interpretation of what they see, hear, and understand” (Creswell, 2007, p. 39). As stated by Charmaz (2006), “any theoretical rendering offers an interpretive portrayal of the studied world, not an exact picture of it” (p. 10). Thus, I recognize and acknowledge my influence as a researcher on both the construction and interpretation of the data I collect. Also, I recognize that my position as a researcher, a teacher, and an individual influences the shape and structure of the design of the study, data collection, data analysis, and the overall writing of this study (Creswell, 2007).

All data collected for this study were analyzed using the qualitative data analysis software known as Atlas.ti (Muhr, 1997/2005). All video- and audio-recorded data were transcribed and coded for the social capital frame, whereas further “focused coding” allowed me to “synthesize and explain larger segments of data” (Charmaz, 2006, p. 57) or analytic categories, leading to the emergence of the “distributed cognition” frame. Further, the codes and data were closely studied again to confirm the aspects of the data that identified with the “social capital” and “distributed cognition” frame. The theoretical frame of social capital was discerned when the pilot version of this study was conducted two years prior to this study, and it was with this lens that this study was conducted. The “distributed cognition” frame was emergent from the findings of the study.

In the analysis of the data collected for the study, I was in essence interested in and looking for an overall progression over time of the implementation of the three Cs. In observing the two immigrant students, for example, if, over time, one of the two students
appeared to be more engaged in class, it allowed for a point of interest to investigate. So, in the classroom observation table (Appendix A) over time, if, for instance, one of the students was talking in regard to the science content being taught in class more and more as the semester progressed, it provided a point of interest to be investigated. In this case, in a consecutive interview, I questioned the student about this behavior and looked in her response for an affirmation or negation of whether she felt this increase in engagement in the science class was a reflection of the implementation of the cogenerative dialogue and coteaching. Also, in this specific student’s cogenerative dialogue sessions, I looked to see whether she was either more or less engaged in the dialogues as the year progressed and later asked the students in their individual interviews whether they felt this increase in engagement in the science class and the dialogue sessions was a reflection of the implementation of the cogenerative dialogue itself and coteaching. This either confirmed that implementation of the cogenerative dialogues and coteaching had an impact in the student becoming more engaged in the class or confirmed that the set of pedagogic tools did not have an overall impact on this specific student. This is also the method via which each of the three sources of data was triangulated. Figure 5.2 reflects the method via which data were analyzed to deduce the three themes discussed in the findings section of this study.
**Figure 5.2: Process of data analysis leading to three themes**
Rigor and Validity

Toward validity and rigor quality (Guba & Lincoln, 1989), three methods were followed: progressive subjectivity, peer debriefing, and member checking (Merriam, 1998). In practicing progressive subjectivity, I recorded and archived with my debriefer, before the beginning of the study, possible outcomes I thought could result from this study (Denzin & Lincoln, 1978). According to Denzin and Lincoln, as “the inquirer’s construction cannot be given privilege over that of anyone else” (p. 238), the technique of progressive subjectivism provides a check on the degree of privilege.

According to Coleman (2001), in practicing progressive subjectivity, “researcher records in his or her field log initial assumptions as well as what he or she expects to find during the process”, in doing so “the researcher scrutinizes and contemplates his or her prior and emerging assumptions and interpretations in relation to the project” (p. 2). In this process of analysis, if “too much privilege is afforded to these expectations and assumptions, the researcher is too focused on imposing her or his own assumptions and values, and not on attending to the constructions” (p. 2). Thus, Coleman further stresses the importance of practicing progressive subjectivity while noting that “if this contamination is not checked, the final report will reflect only what the researcher expected to find, not the realities uncovered from the participants” (p. 2).

I also practiced peer debriefing, where I engaged a peer in the analysis, findings, and conclusion of this study (Denzin & Lincoln, 1978). This was toward responding to searching questions, in order to help the evaluator understand his or her own posture and values and their role in the inquiry; to facilitate testing working hypotheses outside the context; to provide an opportunity to search out and try next methodological steps in an emergent design. (p. 237)

Lastly, I practiced member checking after each of my interview sessions with my interviewees and also after deducing the themes from coding the interviews. This was practiced in order to verify the accuracy of what was written down against what the participant was actually communicating.
Findings

From the data analysis, three emergent themes were observed and were generated among the two participants. These were increased participation with the class network, increased opportunities for voice in the classroom, and, finally, increased ability to access the human and physical resources of the classroom for their own benefit. Below I discuss these three themes, noting the specific findings related to each theme. I first discuss the first two themes together and then the third theme. I discuss the first two themes together, as the findings of both of these themes are very interconnected, as the data below present.

Increased Participation with Class Network and Increased Opportunities for Voice in the Classroom

Toward the beginning of the semester, I noticed that this class was quite noisy and the teacher had a difficult time getting students’ attention. Students who sat near each other talked among themselves mostly about topics unrelated to the lesson, and not much communication took place between students who did not sit in close proximity. Both the teacher and students in the initial cogenerative dialogues and interviews indicated that there were “cliques” in the classroom. Students from two separate 9th grade cohorts were mixed to form this 10th grade cohort, and, as the students indicated in the initial cogenerative dialogue sessions, some students in these two separate cohorts did not get along very well, resulting in confrontations and arguments during class. Cliques formed within the initial 9th grade cohorts, which further caused individual students in the class to stay within their own circle of classroom friends. Below is a one of the first cogenerative dialogue sessions in October 2010, in which Ilia, in a cogen along with other students, indicated the presence of cliques in the classroom:

**Researcher:** You guys were saying last week that your class is a mix...

**Ilia:** Everyone from 9D was to go to 10D but they switched some people to 10E instead

**Nicole:** Yeah…we just don’t agree on certain things
Ilia: Exactly, or with certain people…

Nicole: We just don’t click as well together

Ilia: Yeah….

In the following week’s cogenerative dialogue session, this issue of students from two different 9th grade cohorts being mixed to form their current 10th grade cohort was brought up again. In this cogen, the teacher also confirmed the existence of this issue and the presence of cliques in this classroom while stating, “Yeah, last year they were in separate cohorts … this year they’re mixed … they mixed the cohorts … but in the class now people from last year’s cohort just have their own cliques.”

The cogen sessions included a mix of students from the whole class, who either volunteered to participate or were randomly invited to join; cogen sessions turned out to include students from the different cliques or social groups of the classroom. The cogens created a space and allowed opportunities for Ilia not only to voice her concerns about the classroom environment but also how cogen sessions allowed her to communicate with students outside her social group. In the cogen above, Ilia and another student, Nicole (pseudonym), were part of two different cliques in the classroom who did not usually communicate with one another. However, discussing their classroom environment in the cogen sessions, they both tended to support each other’s thoughts while expressing their own concerns about the classroom environment, such as Ilia expressing her concern about not agreeing with certain students and the other student, Nicole, expressing being concerned about not agreeing on certain matters or decisions in the classroom.

At another cogen session (and also in an informal conversation), Rabina and Ilia both voiced that the school took nearly a month to establish some students’ programs and class schedules, for example, a student attending a class one week was switched to another the following week, with up to three switches in three or more classes. This left many students frustrated, as they were not able to follow through with a given class from the beginning of the semester. The teacher did not want to comment on this issue:
Researcher: In class last week you guys were talking to Mr. F about your schedules and switches…what’s going on there?

Rabina: It took so long for them!…

Ilia: It took them like three weeks in September and they still don’t get it right!…

Here, both Ilia and Rabina were given a space to express or voice their thoughts and frustrations about their similar or shared circumstance, and while they did so, they found support from and comfort in one another, which led to more ease when it came to engaging with one another in future cogens or in classrooms activities. Both students were from separate cliques or social groups in the classroom.

The fact that cogens and coteaching activities allowed for Rabina to communicate with students from other social groups in the class was shared in an interview in which she stated: “I never talked to Monica until at the cogen that day. I helped her when we did the coteaching on parts of the cell. It was me, Monica, Brian, and Maria in the group, and we presented.”

In class, Rabina appeared to be a quiet student, and according to her science teacher, she was mindful of her academic performance. She sat in the middle row of the classroom. She appeared to be disturbed by the noise and disorderliness of her surroundings and often appeared to struggle to hear the teacher’s instruction. Being fairly shy, Rabina never appeared to participate in class or even vocalized in class that she was not able to hear the teacher sometimes in class. In one of her interviews, she revealed this detail: “I can’t sometimes hear him [Mr. F] in class … they just like talk, talk and talk…. I wish they [her classmates] listen cuz it’ll be in the test what he says … they need to know it.” I later passed on this concern of hers to Mr. F, which he considered and incorporated when classroom seating was re-arranged (as co-planned in cogens, later in the semester).

In Nigeria, Rabina studied in two schools, but she indicated that she remembered her most recent schooling most clearly as she spent the most time there, “from very little
to 7th grade.” Rabina talked mostly about her second school in Nigeria when this topic about her schooling in Nigeria came up in my interviews and informal conversations with her. Rabina indicated that most schools in Nigeria were career-oriented and very disciplined. She further elaborated that the form of discipline in her Nigerian school, like most Nigerian schools, often involved corporal punishment. This form of discipline, she explained, was accepted by educators and parents. This practice encouraged her to do well in school, stating, “It worked for me.” Therefore, Rabina was very surprised by the classroom environment and the manner in which students interacted with one another and the teacher: “Here in the American schools, it’s nothing like over there [Nigeria]. You better listen to the teacher over there.”

Due to the presence of cliques or grouping of students, she did not have much opportunity to communicate with her classmates. From the classroom observations in the beginning of the semester, Rabina sat in the middle of the classroom and was surrounded by other students, yet she mostly kept to herself, worked on her own, and was somewhat in isolation from the rest of the class. In the initial classroom observations, Rabina was one of the first students to enter the class, and as class began, she was ready to work, with her notebook open. She diligently listened to the teacher’s instructions and lessons, noting all that Mr. F wrote on the board. Rabina rarely participated in class, in terms of speaking aloud, and on class assignments she mainly worked on her own. Mr. F often praised Rabina for her diligent work ethic and always being on time, stating at one time to the class, “Only a few of you guys handed in all your homeworks, and of course Rabina is in there … good job!” This sort of praise appeared to encourage Rabina to continue in her ways. Mr. F also said of Rabina that “Rabina is one of the only students who always makes it to class on time. If she can do it, you guys should be able to also.”

Mostly quiet in the cogens, she usually did not voluntarily speak in the initial cogens. In the third cogen she attended, Rabina became more comfortable and started speaking in the group. She spoke about favorite school subjects and eventual career
goals. Rabina indicated that she was “doing good in math and science” and was interested in becoming a pediatrician. This subject of academic and career goals appeared to be an “ice-breaker” of sorts for Rabina. She appeared proud to be able to share about her academic performance and future goals—a subject the cogen session allowed her the opportunity to voice. Communicating her own concerns about her classroom environment and school’s scheduling, as noted previously in this section, was also something she later felt comfortable enough to share, which cogens allowed her the opportunity to do as she further participated in the sessions progressively throughout the semester.

By the end of February, half the class had participated in the dialogue sessions, and my classroom observations reflected that there were fewer conflicts between students in the class and most students throughout the class appeared to communicate well with one another. Cogenerative dialogue sessions, informal conversations with some students and the teacher, and individual interviews revealed that this change in the classroom partially had to do with the plan of action students collaboratively came up with along with their teacher to change the structure of the class. Students felt that the collaborative way in which they decided on their own seating arrangement in the science class contributed to their feeling more a part of the class and able to work together constructively and have their input incorporated. As Illia stated in one of her interviews: “We did good with the seating chart … we did it together … he [Mr. F] didn’t just like do it without us … we did it in our groups and it’s actually working in class … nobody be talking over each other … they mostly don’t sit next to each other, so it’s more working and less talking.” The teacher also commented on this change during one of his interviews, where he particularly brought up the seating re-arrangement activity noted above while adding that the students enjoyed working together in this activity.

They actually had a good time working together in the seating re-arrangement activity. The guidelines were that they have to discuss with each other and put themselves around people that they could work with, without getting distracted. They could put themselves in any location of the
classroom seats they thought worked best for them … and I have to say they did a pretty good job, most of them … the current seating has a lot of their inputs … and they worked on it together!... I was really proud of them and I could tell they were pretty proud that it worked out well … and I think because they did it and got to have their input, it made it more meaningful and they’re sticking to it so far.

Ilia, along with others taking part in this activity, as indicated by Mr. F, felt a sense of empowerment and ownership in having a voice in creating a classroom environment conducive to their learning. Their sense of ownership and opportunity to voice their minds encouraged students to get more involved in the class activities. In Rabina’s case, she started communicating with Sarah, a student who sat next to her and who also attended two cogens with her. Following the classroom seating rearrangement, facilitated by the cogenerative dialogue sessions, the coteaching activities most appeared to encourage and engage Rabina in working with the students around her. As noted above, cogens and coteaching allowed her to begin and continue communicating and working with peers such as Monica (above) and Sarah whom she had not had the opportunity to communicate with prior to attending cogens or participating in coteaching.

Ilia also had the opportunity to communicate with students she normally did not communicate with. However, Ilia was one of the students who was actually involved in a clique in this class. Not afraid to vocalize herself, Ilia often called out in class and engaged in conversation with surrounding peers in her clique when Mr. F was teaching. In a cogen, Ilia admitted to calling out, stating, “I know I call out…. I can’t help it … (smiles).” Ilia joined the cogenerative dialogue sessions in the second session. She seemed comfortable to talk with peers and Mr. F in the cogen sessions. At times she was even playful with Mr. F, who encouraged a relaxed and friendly environment so that the more reserved students, like Rabina, would feel at ease to participate.

Cogens also allowed Ilia to voice her opinions about specific academic concerns. Particularly, Ilia brought up the difficulty she had with understanding scientific terms, while stating in cogens the following: “It’s difficult to understand those big science
words”; “You [Mr. F] have a big vocabulary for the test”; “But Mr. F your wording!…..”
In the cogens, both Ilia and Rabina, along with other students, discussed and worked with
Mr. F in better presenting and incorporating scientific terms in the class lessons. One of
the solutions that Ilia, Rabina, and others co-planned with Mr. F was to have a glossary
on the back of their notebooks, which they decided to add to daily when learning a new
word. This glossary was individual to each student and included not only scientific words
particular students had difficulty with, but also English words students newly learned that
day. Cogens not only allowed Ilia to voice her concerns about understanding scientific
terminology, but also opened the table to other academic concerns students like Rabina
had. For example, Rabina voiced that she had had difficulty with graphs in a recent
science exam in the class. Upon voicing that “the graph was hard,” Rabina received
immediate support from Ilia, who stated, “I just didn’t know what to put! Oh my god! I
just put anything [for the graph].” and other students, who also concurred. Raising her
concern about graphing, Rabina not only afforded her peers’ support, but it also resulted
in a more vigorous review of graphs before the next science exam, which in turn provided
her with the necessary academic support. Thus, the cogen sessions allowed an
opportunity for these two students to both participate within their class’s social networks
and also provided an opportunity to voice themselves and their concerns.

Classroom observations of coteaching activities indicate that Ilia regularly
communicated with students within and outside her coteaching group. In the coteaching
activities, she made sure that all members in her group, no matter who she was in her
group, had the necessary materials for the accomplishing the activity. She often walked
over to the teacher and around the class during activities to gather materials such as
markers or rulers for her group’s activity. She was also the person who often picked up
the handouts and class textbook for her group and distributed them to the group before
they began their work.
During the in-class preparation of coteaching activities, Ilia also facilitated content-related conversations within her group. She also took part in initiating content-related conversations between her coteaching group and other coteaching groups. She would share necessary information beneficial to both groups. This sort of interaction and communication with her peers not only engaged members of both groups in science content-related conversations that were relevant to the day’s lesson but also facilitated communication among students who did not generally communicate with one another. In Ilia’s case, the cogens allowed her the opportunity to broaden her social network, fostering her knowledge about whom to get what kind of academic resources from in the class when it came to the coteaching activities. This notion leads into the third theme of this study.

**Increased Ability to Access the Human and Physical Resources of Classroom for Own Benefit**

In both Rabina and Ilia’s cases, their social networks or the number of students they regularly communicated with in their science class was broader due to the participation in cogens and coteaching. Coteaching played a key role in generating this theme among both Ilia and Rabina. While attaining a broader source of new knowledge, Ilia maintained communication with her coteaching group and other coteaching groups, as she indicated in an interview: “Me and my group got the chart idea from Maria’s group … it helped out when we presented … we gave them our construction paper … that helped them out.” This sort of sharing of ideas and human capital (coteaching presentation methods in this case) and physical resource (construction paper in this case) progressively became more and more part of students’ practice, including Rabina’s and Ilia’s. Rabina mostly engaged in and accessed the human and physical resources of her co-teaching group, whereas Ilia accessed human and physical resources of both her own group and other coteaching groups. The structure of coteaching and the cogens enabled opportunities and provided access to attain human and physical resources, which in turn
benefited both Rabina and Ilia in their coteaching activities. Interview quotes from Rabina and Ilia indicated this point:

Rabina: I got the DNA and protein thing better after we talked it out in my group before coteaching it.

Ilia: I like how we charted out the plant cell vs. the animal cell in my group….I got the chart idea from Maria’s group…it’s more clear to me in the chart.

The communication in both the coteaching and cogens allowed the thoughts of one person or even groups to be distributed or shared. In Rabina’s case, she mostly practiced distributed cognition when working with her coteaching group, whereas Ilia practiced distributed cognition more broadly. Ilia not only communicated with her thoughts and ideas within her own coteaching group but also with other coteaching groups in the class.

**Discussion**

As the findings of this study present, the implementation of the 2 C’s of reality pedagogy, cogenerative dialogue and coteaching, generated three major themes among the two participating immigrant students, Rabina and Ilia. These themes explain that while participating in cogens and coteaching activities, Rabina and Ilia were able to increase participation with their class’s social networks and increase opportunities for their voices to be heard in the classroom, and finally, participating in the 2 C’s increased their ability to access the human and physical resources of classroom for their own benefit.

The findings show that participation in the 2C’s allowed Rabina and Ilia to increase their social capital. Within the frame of distributed cognition, their increase in social capital catered to their development as they progressed through the year. As Rabina and Ilia participated in cogens, they formed weak ties with one another and other participating
students, and when they returned to the classroom, these weak ties innately resulted in the creation of structural holes.

More specifically, viewing cogens and coteaching via the social capital lens, the cliques or dense networks of the initial social groups in the classroom appeared to exclude Rabina and students like her from participating in the social networks of her classroom. The cogens themselves and the communication Rabina had with her peers in cogen sessions allowed for structural holes to be created with these dense networks. Structural holes were also physically created when the classroom seating was re-arranged (per students’ suggestion), which, together with cogens, allowed Rabina to create weak ties with the students she interacted with. This sort of interaction created a new source of knowledge (social and academic) for her, which further encouraged her to take part in coteaching activities, even further fostering her social and academic knowledge and social capital overall.

In Ilia’s case, participating in cogens created structural holes in her own classroom cliques or dense networks, where, in the cogen sessions, she began to communicate with students like Rabina, who was outside Ilia’s social group and with whom she never communicated until the cogen sessions. The classroom seating re-arrangement also created physical structural holes. For Ilia also, cogen sessions allowed her to interact in other social groups where she was able to recognize that students outside her own social groups shared similar concerns—as noted previously in the excerpts where Ilia communicated with Nicole and also at another cogen where she communicated with Rabina. These sorts of interactions initiated weak ties with the students she interacted with in the cogens and carried over to the classroom. She appeared to utilize these new sources of knowledge the most during coteaching activities, which further fostered her social capital.

Due to progressive implementation of cogens and also to the classroom seating re-arrangement (co-planned and decided in cogen sessions) and the implementation of
coteaching, most dense networks were either no longer present or no longer as strong as at the beginning of the school year. Moreover, in both of Rabina and Ilia’s cases, the implementation of the 2 C’s of reality pedagogy fostered social interaction, allowing them to gain and share social capital with their peers. Via the coteaching activities, these dense networks were further broken down, allowing students like Rabina—who had previously experienced negative social capital from her peers (i.e., being excluded from dense networks, unable to gain any capital as an outsider)—to create weak ties with her peers, gaining new knowledge and creating new sources of knowledge.

Both cogens and coteaching also foster the distributed cognition frame. The frame of distributed cognition, I would argue, is deeply embedded in the structural design and principal concept of cogenerative dialogue sessions and coteaching, as by design both foster the sharing of ideas and collaboration “across brains” (Hutchins, 2006). Though there are others who may debate that distributed cognition is more than collaboration, I argue here that cogens and coteaching are ingrained at the core of the basic concept of distributed cognition.

Hutchins (2006) explains that distributed cognition is a perspective of cognition. A simple example could be a group of people working together. Here, “cognition is distributed across brains, bodies, and a culturally constituted world” (p. 376). Given this is the case, the first two tools of reality pedagogy—cogenerative dialogue and coteaching—can be comparable to the distributed cognitive perspective. Both of these pedagogical tools allow for collaboration among a group of students and their teacher. In cogenerative dialogue group settings in this study, distributed cognition was practiced while students co-planned a course of action for their class along with their teacher, shared ideas, and eventually executed the co-planned idea, as demonstrated in their collaboration in rearranging the class seating and establishing a system of having individual glossaries.
In the implementation of coteaching, students work with their peers in groups and with their teacher while discussing science content in order not only to gain clarification for themselves but also to teach each other the necessary science content. This transfer and distribution of thoughts and explanations are exemplary of distributed cognition.

Hutchins (2006) further contributes that “a system of multiple interacting subsystems can provide a solution more easily than trying to get all of the constraints out of a single subsystem” (p. 394). In the implementation of both cogenerative dialogues and coteaching in this study, distributed cognition was practiced, while these two students co-planned and collaboratively worked with their peers.

**Conclusion**

This study sheds light on the experiences of two urban immigrant students in their journey in an urban science classroom. The first two pedagogic tools of reality pedagogy, cogenerative dialogue and coteaching, were implemented in their science class. As the findings indicate, the two immigrant students became more involved in their science class. The use of cogenerative dialogue and coteaching fostered their social capital and assisted in building their knowledge via the distributed cognition frame. This study highlights that reality pedagogy fosters students’ social capital and the perspectives of distributed cognition. In this way, reality pedagogy creates a socially supportive space for immigrant students and promotes overall growth of students in urban classrooms. Moreover, for both these immigrant students, the implementation of reality pedagogy allowed them to gradually become full participants in their science classroom while creating a structure and space conducive to their learning and class participation.
Chapter VI

CONCLUSION AND IMPLICATIONS

The purpose of this study was to investigate the impact of the implementation of reality pedagogy in a 10th grade science class (Biology/Living Environment) at an urban public school through qualitative case study, allowing an in-depth look at the phenomenon. Specifically, the study sought to explore the impact, if any, the implementation of reality pedagogy has on the self-efficacy of participating urban science students. The study also explored the impact, if any, the implementation of reality pedagogy had on the two urban immigrant students in this class.

In the next section, I summarize the major findings of the study, as presented in Chapters IV and V. I then look at both chapters more broadly to synthesize the findings across the two chapters. Finally, I discuss the implications of these findings for research and science education overall.

Summary of Major Findings

In Chapter IV, the four cases of urban science students participating in the implementation of reality pedagogy reveal how reality pedagogy interconnects with the sources of self-efficacy. In taking part in the implementation of this approach, all four participants’ (Maria, Nicole, Tara and Christian) self-efficacy was positively impacted via all four sources of self-efficacy (mastery experience, vicarious/social modeling, social-verbal persuasion, and physiological/affective states) within their science
classroom. The four themes deduced from the this part of the study regarding the implementation of reality pedagogy and its impact on the self-efficacy of the participants suggest that this approach improves communication among students and between the teacher and students, allows students to feel more socially accepted and part of the class, increases participation and involvement of students in the science class, and allows for students to improve academically in science (academic shift toward improvement). These four cases are powerful to examine, as they lend insight into what may be accomplished through this culturally relevant approach to teaching and learning science known as reality pedagogy, which both challenges and supports learners.

In Chapter V, the cases of the two immigrant students, Rabina and Ilia, provide another level of understanding of the impact of the implementation of reality pedagogy. Viewed through the lenses of social capital and distributed cognition, Rabina’s and Ilia’s cases highlight the aspects of reality pedagogy that align with the frame of distributed cognition and allow the development of shared social capital among immigrant students, while providing an opportunity for them to interact with their non-immigrant peers. The following tables summarize the key findings of the impact of the implementation of reality pedagogy. Table 6.1 summarizes the ways in which the implementation of reality pedagogy impacted the self-efficacy of the four participating students, whereas Table 6.2 sums up the ways in which reality pedagogy contributed to the development of the two participating students’ shared social capital and process of distributed cognition.
Table 6.1. Summary of the impact of reality pedagogy on participants’ self-efficacy

<table>
<thead>
<tr>
<th>Themes Fostering Self-Efficacy</th>
<th>Maria</th>
<th>Christian</th>
<th>Nicole</th>
<th>Tara</th>
</tr>
</thead>
<tbody>
<tr>
<td>“academic shift toward improvement”</td>
<td>Fostered via engaging in coteaching (mastery experience)</td>
<td>Was not able to fully engaged in coteaching (mastery experience)</td>
<td>Fostered via engaging in coteaching (mastery experience), cogens and after school tutoring</td>
<td>Fostered via engaging in coteaching (mastery experience), cogens and after school tutoring</td>
</tr>
<tr>
<td>“improved communication”</td>
<td>Fostered via cogen and coteaching</td>
<td>Fostered via cogen and coteaching</td>
<td>Fostered via cogen and coteaching</td>
<td>Fostered via cogen and coteaching</td>
</tr>
<tr>
<td>“students’ feeling of acceptance”</td>
<td>In class, cogen and coteaching provided social/verbal persuasion resulting in positive affective/emotional states fostering feeling of acceptance</td>
<td>In class, cogen and coteaching provided social/verbal persuasion resulting in positive affective/emotional states fostering feeling of acceptance</td>
<td>In class, cogen and coteaching provided social/verbal persuasion resulting in positive affective/emotional states fostering feeling of acceptance</td>
<td>In class, cogen and coteaching provided social/verbal persuasion resulting in positive affective/emotional states fostering feeling of acceptance</td>
</tr>
<tr>
<td>“increased participation/involvement in class”</td>
<td>Fostered via engaging in cogens and coteaching while receiving vicarious/social modeling experiences during coteaching presentations of others and while receiving social/verbal persuasion during coteaching presentation of self, leading to positive affective/emotional states.</td>
<td>Did not fully engage in coteaching activities and so vicarious/social modeling was minimally experienced during coteaching presentations of others. Social/verbal persuasion was experienced during class participation, not during coteaching presentation of self (as he did not present). Positive affective/emotional states was impacted but minimally during cogen and class participation.</td>
<td>Fostered via engaging in cogens and coteaching while receiving vicarious/social modeling experiences during coteaching presentations of others and while receiving social/verbal persuasion during coteaching presentation of self, leading to positive affective/emotional states.</td>
<td>Fostered via engaging in cogens and coteaching while receiving vicarious/social modeling experiences during coteaching presentations of others and while receiving social/verbal persuasion during coteaching presentation of self, leading to positive affective/emotional states.</td>
</tr>
</tbody>
</table>
Table 6.2. Summary of the impact of reality pedagogy on participants’ shared social capital and the process of distributed cognition

<table>
<thead>
<tr>
<th>Themes Fostering Shared Social Capital and Distributed Cognition</th>
<th>Rabina</th>
<th>Ilia</th>
</tr>
</thead>
<tbody>
<tr>
<td>“increased participation with the class network”</td>
<td>Fostered via cogens which created structural holes in dense social networks existent in the classroom while she communicated in cogens with students involved in the existent dense networks. Coteaching further facilitated this theme while she worked together with students from different social networks in coteaching activities.</td>
<td>Fostered via cogens which created structural holes in her own dense social networks while she communicated in cogens with students involved in other dense networks. Coteaching further facilitated this theme while she worked together with students from different social networks further diffusing her own dense social network.</td>
</tr>
<tr>
<td>“increased opportunities for voice in the classroom”</td>
<td>Fostered via the non-threatening and supportive environment in cogen where she expressed her opinions and concerns to teacher and other students. Her opinions and ideas allowed the development of distributed cognition in cogen and coteaching and allowed to develop shared social capital, further facilitating her voice.</td>
<td>Fostered via the non-threatening and supportive environment in cogen where she expressed her opinions and concerns to teacher and other students. Her opinions and ideas allowed the development of distributed cognition in cogen and coteaching and allowed to develop shared social capital, further facilitating her voice.</td>
</tr>
<tr>
<td>“increased ability to access the human and physical resources of the classroom for their own benefit”</td>
<td>Fostered via cogens and coteaching. Cogen allowed to build the initial ease and comfort with peers and to approach peers (sharing thoughts and ideas—distributed cognition—with them in cogens). Upon returning to class and collaborating during coteaching the ability to approach peers and access their human and physical resources increased, further developing distributed cognition and shared social capital.</td>
<td>Fostered via cogens and coteaching. Cogen allowed to create structural holes in her existing dense network while collaborating (sharing thoughts and ideas—distributed cognition) with peers outside of her dense network. Upon returning to class and collaborating during coteaching the ability to approach peers outside her own dense network and access their human and physical resources increased, further developing distributed cognition and shared social capital.</td>
</tr>
</tbody>
</table>
Synthesizing Findings Across Chapters

The findings across Chapters IV and V point out two major ideas about the impact of the implementation of reality pedagogy in an urban science classroom. The first point that is salient across both chapters is the significant role cogenerative dialogue sessions play in engaging students in communication with one another and their teacher. The second major point is that coteaching provides a unique experience of learning in urban science classrooms and is an influential aspect of science education for young learners. These findings emphasize the science learning experience for various urban students through their own spoken words and the researcher’s observations throughout the academic year.

It is also important to note here that there were different levels of impact of the implementation of reality pedagogy with the general populace (non-immigrant urban students) and the immigrant students. Though the entire class simultaneously took part and was approached the same way via the implementation of reality pedagogy, the experience or the way each student approached and participated in reality pedagogy was unique to that individual student, and therefore it impacted each of students in a different manner, as the findings in Chapters IV and V show.

In addition, different theoretical lenses were employed based on the emergent findings that allowed interrogating the nuances of the non-immigrant population versus the immigrant population. These theoretical frames—self-efficacy, social capital, and distributed cognition—were used as they spoke specifically to each of these two scenarios presented in Chapters IV and V, based on the analysis of the data of these two scenarios and their emergent findings. This also further led to focusing on separate aspects and results of the two populations. The social capital and distributed cognition frames further allowed interrogating how the two immigrant students in this study interacted and collaborated with their non-immigrant peers during the implementation of
reality pedagogy in order to make the classroom more functional for themselves. Separately, the emergent frame of self-efficacy allowed for an understanding of how the non-immigrant or general populace of the class approached reality pedagogy, establishing that their way of approaching reality pedagogy specifically impacted their self-efficacy.

Further Discourse on Cogenerative Dialogue and Coteaching

Communication among students and between teacher and students has been a topic of discussion among educators and educational researchers alike. However, as an educator myself, I can personally attest to the minimal arrangement that has been made in our urban schools and classroom structures toward promoting or carving out a space for such communication. Particularly in the field of multicultural education and immigrant education, both fields relevant to current urban education, communication has been strongly encouraged. Toward multicultural education, researchers in this field, such as Atwater (1996), strongly support communication between teacher and students and among students themselves, while stating that communication is the key and “central theme in multicultural education” (p. 824). Atwater further emphasizes that socialization involving interaction, not only between students and their teacher, but also between student and student, also plays a major role in the harmony classroom environment. As a result, the quest to find a tool or a set of tools to address what educators have explicitly stated as a necessary theme directed my focus on reality pedagogy and encouraged my decision to research it with this population.

In the field of immigrant education, Skuza (2005) supports that the communication process is what underlies “an immigrant’s acculturation” and that “communication is a central and fundamental mode of human learning and expression” (p. 394) and merits focus toward understanding how it can contribute to immigrant students’ education. Particularly, regarding participation in school science, the “barriers” or factors that prevent students (whose language and experiences are different from what school science
considers legitimate) from fully engaging in classrooms need to be addressed in order for these students to successfully participate in school science (Anderson, 1991; Calabrese Barton, 1998; Delpit, 1993).

With the goal of creating a space for communication among students and between teacher and students in urban classrooms, cogenerative dialogue sessions and coteaching, the first two pedagogic tools of reality pedagogy, can be considered a solution as to how a structured, yet malleable and transformative, form of communication can be implemented in our urban schools. To this end, my study continues to examine the implications of considering cogenerative dialogues and coteaching within urban science education. In both Chapters V and VI, the importance of the experiences of the participants of reality pedagogy, how they communicate, interact, and how this form of communication impacts them position reality pedagogy as a mechanism that could make science education in an urban setting more effective.

Through analyzing the data from this study, it is clear that cogenerative dialogues and coteaching have benefits and positive impacts on their participants. One of the more powerful impacts of cogen and coteaching, as this study reflects, is that they allow students to have a voice or create a space where their voices can be heard. This, in turn, manifests empowerment within students, encouraging agency (Emdin, 2009), which allows students to be more active participants in their own learning. Agency and active participation or having agency (having the power to act) and a platform such as cogens and coteaching to enact this agency allows students to feel comfortable to communicate and participate in class. Within the multicultural perspective, Atwater (1996) suggests that “science teachers must be committed to facilitating the empowerment of students” (p. 831). Atwater uses McLaren’s (1989) definition of empowerment, stating that it is the process by which students learn to critically use science knowledge that is outside of their immediate experiences to broaden their understanding of science, themselves, and the world, and to realize the prospects for reforming
the accepted assumptions about the way people should live in a scientifically diverse culture. (Atwater, 1996, p. 831)

This vision of empowerment endorses and parallels the goals of science education as a whole, and as the findings in my study indicate, this level of empowerment can be achieved while practicing cogens and coteaching.

In both Chapters IV and V, cogens and coteaching played an important role in involving students in their own learning process. While allowing students to collaborate with their peers and teachers regarding their classroom learning environment, given science topics and also preparing to teach science lessons, coteaching and cogens simultaneously fostered their self-efficacy and shared social capital through an approach that allows for the development of distributed cognition.

The implementation of reality pedagogy can be thought of somewhat like a cyclic process where cogen facilitates a non-threatening and comfortable environment that encourages voice (Tobin, 2006), which is further supported by coteaching (Roth & Tobin, 2005; Tobin, 2006). In practicing coteaching, students apply their voice and establish their position as valid members of the classroom, which in turn encourages their agency.

**Implications**

In this section, I discuss how the findings of this dissertation study may contribute to the body of research in urban science education and reality pedagogy.

**Implications for Urban Science Education**

The theoretical frameworks this study utilizes to investigate the impact of the implementation of reality pedagogy are self-efficacy, social capital, and distributed cognition. The separate lens of each of these frames allows us to understand specifically in what ways reality pedagogy benefits its participants.
Within the self-efficacy frame, coteaching was the element of mastery experience that provided social/verbal persuasion for students. Coteaching also provided vicarious/social modeling, which took part in the affective states of participants. Cogens simultaneously afforded a non-threatening environment where students freely communicated with their teacher and peers, further facilitating students’ affective states toward being able to communicate and eventually coteach with their teacher and peers.

Within the social capital frame, cogens and coteaching created structural holes within the dense networks or social “cliques” of the class in which they were implemented. Thus, cogens and coteaching took part in breaking up the existing social cliques present in the classroom. In doing so, students who were excluded from participating with and collaborating with students in the dense network were now part of the class and able to participate with one another while utilizing each other as a new resource of knowledge.

Adding to the current body of literature, the findings of this study establish that the lens of distributed cognition fits well with the underlying concept of cogens and coteaching. While participants communicate and collaborate in cogens and coteaching, their thoughts and knowledge are distributed to one another. This sharing of knowledge allows participants a better understanding of one another and the topic in discussion, given that the topic in discussion is presented and talked about through multiple perspectives via multiple participants. As noted in the findings of this study, participants of this study indicated that various perspectives from multiple peer participants sometimes provided the necessary clarification while presenting the topic in a more simplified manner.
Future Research

The findings of the study leave room for additional research in the areas of both urban science education and reality pedagogy and the interaction of both in science education. First, the experience of the participants with learning disabilities in this study, Tara and Christian, brought up many questions about science education for students with learning disabilities. Questions focus on how science learning can be scaffolded to provide support for students with learning disabilities, even in the absence of a special education teacher to help strategize the execution of science content to LD students. Along these lines, it would also be enlightening to study the ways in which, if any, the tools of reality pedagogy assist in this process. This kind of information could be very valuable for creating appropriate learning experiences for urban science students of different cognitive levels.

Next, in this study, I only implemented the first two tools of reality pedagogy. Given that these two tools resulted in positive benefits for the participants, it is important to investigate the impact of all five pedagogic tools—cogenerative dialogue, coteaching, cosmopolitanism, as well content and context—so as to examine what specifically they have to offer to students’ learning experience.

It is also important to note here that a partial reason for which a 10th grade cohort was chosen for this study was to be able to conduct further future study with some, if not all, participants of my current study. The interest here would be to investigate the long-term impact of the implementation of reality pedagogy in science, where participants’ interest and involvement in science in their 11th, 12th, and even postsecondary science classes can be studied. Whether their participation in reality pedagogy impacted their future engagement in science or science classes or even science-related careers would be the interest of the study.
Also, in implementing reality pedagogy for a whole academic year, it became apparent, as the study progressed, that prolonged involvement in cogens and coteaching was beneficial to participants. In a future study, if the structure of the school allows, investigating a two-year-long study of the implementation of reality pedagogy with one cohort of students may be enlightening.

Finally, given the research I have conducted here, and existing research in science education that focuses on reality pedagogy, we have been able to draw the conclusion that urban youth benefit by having more agency and more opportunities for success through the implementation of reality pedagogy in their classrooms. Our future research can then also focus on teacher practices and the extent to which a teacher’s pedagogical styles and styles of teaching align or are misaligned with the implementation of reality pedagogy. This detail about teacher practices would allow professional development experiences to be offered in order to assist these teachers in modifying their existing teaching practice in a way that aligns to reality pedagogy; in this way, the teachers themselves may enhance their instruction and the classroom experiences and learning of their students.
REFERENCES


Appendix-A

Data Collection Chart for Class Observations

<table>
<thead>
<tr>
<th>Students</th>
<th>Attendance</th>
<th>Engagement - (Following class activity)</th>
<th># of times participate d in class</th>
<th># of times talks to peers</th>
<th># of times talks science to peers</th>
<th># of times seeks help in science from peers or teacher</th>
<th># of times raises hand/ volunteers in response to question posed to class</th>
<th># of times calls out questions posed in class</th>
<th># of times response (raising had or calling out) is ignored</th>
<th># of times offers or provides help in science from peers or teacher**</th>
<th>Participates in coteaching*</th>
<th>Any interesting occurrence or activity</th>
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<td># of times talks science to peers</td>
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</table>

*Note.* *-= Exhibits involvement in coteaching ; **= Exhibits cosmopolitan behavior
Appendix-B

Detailed Schedule of the Study

<table>
<thead>
<tr>
<th>Semester</th>
<th>Observation</th>
<th>Cogen. Sessions</th>
<th>Interviews</th>
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<tbody>
<tr>
<td>Fall’10</td>
<td>Sept.- 20, 27 (20 &amp; 27 meetings with teacher to debrief re: study)</td>
<td>Oct.-4, 11, 18</td>
<td>Oct.-25- IS1<em>IS2</em> IS3<em>IS4</em> Nov1-IT** Nov.-29-IS1<em>IS2</em> IS3* IS4* Dec-6-IT** Dec. 20-IS1<em>IS2</em> IS3* IS4*</td>
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<td>Oct.-4, 11, 18, 25* Nov.-1**, 8, 15, 22, 29* Dec.-6,** 13, 20*</td>
<td>Nov.-1, 8, 15, 22</td>
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<td>Sp’11</td>
<td>Jan.- 3 &amp; 10 (After the week of the 10th and until end of Jan. there will be</td>
<td>Jan-3, 10</td>
<td>March-21-IT** March-28 IS1<em>IS2</em> IS3* IS4* April-25-IS1<em>IS2</em> IS3<em>IS4</em> May-30-IT** June- 6-IS1<em>IS2</em> IS3<em>IS4</em></td>
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<td>no classes due to regents exams)</td>
<td>Feb-14, 21, 28</td>
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<td>Feb-7, 14, 21, 28</td>
<td>March-7, 14, 21</td>
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<td>March-7, 14, 21** , 28</td>
<td>April-4, 11,18,</td>
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<td>April-4, 11, 18, 25*</td>
<td>May- 2, 9, 16, 23, 30**</td>
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<td>May- 2, 9, 16, 23*</td>
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Note.
* = Interview with 4 students. Two these students will be students who are representative of the class and two will be immigrant students. Factors that will allow for selection will be emergent.
** = Interview with teacher (IT)
Appendix-C

Guiding Questions for Cogenerative Dialogues

A. All dialogue session will be video recorded.

B. After a brief introduction of any new participants of the session, each cogenerative dialogue session will begin with listing the rules of the dialogue sessions. In the initial 3 or 4 dialogue sessions the researcher will utter the rules of the session and in the rest of the sessions the students and/or the teacher will be expected to declare the rules before beginning the sessions.

C. The following questions will be asked by the researcher to the group inclusive of the 4-5 students and teacher. These questions will guide the discussion between the teacher and his students. The sessions will be designed such all participants of the session are able to share their response.

D. The discussion of the questions will take two or more cogenerative dialogue sessions.

Guiding questions for teacher- student discussion:

1. What is currently your favorite class in school and why?
2. What is your favorite academic subject and why?
3. * What about the science class you like and don’t like? Elaborate.
4. * What in your opinion and experience are the strengths and weaknesses of your science class?
5. * How do you suggest you specifically can contribute to improve the issues you indicate?
6. * What are some ways the class as a whole and your teacher can help improve the student experience in the class?
7. What about your science teacher’s way of teaching you like or don’t like? Elaborate.
8. How do you suggest he can improve his/ her ways of teaching to help you learn science better?

Note. *=the teacher will be asked to respond to these questions as well.
### Appendix-D

#### Interview Questions

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<thead>
<tr>
<th></th>
<th>Questions for Students</th>
<th>Questions for Teacher</th>
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<tbody>
<tr>
<td>Autumn'10</td>
<td>1. How are the cogenerative dialogues you have with your peers and teachers of your science class helpful or not helpful overall when you come back to your science class?</td>
<td>1. How are the cogenerative dialogues you have with your students helpful or not helpful overall when you come back to your science class?</td>
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<td>*2. How is coteaching in your science class helpful or not helpful overall in your science class?</td>
<td>*2. How is coteaching in your science class helpful or not helpful overall in your science class?</td>
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<td>3. Would you say that compared to your other classes, in science class you are or feel different due to cogenerative dialogues and/or coteaching? If so, how?</td>
<td>3. Would you say that compared to your other science classes you are currently teaching, (where cogens and coteaching is not implemented) the implementation of cogenerative dialogue and/or coteaching in this class had an impact on this class over all so far? If so, how?</td>
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<tr>
<td>Spring'11</td>
<td>1. How are the cogenerative dialogues you have with your peers and teachers of your science class helpful or not helpful overall when you come back to your science class?</td>
<td>1. How are the cogenerative dialogues you have with your students helpful or not helpful overall when you come back to your science class?</td>
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<td>2. How is coteaching in your science class helpful or not helpful overall in your science class?</td>
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<td>3. Would you say that compared to your other classes, in science class you are or feel different due to cogenerative dialogues and/or coteaching? If so, how?</td>
<td>3. Would you say that compared to your other science classes you are currently teaching, (where cogens and/or coteaching is not implemented) the implementation of cogenerative dialogue and/or coteaching in this class had an impact on this class over all so far? If so, how?</td>
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*Note.* *=* If coteaching has not been implemented before the time of the interview, this question will not be asked to the students and the teacher.