Using Cogenerative Dialogue To Catalyse Change

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The Graduate Center, City University of New York
USING COGENERATIVE DIALOGUE TO CATALYSE CHANGE

by

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This manuscript has been read and accepted for the Graduate Faculty in Urban Education in satisfaction of the Dissertation requirement for the degree of Doctor of Philosophy

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ABSTRACT

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Advisor: Professor Kenneth Tobin

Cogenerative dialogue is an empowering pedagogical approach to advance research. In my study cogenerative dialogue and coteaching were employed in an algebra 1 class in an urban high school in New York City. Lessons were cotaught with students and were videotaped for further analysis. The findings suggest that cogens constitute an excellent avenue to catalyze change in an urban algebra class.
Dedication

To my husband, Eroll, daughter Danielle, siblings and extended family. You have been my source of strength throughout this tedious journey.
ACKNOWLEDGEMENTS

Writing a dissertation can be arduous but self-fulfilling. As this long episode comes to a close I am very happy, excited and grateful. I am extremely appreciative to everyone who stayed the course with me.

I will be forever indebted to the algebra students at City Academy for their tireless contribution to my research. I am especially thankful to Sandra and Cue for their honest contribution in helping to build an equitable learning environment.

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Chapter 1

Introduction

Urban Mathematics Education: My Destiny

*Each of us has a destiny,*
*For the good of mankind,*
*Or for the destruction of it.*

*We chose our own destiny,*
*No one else can choose it for us.*

*Do not let others influence you*
*To change what you want*
*Your destiny to be.*
*Because*
*You will lose sight of the road*
*To your destiny.*

*So stick to your choice*
*Of what your destiny will be*
*And you shall see*
*That you will do*
*The incredible.*

(Athena Goddess of Wisdom)

I came to the Urban Education program serendipitously as I was encouraged to apply for that program while conducting research with alternative certification mathematics teachers in New York City. Even though attending the Graduate Center was one of my ambitions, pursuing a degree in Urban Education was far from my mind. My main interest and focus at the time was mathematics or computer science. However, I applied and was accepted into the Science,
Mathematics, and Technology strand of the Urban Education program. As with everything else, challenges prevailed. I had no clue as to what I was going to research. However, because of these challenges and my love for mathematics, I decided that I can do it and I will do it and thus began searching thoroughly into understanding theories and promoting ideas and practices that would foster change in an urban mathematics classroom setting. Needless to say, I have had countless satisfying experiences in the Urban Education program working with peers, observing and sharing with other educators, and most importantly working on my research.

**You Can’t Overtake Your Fate**

When I was about 4 years old, a woman in Newport, Manchester, the small town where we lived in Jamaica West Indies, said to my mother, “Mrs. Woodburn, your daughters are going to become teacher and nurse.” I immediately turned to my mother and said, “me mamma, me nurse!” I knew I was going to be the nurse because my sister’s mantra was “I am going to be a teacher!” Everyone in our household knew that my sister was going to be the teacher because she was always walking around the house acting like a teacher, teaching me, as well as her imaginary students outside in the backyard. Thus, when this woman made her prediction I was very confident that I would be the nurse or some medical professional.
I did exceptionally well in my scholastic endeavors during my elementary and high school years. Most of the time I was assigned to assist my classmates who were not able to grasp concepts as quickly as I did. My sixth grade teacher once mentioned that she firmly believed that I was going to be a teacher and that I would be a very effective one. I looked at her and smiled and said, “no, I am going to be a nurse!”

My ambition of becoming a nurse was thwarted when I got to fourth form (10th grade equivalent). My biology teacher decided that we would have to dissect animals and our first dissection would be a frog. I informed her of my terrible phobia of frogs and blood. She looked at me with raised eyebrows and responded, “a nurse, afraid of blood?” She then told me that I needed to think about another career because even if I am planning to do administrative nursing, the training does require that I work with blood.

Fortunately for me I was enrolled in a general track in high school and passed all the required subjects in the external examinations that would help me get accepted into any discipline. I applied and was accepted to the local college, West Indies College (now Northern Caribbean University) to pursue an associate degree in business administration. I completed the requirements for graduation in one and one-half years. After graduating my father informed me that an associate degree is the least of all degrees and that I should continue until I attain the highest degree because he is responsible for me as long as I am in school. I
immediately re-enrolled in the same college to pursue a bachelor’s degree in business administration with a concentration in accounting.

During the summer holiday, about two weeks before school reopened, I was offered a job to teach mathematics, accounting, and economics at a high school in the city. My response was, “TEACH, I am not teaching material, neither was I trained to be a teacher, so how do you expect me to teach people’s children, and high school at that! No way Jose!” The principal would not accept no for an answer and so he persisted until I finally relented. I told him that I would give it a try for one term; that is, four months. He said that he was comfortable with that arrangement and he knew that I had the ability to be an effective teacher. He also said that if I was not comfortable at the end of the four months he would employ someone else but he preferred to start with me as I was highly recommended. Obviously someone knew more about me than I even knew myself, because never had I considered the thought of becoming a teacher.

I accepted the job and taught for a year. At the end of the school year I bluntly told the principal “I was not cut out to be a teacher, I think you should find someone else.” He did not agree with me but he said that I promised a term and I gave them a year so he would accept my decision. He also told me that he was quite impressed with my performance and if ever I changed my mind I should not hesitate to call him. I thanked him and left the city.
I went to another town, the capital of Jamaica, Kingston to my parents’
dismay because they wanted me to finish college. I did not want to stay home
because I believed that it was time for me to take care of myself and stop
depending on my parents. I found another job, this time as a secretary. I worked at
this career for a while and from time to time was asked to tutor mathematics to
coworkers who had failed the General Certificate Examination (GCE) – an
external examination, and were preparing for a retake. I often times thought to
myself, maybe I was really supposed to be a teacher.

I worked as a secretary for 10 years and then decided that it was time for me
to go back to school. I went back to school and obtained a bachelor’s degree in
mathematics and information systems management and further obtained a
master’s degree in computer science. While in graduate school I was offered a job
to teach mathematics at a junior high school in Brooklyn. I rejected this job
because teaching was not a part of my agenda then or any time soon, especially in
New York City.

As a graduate student I worked with several projects, from coordinating
scholarships for minority students in science, technology, engineering and
mathematics to observing alternative certification mathematics teachers. Of all the
projects I did, the one I favored most was working with the mathematics teachers.
I developed a desire to teach mathematics just from observing these teachers. It was then that I realized that I could not overturn my fate. I was destined to be a teacher.

After graduating with my master’s degree I enrolled in the urban education program at the Graduate Center – City University of New York. By participating in the different seminars at the Graduate Center and observing the work my daughter was doing at her school I realized that there was an urgent need for mathematics teachers and research in urban schools. I decided to be a volunteer mathematics teacher at my daughter’s school. The principal was very appreciative and had me teaching mathematics from third to eighth grade. I also prepared these students for the New York State mathematics assessment. The school year was very rewarding for everyone. The students all performed well on their assessments and I felt good to know that I could have shared my love for mathematics with others. At the end of the school year at my daughter’s school, the lady who had offered me the teaching job at the junior high school again approached me. This time she was offering me a job to teach mathematics at the high school level. I did not hesitate to accept the offer. I accepted my fate.

The urban school environment encompasses students and teachers from diverse cultures. Given the complex nature of teaching and learning in this setting, there is a need to teach toward a critical pedagogy, that is, a teaching approach grounded in critical theory. According to Kincheloe (2005), critical pedagogy
involves transforming relations of oppressive power which leads to the oppression of people. It seeks to humanize and empower learners. Critical pedagogy is mainly linked to Paulo Freire who uses the key principles of critical theory of the Frankfurt school as its principal source. Critical theory addresses the notion of an ethical society where people possess economic, political, and cultural control of their lives.

Critical pedagogy also helps students achieve critical consciousness. There is also an urgent need to teach toward equity and reform. After carefully studying a variety of theories, philosophies, methods of teaching and learning practices, I am now able to identify and address the inequities that arise in urban mathematics education. These inequities oftentimes stem from, cultural diversities, socioeconomic status, racial, religious and language differences. Writing this dissertation and doing the associated research provided an opportunity for me to discuss the challenges and dilemmas inherent in sociocultural approaches in urban mathematics education and address the complexities of equity in mathematics classrooms today.

**Equity Concerns and the Need for Research in Urban School**

Over the years equity has become a major concern for students, families and society at large. Even though mathematics education researchers have given some attention to equity, it would appear that work in this area tends to ignore relevant
social and cultural issues (Lubienski, 2002). This is indeed salient because an equitable learning environment promotes richness of cultural diversity and creates opportunities to engage all students in an interactive learning process. In order to create equitable and high-quality learning opportunities for all students, including those students whose achievements have been impeded because of social injustices in school practices and policies, the mathematics community needs to make a drastic change in curriculum, instruction, and assessment. I share Oakes’ (1990) view when she said, “… both minorities and females must be provided an equal opportunity to acquire the mathematical literacy essential for employment” (Oakes, 1990, p. 158).

During the past three decades, innumerable national reports have documented the underachievement in mathematics of students in urban schools. Most of these reports underscored one major concern, that of change. There exists a strong need to address the changes that are critical to help in the improvement of teaching and learning which would afford every student equal access to a substantive mathematics education. “The social injustices of past schooling practices can no longer be tolerated … Mathematics has become a critical filter for employment and full participation in our society. We cannot afford to have the majority of our population mathematically illiterate: Equity has become an economic necessity” (NCTM, 1989, p. 4).
Challenges in Mathematics Education

All students regardless of gender, culture, socioeconomic status, race, language, disability, or poor mathematics achievement deserve equitable access to challenging and meaningful mathematics education. Researching and implementing equitable practices are very crucial in executing changes for urban students in mathematics education. There are many obstacles facing any mathematics education researcher who desires to examine urban mathematics education through a sociocultural lens. In this dissertation I utilize critical qualitative research methods, specifically cogenerative dialogues, which were introduced in my own urban mathematics classroom about eight years ago. The main purpose of this research was to examine how the complexities of culture, socioeconomic status, gender, and political concerns become integrated in the schema and practices of the urban mathematics classroom. Particularly, the basics of urban culture were investigated in an effort to learn how they can be used to enhance learning and promote equity. Cogenerative dialogues, conversations amongst students, teachers, and administrators afforded me the opportunity to look at shared experiences within a field (i.e., a social space in which culture is enacted) so that they can form a new culture together and/or modify the existing culture in order to improve the quality and effectiveness of teaching and learning. Drawing from the experiences of student researchers who participated in
cogenerative dialogues, I present some of what has been learned about participant interactions and how equity can be produced and sustained in mathematics classes. The research process has incorporated meso and micro levels using video analysis. This research affirmed the fact that urban students are capable of accessing learning opportunities and appropriating the human and material resources needed to construct deep mathematical ideas and positive mathematical identities.

As a result of variations in structuring equitable mathematics learning and the diversity that exists in urban classrooms/settings, I have shaped and preserved the enthusiasm and practices necessary for teamwork, coteaching and cogenerative dialogues in my classroom. My major goal in this dissertation is to introduce and possibly enhance diverse, innovative educational strategies necessary to provide more equitable learning opportunities for all students.

**Cogenerative Dialogues**

Cogenerative dialogues/cogens are reflective conversations among selected participants (Tobin et al, 2014). They can also be considered as sessions in which a small number of students and a teacher review evidence from a recent class and collectively cogenerate decisions regarding new rules for the class, changes in teacher and student roles, and responsibility for enacting culture. The culture of urban communities is usually viewed in a negative light, however, this culture
proved to be a valuable resource, which greatly mediated the learning of mathematics. Cogenerative dialogues began in urban science education via longitudinal research programs. These programs started in City High school in Philadelphia, where students were included in research activities and were actively involved as researchers and practitioners in the teaching and learning of science in their own classrooms (Tobin, Elmesky, & Seiler, 2005). These studies were specifically geared towards urban science and have provided clear and concise insights into the quality of the roles of teachers and students. They have also created opportunities for stakeholders to make and act upon suggestions related to the production of new culture that is enacted within multiple fields.

In recent years, mathematics education researchers have been utilizing cogenerative dialogues in their urban classrooms and have been very successful. This is because cogenerative dialogues provide avenues whereby new culture is produced, thus affording successful interactions between sociocultural fields. According to Tobin, Roth and Zimmermann (2002), cogenerative dialogues, “can be understood as a new learning environment that takes the classroom learning environments as its object of inquiry” (Tobin, Roth & Zimmermann, 2002, p. 6). In this dissertation I present models from a longitudinal study, which consisted of my ninth grade algebra class and cogenerative dialogues. I used cogenerative dialogue as a pedagogical tool to assist in achieving equity as well as to improve the quality of teaching and learning in the urban mathematics classroom.
Everyone has a voice and both teacher and students learn from each other. Cogenerative dialogue afforded participants the opportunities to develop and implement strategies that were receptive to the educational environment. This was important because it helped us to assess and alter pedagogy and the curriculum to best fit our needs. Both teacher and students were active participants and thus were responsible for enacting change in their learning environment.

According to Martin and Scantlebury (2009), cogenerative dialogue has been used in a variety of educational settings both locally and internationally in order to improve the teaching and learning of science and mathematics in K-12, private schools, colleges and graduate schools. This research extends the study of cogenerative dialogue done by Kenneth Tobin’s team of education researchers in Philadelphia (e.g. Martin, 2004) and New York City (e.g., Bayne, 2007, Jackson, 2010 and Wharton, 2010) where cogenerative dialogue was used as a methodology and/or method to improve the quality of teaching and learning in urban schools.

**Research Site and Student Participants**

This study took place in a small parochial high school, City Academy (not the real name), in Reading, New York City. The school was created from a vision of a woman, who from sometime in the 19th century advised that children of a particular denomination should be educated together and that every child deserved
a holistic education. Her belief was that education was more than mere academic achievement but rather a preparation of the ‘whole being,’ getting students ready for the present life and the ‘life to come.’ The school began in 1920 as a one-room schoolhouse with multiple grades but was later expanded to accommodate increased enrollment. Every child that applies for entrance into City Academy is accepted because it is the policy of the organization that every child deserves to learn. The culture at City Academy is one in which the administration and staff strive to develop students who are willing to work diligently, respect diversity, and show compassion. The citizens around the community have lauded the school for molding the students. Oftentimes the students display exceptional behavior.

All the students enrolled at City Academy belong to an ethnic minority group. They are either Black or Hispanic. However, the issue of cultural diversity exists. There are students from several different West Indian islands, Africa, and Latino countries. The teachers are also culturally diverse with 51% being Jamaicans. Issues of ethnicity and socioeconomic status become enmeshed within the culture of my mathematics classroom.

Working with Student Researchers

During my two years of this research, all students (24-32) in my two mathematics classes were invited to participate as student researchers in cogenerative dialogues. Most of the student researchers were self-selected while others were
either invited by their classmates or me to participate in cogenerative dialogues regularly during the school year. The cogenerative dialogues took place once a week, on Fridays during club hours. Two lessons were videotaped per week. Students were involved in videotaping classroom lessons and assisting to select specific vignettes for whole class and small group discussions. Students also opted to lead discussions around certain selected vignettes. Cogenerative dialogues and classroom lessons usually involved the student researchers as well as me (the principal researcher). Sometimes the superintendent, principals from other schools in the organization and the guidance counselor were included in cogenerative dialogues.

How culture gets enacted in various fields, including the classroom/learning environment, becomes possible by engaging different stakeholders and their recollection of shared experiences. Glen and Cue (pseudonym), two student researchers became involved in cogenerative dialogues from the start of my research. The number of participants consistently increased over the two-year period and there were about eight students, two of which were dedicated to transforming their classroom experiences. Reaction, regarding practices, solidarity, entrainment and positive emotional energy (Collins, 2004) became relevant in order to evaluate the culture of the classroom environment.
Conceptualizing the Research

In this dissertation, I discuss mathematics education research in relation to cogenerative dialogues, equity and reform. I take advantage of the experiences, knowledge and practices of urban students with a desire of helping to inform and improve mathematics teaching. Although researchers have reported success of gender-related research, pedagogues are still showing concerns about the lack of attention given to other issues, specifically equity in urban mathematics education. Secada (1992) declared that researchers of mathematics have in effect ignored issues of poverty and social class. Also, Tate (1997) asserted that mathematics education researchers had the tendency to be narrowly focused by drawing primarily on the disciplines of mathematics and psychology. Jacob (1998) described this focus as “cognition without context or culture” (p. 23).

Even though these claims may appear consistent with reported findings, there still exists a need for a change in today’s urban classrooms. It is necessary for changes to begin with educators taking an active role in modeling critical consciousness and employing critical pedagogy as a means of transforming the learning and teaching process. Critical consciousness refers to an educational social concept developed by Paulo Freire. It underscores the extensive understanding of the world and makes allowance for the acuity and experience of social and political contradictions. Transformation of this nature requires much
effort, which is multifaceted. The teacher would need to thoroughly reflect on his/her personal, educational and professional histories. Power is negotiated daily by teachers and students. A reflexive praxis is also a very important requirement. According to Giroux and McLaren (1989), it is important for teachers and students to understand classroom pedagogical practices as a form of ideological production, wherein the classroom reflects discursive formations and power-knowledge relations both in schools and society. In this research a dialectical conceptualization of culture as a symbol of systems and meanings (Sewell, 1999) is presented. These schemas and practices get enacted in different fields. To engage in cultural practices one has to utilize existing cultural symbols in order to accomplish appropriate behavior. Culture impacts change and mediates action by molding a collection of symbols, stories, customs and ideas. A field (Bourdieu, 1977) is a social arena in which people compete for resources. Therefore, fields consist of resources that produce and appropriate structures. Agency within a field exists when there are possibilities to access and appropriate structures. Fields can be viewed as networks that are more diffuse and can spider in variable ways. Bayne (2007) explicates that fields are dynamic because of weak and porous boundaries. Cultures that are enacted in one field can penetrate others because of the weak and porous boundaries. I have adopted a dialectical approach to help understand and analyze my own mathematics classroom. A dialectical approach is a collaborative connection between two variables in which each influences the
other in an ongoing process. With an awareness of my lived experiences, I began to encourage students to focus on who we are and to work toward alleviating social and educational injustices.

The research questions explored in this dissertation are:

1. How can cogenerative dialogues help to bring about equity and reform in an urban mathematics classroom?
2. How do studying and employing practices, awareness and culture of urban students help to inform and improve mathematics teaching and learning?

**Ethics and Authenticity Criteria for Conducting Research**

Ethical issues are present in any kind of research. The research process creates tension between the aims of research to make generalizations for the good of others, and the rights of participants to maintain privacy. Ethics pertains to doing good and avoiding harm, which can be prevented or reduced through the application of appropriate ethical principles. Hence the protection of human subjects or participants in any research study is imperative.

The research presented in this dissertation was conducted in accordance with the principles embedded in the Belmont Report (1979). These principles provide an ethical framework for protecting human research subjects. They make allowance for the minimization of potential harm to participants while maximizing participant beneficence. A series of authenticity criteria was utilized throughout this research. These criteria are of ontological, educative, catalytic and
tactical natures (Guba & Lincoln, 1989). Qualitative research (and cogenerative dialogue in particular) adopts a theoretical orientation towards culture, which is shaped by stakeholders/dominant communities. This research is informed by the guidelines that motivate qualitative research practices. Authenticity requires that stakeholders have equal opportunities to share in conversations and make necessary recommendations. The goal of ontological authenticity is to improve the constructions of the phenomena under investigation. Educative authenticity seeks to understand and respect the value of others and these values frame the perspective of participants. Catalytic authenticity documents relevant knowledge that actively affects the lives of participants and their shared experiences. Tactical authenticity is evident when change is effective from the viewpoint of all stakeholders.

Chapters in Dissertation

This dissertation is organized in 5 main bodies of work. Chapters 2, 3 and 4 present different research studies that emerged over a 2-year longitudinal study in City Academy. Each chapter stands alone, however, as a set the chapters are consistent, based on the unifying themes of improving urban mathematics teaching and learning. Thus, the reader may experience some redundancies in the presentation of methodology. Chapter 5 presents a culmination of what was learned as a result of being involved in this research and the implications for policy and practice.
Chapter 2

The research described in this chapter is situated in a small urban parochial high school in New York City, City Academy. The study examines the critical changes needed in curriculum, pedagogy, policies, and beliefs to promote equity in mathematics in urban schools. The work utilized the experiences, knowledge and practices of students, in order to help inform and improve equity, mathematics teaching and learning in my algebra class. The research work is grounded mainly on the theoretical perspectives of agency – structure relationship (Roth & Tobin, 2005).

The empirical basis for claims stems from the practices salient to cogenerative dialogues (Roth, Tobin, & Zimmermann, 2002). Cogenerative dialogues, as described earlier, are dialogues among stakeholders, which in my research involve implementing and organizing agreed on approaches whereby improvement of learning and teaching can take place. Cogenerative dialogues are fields where the enactment of culture occurs. Urban students get the opportunity to develop and share new forms of culture. This new culture is reproduced and enacted in algebra class, other classes or other fields and thus creates a parallel transformation from its original state. In this chapter I share solid examples of how students who are involved in the transformation of culture utilize their agency and understanding of theory to make conversions from participating minimally to accessing structures that enable them to contribute to their own
learning, and the learning of others in substantive ways. I present the argument that engaging in cogenerative dialogues has presented the ways and means possible for the development of new roles for students. This study validates the idea that the new culture created during cogenerative dialogues can become incorporated into participants’ habitus (Bourdieu, 1996).

In this study I employ the uses of various ethnographic data resources (journal entries, field notes, videotapes and transcripts of cogenerative dialogues, mathematics classroom practices, and student and teacher generated artifacts) along with conversational analysis. The assessment of these data resources has made it possible for me to explore and understand the ways by which culture is aligned and how student roles expand, both inside and outside the mathematics classroom.

Chapter 3

In this chapter I present an awareness of coteaching through first-hand accounts and analyses of videotape of a cotaught lesson. My purpose is to provide an insight into the issues that emerged from a cotaught lesson. The study involved students as coteachers and describes how the roles of students as teachers are enacted in the 2 years in which coteaching was a vehicle for teaching to learn mathematics in an urban high school.

The analyses of data sources involved three distinct fields. These are, whole-class, small group, and individualized. Each field is nested within the classroom
(Tobin & Roth, 2006), therefore the boundaries are weak and porous. This weakness and porosity enables frequent transitions between fields and allows for culture in one field to be enacted in others. The agency – structure relationship is explored in this study as well.

Chapter 4

Cogenerative dialogues seek to do more than merely transform classroom cultures. My intentions are for young urban mathematicians to work hard so that they can enter very rewarding careers and embrace the mantra that aspiring to improve their agencies would help students to achieve their academic goals.

Another goal of cogenerative dialogues in my mathematics classroom is to induce other classrooms and departments/schools in the organization to follow my lead in working towards improving academic standards. In this chapter I demonstrate how involvement in cogenerative dialogues has created ripple effects in the organization.

Chapter 5

In this chapter, I correlate cogenerative dialogue and constructivism. I use a different view of mathematics instruction – one that is closely related to the process of constructing meaning. Children are finding ways to explore mathematical situations and are experiencing new relationships trying to convince one another of their thinking.

Chapter 6
In chapter 6, I address accepting my destiny despite the many struggles. I also provide discussions on what was learned from the research as a whole.
CHAPTER 2

Embracing Equitable Practices Through Cogenerative Dialogues

Throughout my teaching career I have been concerned with equity in mathematics education. My experience includes some years of teaching, learning, and researching in the mathematics classroom. I have seen changes both in the school environment and in the mathematics classroom. These changes along with my encounter with cogenerative dialogues have motivated me to envision an ideal mathematics classroom.

During the last two decades, several national reports have documented the underachievement of urban students in mathematics. Most, if not all of these report that a change in approach to teaching is a priority. In January 2008, the National Council of Teachers of Mathematics (NCTM) published its position on excellence in mathematics. The vision of this position assumes that changes and improvements in teaching and learning will afford every child equal access to a substantive mathematics education. The NCTM also believes that schools in which teachers and students experience equitable practices afford greater opportunities to engage students with significant mathematical ideas while supporting the greater goal of helping students learn to care about others and treat all human beings with dignity and respect. The NCTM states:
Excellence in mathematics education rests on equity—high expectations, respect, understanding, and strong support for all students. Policies, practices, attitudes, and beliefs related to mathematics teaching and learning must be assessed continually to ensure that all students have equal access to the resources with the greatest potential to promote learning. A culture of equity maximizes the learning potential of all students (p. 12).

The NCTM offers a broad view of what it takes to accomplish equity that includes having high expectations for all students, accommodating for differences, and equitable allocation of human and material resources.

A plethora of research underscores the lack of achievement in mathematics by African-American, Latinos/as, Native Americans and female students (National Research Council, 1990). However, the NCTM (2000) in The Principles and Standards for School Mathematics only captured the crux of some situations that lead to inequities in school mathematics. These conditions are, low expectations, inequitable access to quality mathematics, and inequitable allocation of material and human resources. The NCTM addresses equity as it relates to curriculum, instruction, and assessment on one hand but does not position equity within the larger societal context, neither does it offer any suggestions for building a foundation in mathematics education. Mathematics educators are therefore challenged to devise new and varied strategies of knowing and
understanding. My focus as a mathematics educator is to learn and implement ways in which change can take place in the classroom to foster equity. Change as it relates to the production of capital – that is the reproduction and transformation of cultural, social, and symbolic capital (Bourdieu, 1986).

**Setting the Stage for Change**

My thought of the first meeting with my mathematics students at City Academy was, oh my God what did I get myself into. At the very start I began assessing students in my mind. This one is going to be a problem, that one over there has a nasty attitude, and this other one and I will not make it. By the end of the second week I realized that I was having favorites, I was being sarcastic with some of the students, especially the females, and I was becoming frustrated because some of the students were not grasping concepts as quickly as I had hoped. I was having issues. At that time, I believed that if some students were able to grasp concepts with little or no difficulty then all students should have been able to grasp concepts. I was unconscious of the fact that students learn at different paces, and that no two individuals are alike.

After my first two months at City Academy I was ready to quit. One student, John was complaining that I did not like him. Another student, Sandra, also said that she does not like me because I failed her on her test. However, there were the others who said, “Ms. McDonald is nice, I like her.” I must confess that it was not very flattering to hear those comments about myself especially when I thought that
I was the model teacher. The following vignette is a conversation between Sandra, her mother and I.

Sandra  Miss, my mom wants to speak to you.
McDonald  Okay, come on in. Good day Ms. Bush, how may I help you?
Ms. Bush  Well, Sandra told me that you don’t like her and I am here to discuss the problem with you.
McDonald  Sandra, you really think I don’t like you?
Sandra  Yes
McDonald  Why do you say that?
Sandra  Well … miss, whenever I am talking and other people are talking you always only call to me.
McDonald  Really, I am not aware of that. I usually call to anybody who is talking. So you really think that I don’t like you because I call to you when you are talking.
Sandra  But miss, you never see me when I am not talking and you rarely call out to the boys, I really think that you prefer the boys.
Ms. Bush  You know Ms. McDonald, Sandra is accustomed to being the teacher’s pet and whenever she thinks that someone is more loved than her she reacts.
McDonald  I am very sorry but I can’t have pets. If Sandra feels that I am treating her unfairly then I will check myself and will definitely improve my treatment. But if she thinks that I prefer someone to her and is acting up I definitely will not accommodate that kind of behavior. Is there anything else I can help you with?
Ms. Bush  No, that will be all. I really think that Sandra is acting out because she believes that you prefer the boys to her. I will try and work with her.
McDonald  You do that, and I will make sure that I don’t show favoritism in class.

Several more incidents occurred that led me to really believe that I was not practicing equity even though I thought I was. The following episode reflects
what happened in one of my mathematics class. The lesson was about solving linear equations.

Jim  Teacher, I don’t understand how you got 3.
McDonald  Okay Jim, the problem states $3x - 2 = 7$, now we are solving for $x$ (pause)
Jim  
McDonald  Very good. So what do we need to do?
Jim  Isolate the term with the variable.
McDonald  Excellent! What do I need to do next?
Jim  Add 2 to both sides of the equation.
McDonald  Why?
Jim  Because the operation used on the term with the variable is subtraction and therefore we have to use the opposite operation which is addition and the number is 2.
McDonald  Good job. So Jim what don’t you understand?
Jim  Ahh, I guess I was not paying attention.
McDonald  So we will move on.
Petal  Not yet miss, I don’t understand.
McDonald  (very frustrated) You students are getting on my nerves. What don’t you understand? I took the time to explain it to you all and you were there doing what I don’t know, now coming to tell me you don’t understand.
Petal  Miss, you are so unfair. You did not behave that way when Jim said he didn’t understand. I do understand but I was just trying to prove to Anna that you show partiality to some students.

After this particular lesson I was very unhappy with my attitude towards my students during instruction. What happened to the Carol who was so adamant about practicing equity in her classroom? In my mind I was treating all students fairly but it was not so. In reality some students saw me as an unfair teacher who showed preference to boys and students who were able to grasp concepts quicker than the rest. Not good!
My different encounters with inequity forced me to evaluate my teaching style, and the way I handled situations. I realized that I was really treating the boys differently than I was treating the girls. As a matter of fact, I discovered that I preferred to deal with the boys because they did not have the attitudes the girls had, they did not ask what I considered to be irrelevant questions and they were very respectful. Also, the boys did not talk back and were willing to learn. I made a commitment that I will work on achieving equity in my classroom.

I am now committed to providing my students with an equitable learning environment. In my classroom all the students enrolled are from nondominant social groups and have issues with academic achievement. Demographic trends indicate that the majority of people entering the workforce will be female or from an ethnic-minority group and that half of the students in our nation’s schools will come from non-European-American backgrounds (Hodgkinson, 1994). Of the 13 students that participated in the research, three were repeating because of their failure to master the course on previous attempts. One of the three was repeating the course for the third time. The lack of parental guidance, low self-esteem, trust, and misconceptions are possible causes for students’ mathematical struggles.

The practice of tracking students into low-level classes on the basis of their perceived abilities may also contribute to their mathematical struggles. Some of the students in my class are coming from elementary schools whose policies allowed them to track students, especially in mathematics according to perceived
abilities. Also, at the beginning of the semester, the administration at my school made provision for remedial mathematics classes. Students who were placed in these remedial classes are those who scored below 65% on the mathematics placement test. These students began to show negative emotions about the class as well as resistance to me. Their first impression was that if they were placed in my class they were labeled as remedial, not realizing that they had to attend both the regular class and the so-called remedial class. Their feelings are illustrated in the following excerpt from a conversation with a student researcher and me.

Budd: Miss, are you the remedial math class teacher?
McDonald: Why do you call it remedial?
Budd: That’s what the letter that my mom got calls it. Miss, you know I’m not stupid.
McDonald: Well, I know you are not stupid, actually, on the contrary, I think you are quite smart. And incidentally, the ninth grade class is divided into two groups. I will teach one group and Mr. A will teach the other.
Budd: So miss, what about the remedial class in the evenings?
McDonald: Oh, that’s what you are talking about. That’s not remedial class. It is extra classes to help those of you who had difficulty understanding the concepts during the regular classes. I call it after-school.
Budd: Miss, do I really have to come?
McDonald: Ok, how about trying it out for a couple of evenings? Then we can take it from there.
Budd: What about my friends? Will you do the same for them?
McDonald: We’ll see.

Little did administration know that by naming the after-school program remedial classes they were labeling these students and may have caused symbolic violence (Bourdieu, 1992) to some students. This resulted in students showing
frustration and sometimes animosity towards me, the teacher. During the first two weeks many students showed resistance and I on the other hand lost control. I also lost the social and symbolic capitals that were necessary to teach effectively.

Students of mathematics must be afforded equal opportunity to learn mathematical concepts. Also, equitable treatment of all students requires that teachers devise strategies that support students’ involvement in mathematics instruction. I believe that equity in mathematics education can be achieved by participation in practice. Learners can produce knowledge in settings that are socially and culturally constituted (Boaler, 2000). Lave and Wegner (1991) describe learning as participation in a community of practice where novices take on more and more central roles in their community over time.

**Research Squad Invitation**

In the fall of 2007, I was invited by Kenneth Tobin to become a part of a research squad. This research squad was comprised of eight teacher researchers who taught in very different schools. Of the eight teacher researchers, three were mathematics teachers and they all utilized cogenerative dialogues in their individual classrooms. After attending the first squad meeting, the old adage “first impression is lasting,” came to my mind. At that meeting one of the members shared a videotaped vignette and a conversation later ensued where valuable feedback was given from other participants. During the meeting I realized that participants were free to discuss their research projects and how cogenerative
dialogues were working for them. I also discovered that in these meetings one had to speak but it was a learning environment, which would later aid in presentations. The good thing though is that everyone felt comfortable contributing to conversations because no one was ridiculed and everybody’s input was valuable. Prior to my first squad meeting I was very shy. However frequent attendance has helped me to overcome my shyness to a certain degree.

**Breaking Down the Barrier**

Initially, my main focus at City Academy was to teach mathematics. Completing the syllabus and preparing students were of more importance to me than fostering a wholesome classroom. That is, a classroom where students are comfortable to share ideas and participate without experiencing symbolic violence (or being shutdown) by the teacher. As a high school student, I abhorred unfair treatment and therefore I am unhappy that I am treating my students inequitably. I have a problem and the problem will have to be fixed. I am now faced with the challenge of restructuring my classroom.

My involvement with the weekly squad meetings at the Graduate Center has afforded me the opportunity of introducing cogenerative dialogue to my students. The teacher researchers were all using cogenerative dialogue as a research tool and were all reporting great success. I am convinced that cogenerative dialogue is the instrument to utilize in order to promote equity in my classroom. Educational equity is based on the notion that all students have equal opportunity to access the
resources they need to succeed in school (Gutierrez, 2007). I conceptualize equity in terms of students’ access to all the resources necessary for them to learn. An equitable classroom requires good pedagogical practices that account for the social and emotional aspects of learning (Boaler, 2008). To this end, I propose a framework for equitable teaching, which consists of cogenerative dialogues. Also, I strive for equitable instruction that aims to disrupt inequities that occur in everyday classroom practice.

**Implementing Equity in Practice**

It is important that my students know that I care about their successes and I want them all to understand that mathematics goes way beyond solving problems and getting the right answers. My primary pedagogical goal is to build a learning environment where all students will have equal access to both material and non-material resources needed for learning. Material resources include cogenerative dialogue, rich course content and quality instructions. Non-material resources include identity resources and peer-relationships. The journal entry below describes my first cogenerative dialogue meeting with my students.

*Today I facilitated my first cogen. The first 40 minutes were focused on us talking about my teaching style, the changes they have observed, and what we need to do to improve the atmosphere of the classroom. I let them know that the cogens were for us to discuss any issues they are facing especially those issues that impact our class and the school.*
I began the conversation by thanking everyone for agreeing to participate. I let them know that we will see changes. Ena was first to contribute. She had a problem with the length of the class. She said that the class period was too long and that she hated the fact that the class was at the end of the day. “No disrespect or anything miss, you are a good teacher and everything and you are nice but at the end of the day we be very tired and I just want to hear the bell rings to bolt.” Then Leah and Milly both laughed and said simultaneously, “yow, do you see how Chrissy be standing at the door ready to bolt as the bell rings?” All 13 students started laughing and talking. I had to calm them down and remind them that there are other classes going on. I was reminded of the biases that I had when Zen said that at first I used to treat the boys very special but of late she noticed that things are turning around and I am getting very warm. As a matter of fact, she said that she is beginning to like the class and the time doesn’t even matter to her. I was really encouraged by the comment she made about things getting better. Leah wanted to know what could be done to make the class more fun. Ronnie got up and said “you guys are bugging, why do you need to have more fun in class. You came to school to learn not to have fun.” He added, “when you want to have fun then go to the gym there is always something going on in there. These classes are for us to learn.” A few of his classmates were not in agreement with him and so they voiced their displeasures. I believe Ronnie was trying to prevent his classmates from hurting my feelings. While I appreciate his support, I needed to hear all that the students had to say because I want to make a difference and I must achieve equity in my classroom.
Mike and Zen are both very quiet but today they spoke up. Mike didn’t have a problem with the way the class was going but he wished that the girls would be more respectful. I almost agreed with him but I had to remind myself that my primary goal is to treat my students fairly and to provide instruction so that everyone can learn.

In this cogen we planned the format of the next classes. We decided that students would coteach lessons. We formed two groups of four and one group of five. Students are excited about coteaching.

The first cogen went well. All the students enjoyed the conversation and said that they cannot wait for next Friday to continue. Ena said that she enjoyed the conversation and that she hoped that other teachers would think of something like this.

I must confess that I was very pleased with the outcome of our first cogenerative dialogue at City Academy. It was very productive and I do believe that I am on track with my plans to achieve equity in my mathematics classroom. (Journal Entry ~ September 28, 2007)
Figure 1 depicts the algebra lesson following the first cogen – short for cogenerative dialogues. One of the student researchers suggests we form groups when next we meet for class. I immediately embrace the suggestion and for the next class meeting, which was the following Monday morning, students formed small groups. Small group cooperative learning can be used to foster effective mathematical communications, problem solving, logical reasoning, and the making of mathematical connections – all key elements of NCTM’s Curriculum and Evaluation Standards for School Mathematics (NCTM, 1989). Also, some students are more comfortable participating in small group as opposed to whole class discussions. In this small group cooperative learning session, students are assigned mathematical problems from the previous lesson. The students work on the problems in their groups. Each group selects a leader who is responsible for
the whole class discussion. The main purpose of the groups is to ensure that each student has an opportunity to participate and learn. As the students work in their groups I walk around the classroom listening to the conversations making sure that math talk is taking place and that each student is given a chance to share.

I allow students to join a group of their choice even though I would have preferred to group them myself because of their learning diversity. I later realize that I made the right decision in allowing them to self-select because as I walk around the classroom I could sense what Boaler, 2008 describes as a ‘togetherness’ environment. This is an environment where students are willing to learn, feel respected and their mathematics and cultures are valued.

In this particular lesson we explore the topic ‘Systems of Linear Equations’. Each group is given a problem from the four different sections. To be consistent with the equity journey, the problems are typed and folded and placed in a hat for each group to select one. The excitement that fills the room as the groups work on the problems is very flattering. As the teacher I am ecstatic to know that my students who previously put up such great resistance to math are actually showing enthusiasm to do math work. The discussions among the group members are extremely solid and prove that there is clear understanding of the subject matter. One group role-plays the problem they had. The problem states “Farmer Brown had ducks and cows. One day she noticed that the animals had a total of 12 heads and 32 feet. How many of the animals were ducks and how many were cows?” I
remind them that they have to use the principles of linear algebra to solve the problem. They respectfully assure me that they know what they are doing. By this time, I am very excited because my students are having fun doing mathematics.

As I continue to walk around the classroom it is evident that most of the students have a clear understanding of what they are doing. There are some students who are experiencing a little difficulty grasping some concepts. However, their peers are taking their time to carefully explain the concepts and methodology to them. This activity confirms that students in groups can help each other understand and master basic facts and computational procedures in the context of games, puzzles, or the discussion of meaningful problems (Davidson, 1990).

**The Role-Play**

The main purpose of the role-play is to check their answer for accuracy. This particular group did not have enough students to role-play the problem and so they incorporate some of their classmates. They put twelve students to stand at the front of the class. These students represent the twelve heads in the problem. The group leader, Tia (not her real name) then writes \( x + y = 12 \) (1) on the board. (This is the first equation of the system). Below that equation she writes \( 2x + 4y = 32 \) (2) (This is the second equation of the system). She then explains to the class that because there are total of twelve heads then there must be only twelve animals and that is how the group arrives at the first equation. She proceeds on by
explaining the second equation. Tia explains to the class that $x$ represents ducks and $y$ represents cows, therefore, since ducks have two legs and cows have 4 legs it is reasonable to say that 2 times the number of ducks plus 4 times the number of cows must equal 32 legs. The group members continue by solving the problem on the board using the substitution method of solving linear systems. They solve the first equation for $x$ to obtain $x = 12 - y$. They then substitute $12 - y$ for $x$ in the second equation to obtain $2(12 - y) + 4y = 32$. They very carefully and timely explain each step of the problem to the class. They also ensure that each of their classmates is paying attention.

In a previous lesson the class was taught that the solution to a linear system is an ordered pair that is a solution to all the equations in the system. Therefore, when presenting the solution to the ducks and cows problem, the group presents it as an ordered pair $(8,4)$ with $x$ being the first and $y$ the second element. They are now ready to continue their role-play. Tia divides the group in two, four on one side and eight on the other. She confirms that the ordered pair $(8,4)$ is a solution for the first equation because $8 + 4 = 12$ is a fact. She then asks the class to count the feet of the twelve students standing. The class responds, “twenty-four.” She asks the group of four to go on all fours. Again Tia asks the class to count the feet of the twelve students, this time they respond, “thirty-two.” She then concludes by saying, “it is evident that the ordered pair $(8,4)$ is also a solution for
the second equation \((2x + 4y = 32)\), therefore, Farmer Brown had 8 ducks and 4 cows. Tia thanks the participants and they all take their seats.

Immediately after the group members take their seat the bell rings signaling the end of the block. The rest of the students are very disappointed because they are not able to present their problem and solution today. I assure them that I will allow them to make their presentation the next class and they are all in agreement.

**Mathematical Empowering Urban Students Through Cooperative Learning**

Most of my students have internalized negative self-images about their knowledge and ability in mathematics. Introducing my research participants’ ideas about small group cooperative learning helps to promote more positive self-image. The small-group, cooperative learning experiences help my students explore mathematical concepts in an interactive problem-solving setting. Also, these experiences allow them to align real-life situations with the math problems. Group collaboration promotes the growth of mental processes in children, since children tend to internalize the talk heard in the group (Vygotsky, 1978).

I continue to use the cooperative learning strategy for my algebra class, which results in students having more respect for each other as well as actively participating in class. There are two students who resist the whole idea of small group cooperative learning and refuse to participate. These two students have very weak mathematics backgrounds and this could be the reason for them putting up resistance. I constantly encourage them to each join a group and tell them of the
benefits of cooperative learning. Because of respect for me, the teacher, they relent and join a group. I am very impressed with the attitudes of the other students and how maturely they handle the situation. The leader of one of the groups asks me to allow him to talk with the two students. The following is what he says to them, “yo, this is the best thing Miss McDonald did for us. I never could understand nothing that was going on in maths since middle school, but these activities help me to understand. I’m a tell you this, in these small groups we learn from each other and nobody thinks you are stupid. Just try it and see.” He also adds, “listen man, in our groups we do or die together, we sink or swim together and we all make necessary contributions so that our group can be successful.” I appreciate Fred talking to the two students because it helps the students understand that their peers are benefiting from the small group activities and now they have a chance to do so as well. It also helps me to understand that these activities are effective.

Adopting small group cooperative learning in my algebra class is an excellent teaching strategy. This is more than just tossing a group of students together and asking them to solve specific problems. It is about putting students in heterogeneous groups. This is where students are mixed, taking into consideration, students’ academic abilities, ethnic background, and gender. One of the benefits that emerge from the small group activities is student achievement. The effects on student achievement are positive and students are more willing to
cooperate with each other and even like each other more. Also, students’ contributions are solicited, respected, and celebrated. Another benefit is better classroom management. Students seem to be more belligerent, insecure, frustrated, and out of control when they cannot grasp the material being taught. However, with the introduction of cogens and the small-group cooperative learning I have better control of the class and the students are more cooperative and respectful of others.

Cogenerative dialogue and cooperative learning are successful teaching strategies. These strategies involve students of different ability levels. In my algebra class we use a variety of learning activities to improve my students’ understandings of the math being taught. An atmosphere of achievement is formed because each student is responsible for helping his/her teammates learn.
CHAPTER 3
STUDENTS AS COTEACHERS IN AN URBAN HIGH SCHOOL
MATHEMATICS CLASS

Students who are accepted into City Academy are from low socio-economic status families. These students are often times labeled low achievers. Their mathematical knowledge is limited and thus much work is required in order to bring them up to par with their public school counterparts. Also, extra preparation is necessary in order for them to take the New York state standardized Regents test and be successful. Having this group of students in my class made me realize that I have a big challenge to deal with. I have to think and act quickly, as everybody is expecting me to create miracles. That is, no matter the attitudes and aptitudes of the students, it is my responsibility to ensure that each student does well on the mathematics Regents examination.

At the beginning of the course I face students with various issues, such as, low self-esteem, lack of respect (for self and others), over-confidence, and attitudes. I am very frustrated and decide to introduce cogenerative dialogue. About two weeks into the semester my students and I started cogenerate dialogue. We meet every Friday since the first meeting.

From the cogenerative dialogues I discover that in order for instructions to be effective the students need to be more involved. I also remember that as a high
school student, in math class I grasped concepts and learned content more when my teacher allowed me to tutor my peers. I immediately placed students in groups of four and each group was responsible for teaching one lesson per week. Students would prepare the lesson before hand and then meet with me during their study hall to go over each topic. Each student was given the opportunity to model his/her lessons whichever way he/she wanted. The main intention was to give each student an opportunity to learn while teaching and to open doors to new ways of thinking about mathematics and how it is learned.

**The Actual Lesson**

As a teacher, my focus is on each student grasping and understanding concepts and learning the materials taught and therefore I employed the use of coteaching and cogenerative dialogue. The following vignette is from a lesson taught by one of the groups. There are four students in this group. They are all from different ethnic groups. Each student in this group is responsible for teaching one section of the lesson. Two of the students in this group are the quieter ones in the class and they are the ones chosen to anchor the lesson. The topic taught was *Solving and Graphing Inequalities*.

At the beginning of the lesson the student-teachers tell their classmates to close their textbooks. They did this because they wanted to ensure that every student was paying attention. As Mike (the only male in the group and one of the quiet ones) teaches his section of the lesson, he commands the attention of the
other students. He elicits the participation of all the other students by asking relevant questions; questions are not complex but rather brought out thoughtful and interesting responses. Mike shows confidence as he teaches. Because of his quiet demeanor, his classmates are very surprised but pleased at the way he executes his teaching task.

Mike Now we are going to graph (drawing a number line on the board)... How do we graph it?
Class no response
Mike How do we graph it?
Zen you put a closed circle on 2 and another closed circle on 6 and connect them.
[applause] Zen never speaks in class.
Mike graphed the problem.
Mike Why a closed circle?
Zen because the problem says x greater than or equal to, if it was just greater than then we would have an opened circle.
McDonald Good job!

In teaching her section of the lesson, Leah, the other student-teacher, uses a different approach from Mike. She explains the problem, does an example, and then allows students to come to the board to solve different problems. Leah is more alert than Mike in terms of classroom management. She sees two of her classmates sleeping and is brave enough to reprimand them. She tells them that sleeping in class while instruction is going is very disrespectful and now she understands what the teachers are experiencing.

Leah We will work on graphing compound inequalities dealing with OR. Unlike the AND, only one statement needs to be true.
Two young ladies are sleeping.

Leah
Zen, can you please wake up those two?

Zen wakes them.

Leah
How can you be sleeping when the lesson is going on? You are so disrespectful. Now I see what the teacher experiences when she is up here.

The classroom gets extremely quiet and everybody started paying attention.

Leah
Now I will demonstrate how to graph a compound inequality dealing with OR.

She graphed the inequality.

Leah
Jane and Joe please come to the board and do check it out 1 and 2.

The other two group members, Rachel and Sarah demonstrate the problem-solving aspects of the lesson. They explain to the students how important it is to read and understand mathematical problems involving real-world situations.

Rachel reads and explains a problem. Sarah shows the different steps to follow in problem-solving.

At the end of the lesson students are asked to write a brief description of the lesson and to evaluate the different sections. All the students write that they liked the instructions and that they would like an opportunity to teach. As the teacher I am very pleased with my students’ performance. The following is an excerpt of a brief discussion I had with a student after the class.

McDonald
So Chris, how do you think the class went?

Chris
It was fun, I really learned. You should do more of this.

McDonald
What do you think of your classmates? Did they do a good job?

Chris
Oh yes Miss. Did you see how Zen answered up? I think Mike motivated her.

Chris
Miss, may I teach the next class?

McDonald
Sure, but you have to prepare. I like when students want to teach.
Examining the Lesson

As a mathematics student in high school I used to prepare for the next lesson because I loved it when the teacher asked me to assist my classmates. In so doing I learned more and had a better grasp of the subject matter. Moreover, I felt very proud when I was complimented on my mathematics knowledge and skills. It is for this reason that I introduced students as coteachers, which focused their attention on learning.

Allowing students to teach means that they (the students) have to be prepared. That is, they have to learn the lesson first before they attempt to teach it. If they have difficulty with any section, they have the opportunity of coming to me to explain it to them. It is my responsibility to make sure they understand concepts and content before teaching. So the learning is the reward one gets from teaching. Also, they learn as they teach others.

I was very impressed with the way each student executed his/her teaching task. They were all very excited about teaching and wanted to prove to me that they were capable of doing a good job. They all seem to emulate my style of teaching in some way. This was a bit flattering.

During the course of the research I realized that affording each student the opportunity to teach does promote learning and equity. Learning because no child wants to be labeled ‘stupid,’ neither do they want to mess up in front of their
peers. Therefore, they will ensure that they master the subject matter before even attempting to teach. Equity occurred, because each student was able to participate in class in ways that assisted them to achieve the learning goals for the mathematics course and no one was hindered from participating because of the way the lessons were taught. My class is a level playing field.

It was evident that learning was taking place because a comparison of the assessment scores showed that students were scoring higher in the third and fourth marking periods compared to the first. I also noticed that students’ attitudes began to improve. There were no more complaints of wanting to be in another class, instead I got kudos from my students. They tell me, “miss your class is the best!”

**Students’ Perspectives**

My students were very excited about coteaching. They participated more in the lessons that their peers are teaching. The following is a journal entry from one of the students.

*Today I had the opportunity to coteach with Miss McDonald.*

*When I was up in front of the class I was very nervous and excited at the same time. I thought about how the class would react and what Miss McDonald would say at the end.*
When we were teaching I felt that my friends were learning something and that I wasn’t up there for nothing. The enthusiasm that was in the room when we asked questions made me feel as if I was the real teacher. I had fun even though I couldn’t give homework.

I think that letting students coteach is a very good idea and that it should be done in every class because when students teach they also learn what they are teaching at the same time, and if they know it already then they get a better understanding of what they taught. It makes learning fun and that’s the way learning should be. (Mike’s Journal Entry 10/15/2008)

**Students and Teacher Producing Together**

My mother had a popular saying, “two heads are better than one.” I have proven this statement to be true since learning became more effective as my students and I work together (in cogenerative dialogues) for one common goal. Students were motivated by the whole idea of coteaching and therefore were willing to assist each other in class. Teaching is actually the process whereby an individual assists another in learning. Therefore, when my students coteach lessons they are actually maximizing their learning. This form of discourse made allowance for the highest level of mathematical achievement.
Tobin and Roth (2001) premised coteaching on the concept that when teachers work together they learn from each other without even thinking about what they are doing at the moment and why they are doing what they are doing. Hence they coined the central motto: coteaching is colearning in praxis (p. 17). I have based my own research on this same idea. I have discovered that by coteaching, students’ behaviors improved, they respected each other and the classroom environment became more conducive to learning.

**Cogenerative Dialogue as a Classroom Management Tool**

In my algebra class there were significant benefits in learning through the uses of cogenerative dialogue and coteaching. I have learned that in order to be effective, I had to establish a classroom environment that emphasized solidarity as well as to build social capital. As a teacher from a different culture from most of these students I had to understand and value the culture that my students brought to the classroom and in turn work on building social capital for the common goal of learning mathematics. By analyzing the videotapes (of students coteaching) during cogenerative dialogue sessions, students were able to identify behaviors that they deemed unacceptable. Also, they were determined to change their behaviors in order to create a more productive and structured classroom, one that would enhance the learning of mathematics.

Cogenerative dialogues provided my students and I opportunities to talk openly and comfortably. In these sessions students discussed factors affecting
their everyday lives. We also discussed ways to improve the learning of mathematics. During these dialogues each participant was treated equally and every suggestion was reviewed. We were all able to communicate our views, ideas, and beliefs about teaching and learning of mathematics. These focused activities allowed us to develop a greater understanding of each other and to build solidarity and social capital as we developed the cultural capital that was associated with the teaching and learning of mathematics.

The use of videotapes during cogenerative dialogues afforded us the opportunities of focusing coteachers’ attention on specific activities and providing concrete examples about shared practices and experiences from which to get understandings about present and future practices. As all students analyzed, observed, and shared in the experience, ideas for improving behaviors in class were negotiated and it was evident that students were willing to assume responsibilities for their own actions in the classroom. These activities proved to be of extreme importance because our practices were habitual and unintentional. These cogenerative dialogue sessions proved to be effective classroom management tools since students improved their behaviors during classroom instruction. One important thing to note is that the results from the cogenerative dialogues are not evident only in my class but also in other classes. The cogenerative dialogues served as resources to discuss teaching and learning and to illustrate that students needed to take responsibilities for their own activities in the
environment and for changing the distribution of power and the roles of participants.
CHAPTER 4
RIPPLE EFFECTS IN COGENERATIVE DIALOGUE

Jacob Kounin, a classwork management theorist, coined the phrase “ripple effect.” In essence this term describes the positive effect teachers have on students. Kounin posits that the effect occurs when a teacher asks a student to stop a disruptive or destructive behavior. In his observation he discovered that, when a teacher publicly asked a student to stop a behavior, all other students in the class are affected. This action promotes better classroom management because other disruptive students discontinue their bad behaviors.

The term ripple effect is widely used across many fields to discuss how the behavior or occurrence of one thing can have an effect on many other things. One such field is history - the Great War was sparked by a single event, which led to millions of people dying, and continues to affect the world today. This war was a stepping stone for many wars to follow. It caused a ripple effect, setting the standard for many wars. In economy, ripple effect is used to describe the effect of low wages on a housing market, or of a depressed housing market on interest rates. In my research ripple effect is used to describe the effect of cogenerative dialogue on a parochial school system.
The Ripple Effect in Behavior

Even though City Academy is a parochial school, over 70 percent of the students are from low socioeconomic backgrounds. Some are from single parent homes, foster homes, and some are children of undocumented immigrants. Most of these students exhibit apathetic and aggressive behaviors. During instructional time students would disrupt the class by shouting and occasionally fighting. Some students would sleep and others seem bored and uninterested. These behaviors lead me to pass judgment on the students. I view them as rude and disrespectful. I also blame their inability to grasp concepts on their behaviors. My upbringing did not prepare me for this situation.

As a teenager/high school student living in rural Jamaica and attending school in the city I had to display impeccable behavior. Good behavior is considered to be, acknowledging adults, making eye contacts when speaking, listening while others are speaking, being polite, and exhibiting appropriate social graces. Both parents and teachers alike had zero tolerance for what we call emotional and social deficits. My understanding of this is, lack of respect or manners. According to Jensen (2009), children’s behaviors are stabilized because of strong, secure relationships. He said that such relationships provide the core guidance necessary to build lifelong social skills. He also posits that children who grow up with such relationships learn healthy, appropriate emotional responses to
everyday situations. But children raised in poor households often fail to learn these responses, to the detriment of their school performance.

I am frustrated with the overall behavior of the students and this is because my expectations are not being met. I have ideal expectations for these students before I met them and without establishing clear and concise goals and procedures. Also, I did not make any attempt to understand their backgrounds. I have to accept the harsh reality that students come to school with a narrower range of appropriate emotional responses than expected (Jensen, 2009). Many of our students here at City Academy just do not have the repertoire of necessary responses. It is as though their brains “emotional keyboard” plays only a few notes (Jensen, 2009).

![Figure 2. Emotional Keyboard](image1.png)

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I am convinced that all behaviors have ripple effects. Cue appears to be from a relatively stable environment. He comes to school on time, neatly dressed, and his tuition is paid in full. My expectation of Cue is that he would be the model student. My thoughts are that he would be the one with the right attitude and behavior. However, when he comes to class he is disruptive, does not do any work, is unwilling to participate in class discussion, and is often times aloof. His behavior has a significant ripple effect on his classmates. Peer students fail to pay attention in class and appear out of control. The behavior also affects me and leads me to lose control of self and the class. This is rather frustrating and embarrassing because I should be engaged in positive and productive behavior, which in turn will impact the students rather than the students impacting me. I am fully aware that behavior can have systemic consequence, yet I fail to appreciate just how powerful the effect can be.

In order to recreate the algebra classroom and enact change, a change that will have students engaging in positive and productive behaviors, we (Cue and I) had a cogenerative dialogue session. I chose to have a one-on-one session with Cue. He was selected because most of the young men in the class follow his lead and so I figured I could use him to make the difference. Cue is the oldest of three children (all boys) for his parents. His parents are separated (not divorced) but live in the same house. His father doesn’t work and abuses his mother. His father who is his mentor smokes marijuana and supplies Cue and his friends with joints.
He is more concerned with being his son’s friend rather than being a good father. He is not involved in his son’s education. Cue’s mother, Mrs. Barnaby, on the other hand, attends every parent-teacher conference, is present at school functions, and is readily accessible in case of any emergencies involving her sons. In a conversation with her she says she is trying her best to ensure that her sons receive good education but because of the lack of positive support from their father everything that she tries seem futile. She also tells me that she feels so defeated because she believes that Cue and her last son have the propensity to behave like their father. She fears that they will never graduate from high school and will never even be enrolled in college. She is hopeful however, that Seth, her second son, will complete high school and later college. I encourage her by telling her that she is doing her best and that she will be rewarded. I also promise her that I will do my best in assisting with Cue.

Cue and I meet; he tells me a lot of things in confidence. Things that make me raise my eyebrows. He tells me that it is not his intention to disrespect me or the class but he has a lot going on and this is just his way of dealing with his stress. I allow him to talk without interrupting because he makes it quite clear that in this first meeting he does not want advice, he just needs a listening ear. I listen as he speaks taking mental notes and even form opinions of some of the things he says. He speaks for approximately an hour and twenty minutes after which he says, “miss I have taken up enough of your time, thank you for listening to me can
we do this again tomorrow?” He assures me that I will be allowed to speak then. I bid him goodbye and inform him that we can meet tomorrow after school.

On my way home my phone rings. It is the principal of City Academy. She says, “Mrs. McDonald, I know this is the last thing you want to hear, but I am going to be the bearer of bad news,” I sigh. She continues, “Cue was locked up this evening.” At this point I am in a state of bewilderment. I immediately call his mother; she too is in a state of panic. She tells me that on his way home from school Cue along with his brother Seth and some other classmates including girls stop by the rival school and fought with some Latino boys. Cue apparently has issues with one of the boys and hurt him really bad. The boy is hospitalized and the police are involved. They (the police) arrest Cue since he is the main perpetrator and send the rest of students to their respective homes.

In class the next day one of the girls asks me if I heard what happened the previous evening. I tell her no and she proceeds to talk. She tells me a lot, some of which Cue had mentioned earlier. She tells me how worried she is because her parents warn her about Cue and being in his company. She also tells me that Cue is a part of a gang and the boy he fought is a part of a rival gang. It is one big mess and unfortunately I am aware of it. Cue is in jail and the students who accompany him are all on suspension for ten days. Mrs. Barnaby is in denial and refuses to believe that her son is a gang member.
Members of the school’s administration are contemplating to expel Cue. However, there is one member on the team who believes that there is some good in everyone and suggests a less stringent punishment. All the members agree to allow him to remain in the school for the remainder of the year, but on probation. The principal relates the administration’s decision to Mrs. Barnaby and she is very happy with the decision. She believes the decision is fair.

Cue spends the entire weekend in jail and is released on Monday. The parents of the boy decide not to press charges. Cue is home and will remain home for the next two weeks. I reach out to him asking him if he is still interested in continuing our cogens. I assure him that I will always be available if he needs to talk. He tells me that he is very embarrassed and apologizes for his actions. He says, “miss I feel like a failure and like I just can’t get anything right.” I tell him that it is okay to feel that way, however focusing on the negative will not help his situation. I arrange to meet with him at 4:00 p.m. on Wednesday to continue our cogens.

The following vignette is from our meeting:

McDonald: Hey Cue, what’s going on?
Cue: Hello Mickey D (hanging his head)
McDonald: Talk to me …
Cue: Be very honest with me, are you disappointed in me?
McDonald: (sigh, brief hesitation) To be very frank, at first I was, but when you agreed to continue with the cogens my disappointment became hope.
Cue: Ah I see. I want you to know that I really appreciate your honesty.
McDonald: You know Cue, your peers look up to you and you are a big influence on them.
Cue: Yea miss, but I never tell them to follow me.
McDonald: That might be true, but they see you as Mr. Kool and tend to emulate your behavior. Teenagers usually gravitate to what you all call ‘dope’ and to be very blunt, dope is not going to cut it now. You need to refocus.

Cue and I have a very intense conversation. After approximately one hour I encourage him to go home. He bids me goodbye and I implore him to go straight home and to forget about his associates for this evening. He in turn assures me that he will go straight home and that he is listening to me and is trying to get his acts together.

While Cue is out on suspension I ensure that I will send him his assignments and tell him that if he is having difficulty he should inform me and I will provide necessary feedback. We speak every night for the entire time he was out. Sometimes we talk about his school work other times we talk about issues he is facing. As a result of my keeping in touch with Cue and sending him daily assignments, he reaches out to some of his other teachers and asks them to send him all the missing assignments. I learn about this in one of our staff meetings when one of the teachers mentions that Cue is maturing because he calls and asks her to send him some work to do for her class. It is at this point that his history and science teachers also say that he asks them for work as well. By this time the principal is in a state of bewilderment. She says, “this is so hard for me to believe!” She pauses and then says, “am I hearing correctly, did Cue really ask for school work? Unbelievable!” I sit there with mix feelings. I am very proud of Cue
for taking initiative but it really hurts to learn that some teachers and administration have such low expectations of Cue. I am usually very quiet in staff meetings, however, this time I am forced to get out of my comfort zone just to defend my student. I tell them in no uncertain terms that our students are reflections of us and unless we change our mindset and attitude we will continue to experience severe problems. I also mention to them that our biggest problem is the low behavioral expectations we have of our students and that many times low behavioral expectations manifest themselves either because we, the adults neglect to establish clear rules and procedures or we fail to respond when we see misbehavior. I explain to them that when we tell ourselves or when we believe that students cannot behave themselves, we usually feel uncomfortable asking them to behave, which in turn results in a downward spiral whereby students reinforce our low expectations. I admonish them to be more cognizant of misrepresentations and the damaging views they might bring to the classroom. I am willing to be the voice of my students and more so Cue at City Academy because I want the administration and staff to realize that not only are we role models to our students but our mission at City is to prepare the whole man for now and the life to come. Also, I refuse to allow anyone to sabotage my effort with Cue.

Cue is back at school and we are continuing with our cogens. There is a positive change in his behavior during algebra class. He no longer disrupts the
class instead he pays careful attention and participates. This particular algebra class is going well, learning is taking place and most importantly my students and I enjoy interacting with each other. One of the students comes to me and says, “Mickey D, I just love the way the class is going now, at first I thought we would not learn anything because you seem so soft and the kids are so bad. I thought you wouldn’t be able to control them but I realize that even though you are kind and loving you are also very firm and consistent. Anyway Mickey I love you, you are like my second mom.” Hearing that from this student helps to reinforce my stance on cogens and the ripple effects in behavior.

My desire to enact change in my algebra class is realized by facilitating regular cogens with Cue. These activities cause a positive change in his behavior which affects the behavior of the entire class. The change in behavior is not evident only in my algebra class but is manifested in other classes. The English and Social Studies teachers are commenting on the positive change in behavior of some of their students and the effect in instructions and classroom management.

Like the fall of the pebble in water so is the use of cogenerative dialogue in my algebra class. One ripple causes several ripples to occur. The cogens trigger effective classroom management which triggers improvements in students’ behavior which in turn trigger effective instructional practices which trigger excellent performance on state and standardized tests.
The Ripple Effect of Cogenerative Dialogue School-Wide

Students at City Academy are very resistant to teachers reprimanding them especially if they don’t care for the particular teacher. I will admit that the strategies that some of these teachers use are very harsh and tactless. In a conversation with one of them he tells me that he admires the relationship I have with the students and the ease with which I get them to listen and obey commands. He tells me that they have no respect for him and he just doesn’t know how to relate to them. He also shares with me that he spends most of the class period trying to get the students settled. I empathize with him because not too long ago I was facing the same scenario. Coincidentally the principal approaches me to find out if I would be willing to share my strategy with my colleagues. She commends me on the excellent job with my A-day algebra class and informs me that these students are also exhibiting impeccable behaviors in their other classes. I express my gratitude to her for her kind words and assure her that I am more than willing to share with the group. I am very flattered but happy to know that my work with cogens has made such an impact on the culture of the school body. I am also very delighted that my students are practicing appropriate behavior in all of their classes.

The principal sets a time for me to meet with the rest of the teachers. Two of the older teachers show no interest in being a part of our session as they believe
that nothing significant will happen because they have been teaching at City for almost twenty years and nothing much has changed. The principal asks them to cooperate with the program and try to see if they can get some insight as to how they can motivate their students. I believe that their biggest problem is the fact that I am the newest kid on the block and already I am making a difference in the lives of our students. I say this because one of them says that I have an agenda and he does not desire to be a part of it. I inform him that my only agenda for City Academy is for us to enact change in the culture of the school and in doing so we will accomplish the mission of the organization. A part of our mission statement is to “Experience Learning” and the only way to experience learning is for change or transformation to occur. Some people are comfortable in their positions and are definitely resistant to change. I tell the two teachers that children emulate the people they most admire, and if we as teachers are pugnacious then these students will display the same kind of behavior. I also tell the principal not to mandate anyone to participate in the discussion because I want to facilitate a meaningful discussion filled with positive energy.

Eight of the thirteen teachers on staff are present for our discussion. I inform them that the purpose of our discussion is to see how we can work together to foster positive change in our students. One teacher tells the group that the main reason for her participating in the discussion is the evident change in Cue and his friends. She says that she is attributing this change to the incident at the other
school but one of Cue’s friends tells her that Cue has been meeting with Mrs. McDonald and she has made such an incredible impact on him. She adds that Cue’s friend also tells her that my class is different from all the others and that I set aside Fridays so we all can have discussions. She then confesses that she openly reprimands one of the students and he looks at her and says “don’t speak to me like that, you not Miss Mickey D!” She declares that she is very happy that administration puts this in place because she wanted to ask me how I manage to have such a relationship with the students especially the young men. All the teachers then acknowledge the fact that positive change is evident in the algebra students and that they yearn to see this change in the overall culture of the school. This set of teachers is open to change and agrees that if one teacher is experiencing such positive vibes from the students she teaches then it will not hurt for each of them to try to bring about change in their classroom as well.

“So Mrs. McDonald, how do you do it?” asks one of the teachers. I know she is referring to Cue. I explain to the group that Cue displays natural qualities of a leader and that is the reason I target him. I know that if I get his cooperation I will automatically have the cooperation of the rest of the young men. I mention to them that Cue and I meet often to discuss anything and rarely do we discuss academics. I explain that there is a propensity in each of us to want to do good. I quote my mother “when you want to do good, evil presents itself,” to bring across the point that it behooves us to nurture that proclivity with positive expectations. I
share with the group that we need to be more than mere teachers standing in front of a group of students instructing a planned lesson. I tell them that we are and will be the only role models some of these students will ever encounter so we have to be advisor, guide, parent, and confidante and we need to play the role well. I encourage the group to develop trust among them and their students. I elaborate on this by telling them that one of the reasons Cue gives me for the change in his behavior is the trust that we have for each other, the love and respect that I have for him and my sense of humor. I encourage the teachers to try nontraditional tactics to enact change. I explain cogenerative dialogue to them and share some of the students’ feedback on their experiences with cogens. The most popular response I get from students about cogens is that the informal setting that we create allows us (my students and myself) to freely communicate with each other.

It is almost time for our session to conclude and so I urge my colleagues to start establishing high expectations for our students by setting clear goals for them. Also, I ask them to create a bond with their students and let them know that they love and care for them. They all give positive reaction on our session and say that they intend to implement a program, which may not be what I am doing but similar. I remind them that an effective teacher loves what he/she does, has a sense of humor, is knowledgeable, listens, maintains control of the class, and does things with the entire class. I also underscore the necessity for them to maintain equitable practices. I ask them to bear in mind that equity should not be mistaken
for equality. I further expound on the difference between the two. Equality in the classroom is relating to all the students the same way. It is giving the same instructions to every student not taking into consideration that each child is different and what works for one may not necessarily work for others. Equity on the other hand is treating each student fairly even if you have to take an extra minute to explain a concept to one child who cannot seem to get the point. In essence equality is providing each student with the same resources but equity is allowing each student access to the resources that they need to learn. We conclude our session with me demonstrating how the use of cogens has helped me to embrace equity in my algebra class. The use of cogens affords me the opportunity to get to know each of my students, learn where they are from, what they love to do outside of school, their family culture and most importantly I am able to build trust and differentiate instructions. I am also able to assure students of their brilliance and assist them in working towards their potential. These are all rungs on the equity ladder which leads to high expectations with commitment to every child’s success.

Since our session teachers are trying different strategies in their everyday encounter with their students. One of the teachers tells me that things are going better in her English class and students are more willing to participate. This teacher is relatively young and has a passion to make a difference in the lives of her students. She acquires two scrabble games and sets aside Wednesdays for her
students to play scrabble – a form of differentiated instruction. She also invites her students to play words with friends with her online. In so doing she hopes to get closer to her students and build a better relationship with them while improving their vocabulary. Her strategy is working as I hear one of her students bragging about beating her (the teacher’s) score in words with friends. She encourages them to learn the meaning of the words and to make sure that they use these exercises as learning processes. Not only is she experiencing a positive change in her classroom environment, her students are also staying back after school to talk with her. Some evenings as I pass by her room I see some of her students inside with her talking and laughing and just having a good time. One evening she stops me in the hallway and says, “McDonald, I just want to say thank you for the ideas and tips you gave us in the meeting. I know it is your research but I love it and things just couldn’t be better in my class. I wish all of us could see and experience the benefits of your research.”

The atmosphere of the school has gotten much lighter and is now more conducive to learning. There are fewer fights, hence less suspension which leads to improved class attendance. Students are coming to class on time and are responsible and more respectful. Teachers are experiencing better classroom management and trying to ensure that each student has access to everything they need to learn. On the whole, teachers and students are having a better relationship and the ripples continue to form. Eighty percent of City Academy’s teachers are
using some form of strategy to enact change in their classrooms. Some are more successful than others, however, change is taking place.

**New York Regents Test at City Academy**

One of the requirements for graduating with a Regents Diploma from City Academy is passing five core courses in the Regents examination. If students are not successful in the Regents examinations, they are still allowed to graduate with just a high school certificate. In careful examination of the school’s data it is noted that the pass rate of the Regents is extremely horrendous, especially that of English and mathematics. The pass rates range from 30 to 65 percent for English and under 49 percent for mathematics. As the algebra and geometry teacher I know I have my work cut out for me but I am adamant that great things are about to take place even with the limited time that I have.

I mention to my students that the algebra Regents will be administered in June and they all will be taking it. I also stroke their egos by telling them how confident I am that they all will do well because they are so smart. After class Cue comes up to me and suggests that I use one of our cogens as a Regents prep. I give him the high-five and say to him, “excellent idea Cue, but guess what? You will be taking charge of this session.” He is very ecstatic and asks if I really think he is capable of leading the sessions. I assure him that he is more than capable and I will be there to help him if he needs me. I am so very proud of Cue because not only is he showing positive growth, he is also a good source of motivation to his
peers. Each student in my algebra class is now engaged in the lessons and is not afraid of failure. In one of our discussions I explain to them that failure is not the end to life but rather an opportunity to do better the next time around.

The Regents prep with Cue is going well. He makes sure he is on time for each session and is always well prepared. Before each session he and I meet to review one section from previous exam papers. (We have a total of five practice papers and we intend to go through all of them so that the students will have a good chance at success). Cue is handling these sessions really well. He explains the concepts and demonstrates to the rest of the group how to problem solve. The group members are intimidated by word problems but we make them come alive by associating these problems with their everyday situations. Cue even includes some of their names in the word problems and they seem to like that very much. The fact that they are recognized means a lot to them. Cue ensures that he includes at least five word problems for each section. We are reminded that practice makes perfect and this is evident in results from the algebra Regents examination as we have a ninety-four percent pass rate, thirty-five of thirty-seven are successful. This is a significant because City Academy has never experienced such great success before. The principal is in a state of bewilderment to learn that Cue and some of his friends pass the exam. Her reaction is “Cue passed? Cue passed?” I am really basking in the victory because despite the fact that Cue is displaying positive changes and is doing so much to excel administration still has
low expectations. One thing that stands out vividly is a conversation between Cue and I when I challenge him to make a difference and to use his haters as an elevator to achieve great things. The success in the Regents examination is another ripple formed from cogens.

Many ripples are created with the introduction of cogenerative dialogues in my algebra class. There is an improvement in Cue’s behavior and attitude which triggers a change in the behavior of the other students in the class. When students are on their best behavior, classes are managed more effectively. Students are also behaving in other classes. Other teachers create their own dialogue to enact change at City Academy. We experience huge success in the Regents examinations. Most importantly, an entire school has benefited from cogenerative dialogues.
Figure 3. Ripple Effect of Cogen at City Academy (Chart by Carol Woodburn)
Chapter 5
Using Cogenerative Dialogue to Facilitate Constructivism in an Urban Mathematics Classroom

“Miss, this just doesn’t make any sense! I am tired of this class. The more I try the less I understand and I am frustrated right now.” Receiving this feedback from one of my better students is the last thing I need. I had just given my algebra class a problem involving fractions to solve. For this problem I assumed that all the students in my algebra class knew the basics of computing fractions. The problem, solve for $x; \frac{1}{3}x + 10 = 40$. Mia’s outburst caused other students to react. I later realize that my students get bent out of shape whenever they encounter any problem that contains a fraction. Also, as a student if I am experiencing difficulty solving a problem, I often rely on prior knowledge to help me. In my effort to reduce my students’ frustration I introduce the constructivist theory along with cogenerative dialogues.

At City Academy instructions and curricular are centered on a diffusion, or an absorption, perspective of teaching and learning. In other words, teachers practice the traditional teaching styles (chalk and talk) where the teacher controls the learning environment and believes that he/she causes learning to occur (Novak, 1998). Though this may be an acceptable style of teaching, Douglas Clements (1990) in the Journal of NCTM, states that no one can actually teach mathematics, however, teachers who motivate students to learn mathematics are
more effective. Effective teachers are those who can stimulate students to learn mathematics. Catherine Fosnot proposes that it is a platitude that the intent of teaching is to assist students learn. She states that “in the past teaching and learning were most often seen as two separate, even polar processes. Teaching was what the teacher did. They were supposed to know their subject matter and be able to explain it well. Students were supposed to do the learning.” (2004, p. 175)

Constructivism is the philosophical perspective concerning the nature of knowledge. It epitomizes an epistemological position. The French philosopher Jean Piaget is the founder of constructivism. His viewpoint focuses on how humans make meaning in relation to the interaction to their lived experiences and their notions. A number of disciplines have been influenced by constructivism. Mathematics education is one such discipline. During its early stages, constructivism scrutinized the collaboration between human experiences and their behavior-patterns. Piaget’s theory of constructivism has impacted learning theories and teaching methods in education and is a fundamental premise of my education reform.

A Paradigm for Teaching and Learning

The fact that Mia experiences a mental block when given problems involving fractions to solve means that other students are also having the same issues with fractions. Employing a constructivist approach to this problem and many others was not very challenging as we were already using cogenerative dialogues which
mirrors constructivism in some way. Problem-solving is the focal point of my algebra classroom. My students collaborate. They ask questions, explore a topic, and use a mixture of resources to get answers and solutions. As the teacher I pose questions and problems and then direct the students to help them to find their own answers.

In the case of the problem \( \frac{1}{3}x + 10 = 40 \), I broke down the question and ask multiple questions to help them make meaning out of fractions. Below is a vignette of the lesson:

Woodburn: Okay guys, let’s do this a different way. What is this statement \textit{(referring to the problem) called}?

Fred: A mathematical statement!

Woodburn: Yes, \textit{(pause) but do we have another name for it?}

Zen: A statement with a fraction and a variable.

Woodburn: That’s true too, but I am listening for a particular word

Mia: Oh, it’s an algebraic equation – is it not?

Woodburn: Very good Mia, it is an algebraic equation. Who can tell me why it’s called an algebraic equation?

Mia: Because it has a mixture of variable and numbers.

Woodburn: What is the variable in that … \textit{Mia interrupts}

Mia: Miss, my issue is not the equation, my issue is the fraction!!! Why can’t we just work with whole numbers, why do we have to use fractions.

Woodburn: Well Mia, can you recall the number system?
Mia: Yes, and?

Woodburn: Fractions are part of the number system and we cannot ignore them.

Mia: I guess you’re right!

Woodburn: We will proceed. What is the first term of this equation called?

Zen: An algebraic expression

Woodburn: Good! Who can name the parts of this algebraic expression?

Fred: The coefficient is one-third and the variable is x.

Woodburn: Excellent!

After a few more questions, students are back in their groups and will solve the problem. I remind them of the use of reverse order operations, additive and multiplicative inverses. To clear the misconceptions on fractions I ask the class, “what is the significance of one-third?” They respond, “one out of three parts”.

My students are more comfortable when they are able to make meaning out of problems and so I make reference to a pizza problem. I pose the question, “if you have six pizzas to share among three students, how many pizzas will each student get?” They answer, “two.” I further ask them, “why two?” Mia responds, “because we divide six by three, duh!” I then explain to the class that dividing by three is the same as multiplying by one-third. “How is that?” Mia asked. This dialogue afforded me the perfect opportunity to help Mia and her classmates build
on their prior knowledge and make meaning of the assigned problem. I encourage them to discuss the multiplicative inverse properties in their groups.

As I walk around the classroom I can actually feel the excitement of the students as they try to figure out the problem. I stop by one group for a few minutes and hear, “if dividing by three is the same as multiplying by one-third, let’s see what we get if we multiply six by one-third?” I am so excited because my students are really thinking and are using what they have to make meaning/sense out of what they think they didn’t have. “Okay let’s see, one over three times six over one,” says Fred. He continues, “when we multiply fractions we multiply numerator by numerator and denominator by denominator, therefore, one multiply by six equal six and three multiply by one equal three. So, six divided by three equal two.” Fred jumps up and says, “I get the concept now! Miss may I please explain to the class?” I respond, “sure.”

Fred approaches the board and begins to explains the whole concept of dividing by a number and multiplying by the multiplicative inverse of the same number. He confidently points out to his classmates that one-third or one over three is the multiplicative inverse of three. He reminds them that the multiplicative inverse of a number is one divided by the number. By this time, I am in awe as I honestly believe that he had done a better job than I would have in explaining the concept. Fred continues by explaining to the class that a whole number can be expressed as a fraction by dividing that same number by one. He
then writes on the board, \( \frac{1}{3} \times \frac{6}{1} = \frac{6}{3} \). He proceeds to demonstrate the fraction multiplication process, \( \frac{1 \times 6}{3 \times 1} = \frac{6}{3} \). Fred then tells the class that a problem is not complete until it is in its simplest form. He informs the class that six over three in its simplest form is two. “Another way to look at it,” says Fred “is, six divided by three equals two.”

“Oh, I get it now! So one-third of six pizzas is two pizzas,” says Zen. “OMG, Fred, you are a genius,” she continues. By this time all the students in the class are showing excitement and are all eager to work on the initial problem. As the students work in their groups I encourage them to think of further strategies to use to help them solve the problem. According to Fosnot, “most students in mathematics classrooms did not see mathematics as creative but instead as something to be explained by their teacher, then practiced and applied.” When I first assigned the problem, my students were anxious mostly because they are intimidated by problems involving fractions. However, rather than explaining the concept to them, I introduce another problem and then ask them varying questions to help them think and come up with their own approach in solving the problem. In so doing, I give them a chance to make meaning of the mathematics and to build on their own prior knowledge.

“Ohay miss, right here we are dealing with a linear equation, am I correct?” asks Zen. I respond, “yes, you are right on the money.” Zen, Mia, and Primrose
are working together in their group. I stop by and listen to them as they discuss the problem. I am in awe as I listen to the level of “math talk” that is taking place as well as how these three young ladies are modeling a situation mathematically to make sense of it. Below is a vignette of Primrose’s explanation on how to solve the problem.

Remember Miss McDonald said that when we are working on problems we should always think of a real-world situation to associate it with. This way we can never forget the concept. Ok, let’s look at the problem, we know that it is a linear equation, we also know that it has more than one operation. I’m a come up with something. Alright, let’s say we enter the classroom, walk over to our seats, sit down. That involves three steps, but let’s cut it down to two steps to match our linear equation. We walk to our seat and sit down. We will associate the first term as walking to our seat, that is multiplying \( \frac{1}{3} \) by \( x \) and then sit down we will match that with adding 10. Got it? To undo the exercise, we first get up so therefore we are going undo the addition so we will subtract 10. If we subtract 10 from the left side we also have to subtract from the right side – the scale has to be balanced. Ok then, we are now left with \( \frac{1}{3} \times \) multiply by \( x \) equal 30, because 40 take away 10 equals
Alright, match walking to the door as multiplying a constant by \( x \). We have to divide by 3 now ‘cause, err, no, no, no. multiplying by \( \frac{1}{3} \) is the same as dividing by 3 so we are going to undo the operation so multiply by 3. There we go, so when we multiply both sides by 3 we are going to get 3 multiply by \( \frac{1}{3} \) equals 1 and 3 multiply by 30 equals 90, so now we have it, \( x \) is equal to 90. Let’s check to see if we are on the money – 1 over 3 times 90 plus 10. Ok, 1 over 3 is the same as saying 90 divided by 3 which is 30, and 30 plus 10 is 40. That’s it!

I am so overwhelmed to know that my students are able to model a situation mathematically, as a way to make sense of it. In so doing they are aware that mathematics is everywhere and will be able to acknowledge the relevance of the subject.

This approach to mathematics that I tried in my classroom is atypical from what is practiced at City Academy. The other mathematics teachers who are employed to City practice the chalk and talk method of teaching. They stand at the chalkboard and explain concepts and their students practice them over and over. This traditional system may work for the higher level of mathematics like calculus since students who are enrolled in higher level mathematics are students who really love mathematics and
have no difficulty grasping all the different concepts. However, in order to help our students learn and appreciate the subject we have to make a conscious effort to steer away from the traditional approach and engage in a different practice. We need to be creative.

Fosnot posits that mathematicians use a very different practice than that of the traditional approach of “school mathematics.” “They make meaning in their world by setting up quantifiable and spatial relationships, by noticing patterns and transformations, by proving them as generalizations, and by searching for elegant solutions. They construct new mathematics to solve real problems or to explain or prove interesting patterns, relationships, or puzzles in mathematics itself.” (Fosnot 2005, p.181). David Hilbert, a German and the most famous mathematician of his time liked to prove things in at least three or four different ways. By doing so he was better able to comprehend the associations involved. Mathematics is mostly involved with the process of forging relationships and trying to prove them mathematically in order to share them with others.

Everyone tries to make meaning from his/her interactions in the world. Learning can be considered as the process of constructing meaning. “We create our knowledge we do not discover it,” (Fosnot, 2005). Writers make meaning when they formulate stories and narratives, when they
construct characters and plots, when they play with words and metaphors. Scientists make meaning by wondering about scientific phenomena; by hypothesizing, designing, and performing experiments; and then by proposing explanations that fit their results. Musicians hear cadence, rhythm, harmony, discordance, and melody as they interact in their world. Artists see color, form, texture, and line, (Fosnot, 2005, p. 181).

The constructive type of learning is evident in various fields other than mathematics. Students are taught to become good writers by engaging them in the writing process. Art students learn by creating their own masterpieces. Science teachers involve their students in constant inquiry, formulating hypotheses, and carrying out experiments. Since teachers in other disciplines are helping their students to make meaning of their subjects, how can we as teachers of mathematics make meaning of school mathematics? Do we have any prior knowledge of the mathematics being taught in schools? Is there a connection between school mathematics and real mathematics?

The new approach that I have adopted in my mathematics classroom is testament that students can construct their own meaning of school mathematics while building on their own prior knowledge. Also students are able to connect school mathematics with real world mathematics. The
following vignette illustrates how another group of students used different approaches for the same problem.

Figure 4. Students working on linear equation (Photograph by Deonte J)
The students connected the problem to a real-world situation – “The ninth grade algebra class is going on a trip. Each student must pay one-third of the total cost plus an additional ten dollars, that is forty dollars by Thursday. What is the cost of the trip for each student?” – My students are discovering different ways to explore mathematical situations. They are observing and investigating connections, providing explanations and conjectures, trying to influence one another of their thinking. This idea of mathematics was inferred by Hans Freudenthal (1968) in his argument that mathematics was a human activity – the process of modeling reality with the use of mathematical tools.

In order to create this process of mathematizing, I engage my students in an inquiry based on context. As they assess the problem involving fraction, they develop their own tactics for approaching the problem. They identify connections. They then investigate these connections in order to make sense of the problem. They develop their own mathematical questions and discuss them in their groups.

Adopting this new pedagogy in my algebra class means implementing an inquiry approach towards teaching and learning which promotes a change in my style of teaching. Teaching of this ilk somewhat unsettles our routine as lessons are no longer teacher centered but students centered. Also, students are constantly discovering different ways of making
meaning of the lessons. Even though I have made progress with this paradigm shift, I recognize that I still have a lot of work ahead of me. As a matter of fact, there is really no endpoint as learning is continuously taking place.

THE EFFECT OF COGENERATIVE DIALOGUES ON CONSTRUCTIVIST TEACHING METHOD

The use of cogenerative dialogues with my algebra students at City Academy helped me to transition from the traditional method of teaching to one where students can adjust their ways of reasoning through mathematizing verbal and contextual problems (Gravemeijer, 2004). Students are given the autonomy to lead our cogens. They are usually the ones to decide the format of our meetings. We do not have a set format for our meetings. Meeting styles vary depending on the topic of discussion.

In one of our early cogens one student proposed that we discuss ways in which we can make the mathematics class more interesting and bring it to life. I am happy that he made that suggestion as I wanted to introduce and at least try the constructivist method of teaching and learning in the algebra class. I then tell the group of this new approach to teaching that I would love to introduce to the algebra class. I describe the whole concept of constructivism to them. I tell them that with this approach we will be able to make meaning out of the mathematics we are learning, we will
make connections with real-world situations, and we will not be using the
textbook as frequently as before. My reason for limiting the use of
textbooks is that I believe textbooks influence classroom mathematics
teaching. They are happy to hear this as the textbook is really very heavy
and is difficult to tote around. We use this cogen session as a lesson
planning period for the next algebra class where we will introduce our new
approach.

Jayla suggests that we should first give an explanation of
constructivism and volunteered to research the method. The following is
what she submitted to the group:

The purpose of a constructivist learning is for the students to
acquire knowledge and create an understanding on their own, with
the guidance of the teacher. Through the students’ own experiences
they are capable of learning something and comprehend it in their
unique way.

Tyler suggests that since we are on the topic of linear equations we
should plan a lesson that encompasses problems that will allow each
student to make meaning of the problem and build on their own prior
knowledge. The group decides on two word problems. According to
Walkington (2012), verbal problems may provide early access to concepts,
particularly in algebra classes. Translating a verbal problem into symbols
will enhance the cognitive demand of the task. Koedinger and Nathan (2004) discovered that a group of algebra 1 students were more successful in solving algebra problems presented verbally than in solving symbolic expressions. This implies that verbal reasoning abilities and languages skills precede the ability to meaningfully use symbols.

The first problem states that, *Sam has three dollars to spend on apples and bananas. The cost of one apple is fifty cents and the cost of one banana is thirty cents. How many combinations of apples and bananas can Sam purchase with his three dollars?* The second problem states, *Farmer Brown has ducks and cows. One day she noticed that the animals have a total of twelve heads and thirty-two feet. How many of the animals were ducks and how many were cows?*

There is no right or wrong way to approach these problems. Each group will create its own unique way of solving these problems. It is highly improbable that the groups will use the same strategies in solving these problems.

I am aware that I will be faced with challenges as I try to create a teaching practice guided by constructivist principles. However, I intend to transform my algebra classroom so that each student will have access to mathematics they need and also make meaning of the subject.
CHAPTER 6

FACILITATING URBAN CLASSROOM TRANSFORMATION BY PERMEATING COGENERATIVE DIALOGUE AND COTEACHING

Cogenerative dialogues (cogens) as defined by Tobin, 2014, “are reflective conversations among selected participants,” p.182. The primary participants are normally the students, subject teachers, and researchers. The obvious goal of participating in cogens is to “catalyze change” (Martin, 2006, p.702) for the purpose of “improving the quality of teaching and learning – that is, cogen is part of a process of critical pedagogy.” (Tobin, 2014, p.182). All stakeholders in cogens are encouraged to speak their minds. The cogenerated result is a mutual agreement and all stakeholders are liable for the transformative change in the classroom and sustaining it (Martin, 2006).

The principle of creating conversation facilitates advanced models and characteristics of cogenerative dialogues and coteaching. Tobin, (2006) defines cogens as multiple activities whereby students and their coteachers examine evidence from a previous class and collectively “cogenerate” resolutions about new guidelines for the class, changes in stakeholders’ roles and the responsibility for transformation. Coteaching establishes praxes which allow students and their teacher the opportunity to share knowledge, that is, learn from each other.
Cogenerative Dialogues and Coteaching in New York City

There are commonalities in projects done involving cogenerative dialogues and coteaching in Science and Mathematics in New York City. Jackson (2010), employs cogens and coteaching in his mathematics class in an effort to dismantle the power differential that existed between teachers and students. In his study, he focused on two female students, Cece and Bebe. Both students are from low socio-economic backgrounds and have similar academic aspirations. However, they have completely different viewpoints on how they will achieve their goals. Jackson used cogens and coteaching as instruments to inform his pedagogical practices. These practices resulted in changes in perspectives and attitudes of his students. Also, the classroom culture, as related to mathematics, was transformed.

Wharton (2010), also utilized cogens in her Adult Basic Education mathematics classroom to improve teaching and learning. The research helped Wharton to understand how adult learners construct mathematical knowledge and develop the necessary skills for critical thinking and problem-solving activities to gain better understanding of how adult learners approach, enact, and learn the mathematics necessary to achieve their goals of passing the mathematics section of the General Equivalency Development examination. The cogens that were conducted every week
focused on ways to enhance the current teaching and learning practices within the mathematics classroom. Participants began to enact culture to create a successful learning environment that met their goals and motives.

Bayne (2007), worked on cogens with her science class at Collaborative School, a high performing school in lower Manhattan. She did a case study on a student, Theo, who was involved in cogens during her first year of using the methodology. Theo’s involvement in cogens expanded his agency, and as such he became progressively effective in advocating for the rights of his peers both inside and outside of the classroom setting.

Pitts (2007), also utilized cogenerative dialogues in his research. He employed cogen | coteaching as a tool to investigate forms of emotional solidarity which were focused on learning science across social categories of disparities (gender, class, and ethnicity).

Many researchers, including myself have intentionally employed cogens in our classrooms in order to promote school improvement. Tobin writes,

I regard school as a field that has nested fields within it – including departments, classes, and other places of cultural activity, like the lunchroom. From what we have seen in our ongoing research, cogen can
be used to advantage to examine patterns of coherence and associated contradictions in any field. Once these patterns and contradictions are identified they become objects for possible change with the goal of improving the quality of social life in the field. This includes expanding the goals for activity in the field, expanding the range of activities, changing roles of participants, altering rules that apply to a field, and expanding opportunities to successfully use resources to attain goals through participation.

The challenge for all participants in cogen is to set aside existing power structures (that apply in other fields) to allow cogen to produce forms of culture to improve science education. Of course, at the level of an entire country this may prove to be very difficult to do – and in some cultures the symbolic power of certain groups of people might necessitate a different structure for cogen. Hence, from one country to another cogen will no doubt have to be structured differently, thereby allowing for the possibility of different outcomes emerging. This is not something that should dampen our spirit of inquiry. There is vast potential in the use of cogen across the fields that comprise our lifeworlds. As we enact cogen and make adaptations, my challenge is for scholars to study what
happens so that, as a global community, we learn from ongoing programs of research.” Tobin, 2014, pp. 189-190.
CHAPTER 7

THE BENEFITS OF AUTHENTIC INQUIRY RESEARCH

Alexakos (2015) states that “authentic inquiry research embraces hermeneutic phenomenology and design studies by situating research in the world of lived experience,” p. 44. Hermeneutic phenomenology concentrates on lived experiences of groups and individuals. It seeks to uncover the world as experienced by the stakeholder via their lifeworld narratives. My student researchers opted to be a part of the research project because they were interested to see the value it would be to them. Confucius says, I hear and forget. I see and remember, I do and I understand. My students began to understand a lot better as we engaged in activities.

Authentic inquiry methodology in my research stems from Tobin’s (2006) adaptation of Guba and Lincoln’s (1989) authenticity criteria to educational research. Adding to Tobin’s work on cogenerative dialogue in the classroom setting, authentic inquiry provides an effective scaffold whereby teachers may examine their own practices.
STUDENTS AS AUTHENTIC RESEARCHERS

When students understand/learn that research is not some convoluted, abstruse thing led by people in lab coats, they are eager to participate. Below is a reflection from Essy, one of my student | researcher.

Man, I am so happy I participated in this research. At first I thought we were going to prove a math problem and then do a paper so I was a little bit hesitant. When Miss Mac explained the whole process I was more at ease. I became very excited when she selected me and Alex to coteach. At least I get a chance to lead. I wouldn’t say my first experience was a hit, but I believe I did well. My most satisfying moments were when my peers actually understood the content. I never thought that I would even consider teaching but I think I am going to major in education in college. I am so thankful to Miss Mac for helping me to change my perspective on life as well as to understand that there is so much satisfaction in teaching.

After graduating from City Academy, Essy was enrolled in college majoring in math education. She is now a math educator in a public high school in New York City. She shared with me that her decision to become an educator was based on her involvement in cogens. She added that she chose to teach in the city because she intends to help to change someone’s perspectives on mathematics in the same manner I helped her.
Essy was not the only student | researcher to complete a math education degree. Stef also completed a degree in math education and is now employed as a math educator in a middle school Miami, Florida. In a recent conversation with him he stated that he is enjoying sharing his knowledge with children. He also said that his classes are different as a result of his participation in cogens at City Academy.

Incorporating authentic inquiry in my cogen greatly expanded the student | researchers’ excitement and interest for the opportunity to learn, coteach, and conduct research. As I reflect on my research I think of Tobin’s four authenticity criteria that I employed as a framework for conducting my research.

One of the primary reasons for conducting this kind of research was the need for change. Change in classroom culture and how the lessons are taught. In so doing we were able to address the first authenticity criterion – the ontological authenticity that is, accepting change by undertaking research. All stakeholders in my research were open to change and were anticipating transformation.

The second criterion, educative authenticity – learning from each other, was also addressed. The classes were not the traditional chalk and talk. They were very different from the norm. We shared knowledge, we learned from each other. Each participant was able to voice their view/opinion and were valued and respected by all. I being the teacher | researcher made allowance for everyone to share ideas and make suggestions like classrooms rules and expectations. Essy
along with other student-researchers was very involved in making rules and setting expectations for the algebra class. The students’ involvement helped to bring about a transformation in the class.

The third criterion, catalytic authenticity – the research acts as a catalyst for change and improvements. “Participants not only change their perspectives and value and understand the voices and worldviews of others, but also become responsible for enacting positive changes for improvement,” Alexakos, p. 46. As a result of my research both the students and my perspectives were valued. The students were eager to share which brought about a positive change in the classroom culture.

The fourth criterion is tactical authenticity. This means that all participants in the research should benefit. “Teacher-researchers have an obligation to address any disadvantages that may emerge in their inquiry, particularly for those who may not have the power to address them or who, because of their disadvantaged situation, may not be able to benefit from the work, Alexakos, p. 47. Many times during the research I had to address the administration about the manner in which they treat Que and Glen. As far as administration was concerned, Que and Glen were mere numbers occupying seats. I had to step in and defended them helping administrators to respect and value these students.
CHAPTER 8

FINAL THOUGHTS:
Research Findings, Interpretations and Implications

The purpose of this chapter is to provide a summary of the work presented in this dissertation, revisit the research questions, identify limitations, and discuss the implications of the research. In my second year of teaching at City Academy I introduced the practice of cogenerative dialogues in my algebra 1 class with the desire to learn more about my students and bring about equitable practices in the classroom. I became aware of cogenerative dialogues through my participation in a research group at the Graduate Center, City University of New York. At the inception of my research I was very anxious about the unknown as I had major classroom management issues which led to some symbolic violence on my part. However, through my involvement with students and the cogenerative dialogue research squad group my fears were assuaged. My teaching style and classroom practices were transformed, students were more involved in decision making and a more equitable and enjoyable learning environment was achieved.
Summary of Dissertation Study

At first, only a few students were involved in cogenerative dialogues. All of which were self-selected. These students were different from each other meaning that they were from different cultural backgrounds. As time progressed more students saw the positive effects of cogenerative dialogues and decided they wanted to be a part of the study. What emerged out of cogenerative dialogues was a feeling that the whole school community could benefit from the ripple effects, specifically as transformation in behavior and academics was evident. Other teachers in the building were interested in cogenerative dialogue and students’ behaviors were improving. Constructivism was implemented and teachers and students experienced their aha moments making meaning of mathematics.

Revisiting Research Questions

I present two questions in Chapter 1 of this dissertation. The first is, how can cogenerative dialogues help to bring about equity and reform in an urban classroom? The second, how do studying and employing practices heighten awareness of what is happening and foster change in the culture of urban students, thereby helping to inform and improve mathematics teaching and learning?
“The social injustices of past schooling practices can no longer be tolerated.... Mathematics has become a critical filter for employment and full participation in our society. We cannot afford to have the majority of our population mathematically illiterate: Equity has become an economic necessity (Croom 1997, p. 1). Chapter 2 of my dissertation shows how cogenerative dialogues have been employed to engage students who thought that there was no hope for them in mathematics. From cogenerative dialogues we implemented small-group cooperative learning environments. The use of cogenerative dialogues involved strategies that engaged students of different ability levels. It also provided a variety of learning activities to help to improve students understanding of the mathematics being taught. Each student was responsible for helping his/her team mate.

Chapter 3 addresses students as coteachers in an urban classroom. This chapter demonstrates how students maximize learning through teaching. This opportunity lends itself to students speaking openly and accessing resources to discuss teaching and learning. The chapter also illustrates that students need to take responsibility for their own activities in the environment and for changing the distribution of power and the roles of participants. Cogenerative dialogues is a pedagogical tool. With the introduction of cogenerative dialogue I have better control of classroom activities.
Chapter 4 of this dissertation provides evidence of how many ripples have been created from participation in cogenerative dialogues. Improvement in Cue’s behavior triggered a change in the behavior of the other students in the class, which brought about a change in the atmosphere of the class, which triggered changes in the behavior in other classes. These ripple effects inspired other teachers to create their own dialogues to enact similar changes at City Academy, which triggered huge successes in the New York State Regents examination. The entire school has benefited from the use of cogenerative dialogues.

Chapter 5 examined the correlation of cogenerative dialogue and constructivism. It showed how my algebra students make meaning of mathematics. In this chapter I describe how we shifted from a teacher centered class to a student-centered classroom. Students were building on prior knowledge. Also, we modeled everyday life situations mathematically, as a way to make sense of mathematics and relate it to our lifeworlds.

Chapter 6 discusses some others who have employed cogens in the classroom and chapter 7 relates the authenticity criteria to what we have done and learned in this research.
Research Limitations

I did learn a lot throughout the duration of my research. However, the research had some limitations. One limitation had to do with the fact that our cogenerative dialogue may have involved a wider range of students if our school population included students other than minorities. I needed a wider cross-section of students in order to compare and contrast the equity issue. As a measure of equity and good practice, ideally I should have had the opportunity to examine other students’ lifeworlds.

Another limitation involved time available for cogenerative dialogues. I could have done it in the evenings after school or every other Friday during class time. Only a few students were able to stay after school and every other Friday was not sufficient for cogenerative dialogues. Because of this limitation, all the students in my algebra class were not able to have access to cogenerative dialogues.

Implications of the Research

This research and the use of cogenerative dialogues is relevant to the mathematics and science education community as it has direct implications to practice and equity. Cogenerative dialogues are essential factors of the myriad coteaching procedures. The rationale for cogenerative dialogues is for a group of stakeholders to have a conversation about teaching and learning in a variety of
educational contexts. Cogenerative dialogue is so designed that each person’s voice is heard. Everyone’s contribution is important. Research has authenticated the challenging issues that influence educators and students in the urban schools. Bayne (2009) spoke of the poorly resourced classrooms and disenfranchised students. Jackson, Wharton, and Pitts employed cogenerative dialogues in the science and mathematics classrooms. Jackson used students as coteachers in his seventh grade mathematics class as two students, Cece and Bebe, used their cultural knowledge to improve their mathematical knowledge through coteaching math. Wharton’s research was concentrated on a group of adult students seeking a high school diploma via Grade Equivalent Degree. Her study illustrated how cogenerative dialogues produce a learning environment where students and teachers coteach.
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