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Abstract:
The purpose of this study was to determine the effectiveness of cogenerative dialogues as a means of increasing student participation, motivation, and engagement in urban biology classrooms. With two groups of students, who were taught the same learning goals by the same teacher, one group participated in cogenerative dialogues, and the other group did not. Data was collected from both classrooms by documenting the content and impact of the cogenerative dialogues, and an analysis of class video recordings to tally the number of interactions and transactions occurred. Findings revealed that students in the cogenerative dialogue group showed a significant increase in active class participation and a decrease in classroom disruptions, whereas the frequency of these events changed little in the group not engaged in cogenerative dialogues. We discuss the implications of these findings for the body of evidence on the effectiveness of employing cogenerative dialogues as a classroom support strategy to teach science to traditionally marginalized students and on addressing achievement gaps.

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Title: Cogenerative Dialoguing as a Tool to Increase Full Student Participation in the Urban Biology Classroom

Subject/Problem:

Research has shown that the achievement gap between white students and students of color has been growing at an alarming rate throughout the U.S.A. (Hursh, 2006). Up until recently, existing research had often viewed the performance of urban African-American and Latino/a students in science through a deficit lens, attributing their lack of success in science to character dispositions rather than looking at the methods by which they are taught (Jencks & Phillips, 1998). This type of research does not do much to help raise the amount of useful learning that occurs in an urban science classroom but rather, it perpetuates the idea that there is a true intellectual deficiency between African-American and Latino/a students and their white counterparts. Teachers and researchers often buy into these notions and end up either implicitly or explicitly placing the fault on students for their lack of interest in school or their supposed inability to succeed academically. In response, we suggest a tool to support teachers in uncovering the insight into schooling, and academic potential of their students. We also propose to fill a gap in the education literature on urban youth interest and participation through the interrogation of the following questions: (1) Is the implementation of cogenerative dialogues in biology classrooms effective in increasing urban youth participation? (2) How can cogenerative dialogues help transform traditional corporate models of teaching which contribute to the low achievement of urban minority students?

Typically, urban science classrooms are constructed in a manner derived from a factory model whose purpose is "to teach rudimentary skills and unwavering compliance to children of the poor" (Darling-Hammond, 1997, p.17). These classrooms function like a corporation (herein our use of the term 'corporate classroom') where the primary objective is the production of a certain product (in many cases, success on a standardized examination). Corporate classrooms often fail to integrate the process of investigation and social interactions that accompany the learning of a specific topic. Often, students in a corporate classroom feel that content is being imposed on them by an authoritarian teacher whose classroom practices contribute to the reproduction of hegemony and thus render them unable to see any relevance in retaining the information after an assessment (Chomsky, 2003). We argue that by shifting the focus on teaching practices, specifically through the implementation of cogenerative dialogues, students become more engaged within and interested in the science classroom.

Research Design/Procedure:

This study used a mixed-methodology research design in which classroom action research was utilized to collect qualitative and quantitative data. Data was primarily collected using classroom observations made by video recordings of urban science classrooms but also supplemented through semi-structured interviews and reflective journals. The independent variable in this study was the implementation of cogenerative dialogues whose purpose is to "promote the emergence of cogenerated understandings and collective responsibilities for agreed-upon decisions about roles and insights into possible ways to distribute power and accountability in the classroom" (Beers & LaVan, 2005, p.152). Cogenerative dialogues also offer teachers and students the opportunity to discuss their experiences within and outside the

classroom offering an exchange of social capital. This step is essential to shift the learning environment of a classroom in order to support student achievement.

Cobern (1996) argues that the experiences that students possess are what drive them to feel, think, and act in particular ways. When educators and researchers try to understand the connections between student's realities and the ways in which they feel, think, and act, this sheds light on how educators can coordinate activities and/or use analogies that will prompt certain desired student behaviors such as increased participation, increased leadership and higher motivation in class. In the context of this study, cogenerative dialogues served as a medium with which to explore the learning environment and student attitudes by reviewing topics discussed in class, opening avenues for discussions about classroom teaching and learning, providing participants with opportunities to reflect on shared experiences, and allowing participants to take collective responsibility for the betterment of the learning environment.

Data was collected from student participants' enrolled in a Grade 9 Living Environment (biology) course at Wings Academy High School in the Bronx, New York. Participation in this study was completely voluntary and the sample chosen was one of convenience. Wings Academy is an urban school of about 600 students with a 55 % Hispanic and a 42% Black population. In 2010, of the entire student population, 80% qualified for free lunch indicating the low socioeconomic status of the neighborhood. There were a total of 37 general education students involved in this study. These 37 students were divided between two Living Environment classes. Class A had 18 of the 37 students while Class B had the other 19 students. The reading and mathematics levels of the two classes were about even with both groups having a similar range and a mean of 8^{th} grade reading and mathematics scores.

In this study, the effectiveness of cogenerative dialogues was tested by setting up the two classes as a control and an experimental group. Class A was engaged in cogenerative dialogues during the course of the study. In contrast, Class B did not engage in cogenerative dialogues and was taught using teaching strategies characteristic of corporate classrooms, and normalized within the school (i.e. lecture, silent reading, question drills, etc.). Cogenerative dialogues occurred about twice a week usually during the student's lunch hour. During each session, a student was assigned to take notes on the concerns of the teacher and the students, agreements, disagreements and any resolutions that had been reached. Reaching well thought - out resolutions was the key part of the cogenerative dialogue because it is here that both parties began to take responsibility for the collective betterment of the class.

Class A and Class B were both videotaped during classroom instruction for a total of ten weeks. After each week, videos were reviewed to take a tally count of the frequency of interactions and transactions. Interactions and transactions are types of exchanges that occur between two individuals in the class and are a good measure of meaningful student participation in the classroom. The exchange can be between two students, a teacher and a student, or a teacher and a group of students. The difference between an interaction and a transaction lies in the level of meaningful reciprocity. Interactions are viewed as communication between two people with the absence of any meaningful reciprocity. A transaction is viewed as a communication in which a valuable exchange of information with regard to the immediate academic environment is made. An increase in transactions is a marker of increased

communality in the classroom which typically results in increased student participation, motivation, and engagement.

Analyses and Findings

The analysis and interpretation of classroom observations was performed in a manner that minimized threats to rigor and thus focused on the validity and reliability of the data. A quality standard for the qualitative sources of data involved member checking. This procedure gave participants the opportunity to watch the classroom video and then either accept or reject the researcher's interpretations of their actions as being interactions or transactions. Participants also had the option of discussing their actions further which in some cases led to a reinterpretation of the data derived from the classroom video. This allowed for a more accurate representation of the interpretation of qualitative data as researchers may have the tendency to include their bias or to over-interpret an event. Certain rudimentary forms of engagement (passive listening, low verve, low volume) were identified as interactions, while the exhibition of active participation, high volume, and hand gestures were identified as transactions.

Table 1 Number of Interactions and Transactions in Class A and Class B

	Class A		Class B	
Week	**Interactions**	**Transactions**	**Interactions**	**Transactions**
1	49	18	56	23
2	56	21	43	18
3	41	16	44	21
4	47	15	48	17
5	44	24	51	13
6	38	31	37	19
7	32	35	42	24
8	36	38	48	22
9	23	32	44	16
10	25	31	47	19

Table 1 above compares the number of interactions and transactions that were recorded for each class within one week. Both classes began the study exhibiting a large number of interactions and a small number of transactions. The number of interactions was almost three times greater than the number of transactions at the beginning of the study for both classes. As Class A engaged in cogenerative dialogues there was a noticeable decrease in the number of interactions and an increase in transactions. The number of interactions decreased by a little less

than half (49%) as transactions almost doubled (41%). This was not the case for Class B whose number of interactions and transactions remained relatively stable with only slight fluctuations during the course of the study. Class B exhibited 16% decrease in the number of interactions but also a 17% decrease in the number of transaction. It was observed that in Class A, student participation, effectiveness of group work, cooperation as well as the asking and answering of questions all increased. In return, the number of side conversations, inappropriate comments, unnecessary noise, getting out of their seat and talking out of turn all decreased. This is not to say that these actions did not happen but rather the rate at which they occurred decreased with the aid of cogenerative dialogues. Discussions with students in Class A further validated the results obtained from the classroom videos. Students in Class A expressed that they felt their classroom functioned more like a community with shared control in the decision making process. Further, students also expressed their satisfaction with the teacher's willingness to use experiences from their everyday lives as entry points by which to teach science concepts. Students in Class B also displayed a certain number of transactions but there was no noticeable change in the rate at which they occurred between the beginning and end of this study. During discussions with students in Class B, they expressed that they did not feel the need to be active in a classroom which they had no stake, that they were just students in the teacher's classroom, and because they were rarely involved in the decision making process with regard to their learning environment. To these students, the learning environment was only a temporal space distant from anything that had any meaning to their lives.

The data collected in this study supports a growing body of research that argues for the use of cogenerative dialogues as an effective classroom strategy to increase full participation and student achievement among urban minority students in science via an increase in transactions and a decrease in interaction. Not only does the study find there to be a significant difference between the frequency of interactions and transactions between the control and experimental group, but it is able to quantify some of the results of cogenerative dialogues, which critics often cite as being too subjective to yield valuable results.

Contributions:

It is the recommendation of the authors that additional studies continue to be conducted to investigate the effect of cogenerative dialogues on student participation and their perception of the learning environment. This study adds to a small, but already existing and growing, body of research concerning the implications that cogenerative dialogues have on students' academic performance, class participation and motivation in science. The results obtained here are similar with other studies that test the effectiveness of cogenerative dialogues on student performance and participation as interpreted by the frequency of interactions and transactions (Beers and LaVan, 2005; Emdin, 2009; Seiler, 2001). This continued research is very important if we are to truly understand why urban minority students are not as successful in science as their suburban counterparts and to uncover the underlying problems of educating urban students. This research argues for the involvement of students in the multiple facets of the classroom environment and against traditional teaching methods that have not allowed urban minority students to be successful in science.

General Interest:
This study would be of interest to urban science educators who believe that urban minority students could be as successful in science as their suburban white counterparts. Urban science educators often struggle with giving their students the opportunity to fully access the science curriculum due to classrooms that are primarily teacher-centered and allow for little student input. Since the results of this study along with previous studies indicate that implementing cogenerative dialogues are useful in creating an effective learning environment where students are actively engaged and participating, we find there to be sufficient justification in recommending that cogenerative dialogues be used as a general classroom support strategy. While realizing that implementing cogenerative dialogues is a time intensive and organizationally demanding tool, results have generally shown forward progress in the way students view their learning environment, as well as their academic performance and class participation. Cogenerative dialogues are able to improve teaching and learning and therefore provide participants with opportunities to talk about and improve specific lessons, teaching strategies, and subject matter pedagogy.

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