
Racial and Class Tensions in Colombian Mathematics Classrooms

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Underachievement in mathematics along lines of race, class, and gender is a pervasive phenomenon in the Colombian educational system. In particular, black and poor students persistently lag behind their mestizo and wealthier peers. Explanations for the low performance of these students' population are usually grounded in essentialist perspectives that mainly attribute school failure to student backgrounds. Adopting a socio-political perspective, the study I report sought to understand the ways wherein exclusion and marginalization operate within the mathematics classroom. The study focused on analyzing the relationships between students' racial and class background, teachers' expectations, and teaching practices.

Background

Colombia is a society characterized by an unequal educational system that seems to reinforce social inequalities (Garcia, Espinosa, Jiménez, & Parra, 2013). Despite this fact, few studies have focused on investigating the ways wherein school practices contribute to the marginalization of particular groups of students. Regarding school mathematics, an important goal of the Colombian educational system is to provide support and opportunities to learn mathematics for *all* students (Ministerio de Educación Nacional [MEN], 1998). However, this is not the current situation. As the students' outcomes in national and international large-scale assessment show, the failure in school mathematics affects mainly students of marginalized communities (Instituto Colombiano para el Fomento de la Educación Superior [ICFES], 2010), which are largely inhabited by Blacks and other racial minorities. Although it appears that the intersection of race and class shapes Colombian students' opportunities to learn mathematics, little is known about how teacher expectations and teaching practices contribute to this reality. Hence, this study is aimed to analyze the

mechanisms by which students' racial and social backgrounds shape teachers' expectations and practices either hindering or promoting students' opportunities to learn mathematics. The study addressed the following questions:

1. How are Colombian teachers' expectations about eighth graders' ability to learn algebra related to the students' racial and social backgrounds?
2. How are these teacher expectations expressed in their teaching practices?

My interest in issues of race, class, and mathematics education relates to my own experiences as a black, low-income student trying to succeed in the Colombian educational system. Exploring teachers' beliefs about race and poverty in relation to mathematics learning, I face my own story as a student who many times heard her teachers expressing surprise at finding a "successful" poor, black student in the classroom. Thus, my interpretations of the phenomena in this study may be influenced by these experiences and others related to my own work as a mathematics teacher and as a teacher educator in my country.

Theoretical Perspective

This study drew upon recent work in the field of mathematics education that addresses issues of power from a critical sociopolitical perspective (Apple, 1981; Valero, 2012). The paradigm that supports this type of research contends traditional approaches that introduce deficit views of marginalized students to seek explanations for their mathematics failure. Instead, this study was grounded on the premise that, in order to understand such failure, it is fundamental to investigate and focus on the school practices that unequally distribute knowledge, dispositions, and opportunities to learn (Weber, Radu, Mueller, Powell, & Maher, 2010). Beyond trying to bridge the achievement gap between minority and mainstream students, the main purpose of research conducted within the theoretical perspective assumed in this study is to uncover the structure and mechanisms that install and perpetuate inequity at school (Martin, 2009).

In this perspective, schools are not neutral spaces in relation to issues of power and in particular of racism. Indeed, schools are

partially structured along racial lines. Students are located in racial structures in ways that determine their differential access to knowledge, abilities, and dispositions. Racial tensions are acutely expressed at schools and in this sense they are privileged contexts for analyzing the forms wherein racial discrimination operates to produce the outcomes and experiences of black and other racial minority students.

In the context of the sociopolitical stance assumed in this study, I introduce Bonilla-Silva's concept of *framework* or *racial ideology* to deepen into the forms in which ideological representations of black and poor students emerge at school and configure teacher-students interactions and teaching practices. Frameworks constitute the sources that nurture the representations teachers elaborate about particular group of students and allow them to explain, justify and naturalize the school failure or success of students. Such frameworks are conveyed through *discursive strategies*. Everyday conversations and institutional talks and texts are the key mechanisms in the reproduction of prejudices (Bonilla-Silva, 2010; Van Dijk, 1992) and in their naturalization. Frameworks and discursive strategies are fundamental in understanding how power operates at school.

The Study: Context and Methodology

Using a comparative method and an interpretative approach, I analyzed the expectations and teaching practices of three different eighth-grade mathematics teachers. The study was conducted in one low-income, one working-class, and one upper middle-class schools in Cali, the Colombian urban center with the highest percentage of black population (Urrea, Viáfara, Ramírez & Botero, 2007). Because of the overlap between race and class in Colombia, black students were overrepresented in the low-income school whereas they were absent among the student population at the upper middle class school. I filmed the participating teachers' lessons of algebra and four students in each classroom wore sunglass cameras to record their interactions with their peers and teachers. I also interviewed teachers and students. Finally, I conducted weekly debriefs with each teacher to discuss class episodes previously selected. The teachers identified themselves as *mestizos* and middle-class. Table 1 summarizes the racial and class compositions of the participating schools as well as the characteristics

of the participating teachers.

Table 1
Racial and Class Compositions of the Three Schools

SCHOOL	TEACHER'S NAME	TEACHING EXPERIENCE		PERCENTAGE OF BLACK STUDENTS	PERCENTAGE OF POOR STUDENTS
		Mathematics	Algebra		
Low Income School	Diana	16	3	41%	100%
Working Class School	Juan	18	3	9%	23%
Upper Middle Class School	Pedro	20	4	0%	0%

I used an interpretative analysis perspective to make sense of the participating teachers' expectations and practices. The process of conducting an interpretative analysis comprised three different stages. First, the transcriptions of a small piece of the data sources were read to look for potential categories and themes. Second, as the categories emerged, the process continued going over the data and pulling them from those categories. And third, the links between the categories were identified.

Findings

The findings of this study draw attention towards the critical role of the ideological representations of poor and black students in the expectations teachers hold about the ability of these student populations to learn algebra. In my discussion, I will focus on the interplays between teachers' expectations and their instructional strategies.

Ideological Representations of Black Students: Cultural and Class Eeficit Frameworks

The results confirm a dominant view in education according to which racial minority and poor students have lower ability to

learn mathematics than their wealthier and mainstream peers (Zevenbergen, 2003). The teachers in this study constantly held lower expectations for black and poor students and accordingly adjusted their teaching practice to such anticipations. Both race and class constituted the main sources of representations, ideas, and meanings that the teachers used to interpret and make sense of the students' attitudes and behaviors during mathematics instruction. *Cultural* and *class deficit* frameworks were identified as the main sources used by the participating teachers to justify and explain poor and black students' performance at school. Juan's narrative about black people exemplifies a cultural deficit framework:

Luz: How would you explain Daniela's (black student) and Sandra's (native student) difficulties in learning algebra?

Juan: There may be little interest to develop [mathematics thinking] in those communities. They might think "our educational project is not aimed to get students ready for college but to prepare them to farm and become farmers." Or they might think "our educational project is oriented towards developing handcrafted abilities" and then, learning mathematics is not a goal for them. Or they might think "we have the biotype for becoming athletes". I think [cultural differences] might affect [the students' performance]. [They affect] the majority of students although there are some exceptions.

The cultural deficit framework is also noticeable in Diana's narrative about her black students. It allows her to justify the black students' low performance at school, to naturalize their low performance, and to avoid the responsibility in her students' failure:

Luz: Do you think black students in your classrooms need additional support to learn mathematics?

Diana: And why just for learning mathematics? I think it is not just to learn mathematics; they need support to learn anything. They do not like to read and reading is fundamental for [learning] any subject matter at school; they do not like to read, so they are not going to understand the different concepts or basis

they are given in the different classes. And they do not have the culture of [complying with] homework.

Luz: What type of support do you think they would need?

Diana: I think they would need psychological and occupational therapy... Because they could take their problems out. That is something teachers cannot do; we do not have time for that, we are not trained for that. We are trained for teaching, so we do not know how to face the difficulties these students are having—displacement, drugs, gangs—all this kind of stuff. Sometimes you just do not know how to deal with them, so you ask yourself, “God! What else should I do? What else can I do? Besides we do not have time for that

Diana’s narrative reveals the inferior social and cultural status in which she positions black students depicting them as lacking the dispositions needed to perform well at school. They are positioned as different and divergent from expected and accepted social behaviours and cultural differences are portrayed as pathological conditions that need to be treated. Thus, through cultural deficit views the participating teachers convey representations of black students as culturally inferior and lacking the dispositions to succeed in learning mathematics.

Regarding a *class deficit framework*, the participating teachers depicted poor students as deviant from mainstream values and dispositions needed for academic success. Poverty was seen as a condition that impeded the students’ access to complex forms of algebraic knowledge and higher order algebraic thinking. The teachers perceived poverty as an obstacle that needed to be overcome before the students could reach any achievement. The following narrative exemplifies a class deficit framework:

Luz: Why do you think that idea is so widespread?

Diana: Because the context they live in? People have generalized in that way. I mean the areas inhabited by vulnerable people, that have low employment opportunities; then, you relate [the areas] with people who do not want to study and do not want to reach something better or they cannot reach something else,

I do not know. She [another teacher] has always told me that the students, the group of students here is different, I mean, the environment they have here is different, the conditions they have here in the *distrito*, and it is not possible to do the same work here that could be done in another school [out of the *distrito*].

In contrast, references to students' backgrounds are absent in Pedro's narratives about his students' mathematics performance, as may be noticed in the following narrative:

Pedro: All students in my class have the same chances to pass. They like algebra a lot. I think they enjoy the class and want to learn. There are a few students that might have some problems, but [their future performance] depends on you, as the teacher. If they failed is because there was a lack of teacher's effort.

The intersection of race and class in the learning of algebra constitutes a double jeopardy for the students in this study. Black students are overrepresented in the low-income population in Cali and, in this regard, discrimination and marginalization at school doubly affect them. On the one hand, black students are positioned as incapable of learning mathematics because of ideologies that have naturalized representations of black culture as inferior and its people as lacking the abilities for carrying out processes of thinking strongly associated to the dominant mathematics rationality in the Western world. The trivialization of the black culture that associates it with the dominance of sense over thinking, handwork over intellectual work, and body over mind, translates into low expectations at school. On the other hand, the marginalization of poor students comes from dominant ideologies that present middle-class values and dispositions as legitimate "while treating the cultural\communication styles of working-class people as inferior or worthless" (Lim, 2008, p. 93). This is why, in my opinion, Pedro does not use his students' backgrounds to explain their school performance: They fulfill the requirements to be successful at school. That the participating teachers are biased against black and poor students is clear when I asked Pedro to compare the mathematics performance of the students in the upper-middle class school with the students in a public school mainly attended by poor pupils and in which he teaches during the afternoons. Pedro told me:

Pedro: What I would say. [In the public school] there are some students that assist for earning a certificate rather than for learning. [They think] “education is free, I am forced to attend, I have to comply with” [it]. Currently, I’m teaching in two ninth grades there and when I talk with my students, I know where they are going: nowhere. If you asked them, “What do you want to do in the future?”, [you would know that] most of them do not have expectations.

Researchers have argued that school, as one of the main agencies of cultural reproduction, promotes and recognizes values and dispositions of the ruling class that are unfamiliar to economically disadvantaged students (Bourdieu, 2011). Wealthy students adapt and easily respond to the dynamics of the school to the extent that they possess the cultural capital to do so, and then, school practices and discourses favor this student population (Zevenbergen & Niesche, 2008). The findings in this study coincide with this trend and show that the teachers highly value some dispositions that are presented as legitimate and whose absence indicates academic deficit and inferior status. Poor students are disadvantaged by hegemonic representations that position them as “others” in contrast to dominant assumptions of middle-class learners (Archer, 2003). Stereotypes as conveyed through the cultural and class deficit frameworks are ways of perpetuating the exclusion and marginalization of poor and black students. Ideological representations about black pupils helped the participating teachers naturalize the mathematical performance of the students and present themselves as neutral participants in the configuration of their low mathematics performance.

Teaching Practices

The findings of the study also reveal the ways wherein teacher expectations shape their teaching practices. Low and high expectations resulted in different opportunities to learn for the students and then, their experiences in learning algebra were markedly different across the three social contexts.

Low expectations translate into teaching practices that, in this study, diminished the quality of the algebraic content to be taught

(Anyon, 1980; Lee, Smith, & Croninger, 1997). The teachers tried to foster the learning of algebra by adjusting their instruction to the perceived abilities of the students. Both, the language and the teaching practices displayed by the teachers were aimed to facilitate the learning process of a group of students who was perceived as low achieving. Poor and black students were exposed to teaching practices that watered down the quality of the algebraic content. To illustrate this finding, I compare the strategies used by Diana and Pedro to introduce the notion of variable for first time to their students.

The following class episode shows the strategy used by Diana:

Diana: (*Diana draws a set of five hearts on the blackboard*) Here we have a set, and because we are always in love, we have little hearts. This is a set of what?

Students: (*Students answering in chorus*) Hearts!

Diana: (*She writes "hearts" on the blackboard*) How many hearts do we see here?

Students: Five!

Diana: We have five hearts, don't we? (*She writes "five hearts" on the blackboard*). However, writing "five hearts" takes forever, so we can express it with the number five and a little heart that it is the symbol (*She writes the number five and draws a heart*). But, what [would happen] if instead of a heart, we had a butterfly? It would take too much time to write "butterfly," so we can replace the heart with a letter. Which letter?

Students: The [letter] *h*! The [letter] *m*!

Diana: Ok, let us write the [letter] *m*. What is the meaning of that [letter] *m*?

Students: Heart!

Diana: Right, heart (*She writes the word "heart" on the top of its drawing*). Look, here we have started algebra. It is as simple

as this. The letters are going to replace unknown and known objects, things that we may know or not. Let us observe that after having a set of five hearts, we have got “five *m*”, where the letter *m* is representing an object called “heart”

Rather than a quantity that varies in a numerical range, Diana introduces the variable as a letter that stands for a material object or as a *label* (Philipp, 1992). In this particular case, the status of the variable is that of a letter that depicts an object. The variable is not characterized as a mathematics object that makes sense in the context of mathematics theories but it is objectified as a letter that can be easily manipulated. The letter representing the variable is an abbreviation whose introduction avoids the students writing long sentences. In addition, the mathematical relationship represented by the algebraic expression $5m$ is completely ignored. The process through which the expression is built does not focus on the additive relation between the coefficient and the variable but rather on an economy of words and as a result, conceptual understating is sacrificed.

In contrast, Pedro introduces the notion as exemplified in the following class episode:

Pedro: Today, we are going to start using variables. Write down this problem. Take your time solving it. Write down three consecutive numbers and add them up. Repeat this process with five different sets of three consecutive numbers.

Students: Teacher, could the numbers be forty-one, forty-two, and forty-three?

Pedro: Any three consecutive numbers. Just be sure that the numbers are consecutive, ok? Observe all your responses and write down what you observe. Do you see a pattern? Do you see a rule or a regularity? What relationships between the three consecutive numbers and its sum do you observe? How would you describe such relationships? Take your time. Write down your answers and we will go back to them later

Pedro’s teaching practices expose the students to mathematics experiences that researchers have pointed out as important for developing

algebraic thinking such as solving problems and generalizing patterns (Kieran, 2007; Mason, 1999). The wealthier students are invited to build meaning for algebraic objects and procedures by exploring mathematics tasks in ways more aligned to those suggested by researchers in the field. In this sense, their chances to access meaningful algebraic knowledge needed to succeed in the school systems are higher than those of their poor peers. While Diana focuses her teaching on the syntactic aspects of algebra and appeals to context-dependent situations to help students build meaning for algebraic operations, Pedro frequently focuses on asking the students to translate from the natural language to the algebraic symbolism and vice versa. He would ask the students to express in natural language an algebraic expression or, given an algebraic expression to represent it using natural language. As held by several researchers (e.g., Kieran, 2007), by introducing this strategy Pedro engages his students in a complex process of understanding and building meaning for algebraic objects that is absent in Diana's instruction.

Summarizing, in this study, the process of turning algebraic objects into objects of the material world and focusing on the procedural aspects of algebra arose as common practices to facilitate the students' learning. By linking the meaning of algebraic objects to objects of the material world, and by focusing on the syntactic features of algebra, the teachers in this study deny black and poor students opportunities of developing more powerful levels of algebraic thinking and building mathematics bases for acquiring more advanced mathematics knowledge (Sfard & Linchevski, 1994). This is an important way wherein teaching practices lessen the quality of the algebraic knowledge and prevent already marginalized students to move forward in their educational process.

Conclusions

The findings of this study draw attention towards the critical role of the ideological representations of poor and black students in the expectations that teachers hold about the ability of these student populations to learn algebra. The findings are consistent with research that points to the significant impact of the beliefs that teachers hold about students on mathematics learning, school experiences, and

outcomes. Moreover, the results confirm a dominant view in education according to which racial minority and poor students have lower ability to learn mathematics than their wealthier and mainstream peers (Zevenbergen, 2003). The teachers in this study consistently held lower expectations for black and poor students and accordingly adjusted their teaching to such anticipations. Clearly, the teachers' expectations were supported and nurtured by ideologies related to the students' social backgrounds. Both race and class constituted the main sources of representations, ideas, and meanings that the teachers used to interpret and make sense of the students' attitudes and behaviors during mathematics instruction. Likewise, dominant ideologies about poor and black pupils helped teachers naturalize the mathematical performance of the students and present themselves as neutral participants in the configuration of their low mathematics performance.

The study is particularly significant for both the Colombian mathematics education community and the Colombian society itself. First, few studies addressing issues of power within the mathematics classroom have been conducted in Colombia due to, among other reasons, the dominance of cognitive and sociocultural perspectives in mathematics education research. Second, Colombia is considered as a racial democracy in which every individual regardless race, class, and gender has the same opportunities of social mobility. However this study shows that not all Colombians are equally positioned at school. In this sense, more studies addressing these issues are needed in order to better understand power within the mathematics classroom in developing countries and "racial democracies" as Colombia is considered.

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