

(In)equitable Schooling and Mathematics of Marginalized Students: Through the Voices of Urban Latinas/os

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In this article, the authors present the mathematics counterstories of a marginalized, non-dominant group of students: urban Latinas/os. The presentation rests on a key tenet of critical race theory: that the experiential knowledge of non-dominant people is legitimate and critical for understanding and remedying the factors and processes that subordinate groups, in this case, urban Latinas/os in mathematics. The authors use data from research on afterschool mathematics projects to provide Latina/o students' perspectives, or counterstories, on their experiences with learning mathematics. Throughout their counterstorytelling, themes are uncovered that relate to Latina/o students' perspectives on their mathematics learning experiences and ways in which they sometimes resist these experiences. These counterstories, in turn, offer insights that shift assumptions about marginalized students and mathematics instruction.

KEYWORDS: critical race theory, Latina/o education, mathematics education, urban education

While there has been (some) progress in reforming mathematics teaching and learning, the same cannot be said for turning schools into equitable environments with concomitant outcomes for significant populations of students, especially students who are linguistically, ethnically, and racially diverse and who

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live in urban areas. This lack of equitable learning environments is particularly true for Latinas/os. Too often, Latinas/os hold minority status in terms of equity and sociopolitical power, even though they may outnumber other student populations, and are educationally marginalized because of their status (López Leiva & Khisty, 2010; Solórzano & Villalpando, 1998). Most unfortunate, the schooling practices and processes for Latinas/os continue to be linked to discrimination, segregation, and failure (Moll & Ruiz, 2002). Latinas/os tend to be over-represented in classrooms where reductionist pedagogies are emphasized (Lipman, 2004), they have the lowest achievement levels in mathematics on standardized tests (Darling-Hammond, 2010), and they often suffer discriminatory micro-aggressions that marginalize or exclude them from critical participation in mathematics (López Leiva & Khisty, 2010).

In this article, however, counter to these often-repeated circumstances, we are concerned with understanding the *experiences* in mathematics of Latinas/os in urban schools and the factors and practices that hinder or nurture their learning. We do so by listening to and foregrounding the students' *voices*—a term critical race theorists use to mean People of Color naming their own realities (Ladson Billings, 1998). While explanations for the persistent and pervasive underachievement of Latinas/os in school have been put forth elsewhere—namely, deficit-based explanations that place the blame within the students, their parents, or their culture (Valencia & Black, 2002)—it most often has been from the perspective of the majority with its inherent roots in the status quo. These explanations can be considered majority stories. On the other hand, Latina/o students have seldom been asked for their perspectives on their classroom mathematics experiences or what insights they might provide about the possibilities of enhanced mathematics learning opportunities. The Latina/o students' perspectives and insights are what critical race scholars call *counterstories* (e.g., Parker & Lynn, 2002; Solórzano & Yosso, 2001; Yosso, 2006); in this case, stories that illuminate the conditions of schooling and perhaps challenge accepted assumptions about schooling practices, particularly those related to mathematics and Latinas/os.

We begin our discussion with setting forth our assumptions related to counterstories. We then describe our methodological approach and discuss our findings related to students' counterstories. These counterstories tell of student resistance to their exclusionary experiences of mathematics and shed light on potential alternative learning arrangements. Importantly, we consider the interaction of students' home language and mathematics—as told through the voices of the Latina/o students—because of the critical role that language plays in their sense of self, or identities (González, 2001). We close with some concluding thoughts and implications of our work.

Background and the Use of Counterstories

Latinas/os now comprise the largest “minority” student population in the United States, and the majority of students in many metropolitan school districts across the country (Moll & Ruiz, 2002). The label “Latino” represents a wide variety of groups from South and Central America and the Caribbean. However, the majority of Latinas/os are Puerto Rican (9%) and Mexican or Mexican descent (Mexican American) (65%) (U.S. Census Bureau, 2010). In this discussion, we focus on the latter group. This distinction is significant because while other Latina/o groups may think of themselves as immigrants and carry with them the willingness and disposition to assimilate into the U.S. society, Mexican Americans—and Puerto Ricans—generally do not. These two groups have deep roots in the geographical United States and histories marked by colonization (Donato, 1997; Suárez-Orozco & Páez, 2002). The history of Mexican Americans is one that includes a struggle for civil rights during the 1960s (Donato, 1997) and self-determination since the mid-1800s (Valencia & Black, 2002); their schooling has been characterized by segregation and control, and coercion through the content (i.e., a curriculum that does not reflect their histories, promotes assimilationism, and has a colonizing effect) (Moll & Ruiz, 2002). Consequently, to analyze and understand the current state of Latinas/os’ education (i.e., Mexican Americans in particular), requires a perspective that takes into account the social, political, and historical patterns of exclusion, degradation, and racism that permeate Latinas/os’ education.

For this reason, we base our conceptual approach and analysis in the work of critical race theory, and specifically, in the use of counterstorytelling (e.g., Parker & Lynn, 2002; Solórzano & Yosso, 2001; Yosso, 2006). Critical race theory was developed by legal scholars in response to the need to acknowledge and account for the systemic unequal and biased societal conditions for People of Color when considering legal arguments (Delgado & Stefancic, 2001). Applied to the field of education, this perspective rests on the premise that systemic unequal and biased *schooling* conditions, access, and opportunities exist (Delgado & Stefancic, 2001). Because these circumstances negatively impact later life outcomes (Yosso, 2006), improved schooling for non-dominant students cannot occur without addressing these conditions. A counterstory serves to illuminate these biases and the processes by which they operate and influence educational acts. Furthermore, a key tenet of critical race theory is that the experiential knowledge of People of Color is “legitimate, appropriate, and critical for understanding, analyzing, and eradicating racial subordination. Critical race research in education draws explicitly on the lived experiences of Students of Color” (Yosso, 2006, p. 7).

Counterstories seek to document the processes of discrimination, bias, and racism from the perspective of those injured or affected by these factors (Ladson-

Billings, 1998; Yosso, 2006). They also offer the unique opportunity to locate patterns of resistance to these processes that are often embedded in systems of schooling. Solórzano and Delgado Bernal (2001) describe these patterns of resistance as ranging from subtle to outwardly activist, yet all contributing to transformation of oppressive conditions. For the purposes of this article, we combine counterstory with critical ethnography, ethnography that attempts to not only describe but also challenge the lived conditions of the marginalized (Foley, 2002). We weave together the stories of individual students to present a collective voice of Latinas/os' lived experiences in mathematics education. This data representation allows us to understand their schooling in the context of such processes of discrimination, bias, and racism and allows us to counter the deficit-based perspectives of Latina/o students that pervade educational discussions today. However, we also recognize the complexities evident in their stories. While the stories sometimes reflect a narrative of exclusionary schooling, the counterstories also offer insights into ways these students resist such schooling processes and into possibilities for disrupting these processes.

Setting and Methods

We draw on data gathered as part of a larger ethnographic study of third- to sixth-grade urban Latinas/os in after-school mathematics settings (e.g., Khisty & Willey, in press; Varley, Willey, & Khisty, 2009). The after-school contexts are relevant to the present discussion because of their role as a methodological tool. The after-schools were designed specifically to offer an alternative mathematics learning environment, one that explicitly defined and utilized students' home language, communities, and knowledge as learning resources; they also offered more advanced mathematics opportunities and practices than what the students typically received in their classes. The after-schools, thus, were intellectual spaces where students did academic work, but not like school; in a physical school-like environment, but not of school; employing learning skills and resources for thinking, but not as they did in school. Consequently, the after-schools became *counter spaces* (Gutiérrez, Rymes, & Larson, 1995) that naturally provoked students to compare, analyze, question, and comment on their mathematics experiences in both the after-school and their regular classrooms.

Our work was conducted in two geographical sites (the Midwest and Southwest United States) in urban schools that are predominantly Latina/o and with students who run the range of proficiencies in Spanish and English. With respect to language use in schools, the two contexts are very different. In the case of the Midwestern site, the students attended a school that strives for biliteracy and which has content instruction in Spanish and in English up to 6th grade; it is a dual language school in most respects. At the Southwestern site, there are institu-

tional sanctions against using Spanish in schools for instruction. Consequently, our participants have different experiences related to Spanish and English in mathematics classrooms. Yet, in spite of these differences, as we will see in a later section, bias based on language ideologies affects both contexts equally.

Critical ethnographies of the after-schools were carried out for approximately three years. During this time, the after-schools generally took place for 8 to 12 weeks each school semester, meeting for approximately two hours once or twice a week. Students volunteered to participate in the mathematics afterschool “clubs,” and a majority of them chose to participate throughout the running of the after-school projects. Between the two sites, there were approximately 34 students (distributed nearly equally across both contexts) many of which participated in the after-schools all 3 years. About two-thirds of the participants were young females.

The after-schools emphasized collaborative, project-based activities that involved cross-generational participants (i.e., students, preservice teachers, and researchers). In this way, we were active participant observers with a relatively constant group of students across multiple years. In this general context, students frequently offered natural, unsolicited comments and questions—which became an essential component of their counterstories.

All activities in the after-schools were videotaped, audiotaped, and/or described in extensive field notes. Our discussion draws from these data. The themes that form the counterstories emerged from students’ spontaneous and more structured comments. As they emerged, data sources were revisited and analyzed to confirm and elaborate the more salient of these themes. In addition, semi-structured and informal interviews with students were conducted as the occasion warranted, to further elaborate the themes. Regular focus group discussions were also held to garner students’ feedback and insights regarding the after-school or any other topic they chose; these, again, served to confirm the relevance of the themes. In this way, the stories that emerged include the students’ own perspective of their schooling experiences, which we then situate within a larger societal context, following tenets of both critical ethnography and critical race theory (Foley, 2002; Yosso, 2006).

The themes we discuss represent the composite voice of the schooling experiences of a particular group of students across settings, presented as counterstories. In some cases, we use the voice of one student to represent the experiences of others, and in other cases, one student’s “story” offers the full counterstory. The nature of counterstories allows for the voices of students to form a “living theory” in itself. The themes from the students’ counterstories represent their situated perspectives on mathematics education and the tensions they perceive in their collective mathematics learning. Because these students share similar systemic forms of exclusion, we present their voices as a collective reflection of this exclusion.

In the following section, we discuss four of the most salient themes to emerge from student's comments over the years of participating with them in mathematics in the after-schools. We present their own perceptions of their mathematics education, as well as their stories of resistance to school mathematics, examples of resistance to current arrangements concerning language and mathematics, and illustrations of resistance revealed through the alternative arrangement of the after-school learning experience.

The Counterstories

White, middle-class students often experience mathematics as challenging and collaborative problem solving (Gandara & Contreras, 2008), and therefore personally beneficial. Consequently, they co-construct shared perspectives about mathematics consistent with their experiences. Latinas/os and other political minorities, on the other hand, too often have very different experiences with mathematics, experiences often characterized by rote learning of rules and steps to solve problems (Khisty & Willey, 2008; Martin, 2000); likewise, they develop a shared perspective consistent with those experiences. Because the experiences are different, Latinas/os' attitudes and perspectives about mathematics differ accordingly. This reality begs the questions of what are Latino students' perspectives of their regular school experiences, and what are their perspectives given significantly different experiences with mathematics. In addition, in what ways do Latina/o students *resist* these schooling experiences?

Moll and Diaz (1987) raised the following concern:

Although student characteristics certainly matter, when the same children are shown to succeed under modified instructional arrangements it becomes clear that the problem these working class children face in school must be viewed primarily as a consequence of institutional arrangements that constrain children and teachers by not capitalizing fully on their talents, resources, and skills. (p. 302)

The issue, consequently, becomes understanding (from the perspective of the students) the "social arrangements" of classroom mathematics juxtaposed against a different environment (i.e., after-school) that is aimed at capitalizing on students' linguistic and cultural resources, and their lived experiences. How do their perspectives of mathematics in the different learning environments compare? We begin with the students' expressions of their perceptions of mathematics learning.

Latina/o Students' Perceptions of Mathematics Learning

If we are to understand students' affiliation to or defection from learning a specific content or persisting in schooling, then it is relevant to understand how

students think about or define those experiences: Do these experiences draw them in or push them to the periphery of the learning community? Do they align with their own sense of what they should be learning? Our analysis of students' perceptions of mathematics and mathematics learning did indeed reveal patterns reflective of constricting institutional arrangements. Although the bulk of our argument lies within the students' counterstories to this kind of dominant, exclusionary narrative of schooling, which is presented in the subsequent section, we begin with a brief description of ways in which students' stories sometimes reflected these dominant narratives. This portraiture is important because it presents a picture of mathematics education as experienced by the students. Representative of the majority of after-school participants' perceptions, Mariana¹ described mathematics as follows:

I think of numbers, like 2 times 20 or 2 times 100. ... When I think of math, I just see a whole bunch of numbers, and problems go around me, and I get dizzy, and then I fall because it's so much work.

Even when pushed to stretch their definition, students rarely broke out of the "mathematics-is-numbers" box. When students were asked to consider what it takes to be "good at mathematics," they largely gravitated toward external measures of mathematical success, such as grades or test scores. This perception was closely linked to comments that good mathematics students "do homework," "practice," "pay attention to the teacher," and "show up for class on time." These notions of what it means to do mathematics have little to do with engaging in mathematical practices as a learner, and more importantly, they disenfranchise students who do not readily conform to these behavioral norms.

Despite these "dominant" stories, students told stories that countered this narrative either in ways in which they resisted the narrative or in ways in which the after-school mathematics setting offered an alternative or contrasting experience. The following counterstories shed light on an alternative narrative of mathematics education, one that reveals patterns of resistance to the dominant narrative and the potential of an empowering mathematics education.

Latina/o Students' Counterstories of Resistance to School Mathematics: Defining Mathematics Differently

Even though students expressed limited conceptions of mathematics learning, they still told counterstories of resistance, or what we deem stories that challenge the school system's narrative of what the students can or should do in math-

¹ All student names are pseudonyms.

ematics. Several students expressed resistance to being defined as “good at mathematics” through external evaluations such as by the teacher or from test scores. Margarita related:

I like to be able to think a certain way, like not somebody telling you, you have to think this way in order to do that. You just think your own way to find out the answer your way. There [are] different strategies, and you can find your own strategy.

In another instance, Margarita said:

Some kids hate math, but at this point, I’m acing math because math is really easy for me. I like math. It’s one of my favorite subjects. It’s just something that I click right away. ...Probably ‘cause I pay attention so I understand. I find all the details that help you find it. My teacher, he finds a way of doing it like finding division, but I have a different way of finding it so for me it’d be easier.

These comments reflect Margarita’s confidence in her mathematical abilities and a problem-solving orientation to what it means to do mathematics (e.g., “find your own strategy”). Although Margarita did describe these problem-solving-based mathematical practices, she also acknowledges an existing tension as she speaks about more discrete activities and an emphasis on speed. Margarita explained:

I like to work alone in math because usually when I have other kids with me I have to help them and I really want to get my work done and to me if I don’t finish my work then I feel like I’m gonna get in trouble.

At the same time, Margarita described the importance of taking “your time”: “It’s like when you think of something and you take your time and that’s when you pass something. But you have to take your time to get it right.” Although she says that mathematics “clicks right away” for her, and that it is important for her to finish her work or she might “get in trouble,” she also describes the need to “take your time” in order to find the strategies that make the most sense and to really “understand.”

We see these somewhat contradictory ideas (e.g., emphasis on outcome vs. process) as evidence that students believe they have strengths that are not fully recognized or appreciated in classrooms. Margarita was both playing the game of school, while resisting the form of learning that was highly valued in her classroom because she felt it was not necessarily the best way to “understand.” These same ideas may be reflections of the dual presence in many U.S. schools of both an emphasis on a reform curriculum intended to develop student understanding and the pressures from a timed, standardized testing and tracking-based school culture. Despite an emphasis on numbers and operations, and being good at math-

ematics as measured by external factors such as test scores or grades, some students, like Margarita, resisted these notions and articulated more productive perspectives of themselves as mathematics learners; that is, she acknowledges a sense of agency, one that reflects her confidence and capacity to access tools and approaches to solving mathematical tasks beyond those typically promoted by the teacher.

In addition, we were surprised by a final, subtle pattern related to critique and resistance that emerged from some students: a sense that they were being misjudged and abandoned mathematically—or “short-changed”—in their classrooms. Yesenia conveyed how she would like “a lot of math things like the charts [referring to mathematical graphs],” higher-level content she knew existed but did not have sufficient lessons on. Similarly, another fifth grade Latina, Katrina, wanted to know “how shapes and polygons are,” a clear reference to wanting more advanced mathematics, but fall outside the frequent emphasis on numbers and operations. Finally, a third Latina, Maribel, offered the following assessment of what was missing from her fifth grade class: “*Que nos enseñaran come hacer pi... como hacerlo porque nos enseñaron un poco pero pararon porque nos tuvieron que enseñar mas de ciencia.* [That they would teach us how to make pi... how to make it because they taught us a little, but they stopped, because they had to teach us more science.]” Juliana noted that she felt that her participation in her mathematics classroom was “to make me feel like crap ‘cause I don’t know how to do the work.” This feeling was in direct contrast to her description of her participation in the after-school that was “actually there to help me,” and “I’m not being graded on it.” Other students similarly noted they felt that good grades in math came from behavior that reflects the ability to play the game of school, such as, “doing your work,” “turning in your homework,” and “paying attention.”

These comments are significant indicators that these students did not trust the system of schooling, in part, because they know they were not getting all they should (e.g., “advanced” or more challenging mathematics), and that they recognized there is more to mathematics than the basic operations that tend to dominate their curriculum. Moreover, as Maribel implied, she was being abandoned, relegated to know less than she could have known—all because there is not enough time. These comments are real indictments of these students’ classroom learning arrangements, some of which are dictated by ill-conceived policy or district mandates.

Latino Students’ Counterstories of Language and Mathematics

A frequent theme to emerge among students’ comments related to the role Spanish and English played in the context of mathematics. Given the essential role that language plays in learning and its connections to identity, this is an important element in understanding Latinas/os’ perceptions about mathematics edu-

cation and their sense of affiliation or alienation toward it. Moreover, we recognize that language bias and language ideologies represent perhaps the most overt form of bias, discrimination, and racism that Latinas/os experience; they are precisely the processes that need to be exposed through the students' counterstories.

When we asked students for some background related to Spanish and English use in their homes, we found a diversity of experiences consistent with what is generally known about Latino families and language use (Zentella, 2005). Most of the Latina/o students in our after-schools came from homes where one or both parents speak only Spanish, but where many family activities are conducted in both Spanish and English. For example, Elisa described her mother as "speaking English so, so...[and] my dad knows a lot [English]...and I always talk to him [in English], well I talk to him in Spanish, too." Students noted that their siblings tended to speak English amongst each other because they are English-dominant.

Given the various proficiencies, students made many language choices. In other words, they moved between the two languages depending upon with whom they spoke, and as in the example above, depending simply on "how they feel." Furthermore, many students described themselves, their family, and their home as "bilingüe" (bilingual). The self-identification as "bilingüe" seemed important to students, because as Katrina noted, "I like Spanish because there's a good connection with my mom and my parents," and as Alonzo explained, "When I speak Spanish, it feels like I am in Mexico." However, some students clearly gave English status: "because I am attracted to English" (Alonzo), and because "*solo aprendemos palabras mas grandes* [in English] [we only learn bigger words {in English}]" (Maribel).

In addition, the majority of the English-dominant or English monolingual Latina/o students at the Southwestern site—where Spanish was all but outlawed in schools—spoke about a desire to speak Spanish or to speak more Spanish. For example, Vanessa (Vane) described herself as of Mexican American and Native American descent and her family as Spanish-speaking. Vane explained that she spoke some words in Spanish and understood a bit more, although she said she would like to learn more Spanish and have her classes in Spanish because "I'm Mexican, and I don't know that much Spanish." Although Spanish was not her first language, because she is Latina, she explained, she identified with Spanish. She went on to say, "My whole family is Mexican and most of my family speaks Spanish." Like Vane, the majority of the students in the after-schools referred to their affiliation with Spanish because they were Latinas/os, whether they were English or Spanish-dominant.

Interestingly, in the mathematics context, students tended to view different roles for the two languages: one language was used to read or comprehend a problem and another was used to express their ideas—and maybe something different yet for working with peers. In the following statement from Katia, a fifth grade

Latina, we can see how she uses her bilingualism as a tool. (Note that “I” refers to the Interviewer and “K” refers to Katia.)

- I: Ok, ¿cuando trabajas en matemáticas qué idioma usas el inglés o el español?
Ok, when you work in mathematics, do you use English or Spanish?
- K: Los dos. *The two.*
- I: ...¿cuál idioma sientes que es mas fácil para ti para usar para que puedas comprender el problema, cuando está en inglés o en español?
...Do you feel is easier to understand the math problems in English or Spanish?
- K: En español. *In Spanish.*
- I: ¿... y para explicar tus ideas en el problema? *And which one is easier to express your ideas?*
- K: Ingles. *English*
- I: ¿Inglés, te explicas mejor en inglés? Pero te gusta mas cuando está el problema en español. ¿y para hablar en general? *You express yourself better in English? But you like it better when the problem is in Spanish. What about when you are speaking?*
- K: Spanglish
- I: Uh?
- K: Spanglish

While this student demonstrated a keen sense of meta-linguistic awareness (i.e., recognizes the need to use one language for one thing and another for another objective), some students were just as aware of the fact that their skills in the two languages were not equal, and because of this imbalance they had to rely on one language or the other for a given linguistic task. Students noted that they “don’t read English well enough” or “speak Spanish well enough for expressing ideas” to really be able to use the two languages as tools for learning. In the following interview response, we see an older student who exemplifies an awareness that something is missing from her repertoire of resources for learning mathematics. Margarita speaks Spanish at home with her parents and grandmother, though she clearly describes her struggle with Spanish as an academic language: (Note that “I” refers to the Interviewer and “M” refers to Margarita.)

- M: If I’m doing multiplication or take away, then I would probably speak in Spanish or English, but if I was doing division, like the harder ones, division or fractions, I would have to speak English ‘cause fractions right now, doing the minus and stuff like that and times and stuff like that with fractions gets to your head and stuff like that...so I would have to probably speak in, in English for that. ...Because like sometimes in Spanish I, like menos is take away so if I were to talk, I would know how to say take away in Spanish so if I were to explain it to somebody I would tell them, “This menos this equals what?” And if I were to say division, I have no idea how to say division in Spanish, so I wouldn’t know how to explain to somebody who just knew how to speak Spanish.
- I: And is explaining part of the math class, learning math?

M: Yeah, it's also if my teacher asks me questions and I can only speak Spanish, then that would be, that would be hard for me, because I don't know how to say fractions or division in Spanish. I know how to say math and all that stuff, but I just have no idea how to say division and fractions.

Although Margarita focused explicitly on vocabulary, she referred to specific instances of communicating mathematical ideas in Spanish and the struggle she anticipated if she did not have the Spanish vocabulary to communicate her thinking effectively. What we hear from the students is their pride in their bilingualism or its potential, and the recognition that the two languages are learning resources—not only for literacy development but also for mathematics. Current research supports this idea that two languages can serve as powerful tools in students' mathematical development (e.g., Planas & Setati, 2009). Unfortunately, the students also remind us that their bilingualism is an untapped and underutilized resource, especially in mathematics.

From the students' comments, we can conclude that at least two phenomena are occurring here: (a) the students are accessing and utilizing two languages for various sub-tasks (within a larger mathematical task) to communicate and make meaning of mathematical ideas, and/or (b) students regret their lack of proficiency in academic Spanish, effectively deeming it a lost learning resource. In either case, the importance of maximizing Spanish as a resource becomes clear, whether it be to facilitate cognitively challenging tasks or to help verify the notion that Spanish is a tool worthy of development and use in academic settings, a reality that has major implications for Latinas/os' mathematical identities (González, 2001; Khisty, 2006). Regardless of the language context, their stories point to a need for a re-orientation to the role of language in mathematics. The dominant narrative tells us that English is important because of its role in mainstream instruction, tests, and general school and social advancement. While this may be true in some respects, it is also true that Spanish has critical functions as a cognitive tool to help students make sense of complex mathematical ideas, as a means of maintaining family and community connections, and as a marker of historical and present identity. As the students' counterstories imply, bilingualism is a strong alternative to monolingual schools and mathematics classrooms.

Latino Students' Stories of the After-School Setting

Students' comments offered evidence that the after-schools began to challenge and alter some of the socialization patterns of the regular classroom that we described above. As noted earlier, the afterschool environments clearly provided students with alternative experiences with mathematics, ones that both supported their mathematical understanding, and also connected to who they are by valuing

and integrating their language (i.e., adults often spoke in Spanish and tasks were written in two languages), experiences, and communities.

When we asked students to compare the after-schools to their mathematics classrooms, students frequently noted how their regular classroom experiences were limited in the diversity and quality of activities. Maribel, noted: “We don’t use those games [in class] to make it more enjoyable; we only use them for fractions.” Katrina pointed to the fact that “in class, we don’t make our own math problems” (a very common activity in the after-school). Several students spoke about the benefits of problem solving in the after-school, a reference to working on more challenging, open-ended problems frequently embedded in games or projects. Vane described:

You don’t know, first of all with the investigation,² you don’t know what type of math you’re doing. That’s what you have to find out: ‘Oh, I have to do multiplication for this, or division, or addition, or subtraction.

Often, the mathematical investigations in the after-school developed from the interests and experiences of the students and were grounded in their communities, rather than being based on a content area, as is often the case in classrooms.

Moreover, other students noted the different patterns of interaction in the after-schools, for example: “If I don’t understand something in the classroom, I ask the teacher, and he explains it more, and in *Los Rayos* [the name of one of the after-schools], I can ask a lot of different people” (Yesenia). Another student expressed that in the after-school, the facilitators ask questions rather than offering explanations; or, in other words, they engaged students in dialogue. Still a different student, Marlena, described the learning environment in the following way:

Instead of—you can’t get up on your feet in the normal class, like you have to stay with the person you are working with. You can’t go around and check what they’re doing to see if you or your answer...to see if whoever you are working with, to see if you got the answer right with another pair. But when you’re at the after-school, you can move around and ask them, “Oh, what did you get? Because I got this...” And then we look at each other’s work, and we see if one of us got it wrong. And it’s kind of better than in class.

Marlena spoke about seeking out peers as resources in finding valid strategies for solving problems, and how the after-school environment facilitated this freedom, even if only in the sense of physically being able to move around the room. These responses in particular are indicative of students’ recognition of the normative

²*Investigation* refers to a mathematical investigation that took as its starting point the concerns of students; in this case, the potential closing of their school.

behaviors required in the classroom as compared to the different ways of interacting and communicating in the after-schools. It should be noted that such comments or counterstories came from students from both project sites. These comments also reinforce the idea that Latina/o students recognize that there are other possibilities for learning.

Finally, students' experiences with community-based mathematical investigations opened a window into the role of mathematics as a tool for more outward forms of resistance, resistance to the current structures of society. Some of the mathematical investigations that we conducted with the students involved projects that specifically linked social issues in their community to mathematics. These instances gave us an opportunity to explore students' ideas about the role or usefulness of mathematics for social change. We explored their ideas about resisting conditions in their lives and connections to mathematics. Drawing heavily upon their experiences with community-based mathematics projects aimed at creating change, students shared stories about making change in their lives and the role of mathematics in making that change. Vane described how she would like to make her nana's (grandmother's) neighborhood safer, referring to specific actions undertaken during a project to save her school from being closed. When asked if she felt that she could do anything about the crime in her nana's neighborhood, she replied: "Not unless the whole community comes together and talks about it. ...Because we might hear other people's thoughts about their feelings about getting robbed; having their whole neighborhood robbed." She linked these ideas to what she had learned through her involvement in the community movement to save her school, explaining, "Cause our community kinda, sorta got together on that thing we had, the rally we had on that board meeting."

Interestingly, students detailed specific ways in which they could leverage mathematical investigations to make social change. More specifically, they expressed confidence in their ability to collect, organize, and represent data in ways that would inform and convince others that there is a problem that needs to be addressed. For example, Vane felt that her grandmother's community could use mathematics, as well as community members in positions of power, to improve the safety of that neighborhood: "[We could use math] finding out how many people feel about the robberies and how many houses have already been robbed." Vane went on to explain her belief in the power of organizing by saying, "When we did this [community-based project], I felt like we could do whatever we wanted and that the board members are listening to us." In this case, the board members were the community members that needed to be convinced to not close her school. She referred to specific, concrete actions done in the community-based project to describe what her nana's neighborhood could do to change the situation.

In reflecting on the community-based projects, students spoke about their belief in the power of using mathematics to make their arguments and how this belief contributed to their sense of voice. Adán, who participated in a project to document and share issues about bullying with the teachers at his school, remarked, “I like seeing all the statistics in action.” Given that many students find little utility in mathematics beyond consumer practices, it is striking that this student saw how statistics could be utilized in an authentic context. Other students remarked on the ability to show their thinking and “show drastic differences” using mathematics, and how this could lead to social change. In spite of all the emphasis given in their classrooms to rote manipulation of numbers, students exhibited a flexible understanding of how the mathematical tools they used and developed in the after-school investigations could be applied to other situations. Their comments about their after-school experiences suggest the value of directly connecting mathematics to their lived realities and providing Latinas/os with the requisite tools to imagine not just ways to participate in mathematics, but ways to participate in making social change. Based on these counterstories, it is clear that for students who are marginalized, not just in schools but in many facets of society, the development of tools to engage in social change could be an important component to reversing this trend of marginalization.

Concluding Thoughts and Implications

The Latinas/os’ words we bring forth in this discussion tell important counterstories. At a time when there is extensive concern about Latinas/os’ progress in mathematics, their stories confirm that, in fact, instruction appears to be constraining with an over emphasis on lower-level content. In light of this context, it is little wonder that many Latinas/os become distanced from mathematics and that few embrace mathematics and identify with it. However, our findings also point to Latinas/os’ unwillingness to accept this condition. Their counterstories tell of resistance to schooling practices related to what it means to do and learn mathematics. For example, they tell stories of resistance to the kind of learning environment where the teacher is the sole holder of knowledge and instead declare their own ability, as noted earlier: “I like to be able to think a certain way, like not somebody telling you.” In addition, the students clearly point to their recognition that there is learning power in two languages, power not being utilized. The students’ recognitions in this regard are fractures in the façade of the dominant narrative that learning mathematics can or should be done in only English. In addition, based on the students’ experiences using mathematics in community-based projects, the students told stories of using the mathematics content for a more overt form of *transformative resistance* (Solórzano & Delgado Bernal, 2001) to oppres-

sive social structures. We can use these stories as insights of what and how to take steps towards better mathematical experiences for Latinas/os.

These findings raise questions about schools' effects on Latinas/os' mathematical agency, in this case, referring to their overall sense of power, self-determination, and positive identity. Are these students given sufficient and appropriate intellectual space in classrooms to genuinely engage in developing higher-level mathematical understanding—or to become empowered? Are there spaces for their voices of resistance to current schooling conditions? If yes, are we positioned to faithfully listen and act on their insights? Unfortunately, Latina/o students do not control the curriculum, which raises further questions about the preparation of teachers and other educators to move beyond simply mastering teaching practices related to content and pedagogical approaches. How do we develop educators to move toward understanding student histories, listening to students' stories, building on students' unique knowledge (e.g., home language), and granting abundant and explicit opportunities for students to be inducted into authentic mathematical practices through communities (Gee, 2005)? Ultimately, there are questions about how to challenge educators' own stereotypes and biases concerning Latinas/os and other non-dominant students.

Moreover, the students' counterstories raise questions about ideologies—especially those related to language—and how they constrain both students and teachers, causing many learning tools and resources Latinas/os have—including Spanish—to be grossly neglected. Is mathematics education complicit in holding Latina/o students back by not paying any or enough attention to the role of students' home language (Spanish) in instruction and in curriculum? Despite the differences in contexts, the prevalence of English-only or assimilationist ideologies becomes clear through the students' voices. Students are bombarded daily with schooling practices (i.e., instruction, course requirements, standardized tests, textbooks, etc.) and tacit or explicit messages that convey a primary and urgent goal of abandoning Spanish and developing proficiency in English. These students' counterstories convey the damage that is caused by the overwhelming quantity and abrasiveness of language ideologies that denigrate Spanish, a critical component of their being or identity, but one that is systematically extracted from their repertoire of learning and communicative resources.

Because critical race theory tells us, “that these traditional paradigms act as a camouflage for the self-interest, power, and privilege of dominant groups in U.S. society,” (Solórzano & Delgado Bernal, 2001, p. 313), the counterstories we have presented are all the more crucial to transforming educational experiences. The students' counterstories suggest that unless fundamental changes are made, oppressive schooling conditions and schooling failure will persist.

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References

- Darling-Hammond, L. (2010). *The flat world and education*. New York: Teachers College Press.
- Delgado, R., & Stefancic, J. (2001). *Critical race theory: An introduction*. New York: New York University Press.
- Donato, R. (1997). *The other struggle for equal schools: Mexican Americans during the civil rights era*. Albany, NY: State University of New York Press.
- Foley, D. E. (2002). Critical ethnography: The reflexive turn. *International Journal of Qualitative Studies in Education*, 15, 469–490.
- Gandara, P., & Contreras, F. (2008). *The Latino education crisis: The consequences of failed social practice*. Cambridge, MA: Harvard University Press.
- Gee, J. P. (2005). Semiotic social spaces and affinity spaces: From *The Age of Mythology* to today's schools. In D. Barton & K. Tusting (Eds.), *Beyond communities of practice: Language, power and social context* (pp. 214–232). Cambridge, United Kingdom: Cambridge University Press.
- González, N. (2001). *I am my language: Discourses of women and children in the borderlands*. Tucson, AZ: University of Arizona Press.
- Gutiérrez, K., Rymes, B., & Larson, J. (1995). Script, counterscript, and underlife: James Brown versus *Brown v. Board of Education*. *Harvard Educational Review*, 65, 445–471.
- Khisty, L. L. (2006). Language and mathematics: Toward social justice for linguistically diverse students. In J. Novotna (Ed.), *Proceedings of the 30th Conference of the International Group for the Psychology of Mathematics Education* (pp. 433–440). Prague, Czech Republic: Faculty of Education, Charles University in Prague.
- Khisty, L. L., & Willey, C. (2008). The politics of language and schooling of Chicanas/os. Paper presented at the International Congress on Mathematics Education, Monterrey, Mexico.
- Khisty, L. L., & Willey, C. (in press). After-school: An innovative model to better understand the mathematics learning of Latinas/os. In P. Bell, B. Bevan, A. Razfar, & R. Stevens (Eds.), *Learning in Out-of-School Time*.
- Ladson-Billings, G. (1998). Just what is critical race theory and what's it doing in a nice field like education? *International Journal of Qualitative Studies in Education*, 11, 7–24.
- Lipman, P. (2004). *High stakes education: Inequality, globalization, and urban school reform*. New York: Routledge Falmer.
- López Leiva, C., & Khisty, L. L. (2010). “Juntos pero no revueltos”: Uncovering exclusionary practices in the mathematics education of Latinas/os. Manuscript in preparation.
- Martin, D. B. (2000). *Mathematics success and failure among African-American youth: The roles of sociohistorical context, community forces, school influence, and individual agency*. Mahwah, NJ: Erlbaum.
- Moll, L. C., & Diaz, S. (1987). Change as the goal of educational research. *Anthropology and Education Quarterly*, 18, 300–311.
- Moll, L. C., & Ruiz, R. (2002). The schooling of Latino children. In M. M. Suárez-Orozco & M. M. Páez (Eds.), *Latinos: Remaking America* (pp. 362–374). Berkeley, CA: University of California Press.

- Parker, L., & Lynn, M. (2002). What's race got to do with it? Critical race theory's conflicts with and connections to qualitative research methodology and epistemology. *Qualitative Inquiry*, 8, 7–22.
- Planas, N., & Setati, M. (2009). Bilingual students using their languages in the learning of mathematics. *Mathematics Education Research Journal*, 21(3), 36–59.
- Solórzano, D. G., & Delgado Bernal, D. (2001). Examining transformational resistance through a Critical Race and LatCrit theory framework: Chicana and Chicano students in an urban context. *Urban Education*, 36, 308–342.
- Solórzano, D. G., & Villalpando, O. (1998). Critical race theory, marginality, and the experiences of students of color in higher education. In C. A. Torres & T. R. Mitchell (Eds.), *Sociology of education: Emerging perspectives*. Albany, NY: State University of New York Press.
- Solórzano, D. G., & Yosso, T. (2001). Critical Race and LatCrit Theory and method: Counter-storytelling. *International Journal of Qualitative Studies in Education*, 14, 471–495.
- Suárez-Orozco, M. M., & Páez, M. M. (Eds.) (2002). *Latinos: Remaking America*. Berkeley, CA: University of California Press.
- U.S. Census Bureau. (2010). American FactFinder. Retrieved from <http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml>.
- Varley, M., Willey, C., & Khisty, L. L. (2009). Latina/o student insights on mathematics learning and the role of language in mathematics. Paper presented at the annual meeting of the American Educational Research Association, San Diego, CA.
- Valencia, R., & Black, M. (2002). “Mexican Americans don’t value education!”- On the basis of the myth, mythmaking, and debunking. *Journal of Latinos and Education*, 1, 81–103.
- Yosso, T. J. (2006). *Critical race counterstories along the Chicana/Chicano educational pipeline*. New York: Routledge.
- Zentella, A. C. (Ed.) (2005). *Building on strengths: Language and literacy in Latino families and communities*. New York: Teachers College Press.