

"Whenever My Mom Speaks Spanish at Home, It Helps Me Understand More in Math": Reflections on the *Testimonios* of Bilingual Latinx Students

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Abstract

In this paper, we share three insights from our conversations with 46 upper elementary Latinx students at predominantly white schools: 1) Students' were silenced, but they persisted; 2) Students' relationship with mathematics was enveloped in language; and 3) Students' mathematics and community were tied together through language. By highlighting the *testimonios* of our participants, we hope teachers reflect on how they empower and raise the voices of their bilingual Latinx students to counter deficit storylines. We also provide opportunities for growth in creating more equitable spaces for bilingual Latinx students.

Discussion And Reflection Enhancement (DARE) Pre-Reading Questions

- 1. What is a mathematical identity? How does or does not a students' mathematical identity manifest itself in school? Are all children asked to share their identities in school in the same way?
- 2. How do you promote students to use their home language when doing mathematic activities?
- 3. How do you show students you value their mathematical thinking that may not be in English?
- 4. How do you construct a classroom environment where use of multiple languages is promoted and valued?

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44

Latinx¹ students have historically experienced the effects of racism within social institutions like schools (Feagin & Cobas, 2014). This includes marginalizing students based on the color of their skin, their cultural differences, or use of a non-dominant language (Yosso, 2006). As a field, we recognize the existence of structural racism and the role of schools in the oppression of students of color (e.g. Martin, 2000; Yosso, 2006). Latino critical theory (LatCrit) helps us focus on how individuals' identities as doers-of-mathematics are impacted by race, language, and power in the everyday experiences of Latinx students. For example, some teachers continue to have a deficit perspective of bilingual students (García & Gonzalez, 1995). These deficit perspectives are perpetuated by some teachers believing students require English proficiency before they can do, for example, mathematical tasks with high cognitive demand (de Araujo, 2017)-thereby constructing a master narrative that mathematics is an English action and mathematical thinking should be communicated only in English. Students then see themselves as good at mathematics only if they have strong English proficiency. We argue deficit perspectives can be reflected on and challenged by teachers listening to the testimonios (stories) of marginalized students. Testimonios (Solórzano & Yosso, 2001, 2002) are part of the mathematical narratives of Latinx students and provide insight into their mathematical identity or what it means to be a doer-of-mathematics (Zavala, 2014). Martin (2006) describes mathematical identity as follows: Dispositions and deeply held beliefs that individuals develop, within their overall self-concept, about their ability to participate and perform effectively in mathematical contexts and to use mathematics to change the conditions of their lives. A mathematics identity encompasses a person's self-understanding of himself or herself in the context of doing mathematics. (pp. 206-207)

Focusing on Latinx students' *testimonios* help in understanding their developing mathematical identities and their perspectives on teachers' practices.

In this paper, we reflect on our experiences interviewing 46 upper elementary Latinx students. We recognize not all Latinx students are bilingual, but most participants described speaking Spanish as a valuable part of their life or were identified as bilingual (receiving services called English for Speakers of Other Languages [ESOL]). Our discussions focused on their experiences learning and doing mathematics in predominantly white schools² (PWSs). Latinx people are racialized in American society because Latinx people are seen as needing to assimilate to the dominate (white) culture (Feagin & Cobas, 2014). Thereby, Latinx students' racial and linguistic experiences in school need to be better understood as their experiences differ from other students. Consequently, we focus on phenomenological underpinnings (Sokolowski, 2000) and highlight these assumptions to help teachers reflect on their own experiences and ways of thinking about bilingual Latinx students. By highlighting the testimonios of our participants, we hope teachers reflect on how they can empower and raise the voices of their bilingual Latinx

comparison to minoritized students (see Bourke, 2016). The term names the dominant culture and emphasizes the power structures in play that minoritized students learn to navigate. We characterized a PWS as having more than 50% of the student population registered as white and Latinx students as being 20% or less of the student population. We choose 20% based on Kanter's (1977/1993) work on tokenism. We increased Kanter's percentage from 15% to 20% based on local district data.

¹ We use the term Latinx (La-teen-x) to be in solidarity with queer, trans, non-binary, gender fluid, and gender non-confirming Latinos/as. The 'x' is a variable to represent the different gender performances of individuals and to go beyond the strict male/female binary.

² The term 'predominantly white schools' has greater implications than just the percentage of white students in

students in developing strong mathematical identities that counter deficit storylines.

Critical Race Theory and Latino Critical Theory

We use critical race theory (CRT) and Latino critical theory (LatCrit), aligning with other critical race theorists, who "attempt to explain the implicit and explicit consequences of systemic, policy-related racism; and [who] work to disrupt and transform policies, laws, theories, and practices through the exposure of racism" (Milner, 2007, p. 391). We recognize racism and linguistic discrimination are normal and prevalent within bilingual Latinx students' being-in-the-world (see Delgado Bernal, 2002; Solórzano & Delgado Bernal, 2001; Solórzano & Yosso, 2001, 2002). Moreover, Latinx students navigate an education system not originally built with them in mind (Yosso, 2006). CRT emerged from legal scholars in the 1970s after they saw the progress made during the Civil Rights Movement gradually dissipate (Duncan, 2018; Ladson-Billings, 1998). Therefore, they worked to investigate and theorize the relationship between race, racism, and power (Delgado & Stefancic, 2001). Since then, CRT has branched into other critical theories (e.g.,

FemCrit, AsianCrit), centering the histories and experiences of other marginalized groups (Yosso, 2006).

Our project aimed to understand Latinx students' experiences learning mathematics in PWSs with the intent of understanding students' testimonios about what it means to learn and do mathematics. Hence, LatCrit played a major role in the conceptualization of our study because LatCrit "is concerned with a progressive sense of a coalitional Latina/Latino pan-ethnicity and addresses issues often ignored by critical race theorists such as language, immigration, ethnicity, culture, identity, phenotype, and sexuality" (Solórzano & Delgado Bernal, 2001, p. 311). LatCrit helped to center the role of race, racism, power, and language in the mathematics education of upper elementary Latinx students. Solórzano (Solórzano & Yosso, 2002; Solórzano & Delgado Bernal, 2001) described five tenets foundational to CRT and LatCrit in education research and methodology (see Table 1).

Each of the tenets aid in understanding students' *testimonios* and develop a richer understanding of the experiences of elementary Latinx students. Previous research has found that students' *testimonios* provide insight into the mathematical identities of students. For example, Zavala (2014) found that secondary Latinx

Table 1

Tenets of CRT and LatCrit in Education	Description
The centrality of race and racism and their intersectionality with other forms of subordination	Ways of knowing directly in contrast with Eurocentric epistemologies and focus on the intersection of race with gender, language, class, and other social aspects.
A challenge to dominant ideologies	Cultural and linguistic experiences provide different ways of knowing and being challenging traditional notions of knowing and knowledge construction
A commitment to social justice	Focus on the ways resistance is used when pursuing social justice.
An emphasis on experiential knowledge	Experiences of students are valuable and a strength. Embrace the counter-stories and other experiences which provide the unique insight of the student.
Importance of transdisciplinary approaches	Provides opportunity to use tools and methods from other disciplines like women's studies and law to understand and improve the experiences of students of color.

students' perspectives of being successful in mathematics related to racial stereotypes (e.g., violent, illegal) and students who did not speak English "properly" found mathematics classrooms to be threatening spaces. LópezLeiva and Khistv (2014)identified microaggressions that an elementary Latinx student experienced from other students and teachers because of her language minority status. The microaggressions prevented her from experiencing productive group work and doing rigorous mathematics. These works, and others (see also Guerra & Lim, 2014), suggested it was necessary to talk with students about how they are experiencing school and mathematics. Moreover, LatCrit positions students' testimonios as valuable to our understanding of mathematics teaching and learning. Our conversations, therefore, focused on collecting testimonios and investigating how they were challenging dominant ideologies of race, language, power, and mathematics learning. Our guiding question was: What are the developing counter-stories of learning and doing mathematics of Latinx students? In this paper, we highlight our reflections and insights from our initial analysis of our conversations with these students.

Description of Study

The participants have entrusted us with the retelling of their *testimonios*; therefore, it is our responsibility to be reflective on how our being-in-the-world impacts our understanding and dissemination of the students' *testimonios*. Consequently, we needed to be critically conscious of our gender, race, class, sexuality, ethnicity, and nationality and how they impact all aspects of our investigation (Pillow, 2003). Our research team consists of a bilingual white-presenting Chilean cisgender male

who immigrated to the US at a young age, an English dominant Mexican-American white-presenting cisgender female, a monolingual white cisgender female, and a monolingual Black cisgender female. This project was a pilot study designed to inform the team of the experiences of Latinx students in local schools and meant to begin a partnership with the participating district. Therefore, the researchers had no previous relationship with the students. We worked with school administrators and were dependent on their relationship with the community for students to trust us.

Fazil, Kemp, and Leona elementary schools are all part of the Kingwood County School District (all names are pseudonyms) located in the southeastern United States. The three elementary schools had the largest percentage of Latinx students (17%, 20%, and 11%) in the Kingwood District with most of the students in these schools being white (61%, 59%, and 72%). We conducted 46 semi-structured interviews with 3rd, 4th, and 5th grade students whose school records identified them as Latinx. Table 2 below provides the number of students by grade, school, and those receiving ESOL services. The consent form was distributed in both Spanish and English and all students were given the option of being interviewed in either language. All students, however, chose English. Interviews ranged from 22 to 50 minutes.

A LatCrit methodology emphasizes the experiences of Latinx students and their response to our education system (Solórzano & Yosso, 2002). So, the first portion of the interview focused on participants sharing their *testimonios* about learning mathematics at a PWS. Questions included, "How do you think being Latina/o plays a role in how you learn mathematics?" and "How does knowing Spanish help you in learning mathematics

Table 2

Number of Participants by Grade Level and School (participants receiving ESOL services)

School	3 rd Graders	4 th Graders	5 th Graders	Total
Fazil	6 (3)	6 (4)	11 (9)	23 (16)
Kemp Leona	6 (0)	4 (3)	7 (6)	17 (9)
	1 (1)	1 (1)	4 (4)	6 (6)
Total	13 (4)	11 (8)	22 (19)	46 (31)

at a PWS. Questions included, "How do you think being Latina/o plays a role in how you learn mathematics?" and "How does knowing Spanish help you in learning mathematics?" Moreover, a series of questions were developed based on Martin's (2006) conceptualization of mathematical identity: "Would you describe yourself as a good math student? Why or why not?" and "How do you think learning mathematics will change your life?" For the second portion of the interview, a semi-structured task-based interview approach was used. For this paper, however, we concentrate only on students' responses to the first part of the interview.

In (re)telling the participants' testimonios, we followed Solórzano and Yosso's (2002) description of critical race methodologies. Accordingly, we constructed their testimonios from (a) the data collected during the research process; (b) the literature informing the study; (c) the research team's professional experience; and (d) the research team's personal experience (Solórzano & Yosso, 2001). To analyze the data collected, Solórzano and Yosso (2002) recommend the use of grounded theory (Glaser & Strauss, 1967) along with a critical lens. We began by transcribing all interviews, reading them multiple times, and taking notes about possible emerging ideas. We met weekly to discuss our reflections regarding our own personal and professional experiences caused by our reading of the data. For this article, we focus on three points of reflection we shared during our conversations. We connect these points to data from our study and the literature to help readers reflect on their own experiences and what they could do in the classroom to create more equitable learning spaces for bilingual Latinx students.

What We Learned from the Students

We emphasize three facets of students' phenomenological ways of being-in-the-world (Sokolowski, 2000): 1) Students were silenced, but they persisted; 2) Students' relationship with mathematics was enveloped in language; and 3) Students' mathematics and community were tied together through language.

Students were Silenced, but They Persisted

Many of the students we interviewed determined when it was appropriate and when it was inappropriate to use Spanish at school. This prompted us to reflect on the choices students make in regards to the linguistic resources they bring to the mathematics classroom and how they may choose not to access linguistic resources because of the risk it may pose to their self-concept as doers-of-mathematics. This is further complicated for bilingual students who use multiple languages to make sense of their world, particularly, when teachers do not create an environment where multiple modalities of expression are valued. For example, Antonio described how the use of Spanish was construed as "keeping secrets" by his teacher.

Interviewer: Ok, how do you think your teachers feel about you talking in Spanish, using Spanish or talking in Spanish with Juanita?

- Antonio: Um, kind of like mad because all the time me and Juanita would speak Spanish and they said 'no secrets in class' and it's basically not a secret because we're just um telling each other like jokes when it's raining outside so we have to stay inside. And then um, like we would say it in English and then they'd be like oh wait that's what they were saying so they got kind of mad that we were, doing secrets but we weren't.
- **Interviewer**: Does that make you not want to speak Spanish in school?

Antonio: No, not really. I only do it at recess.

Antonio's use of Spanish was silenced by his mathematics teacher. Consequently, his communication with Juanita in the mathematics classroom will be based on a limited linguistic repertoire (i.e., English only). Although he may still use his entire language repertoire when thinking about mathematics and in specific spaces ("at recess"), his verbal communication is restricted in mathematics class because of the risk of being seen as a misbehaving student. This is also an example of how multilingual students are socialized into believing their linguistic resources are not valued in regards to their participation.

Our participants highlighted how teachers kept their language as a present-absence (Sokolowski, 2000), or recognizing the existence of the child's linguistic practices but not acknowledging their language through mathematical activity. We recommend teachers reflect on how they make visible a student's use of language and the role it plays in the student learning and doing of mathematics. Literature about translanguaging—seeing bilingual students as not having two autonomous languages but instead one linguistic repertoire (García & Wei, 2014)—may be particularly helpful in thinking

TEACHING FOR EXCELLENCE AND EQUITY IN MATHEMATICS

about classroom environment and how to promote holistic linguistic practices (see García, Johnson, & Seltzer, 2017; García & Wei, 2014). Translanguaging is not limited to multilingual individuals. Even those who see themselves as monolingual are translanguaging because linguistic repertoires are also culturally constructed (see Translanguaging Reading Group, this issue). García et al. (2017, p. 63) recommend the following actions to practicing teachers: hang bilingual posters, and signs; put up students' work in English and in the students' home language; create word walls incorporating students' home languages. We also advocate for teachers to incorporate ways for students to use the entirety of their linguistic resources in doing mathematics. In the same way we promote students to use multiple representations to explain their mathematical thinking, we should also encourage them to use their multiple linguistic resources as ways of knowing and doing mathematics. This may include drawing connections to similar-sounding words in different languages (e.g. adición/addition; suma/sum), promoting agency in the language students use to discuss their mathematical thinking, and developing gestures and visuals collectively to communicate mathematical ideas (see Texas Math Sign Langauge Dictionary: http://www.tsdvideo.org).

Students' Relationship with Mathematics Is Enveloped in Language

From our reflections on our conversations with students, we were able to discern different ways students described how knowing Spanish impacted learning mathematics. When asked, "Does knowing Spanish help you when learning math?", most students said yes, but some were not able to state how. Others described how knowing Spanish is a resource to learning mathematics. Estifan, for example, described how doing mathematics is not necessarily different in either language, but learning mathematics can be easier in one language compared to the other depending on the problem.

Interviewer: How do you think knowing Spanish helps you learn math?

- **Estifan**: Because sometimes you can—instead of just every time saying it in English you can also say it in Spanish.
- **Interviewer**: Oh ok and is it helpful whenever you can say it in Spanish too?

Estifan: Yeah.
Interviewer: How does it help you?
Estifan: By it is just—they're the same numbers. I don't know. That's all.
Interviewer: Is it sometimes easier to understand if it's in Spanish?
Estifan: Not really.
Interviewer: No. Ok
Estifan: Sometimes it's hard, sometimes it's easy.
Interviewer: Is it—is sometimes it's easier in English and sometimes it's easier in Spanish?
Estifan: Mmhm [yes]
Interviewer: So it just depends
Estifan: Yeah. It depends what the problem is.

Estifan determined mathematics can be done with his complete linguistic repertoire, and therefore, mathematics can be done in either language depending on his need. We describe Estifan's and other students' perspective like this as seeing mathematics and their languaging as a fluid and dynamic practice.

There was no evidence the students had considered or been given the opportunity to use Spanish as a way of communicating their mathematical thinking at school. The students did not describe their use of Spanish to quickly access ideas as being publically legitimized. Even though a couple of students described thinking about their mathematics activity in Spanish before communicating their thinking in English. For example, Evita recognized knowing Spanish as a resource for doing mathematics; however, when it came to sharing and communicating her ways of knowing, she had to communicate in English.

Interviewer: How does knowing Spanish help you learn math?

- **Evita**: Well for me it probably more easy counting in Spanish the numbers. Then counting the numbers in English.
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48

- **Interviewer**: And when you share your answer, you speak Spanish or English?
- **Evita**: Well mostly I count in my head. Then speak English.

Interviewer: Oh okay. So you count in Spanish in your head but then when you are sharing with the class -

Evita: I speak English.

Evita shared how she prefers to count in Spanish, but the norm in the mathematics classroom is to communicate mathematical thinking in English. She does not challenge this norm. Her linguistic repertoire is then constrained

when sharing her mathematical thinking even though in her head she used her full linguistic repertoire to solve the problem. Hence, Evita was subtly resisting the idea mathematics needed to be done in English. Her example also highlights the importance of her linguistic repertoire as a resource for doing mathematics. Does Evita's teacher recognize and legitimize this aspect of Evita's mathematical thinking? Teachers need to promote students' access to their linguistic resources publically. By not opening space for students to use their complete linguistic repertoire, teachers are limiting students' access to an important resource for learning and doing mathematics. Evita's *testimonio* demonstrates how mathematics was not just an English action, but accessing her full linguistic repertoire could happen only internally.

Students' Mathematics and Community Connected Through Language

Some of the students when asked how Spanish helps them in learning mathematics discussed how knowing Spanish provided them access to their parents as a resource for helping them think about the mathematics they were learning. At first, we did not think too much of this, but reflecting on how taken-for-granted this is for English speaking students, we realized this is an important relationship as it highlighted how students' community, particularly family, can legitimize their complete linguistic repertoire as useful for learning and doing mathematics. This again, helps in the construction of the narrative that mathematics is not just an English action. Alfredo provided us one of these narratives.

- **Interviewer**: how does knowing Spanish help you in learning math?
- Alfredo: Because, well in school not a lot, but at home yeah. Because whenever my Mom speaks Spanish at home, it helps me understand more in math, like, what to do and stuff.

For Alfredo, not only is his mother a resource for understanding mathematics, but doing and learning mathematics is discussed in Spanish. Moreover, this interaction helps him understand the mathematics better. Consequently, the experience legitimizes mathematics as a Spanish action, thereby countering the stories of doing and learning mathematics he hears at school. However, he also emphasized how knowing Spanish—a part of his language repertoire—is a lot of the time not useful in a school context. This is where the teacher needs to work as a cultural broker and help the child in bridging in- and out-of-school mathematics experiences through the use of the child's full linguistic repertoire. Previously, we discussed how teachers can construct spaces that empower bilingual students. Alfredo demonstrates how those environments may also legitimize doing and learning mathematics with a students' full language repertoire and subsequently the community's ways of doing mathematics.

This reminded us of the aspects we, at times, take for granted when teaching because we assume a particular norm. In regards to family or a student's community, it is more than seeing them as a resource, it is also recognizing how the students' language may be bridging the out-ofschool mathematics and in-school mathematics. Teachers need to recognize this bridging action and the impact it may have on their activities in the classroom. The questioning strategies used by teachers to learn about students' mathematical thinking can provide evidence of students' perspectives on the relationship between inschool and out-of-school mathematics.

Conclusion

In this paper, we reflected on what we learned from our conversations with elementary Latinx students. Limiting a student's linguistic repertoire not only constrains his or her forms of communicating, but also masks from the teacher the relationship the student has with mathematics and their community. Moreover, students not accessing their complete linguistic repertoire keeps teachers from having a full picture of the students' mathematical thinking. Thereby, to counter deficit perspectives of bilingual Latinx students, teachers must listen and legitimize students' *testimonios* and empower students to use their complete linguistic repertoire in learning and doing mathematics. Students need to see they can be successful in mathematics and still use their complete linguistic repertoire.

Our study pushed us to reflect on the opportunities we provide students to bring their entire identity and linguistic repertoire to the mathematics classroom. In addition, their *testimonios* had us thinking deeper about what support systems could look like for bilingual students. We recommend teachers use reflective tools like mathematics journals, discussion boards (e.g., Flipgrids),

or brief interviews with students to learn about their *testimonios*. Listening and reflecting on students' stories can help in the construction of stronger relationships and in designing meaningful mathematics activities. Learning about the community can also help in redefining how to leverage bilingual Latinx students' linguistic resources for the benefit of all students.

Although we focused on bilingual Latinx students, counter-stories are developed by other marginalized populations (e.g. Black, Indigenous, neurodiverse, LGBTQ+, low socioeconomic status). We recommend reflecting on how your mathematical practices allow the entire child to be part of the classroom's mathematics. What opportunities do you provide the child to bring in their culture and alternative ways of reasoning? How and when is language separation detrimental to mathematics learning? To rehumanize bilingual students we need to focus on the 'ands.' A child is bilingual and mathematically brilliant and Latinx. Each of these aspects of their identity work together to construct the child's mathematics and will deeply influence their mathematics learning (Aguirre, Mayfield-Ingram, & Martin, 2015). It is our responsibility to see each child's mathematics how they want it to be seen and heard.

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Discussion And Reflection Enhancement (DARE) Post-Reading Questions

- 1. How can children's linguistic practices be promoted in the mathematics classroom?
- 2. In what ways can children be empowered through their use of language in the mathematics classroom?
- 3. How can your mathematical practices promote the entire child to engage in the mathematics classroom?
- 4. What consequences are there to students learning mathematics if they continue hiding other identity aspects?
- 5. What norms can be established to promote students to use their entire linguistic repertoire?

"DARE to Reach ALL Students!"

