

Using Poetic Transcription to Showcase Multilingual Students' Experiences of Silence in Introductory College Mathematics Education

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In this paper, we explore the role that silence plays in the experiences of multilingual students of color within undergraduate mathematics classes. The poetic narratives presented in this paper focus on exploring the role of silence in students' experiences. While silence often reflects marginalization (e.g., being silenced), it can also function as a mechanism for navigating different spaces, and as a form of resistance. As such, we take an asset-based and anti-deficit framing to explore how silence interacts with students' cultural capitals, including, for example, navigation capital, resistance capital, aspirational capital, and language capital. We use poetic transcription to present students' stories using only their own words.

Keywords: multilingual students, undergraduate mathematics, critical methodologies, poetry

Educational institutions at all levels continue to serve more students who are multilingual learners (henceforth, this term is used to refer to students whose home languages are different from the language used for instruction). For decades, research in K-12 mathematics education has advocated for tending to the care of these students, and the importance of nourishing their home language and culture in their learning of mathematics (Civil, 2009; Gorgorió & Planas, 2001; Moshkovich, 2002; Planas & Setati, 2009). In this paper, we focus on elevating the voices of multilingual students of color by sharing their narratives about introductory college mathematics education using their own words through the process of poetic transcription.

Background and Literature

Language is inherently political and can function, in conjunction with race, to empower some students while marginalizing others (Barwell, 2015; Planas & Civil, 2013). This has been discussed significantly at the K-12 level; however, the same challenges documented in the K-12 literature persist in higher education (Rios, 2024; Hwang, 2023). For example, Rios (2024) found that multilingual students were often positioned by others in deficit-oriented ways, particularly when they are not frequent vocal participants in the classroom. Civil (2014) states that "if most of the communication is expected to be in oral form, this may silence students who are not comfortable speaking up or who have a hard time producing oral explanations" (p. 14). In response, Planas and Civil (2013), Civil (2014), and Rios (2024) challenge deficit narratives about students' participation by emphasizing ways that home languages and prior experiences serve as assets to students' mathematical learning.

Focusing on student assets is an approach research has taken to promote an anti-deficit orientation of multilingual students. This involves recognizing the valuable role that students' cultural capitals can play in their education. In addition to language resources, other cultural capitals include students' families, communities, aspirations, and knowledge about navigating and resisting existing systems that are oppressive (Peleaz et al., 2023; Yosso, 2005). Research

has shown how different forms of capital, rooted in community, are linked to student motivation in pursuing and persisting in their education (e.g., Dilka et al., 2018; Samuelson & Litzler, 2016). Moreover, in Peleaz et al. (2023), the authors discuss the tensions around celebrating 9th-grade multilingual student Layla's strengths, agency, and ability to overcome, without minimizing the structural barriers that are potentially marginalizing to students of color. They state that "while other students may navigate or resist the educational system differently, their relative empowerment does not change the overall reality of oppression" (p. 11).

The growing body of literature examining multilingual students' experience in K-20 mathematics emphasizes the importance of amplifying students' voices and documenting their lived experiences using their own words. For example, Hwang (2023) uses narrative inquiry to explore, in greater depth, the lived experiences of four international, post-secondary students studying mathematics. In her methodological approach, Hwang constructs narratives—using primarily students' own words—to capture each student's experiences studying advanced mathematics.

There is an undercurrent in this body of literature related to silence, and the lack of students' voices, in their experiences. Recognizing and responding to this juxtaposition, this paper aims to showcase the individual experiences of multilingual students of color in undergraduate mathematics classes, especially around silence, while using only their own words via poetic transcription (Glesne, 1997; Prendergast, 2009; Tremaine, 2022). Our methodology builds off of Hwang's (2023) narrative inquiry approach to present multilingual students' experience in undergraduate mathematics. The poetic narratives we present here attend to both the challenges shared related to silence and the cultural capital demonstrated through silence.

Theoretical Perspectives

Asset-based and anti-deficit lenses

Two theoretical lenses guiding this work include asset-based perspectives (emphasizing the resources students bring rather than their deficits) and anti-deficit perspectives (explicitly and intentionally challenging the deficit narratives). Historically, the language resources of multilingual learners have been viewed as obstacles to learning mathematics (Barwell et al., 2016; Setati & Adler, 2000). To shift this narrative, asset-based and anti-deficit perspectives (Adiredja, 2019; Adiredja et al., 2020; Celedón-Pattichis et al., 2018; Harper, 2010) take the firm stance that "all students are capable of reasoning mathematically and that they bring productive resources for learning" (Adiredja et al., 2020, p. 521). In the context of language, these lenses assert that all students are capable of learning and participating meaningfully in the classroom, and that students' language backgrounds enrich their ability to do so. While asset-based perspectives highlight student's strengths and resources, anti-deficit perspectives go a step further to challenge deficit narratives (Adiredja, 2019). This asset-based, anti-deficit approach informs our work by acknowledging that some multilingual students of color may be quieter in the classroom, not due to disengagement, but because they may feel uncomfortable speaking in an environment that lacks diversity and emphasizes vocal participation (Civil, 2014; Rios, 2024). An anti-deficit lens also challenges the "disengaged" narrative by emphasizing alternative ways these students actively engage in their math courses (Rios, 2022).

Cultural Capital Wealth framework

Yosso's (2005) Community Cultural Wealth (CCW) framework exemplifies the transition from a deficit to an asset-based perspective. Specifically, this framework identifies existing resources and capitals that students of color often bring to their college experiences. Although

not typically valued by the dominant culture, these forms of capital originate from students' communities and can play a crucial role in how students of color navigate educational systems and environments. In particular, Yosso's framework identifies six cultural capitals: (1) *linguistic capital*, (2) *resistance capital*, (3) *navigational capital*, (4) *aspirational capital*, (5) *familial capital*, and (6) *social capital*.

In addition to language capital, in this work we focus on resistance and navigational capital. *Resistance capital* represents the knowledge and skills that students of color develop to stand up to inequities and injustices in their daily lives. Similarly, *navigational capital* is the knowledge and skills that students of color develop through constantly navigating spaces that are not designed for them. In this paper, we examine how silence intersects with these two capitals as manifestations of the resources students draw upon when facing potentially harmful experiences.

Perspectives on silence

Finally, we draw upon theoretical perspectives on silence. This literature provides distinct forms of silence: that of being silenced, broader notions of silencing, as well as using silence for navigation, and as an act of resistance. While the first two are clear acts of marginalization, the latter two, though they may happen in conjunction with being marginalized (Peralta et al., 2013), can also be seen as components of students' cultural capital, and related to navigational capital and resistance capital respectively. Silence can be shaped by students' sociopolitical realities (Smith & King, 2018). Silence is intermeshed with the distribution of power, and social roles, among dominant and marginalized groups of people (Mills, 2006; Verma, 2017). For example, the act of silencing—that is, the deliberate or inadvertent suppression of the voices, ideas, or agency of individuals or groups—functions as a way to “exclude”, “constrain”, and “devalue” others (Mills, 2006, p. 1). Moreover, silence can relate to assimilation, and how certain aspects of people's identities are silenced as a result of the dominant culture, including their language and cultural values (Migliaccio, 2016; Ricketts et al., 2007). At the same time, silence is also a form of communication and can have a specific navigational or resistance function (Verma, 2017; Ellis & Wrightsman, 2024). For example, in Gilmore (1985), African American students in an inner-city school deliberately used silence as a way of shifting the burden of communication back to the teacher, thereby asserting their resistance to the teacher's authoritative role in the classroom. We draw on these perspectives to guide our investigation and discussion of how multilingual students of color experience silencing in their introductory mathematics courses, as well as how they navigate, and resist being silenced.

Research Questions

Drawing from these perspectives, the research questions we explore are: (1) How do multilingual students of color experience silencing in college precalculus and calculus classes? (2) How do these students respond to silencing in college precalculus and calculus classes?

Methods

The data utilized for this paper is part of a larger study aimed at exploring the experiences of multilingual students in precalculus and calculus courses. The study was conducted at a large Hispanic-Serving Institution in the Southwest, which also serves a large population of international students. As part of the study, 28 students were selected to be interviewed, all of whom identified as having a home language other than English. All 28 students were students of

color¹, and although their racialized experiences in mathematics were not the central focus of these interviews, it is an important context that distinguishes their experience from multilingual students from Europe, where accents are often privileged and seen as an indication of education status (Moscovitch, 2007; Rosa & Flores, 2017). Interviews were conducted over Zoom, lasted for 60-90 minutes, and were semi-structured. Interviews were recorded and were transcribed verbatim. As will be detailed below, we identified six of these students to answer our research questions. In the results section, we include a brief introduction to each student.

We use poetic transcription (Glesne, 1997; Prendergast, 2009; Richardson, 2004; Tremaine, 2022) to showcase the stories of multilingual students of color within these courses. Poetic transcription is an arts-based methodological tool that re-presents interviewees' words in the form of a poem; this allows the interviewee's own words to be used to tell their story while also bringing in space for the researcher's interpretation and analysis through choices in poetic juxtaposition. Particularly as we discuss the cultural silencing of multilingual students of color, our research methodology must be one which centers those students' voices; we see re-presenting these students' own words verbatim through intentionally constructed poetry as aligned with this aim.

We developed a process for co-creating poetic representations of students' experiences in undergraduate mathematics. First, the first author identified 10 student interviews that explicitly discussed or related to silence. Four students were initially selected, and we began by individually engaging in poetic transcription using Tremaine's (2022) methodology. After creating poems for two of these students, we paired up to co-create collaborative versions. This proved challenging due to our attachment to our individual drafts.

To address this, we adopted a new approach: two team members would each create individual drafts, while two others would merge them into a cohesive poem by selecting stanzas that told a unified story. The first author then reviewed all the poems to ensure a cohesive voice across the collection. As we refined the process, we eliminated four students' stories after team discussions about their relevance to the theme of silence.

Through this process, we established a set of guidelines for consistency, such as using students' exact phrasing without creating repeated words, removing filler words when necessary, and preserving students' sentence structures. We used italics to indicate direct quotes and combined experiences from both high school and college to create a cohesive narrative. Our approach prioritized methodological rigor while embracing the creative elements of poetry to authentically capture students' experiences with silence.

Results

Qamar: *Not Something I Wanted to Hide*

Qamar (she/her) is a Syrian refugee student who spent the pandemic living in Saudi Arabia, while her college classes were all remote. In her poem, we see her share about two class experiences: first, where a teacher refused to record the video sessions, and so Qamar had to attend that class remotely at 3am her time; second, where her teacher muted Qamar in the video session so that the class could not hear Qamar's contributions, to which Qamar responded by unplugging her audio so the teacher could see that Qamar was attending but not listening.

¹ Drawing from Yosso's (2005) work and terminology, we have chosen to use the term *students of color* to refer to students from racially minoritized communities, based on the U.S. context. We recognize that international students may not be from racially minoritized populations in their home countries and that different countries use different terminologies to describe minoritized populations.

I was like:
Hey Professor,
can you please record the Zoom thing?
I'm not sure I could make it,
it's like really late.
Actually
I will not record this class.
We're actually going to make it more
harder for you.
Because you know what?
It's your struggle, you have to deal
with it.
We will not record the class.

I speak a different language.
 I don't think it shows.
 Maybe it shows in certain words.
 I'm not sure how that would impact this.
 There was definitely some circumstances
 where
 the teacher is treating someone else better.
Ask me all the questions you guys
want.

I was asking a question,
 and the professor literally muted me.
I'm a good student, I'll do it–
You will not do it.
 She'd interrupt me.
I'm not physically muting you,
I'm talking-muting you.

(continued)
 Okay.
 It's stay silent situation.
 It was really belittling,
 Rude.
 and not welcoming–
 I'm not asking any more questions;
 that just creates more problems.
 It's better to be silent.
 I'll stay silent.
 I'm a very extroverted student
 I usually just want to talk and share–
You're not really welcomed in this class.
Why are you even here?

You know what?
I'm never responding to you;
this will only harm me.
You muted me in your class.
I'm attending
but I'm not really listening.
I did not want to listen to you.

I would literally leave the computer audio
I don't want to hear you anymore.
Your class is not even valuable to me.
I'm in the class but I don't want to hear you.
 She definitely could see that
 And it was not something I wanted to hide.
 I didn't even apologize.

We use italics and formatting in this poem to illustrate different voices, though all of the words were spoken by Qamar during her interview. This structure conveys a back-and-forth dialogue between Qamar (represented by italics and left justified) and her teachers (represented by italics and right justified), with reflection from Qamar in regular font. While this dialogue is a poetic transcription of Qamar's reflections from two different class experiences, the juxtaposition emphasizes Qamar's desire to be a "good student" who was working hard to attend class and engage, but feeling shut out and treated differently than other students. By the end of this poem, we see Qamar stand up to her teacher by choosing to literally silence her teacher by turning off the audio feed from class (which was conveyed back to the teacher) - an act of resistance for which Qamar "didn't even apologize."

Suveer: *The Switch Just Turns On*

Suveer (he/him) is an international student from India who majored in computer science and took Calculus II.

I am always myself.
Most of the time I use Hindi to talk to myself.
I just use American English, sometimes.
Your mind automatically switches to the Hindi mode for conversation.
We sometimes may use Hinglish.

Everything is English;
the resources are all in English.
Nothing is in Hindi.
My mind would be a bit confused initially:

*Oh my God
Why are you doing this?
It is so awkward*

But then it is our teacher
and you can't really disobey.

I don't talk a lot.
Every student knows English.
The switch just turns on.
But I won't say I was uncomfortable
or I felt really strange.
I just bend myself into the surrounding;
I have to adapt to the thing that is with me.
It happens automatically.

(continued)
It's not like
I'm calling upon
a second personality within me.
It's just habituated,
it's there in me.
I am being myself.
I have that background of watching American films,
superhero films, and all of that.
So I am being myself.

Being bilingual doesn't make things better in the class.
Classroom exams, homework assignments—
no, not particularly there is an advantage of being bilingual.
But when I'm talking to myself,
studying math,
then I use Hindi.
That is one essential part
I won't give that up.

Italics is also used in Suveer's poem to portray the voice in Suveer's mind that felt "confused initially" by the lack of Hindi used in his math classes. While this voice is still part of Suveer and not meant to portray a second person as in Qamar's poem, this poetic structure helps to highlight the "second personality within" Suveer that can "bend" and "adapt" to the English-only mathematics class. He relates his ability to adapt (or one may say assimilate) to the expectations and norms of his math classes to his "background of watching American films", and so he asserts that this adaptation version is still him "being [him]self." The poem ends with Suveer naming "one essential part" of himself that he "won't give up": talking to himself about math in Hindi.

Discussion

Our poetic narratives explored multilingual students of color experiencing silencing in college precalculus and calculus classes and highlight how these students respond to silencing. Several students described explicit acts of verbal silencing, carried out by others' lack of engagement with their questions and contributions. For example, Qamar details being explicitly silenced by her teacher, via muting her on Zoom, when she asks questions in class. She notices that other students frequently ask questions and do not receive the same treatment.

Beyond sharing these students' stories of silencing while using their own words, the poetic narratives reveal three different responses: (1) becoming silent, (2) intentionally using silence as a navigational tool, and (3) using cultural capital, sometimes through silence, to manage and resist marginalizing experiences in the classroom.

We see instances where students become silent in the face of explicit actions by others that are meant to silence their voices, ideas, or identities. Qamar says "It's better to be silent. I'll stay silent." Qamar refers to these as "stay silent" situations. Qamar's poem exemplifies how the silence instructors or peers might see in the classroom is not necessarily indicative of disengagement, but rather a response to marginalization within the classroom.

We also see examples that demonstrate students' agency to intentionally use silence as a navigational tool, allowing them to more comfortably maneuver within the classroom environment. For instance, Suveer describes code switching as a way he silences his home language to navigate the classroom. Suveer recognizes that the math classroom is a place for speaking English, and navigating this space requires turning on his internal English "switch", "bending" himself into the "surroundings". Although he feels like he can "be himself" and does not feel "uncomfortable" speaking English, Suveer shares that he does not "talk a lot" in class. These students' narratives highlight the way that silence can still include speaking, allowing them to still engage in some of the mathematical discussions in class while silencing aspects of their experience - their home language (Fivush, 2010).

In recognizing silence as a form of navigational capital, we are pushing back on the narrative that multilingual students are quiet because they are not interested, not engaged in learning, or not capable of communicating with sufficient fluency in English to maintain mathematical discussions. Instead, we showcase how students' "silent" responses to the silencing around them can be tactical, and that their participation should not be interpreted in a deficit way. We offer their narratives and our reframing as an explicit counter-story to the discourse of multilingual students' silence.

Finally, students' narratives exemplify a third response to silencing: using cultural capital, sometimes through silence, to manage and resist marginalizing experiences in the classroom. Qamar describes agentively using silence as a form of resistance. Recognizing that her teacher's behaviors are harmful to her, Qamar intentionally disconnects her computer audio during her online class and decides: "I'm never responding to you". Moreover, she chooses this form of silent resistance, knowing that it is a visible act that she was not trying to hide from her instructor. This skill of knowing how to resist is an asset that Qamar brings to the classroom and allowed her to exist in a harmful space in ways that mitigated this harm.

Our work shares (counter) narratives in the form of poetic re-presentations of multilingual students of colors' experiences of silence within undergraduate mathematics. These poems allow us, as researchers, to share students' stories in a way that conveys more of their human experience and preserve the emotion of these experiences, and we offer our methodology to support more such work. These poems also teach us, as college instructors, to view students' participation (or lack of participation) in our classes with a different lens, and specifically with an anti-deficit lens. We join other scholars (e.g. Boistrup & Samuelsson, 2018; Hinestroza, 2020) in calling other teachers in to recognize how silence can be used as a tactical resource in students' mathematical sense making, and to encourage instructors to recognize and disrupt the harmful ways other students or they themselves may be silencing their multilingual peers or students.

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