

## **MATHEMATICS TEACHERS' PERCEPTIONS OF THEIR INSTRUCTION FOR MULTILINGUAL LEARNERS THROUGH PROFESSIONAL DEVELOPMENT EXPERIENCES**

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*As the demand to challenge and attend to multilingual learners has increased, teachers have not received adequate professional development to combat biases and perceptions implicitly engrained throughout the education system, especially in mathematics classrooms. This study implemented a studio day professional development cycle with inservice teachers who worked with multilingual students in Math 1 classrooms. This study examined teachers' initial perceptions of multilingual learners and their understanding how to prepare for, challenge, and support multilingual learners. Teachers reported that, while their previous learning experiences around multilingual learners and mathematics were limited, this professional development opportunity allowed them to extend beyond simply attending to vocabulary to consider how to access text in rich ways to engage their students in more meaningful learning.*

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Multilingual learners are among the fastest growing student populations in U.S. schools (National Clearinghouse for English Language Acquisition, 2009). The increase of multilingual learners is not an isolated phenomenon. Each state has experienced an increase in this population (Cheuk, 2016; Lee & Buxton, 2013), and it is expected that multilingual learners will make up 25% of the students in K-12 settings by 2025 (National Education Association, 2005). Despite the current numbers and projections, problematic trends regarding teacher preparation and practices have persisted in relation to multilingual learners, including deficit-based thinking models among teachers (de Araujo et al., 2016; McLeman & Fernandes, 2012; Pettit, 2011). In an attempt to address such deficit-based thinking, this study used a “studio days” model (Von Esch & Kavanagh, 2017) to introduce teachers to instructional mathematical routines that could engage multilingual learners in rich mathematics content (Kelemanik et al., 2016). This study sought to answer the following research question: How did mathematics teachers' perceptions of multilingual learners and their understanding of how to challenge and support multilingual learners evolve as teachers engaged in professional development experiences?

### **Theoretical Framework**

This study is organized around two complementary theoretical ideas—instructional mathematical routines and key principles of reform-based instruction for multilingual learners. Both are meant to help teachers think about ways to engage multilingual learners with content in meaningful ways.

#### **Instructional Mathematical Routines**

Instructional mathematical routines are intended to support students to engage productively with content, providing them with tools that they can grow familiar with and return to regularly so as to solve cognitively demanding mathematics tasks (Kelemanik et al., 2016). Routines allow students to focus on their learning, because they provide structured ways for students to make sense of rich, challenging mathematics; build important mathematical thinking habits; and provide more students with access to important mathematics. Zwiers et al. (2017) developed routines specifically for multilingual learners to help teachers amplify, assess, and develop these students' language in

mathematics classrooms. As such, multilingual learner student engagement in these mathematical instructional routines can help them develop mathematics thinking and language simultaneously.

### **Key Principles of Reform-Based Instruction for Multilingual Learners**

Five key principles of reform-based instructional practices for multilingual learners in mathematics classrooms also guided this work (Roberts & Bianchini, 2019). These principles grounded our work with teachers, the conversations we had with teacher participants about the teaching and learning of mathematics for multilingual learners, and the analysis of data collected. In this paper, we focus on our fourth principle, *identifying academic language demands and supports for multilingual learners* (Aguirre & Bunch, 2012; Lyon et al., 2016). This principle focuses on the language demands in the tasks teachers provide and asks teachers to implement appropriate supports so that all students can read disciplinary texts, share their ideas and reasons in whole class and small group discussions, and communicate mathematics information in writing.

### **Methods**

Our study was situated in one school district in Central California that included a substantial number of multilingual students. Teachers participating in this ongoing study were engaged in a two-year professional learning program organized around mathematics “studio days” for multilingual learners (Von Esch & Kavanagh, 2017), in which teachers developed and studied a single lesson focused around one instructional routine and one mathematics language principle during each cycle. The findings of this paper come from the first studio day cycle. Using Von Esch and Kavanagh’s professional development model of studio days, we created a cycle of three professional development meetings for our participants. The studio day cycle of interest paired the instructional mathematical routine “Three Reads” (Kelemanik et al., 2016), which provides students access to rich text, with the principle *academic language demands and supports*.

### **Participants**

Nine mathematics teachers from three high schools and their district mathematics instructional leader (who helped facilitate the professional development) participated in this study, with four teachers serving as our focal teachers. Of the nine teacher participants, five were female and four were male. Seven were White/Caucasian, one was Latinx, and one was Asian American. One teacher was in her first year, three had 1-4 years of experience, and four had 10-19 years of experience. One teacher was bilingual (Polish), and the rest were monolingual English-speakers. At Ash High School, the percentage of multilingual learners was 4.5%; at Birch High School, 6.0%; and at Cedar High School, 9.4%. Teachers noted that they had both multilingual and reclassified students in their classes.

### **Data Collection**

We conducted two individual semi-structured interviews (Glesne, 2011) with the four focal teacher participants and the district mathematics instructional leader to understand how teachers supported students, especially multilingual students, in accessing mathematical content. More specifically, the pre-interview explored teachers’ perceptions of multilingual learners, what they did to support multilingual learners in their classrooms, and their prior experience with preservice or professional development tailored towards challenging and supporting multilingual learners in mathematics. Following the first studio day cycle, in the post-interview, we asked participants about how they supported multilingual students to access text and to attend to academic language demands. We also asked about their experiences with the studio day cycle.

### **Data Analysis**

We qualitatively analyzed both interviews across all five interviewed participants to identify key pieces of talk related to the following: (1) teacher preparation and professional development; and (2)

attitudes towards their preparedness for challenging and supporting multilingual learners. We compared participants' responses across the two interviews. We drew on fieldnotes from studio days and classroom observations as ancillary data to triangulate our findings. Throughout the data collection and analytic process, we wrote analytic memos to develop our ideas, test our conjectures, and track our research processes (Yin, 2016).

## **Findings**

Our first set of findings examines teachers' baseline perceptions of multilingual learners and professional learning experiences related to multilingual learners. The second set focuses on teachers' evolving perceptions related to multilingual learners and their preparedness in challenging and supporting multilingual learners in their mathematics classrooms following their participation in the studio day cycle.

### **Multilingual Learners – Initial Perceptions**

All four teachers reported having large Spanish-speaking multilingual learner populations in their Math 1 classes. All four also used strategies in their classes to support their multilingual learners. Specifically, while many students were reclassified throughout the district, the teachers reported that they still implemented academic language support for these students in similar ways to students officially classified as “English learners.” For example, Ms. Lacrosse reported that over 50% of students in her typical classroom were classified officially as “English learners.” Her approach to supporting multilingual learners in communicating their reasoning was the following: “Even if they don't have a lot of academic knowledge, they do have at least enough to be able to express it at the level they are at and be exposed to others who are richer [in linguistic ability].” One of Mr. Huerta's supports was “rewr[iting] the text to make it simpler.” Ms. Parker went further, rewriting two to three of her lessons each week to adapt the text for multilingual learners.

### **Professional Learning Experiences with Multilingual Learners – Initial Perceptions**

Of the four focal teachers participating in this study, three mentioned having extensive experience with multilingual learners through prior teaching assignments, one shared that this was their first school year working with multilingual learners on a full-time basis. Only one of the four focal teachers mentioned receiving any explicit training related to multilingual learners during their teacher education program. The other three focal teachers stated that their preservice teacher education did not include any class or support around multilingual learners in mathematics specifically. All four focal teachers discussed a lack of district-mandated professional learning experiences related to multilingual learners, including during the implementation of a new curriculum three years prior. While Mrs. Hope, the district mathematics instructional leader, did share that she provided supplemental support through her typical interactions and coaching time with the teachers, it appeared this was the only professional development experience regarding multilingual learners and mathematics the district provided.

### **Perceptions of Multilingual Learners – Post Studio Day 1 Cycle**

Through their studio day cycle participation, focal teachers reported shifting their focus for multilingual learners from singular vocabulary words for a given lesson to allowing multilingual learners to access and participate more fully through the implementation of the “Three Reads” mathematics language routine. Ms. Lacrosse discussed that her perception of supports for multilingual learners changed from focusing solely on vocabulary or specific problems to providing access to key mathematical ideas: “It's about reaching out and providing more support so that they can access the material, reading, writing.” Focal teachers also discussed that student engagement with the text, including for multilingual learners, increased through the use of the “Three Reads” mathematics language routine. Mr. Huerta brought up the importance the routine had in his class as it

was being implemented more frequently, signaling to the students that the process of engaging with the text was important. With multilingual learners engaging with the text at a higher frequency and at a higher cognitive and linguistic level, teacher perceptions of their multilingual learners appeared to be challenged. Still, Mrs. Hope, the district math instructional leader, reiterated the need for a future focus on communicating reasoning while using academic language.

### **Professional Learning Experiences with Multilingual Learners – Post Studio Day 1 Cycle**

Teachers reported the studio day cycle was an effective opportunity to analyze the teaching practices they implemented as they related to academic language, especially with regards to multilingual learners. Ms. Lacrosse discussed both the benefit of having other teachers provide feedback on her teaching and the benefit of watching other teachers implement the same lesson. Mr. Huerta shared that, even though he and another teacher at his school site did not teach the same lesson during the studio day, he was still able to adapt his teaching practice after observing his colleague. All focal teachers explained that a key benefit was being able to interact with and work with other teachers at their school sites and within the district. Mr. Ming reflected on the value of building a community of critical educators on his campus through observing other teachers and reflecting on how those teachers may be working with multilingual learners: He found useful “the whole coming together, drafting of lessons together, then executing the lesson, and then debriefing on it.” Mr. Huerta echoed this sentiment, saying, “I would say the other beneficial thing... being able to see the math studio day happen at all three campuses together and having the collaboration of teachers that were in different schools within our district.”

### **Discussion and Conclusions**

We found that teachers' perceptions of multilingual learners shifted from holding beliefs that multilingual students could not access text-heavy curriculum at the same level as non-multilingual learners to realizing that they could challenge and support multilingual learners using mathematics language routines. The mathematics language routine of focus, “Three Reads,” allowed teachers to engage their multilingual students in more rich content and language learning beyond simply reviewing math vocabulary terms. Teachers were able to provide their students with practice in accessing text and thus in reading, writing, and talking about math in richer ways. Teachers valued this professional learning opportunity and the chance to interact with fellow Math 1 teachers as a way to improve their mathematics teaching practices related to multilingual learners. Our work suggests the need for future professional development and research efforts to focus on other important aspects of academic language in mathematics, including communicating reasoning.

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