Positioning Emergent Bilinguals in Mathematics: A Case Study of a Middle School Teacher

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Abstract

This study investigated how a middle school mathematics teacher positions herself and her students in the context of teaching Emergent Bilinguals. The teacher's discourses during the planning meetings and teaching sessions were analyzed through the lens of positioning theory. The strongest patterns in the teacher's positioning were assessor and supporter, respectively. In the planning sessions, the teacher positioned herself as one who assesses EBs' readiness in mathematics and English and revealed her views that her EBs were not currently ready to do many mathematical and linguistic tasks suggested by the researcher. However, her positioning EBs as capable problem-solvers was clear and consistent through all co-planning and co-teaching sessions.

Purposes of Study

This study aims to investigate how a middle school mathematics teacher positions herself and her students in the context of teaching Emergent Bilinguals (EBs; a.k.a. English Language Learners). The research question that guided this study is "how does a mathematics teacher position her role as a teacher of EBs and position EB students in learning mathematics?" To examine how the teacher positions EBs in learning rigorous mathematics, we used mathematical modeling as the main curriculum to co-develop lesson plans.

Mathematical Modeling

Modeling is defined as "the process of choosing and using appropriate mathematics and statistics to analyze empirical situations, to understand them better, and to improve decisions" (NGA & CCSSI, 2010, p. 72) and represents two different functions of modeling: modeling as a vehicle and modeling as content (Galbraith, 2012). Modeling as a vehicle is using modeling as a tool to teach mathematics while modeling as content treats modeling as a curriculum itself and allows students to use any mathematical approaches to solve an ill-defined real-life problem. We focused on modeling as a vehicle because our goal was to implement modeling as an instructional approach on a daily basis.

Positioning Theory

We employed the positioning theory as the framework of our study. Davies and Harré (1999) described positioning as "the discursive process whereby people are located in conversations as observably and subjectively coherent participants in jointly produced storylines" (p. 48). Through the practices of positioning, people come to understand the categories or groups in which they are included in, or excluded from, a particular context (Zangori & Pinnow, 2020).

Within education, positioning theory has been applied to examine the role of discourse in providing opportunities for students to demonstrate problem-solving, develop reasoning, and foster academic competencies, and interpersonal interactions between teacher and student. Mathematics education researchers have used positioning theory to examine various topics. For

example, Esmonde (2009) determined that mathematics teachers position students as "experts" or "not expert" according to students' interactions in groups.

In this study, we focused on the teacher's reflexive and interactive positioning. Reflexive positioning is the positioning of oneself in a given context, and interactive positioning is the positioning of a person, or persons, by others in a given context. In a classroom context, reflexive and interactive positioning are often shaped by a teacher's implicit power which provides them with particular rights, duties, and responsibilities as well as the authority to shape students' opportunities to engage in the activities (Zangori & Pinnow, 2020). Moreover, examining which learners are posed for particular types of questions during classroom discussions can provide insight into how questioning patterns constrain or afford learners' access to academic content, language, and identities (Pinnow & Chval, 2015).

Methods

Participants & Context

This project was conducted as a collaborative PD with one middle school mathematics teacher in a 100% EB classroom in a large-scale urban school district in a Midwest area of the USA. The situated PD consisted of co-planning, co-teaching, and co-analysis sessions between one researcher (1st author) and one teacher (participant). The EB-only mathematics class consists of 11 EBs from diverse countries in Asia, Africa, and Latin America. More than half of them were from refugee families. We co-planned, co-taught, and co-reflected six lessons throughout one semester, using mathematical modeling as a vehicle.

Data collection and analysis

The planning and reflection meetings with the teacher were audio-recorded, and the teaching sessions were video-recorded. In this presentation, we will share our analysis results of the teacher's discourse data in the six co-planning and teaching sessions based on the positioning theory. Three coders/authors open-coded one transcribed teaching session and discussed it until we had a satisfied agreement and developed a coding manual. The coding manual was revised multiple times through our discussions. After the coding manual was established within two categories, reflective positioning, and interactive positioning, all co-planning and teaching session transcriptions were coded, analyzed, and emerging themes were observed. The code description mentioned above is given in Table 1.

Results

Due to the structural difference in planning and teaching, the patterns of teacher positioning in planning and teaching sessions appeared significantly different. Hence, we describe the themes from teacher discourse during co-planning and co-teaching sessions separately.

Themes in Co-planning Sessions

The most prevalent theme in the teacher discourse during co-planning sessions was that the teacher was aware of EBs' current readiness in mathematics and English. She recognized EBs' needs in English and positioned EBs as not ready yet for understanding/using English on several occasions. She was also aware of the distinction between EBs' readiness in mathematics and readiness in English. There were several instances when she thought that EBs were ready to do mathematics but were not capable of expressing themselves: "I know that I think they

understand the concepts of, three plus two is two plus three, and they understand three minus two and two minus three is not the same, but I don't think they have any vocabulary." EBs were also considered as not ready yet to do some mathematical work. When the researcher suggested using the number line in performing addition and subtraction of integers, the teacher replied, "They don't always know where they need to start or where they can go from there."

Despite her awareness of the EBs' lack of readiness in mathematics and English, the teacher often positioned EBs as capable problem-solvers in mathematics. It was apparent the teacher intended to give meaningful challenges to the EBs with inquiry-based tasks (e.g., "they can guess how many cups, and check how close they were, then they figure out what that actual height is, based on how many cups").

As for reflexive positioning, despite the relatively low frequency, we found it meaningful that the teacher revealed the difficulty with teaching EBs: "I think about all the English they have taken. Like trying to learn content and foreign languages… What's too much vocabulary? What's a good balance? And trying to choose we can learn forty words every unit, but do I want to choose just 10 strong words? ...But all other words are still important. And everything they learn every day, so I have to, yeah, I'm struggling sometimes." This discourse described that the teacher felt difficulty with making the right decision for EBs regarding the amount of language teaching as a mathematics teacher.

Themes in Co-teaching Sessions

The most prevailing theme was that the teacher positioned herself as a supporter of EBs by providing help in language, mathematics, and other pedagogical aspects (e.g., "Do you want to watch the video again?"). The most frequent language support was revoicing and restatement. For example, she almost always repeated or paraphrased the directions and questions given by the researcher to help her students understand them. In addition, when students responded to a question with one word or sentence fragment, she restated the answer in a full English sentence. It is noticeable that the teacher provided support that enhances EBs' mathematical reasoning as much as support that helps EBs' English expressions. However, one concern was raised while we observed the teacher's support. Sometimes the teacher provided unnecessary help and as a result reduced the cognitive demand of mathematical problems. For example, during the first co-teaching session, we asked the students which information they needed to solve the task. We were expecting them to identify the cost of one item was necessary but missing. Before the students showed any struggles, the teacher asked, "Do you know how much the money duck cost?"

Finally, similar to the results in co-planning sessions, we found that the teacher viewed EBs as competent/capable problem-solvers and encouraged EBs to explain their mathematical reasoning (e.g., "How did you do that, in your head you did what?") Although the teacher was aware of the lack of readiness of EBs in English and mathematics, as mentioned in co-planning sessions, she did not imply it during the co-teaching sessions. Instead, she often positioned herself as a supporter and provided various support in both mathematics and English.

Discussion and Implications

Our analysis results based on the positioning theory indicate that the strongest patterns in the teacher's discourse during co-planning and co-teaching sessions were assessor and supporter, respectively. In co-planning, the teacher positioned herself as one who assesses EBs' readiness in mathematics and English and revealed her views that her EBs were not currently ready to do

some mathematical and linguistic tasks suggested by the researcher. However, her positioning of EBs as a capable problem-solver was clear and consistent throughout all sessions. Having a high expectation while she was aware of the lack of readiness of EBs might lead her to strongly position herself as a supporter of EBs in both mathematics and language.

It is also worthwhile to note that while the teacher's positioning herself as supporter of EBs occurred in her regular teaching discourse pattern, the teacher's positioning EBs as those who share or use their culture as a means to understand a math problem was not observed in her discourse routine but only in the planned lesson. Hence, the lesson plan should be carefully planned to increase teacher's acknowledgement about EBs' cultural contribution. It is not likely to happen naturally or routinely without intentional plans.

Through this study, we found that positioning theory helps see teacher discourse and views on EBs in depth. Positioning theory can be used in teacher education as a tool to increase teacher awareness of their views on EBs or other marginalized groups. In addition, the collaborative PD allowed us to learn about the teacher and provide ample learning opportunities to the teacher because the PD is situated in teaching practices.

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Table 1. Sample Code Manual

ROOT CODE	CODE	DESCRIPTION
Reflective Positioning (RP)	Authority (RP-A)	Teacher positions herself as an authority who gives directions and commands
	Difficulty (RP-D)	Teacher positions herself as one who has difficulty with teaching EBs.
	Support-Language (RP-S-L)	Teacher positions herself as one who supports EBs' language use and development.
	Support-Mathematics (RP-S-M)	Teacher positions herself as one who supports EBs' math use, reasoning, and development.
Interactive Positioning (IP)	Competent problem solver (CPS)	Teacher positions EBs as competent/capable problem-solvers, creative thinkers (can have a good mathematical reasoning) in math.
	Culture contributor (IP-CC)	Teacher positions EBs as contributors of their cultures by asking them to share their cultures or valuing them.
	Nor Ready for English (IP-NR-E)	Teacher positions EBs as ones who are not yet ready for understanding/using English.
	Nor Ready for Math (IP-NR-M)	Teacher positions EBs as ones who are not ready yet to do math work or think mathematically.