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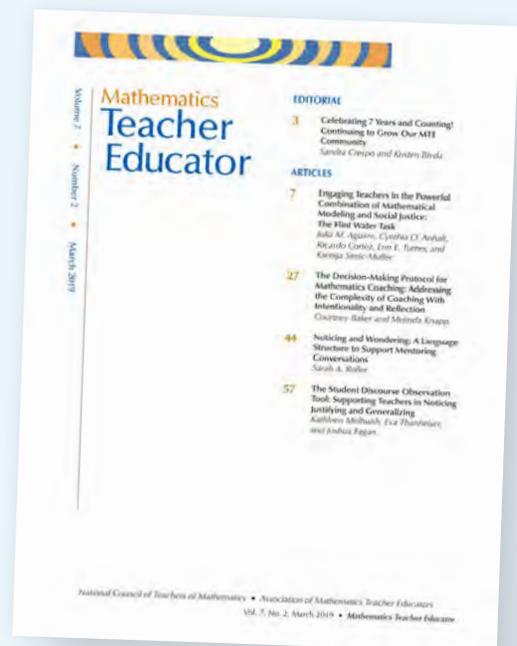
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Families and Teachers Doing Mathematics Tasks Together: Considering Funds of Knowledge and Positioning

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In this article, we explore the power relationships and positioning that occurred between caregivers and teachers who engaged in mathematics tasks as a part of a year-long project involving workshops. Specifically, we explore the shifts in power and positioning that occurred when the tasks were grounded in the caregivers' funds of knowledge, in contrast to the positioning that occurred during problem-solving tasks that were not. Our analysis indicates that using funds of knowledge in mathematics has the potential to create collaborative and not hierarchical relationships between caregivers and teachers. This result has implications for the mathematics classrooms of multilingual learners.

Keywords: Funds of Knowledge; Mathematics and Families; Positioning; Multilingual Learners

It is widely known that teacher and family collaboration is beneficial to children's learning (Averill et al., 2016; Mapp, et al., 2022; Trinick, 2015). However, a persistent problem of practice in teacher collaboration that occurs with families from nondominant communities is the presence

of hierarchical power relationships ingrained within school structures and patterns of participation (Delgado-Gaitan, 2012; Quintos et al., 2024). Deficit thinking and narrow opportunities for caregiver participation that are normative in schools, such as contributing supplies, reading newsletters (one-way communication, often only in English), or passively attending events, marginalize many families in underserved communities (Baquedano-López et al., 2013; Olivos, 2006; Valdés, 1996). These approaches position family members as receivers of school knowledge with insufficient desire, knowledge, or skill to support their children academically. In turn, this positioning becomes a missed opportunity for teacher-caregiver collaborations to support children's learning (Averill et al., 2016; Trinick, 2015) and serves to reinforce systemic patterns within our educational system that marginalize communities of color. In contrast, asset views of family engagement recognize family and community resources and their deep commitment to education (Delgado-Gaitan, 2001; González et al., 2005; Jiménez-Castellanos et al., 2016).

In mathematics education, there is a need to view caregivers as intellectual resources for their children's mathematical learning (Civil & Andrade, 2003; Ishimaru et al., 2015; Takeuchi, 2018). However, even with an asset-based framework, when caregivers and teachers meet within the school structures, asymmetrical power relations with teachers positioned as experts and caregivers positioned as receivers of knowledge are often reproduced rather than challenged (Civil & Bernier, 2006). This article centers on a project explicitly designed to shift deficit views and traditional power differentials between mothers of multilingual learners and teachers. Specifically, we explore how the lenses of funds of knowledge (González et al., 2005) and positioning (Davies & Harré, 1990; Van Langenhove & Harré, 1994) can inform both the design and analysis of teacher-caregiver interactions. The question guiding our work was, How do teachers and mothers position themselves and each other during their participation in mathematical tasks?

This inquiry was crucial for assessing how their moment-to-moment interactions either challenged or upheld their respective ascribed roles as reflected in institutional hierarchies of whose knowledge is valued.

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Theoretical Framing: Positioning and Funds of Knowledge

With the intention of disrupting long-standing narratives in mathematics education among under-resourced schools and multilingual communities, we drew on two theoretical perspectives, funds of knowledge and positioning theory, to facilitate and understand caregiver–teacher interactions. *Funds of knowledge* is a theoretical construct to name the rich, household knowledge bases that exist within non-dominant communities (Velez-Ibañez & Greenberg, 1992). The construct explicitly frames household and community knowledge from an asset-based lens, and when applied to educational settings, advocates centering family and community knowledge in the classroom. In the case of our project, we use families’ funds of knowledge to establish relationships and design and facilitate mathematics tasks in ways that aim to *position* caregivers as knowledgeable and capable. Our objective was to support opportunities for caregivers to embrace alternative roles as active mathematics participants.

Positioning theory focuses on how individuals use discourse and actions to locate themselves and others within conversations and in social interactions (Davies & Harré, 1990). Positioning theory allows us to understand how moment-to-moment social interactions influence opportunities to participate, which in turn impact the identities and shared understandings that participants develop (Kayi-Adar & Miller, 2018; Van Langenhove & Harré, 1994). Positions are a metaphor to refer to individuals’ rights and responsibilities (what one is allowed or expected to say or do) within those interactions (Davies & Harré, 1990; Van Langenhove & Harré, 1994). These positions are significant because they constrain or expand the possibilities of meaningful participation (Herbel-Eisenmann et al., 2015). For example, if a participant takes on the position of mathematics content expert, they are ascribed certain rights to contribute, evaluate, or justify mathematical ideas. Failure to position families as knowledgeable partners results in their exclusion from sharing their mathematical knowledge and perspectives (and, therefore, their funds of knowledge). In this project, we used the construct of positioning to analyze how caregivers and teachers position themselves and others in relation to mathematics, varied mathematical tasks, and each other.

In the next section, we describe our intentional design of the workshop structure and environment, informed by these theoretical frameworks, and our desire to disrupt

traditional power differentials present between caregivers and teachers.

Project Design

The purpose of the broader project was to bring together caregivers, children, and teachers in partnership to (a) reorganize spaces and roles to transform school–home power differentials around mathematics learning; (b) leverage children’s and families’ knowledge and expertise as a resource in teaching and learning mathematics; and (c) build teacher and caregiver understanding of practices to support mathematics learning for multilingual learners. A primary component of the project was a series of workshops that were the context for the interactions analyzed in this article.

Workshop Overview

We held workshops once or twice a month over one school year (2021–2022). Although this article focuses on the workshops involving parents¹ and teachers together, we also facilitated workshops for teachers on their own, parents on their own, and parents and children together (see Table 1 for session themes and sample activities). The purpose of the workshops was to create a space where parents and teachers could work on mathematics together, build stronger relationships, and explore challenges and opportunities related to multilingual students’ participation in the mathematics classroom. The goal of engaging in mathematics together was for parents and teachers to experience problem-solving tasks as learners and interact with and learn from each other. During each session, participants engaged in mathematics tasks, along with other activities related to the workshop theme (such as analyzing videos of classroom practice or family activities). The mathematics tasks aimed to center community members’ everyday cultural knowledge and practices to highlight their expertise. We also focused on requests from participants; for example, the mothers asked to focus on fractions. Tasks were bilingual (Spanish–English) and reflected everyday family and cultural practices such as cooking rice, designing and making folklórico skirts, or making paper flowers.

Features of the Workshop Environment

Several features of the parent–teacher workshop environment provided important context for the interactions we describe, namely, demonstrating a commitment to the

¹ When talking generally, we choose to use the term caregiver as a term inclusive of the many forms that caregivers take in children’s lives. In our context, we had all mothers participating and so will sometimes use “parents” or “mothers” when talking about our specific group of caregivers.

Table 1

Workshop Themes and Sample Activities

Workshop Themes	Sample Activities/Tasks	Description
Introduction and Community Building	Parent–Teacher Activity: Sharing Stories	Community building and introduction to project topics. Also designed to activate prior knowledge and build background related to the main themes.
Funds of Knowledge (F of K)	Funds of Knowledge (F of K) Math Task: Paper Flowers (See Appendix) F of K Math Task: Folklorico Task	Exploration of community math resources. Designed to offer opportunities for teachers to learn from parents and to mutually uncover funds of knowledge.
Positioning	Parent–Teacher Funds of Knowledge Conversation F of K Math Task: Sugar Skulls Task Parent–Teacher Activity: Factors that support participation	Reflecting on the impact of the learning environment and interactions when learning mathematics. Teachers explore their role in positioning children in their classrooms.
Language	Parent–Teacher Activities: Video Analysis of language in the Math Classroom; Experience a Math Lesson in Another Language Teacher Activity: Classroom Routines that Support Language Development	Understanding affordances of language(s) in the mathematics classroom. Parents and teachers discuss and reflect upon the role of language in the mathematics classroom.

community, developing *confianza* and building rapport, and valuing translanguaging.

Demonstrating a Commitment to the Community

The researchers/educators facilitating these workshops have spent extensive time in this local, majority Mexican-origin and Mexican immigrant community in the Southwestern United States. Several facilitators have worked in local schools; conducted workshops with teachers, parents, and children; taught university methods courses at this school; or were supervisors for undergraduate preservice teachers in the classrooms of some of the participant teachers.

Additionally, one facilitator is a parent in the district. Furthermore, several of the participating teachers were long-time educators in the community. This connection and commitment to the community inevitably shaped the workshop environment.

Developing *Confianza* and Building Rapport

Cultivating an environment of *confianza* (mutual trust) when families and teachers come together is at the center of the funds of knowledge work (Moll, 2005) and our work with parents and mathematics. As Civil (2014) describes, “. . . *confianza* that grows out of a real interest in understanding students’ lived experiences allows

us to also make connections toward their mathematical learning” (p. 17). As facilitators, we shared our history with the community at the start of the project, and we invited teachers and families to share their history during several of the workshop activities. Our familiarity with some of the teachers, the school/community, and the district allowed us to consider the context when developing activities and tasks and was the basis for establishing rapport with the participants.

We intentionally provided time and space for conversations to unfold and for participants to share their ideas and experiences. For example, during the first workshop, mothers and teachers shared stories about their own backgrounds through visual representations. We provided several prompts to guide the creation of their visual representation, for example: (*for parents*), What would you like for the teacher to know about you, your family, and your child?; and (*for teachers*), What would you like the parents to know about you (as an individual, as a teacher, etc.)? These prompts enabled more conversational interactional patterns and personal story sharing, further building rapport among participants. In addition, parents and teachers engaged in funds of knowledge conversations in pairs or small groups, which included questions about family traditions, everyday activities, and experiences with mathematics. As facilitators, we shared examples of our own lives to build connections

and encourage sharing. We also interspersed check-ins about each other's lives at the start of some sessions, such as sharing a highlight or challenge from the past month, which allowed us to learn of significant life events we could celebrate together and, in other cases, to offer resources to support a participant. Finally, we shared coffee and *pan dulce*, important signs that we valued the time-honored tradition of sharing drink, food, and conversation. All these moments humanized our time together and supported connections among participants.

Fostering an Environment that Values Translanguaging

From the beginning, both English and Spanish were used by facilitators. To counter the dominance of English in the school context, we asserted the value of Spanish by making sure facilitators used Spanish on the public floor, and all materials were bilingual. In our context, participants varied along a range of multilingualism (in this case, English and Spanish) and used languages flexibly as they worked together. Our setting evolved into one in which translanguaging, the flexible and dynamic use of multiple linguistic and multimodal systems (Garcia & Wei, 2018), was a natural way for this community to establish rapport as well as engage in mathematics tasks, as illustrated in the data excerpts represented below.

Methods

Participants

Our participants were parents and teachers of grades 2–5 multilingual children from the same school. Nine parents and seven teachers participated in the project. All the mothers and some of the teachers reflected the Mexican origin and Mexican immigrant community of the school and represented a range of bilingualism in Spanish and English.

Data Sources and Analysis

Primary data sources included video recordings of small groups of teachers and mothers as they worked on mathematics tasks during workshop sessions. This data included all instances in which parents and teachers jointly engaged in mathematics tasks to better understand the positioning that occurred during various types of tasks (tasks that integrated funds of knowledge and those that did not). Additionally, after each workshop session, facilitators reflected on parent and teacher participation and on the goals of the session. These reflections were documented and used to inform our analysis. Specifically, we noted interesting interactions related to our research focus.

In the first round of analysis, we watched the videos, compared them with our reflections, and generated memos to summarize our interpretations and the patterns we were noticing. We focused on the positions that participants took on in relation to whose knowledge was valued and centered and on instances when participants explicitly shared or drew on their funds of knowledge. A second round of analysis focused on a subset of parent–teacher interactions.

To investigate potential contrasts in positioning that occurred between two kinds of tasks, one grounded in funds of knowledge (the paper flowers task) and one based on principles of equitable participation in group work (the ordering numbers task; Cohen & Lotan, 2014), we selected analyzed interactions from several small groups that included some of the same participants as they engaged in these tasks.

In this follow-up analysis, we used the funds of knowledge framework to identify instances when participants (teachers and caregivers) shared ideas, knowledge, experiences, or perspectives with others and then examined how this knowledge was taken up or disregarded as they engaged in the mathematical tasks. We also analyzed how participants positioned themselves or how different participants were positioned by others (e.g., teacher, learner, collaborator, expert, problem solver, leader, follower, listener), with implications for power differentials. Although we analyzed the interactions of multiple small groups, our findings focus on a subset of these interactions that reflected themes evident in the broader data set. Specifically, we report on interactions that involve the same mother to more clearly illustrate the contrasts evident across different tasks. We use these interactions to further illustrate the features of the environment outlined above and to analyze how the task context and connections to funds of knowledge influenced the self-positioning and positioning by others that occurred among caregivers and teachers.

Positioning as Mothers and Teachers Engage in Two Different Mathematics Tasks

Paper Flowers Task

The Paper Flowers task (see the [Appendix](#)) was an adaptation of a task from a previous project (Civil et al., 2021) and was revised by local teachers (see www.eqstemm.org). The problem was to determine “how many flowers can be made by using one package of tissue paper that has 24 sheets.” To solve the problem, participants had to make decisions about how to fold and cut the

paper to create flowers of different sizes (e.g., folding the paper in half creates larger flowers, while folding in fourth results in smaller flowers), and how many layers of paper to include in each flower. The selection of the paper flowers context was intentional; these flowers are commonly used in our community for decoration in the local schools and to create altars for the *Día de los Muertos* celebration in early November, reflecting the Mexican origins of the community.

The task was launched with a short video explaining how to make paper flowers, followed by a brief discussion, which brought up several connections to mathematical concepts, including geometry. Then, Marta (facilitator) purposefully asked the participants if they had made this kind of paper flower before. Several of the participants (both mothers and teachers) raised their hands, and Fany (facilitator) noted that there were experts in every small group as they set to work on the task.

For this article, we will focus on interactions in one group to illustrate the participation and positions between caregivers and teachers. The group included Melissa (second-grade teacher, bilingual), Linda (fifth-grade teacher, English-dominant), and Lilianna (mother of a fourth grader, Spanish-dominant). In what follows, (T) refers to Teacher and (M) to Mother.

As soon as Fany finished the task launch, Lilianna (mother who had experience making paper flowers) suggested a starting point for the problem, folding the paper into fourths. She spoke aloud in Spanish as she figured out where to begin and used the tissue paper to show her folds. Lilianna (M) explained, “Si lo partimos en cuatro, nos va a salir una flor. Entonces, de un paquete hay 24 hojas, nos va a salir 24 flores.” *“If we divide it [each sheet] into four, we will have one flower [per sheet]. And so, from one packet of 24 sheets, we would have 24 flowers.”* Melissa (T) began asking questions to Lilianna (M) in Spanish to follow Lilianna’s reasoning, while Linda (T) mostly observed or worked on her own. Lilianna (M) not only initiated and guided the work, but she also included Linda (T) by moving her notes to the middle of the table for Linda (T) to see, making gestures, folding the paper, showing the numbers with her fingers, and pointing to indicate what she was referring to while looking at Linda (T). Through these actions, Lilianna (M) positioned herself as knowledgeable and able to lead the work of the group, while teachers accepted her self-positioning by listening to her explanations and following her lead. As the interaction continued, Lilianna (M), Linda (T), and Melissa (T) collaboratively explored what would happen if they folded the paper differently and if they included five layers per flower instead of four. Linda (T), who is English-dominant, often relied on Melissa (T) to translate from Spanish to

English during these interactions, as evidenced in the following exchange in which Linda (T) suggested that the flower should be made from five layers (according to the video’s instructions).

1. Linda (T): “But you have to put five squares together to make one flower. . . . We don’t have to, but we could only make one flower and we would have leftovers.”
2. Melissa (T): “So can we combine these two?” [indicating layering two full sheets of tissue paper together, each folded into four parts], turning to Lilianna (M) “Ella [Linda] dijo que si los ponemos juntos solo vamos a tener uno- one flower.” *(She [Linda] said that if we put them together, we will only have one- . . .)*
3. Lilianna (M): Si los ponemos juntos, como así? Dos? [holding up two sheets] *[If we put them together, like this, two [sheets]?*
4. Melissa (M): [to Linda] Is that what you are saying? [begins to fold the papers]
5. Linda (T): Fold it in fourths when you put it together.

This exchange illustrated the collaborative sense making that characterized this group’s interactions during the Paper Flowers task. Linda (T) suggested an alternate approach [flowers with five layers, instead of four (line 1)]. However, she positioned the idea as a collective decision of the group rather than a suggestion that must be followed (i.e., “we don’t have to, but we could”). Next, both Melissa and Lilianna began to clarify and test out the idea (lines 2-4), positioning themselves as active collaborators as they folded the papers and investigated the outcome.

Following this exchange, the group decided to use five layers for each flower. They explored different ways to fold the paper and collaborated to make sense of how repeatedly folding the paper in half impacted the number of parts formed and the number of flowers that could be made.

6. Melissa (T): So, if we do this in halves, fourths [folds a sheet of paper in half, and then again in half to make four parts.
7. [Linda (T) and Lilianna (M) both concur that two folds make fourths.]
8. Melissa (T): [continues to fold the paper in half, two more times] This is sixths, right? Then this is eighths? [expressing uncertainty] So how many flowers would that be -?
9. Lilianna (M): Si son cinco hojas por flor *(if there are five sheets per flower)*

Melissa then unfolded the paper, and collaboratively, all three participants counted the parts to determine that the four half-folds resulted in 16 parts instead of eight.

10. Linda (T): So, it's 16.
11. Liliana (M): Dieciséis. (*Sixteen*).
12. Linda (T): So that would be three flowers-
13. Melissa (M): - [said at the same time] Three flowers.
14. Linda (T): With one left over -
15. Liliana (M): [said at the same time] - y sobra uno, aha. (*and one is leftover, right*)

Next, Liliana reminded the group that there were 24 sheets of paper, so they would need to multiply the number of flowers in one sheet by 24.

16. Liliana (M): Three flowers. . . . Por veinticuatro (*For 24*)
17. Linda (T): Right, if we figure out how many is one sheet.
18. Melissa (M): Is three flowers.
19. Linda (T): we can multiply it by 24. . . .
20. Liliana (M): Mhm. Si pero acuérdense que nos sobra un pedacito, de cada hoja .. entonces, se suma otra flor. (*But remember, we have a leftover piece from each sheet .. and so that adds another flower*)

Liliana, Melissa, and Linda then reasoned about the extra piece from each sheet. Because the pack had 24 sheets, they determined they would have 24 pieces left over to make four additional flowers.

As they engaged in the Paper Flowers task, the teachers' and mother's communication involved English and Spanish, mathematical reasoning, and multiple representations (including gestures and use of materials). Their interactions illustrate the dynamic nature of the *translanguaging* (Garcia & Wei, 2018) present in the workshop environment. Additionally, each participant positioned themselves and others as active contributors to the problem-solving work. Both the mother and the teachers suggested ideas for the group to consider, and they collectively tested and verified these ideas as they worked toward a solution. Although Liliana led the mathematics problem solving during significant portions of the discussion (e.g., she proposed the initial idea of folding the paper in fourths and also reminded the group to multiply by the number of sheets and to consider the leftover piece in each sheet [lines 16 and 20]), Linda and Melissa also made important contributions that shaped the group solution (e.g., Linda suggested using five layers per flower [line 1], Melissa led the exploration

of repeated half-folds to create 16 parts per sheet of paper [lines 6 and 8]). At times, their meaning-making reflected such a collective effort that they offered ideas almost in unison (e.g., they counted the number of parts formed together). Both Linda and Melissa noted that they could make three flowers with 16 parts (lines 12–13), and Linda and Liliana jointly concluded that this would leave one leftover piece (lines 14–15). Liliana's (M) positions as group leader and collaborator during this task challenge traditional historical power differentials among parents and teachers.

After the group settled on a solution, they began to make the flowers, and Liliana shared her own background and childhood memories related to the making of paper flowers for Día de los Muertos:

“Mi mamá, mi mamá hacía flores para el día de los muertos. [. .] y siempre me ponía a mi a recortar. Ugh, como lo odié por mucho tiempo. Decía yo, ‘no mamá, me duelen los dedos’, pero pues también eran muchas muchas flores las que ella hacía. Y no voy a decir que soy experta pero si sé como hacer algunas. [. .] Pero porque yo cortaba desde, desde agosto a hacer las coronas. Y eso que las hacía muy grandes. Y a veces pues vendía también.”

English Translation: “My mom, my mom made flowers for Day of the Dead. (. .) and she always put me to cut. Ugh, how I hated it for a long time. I said, “no mom, my fingers hurt,” but it was also a lot of flowers that she made. And I am not saying I am an expert, but I do know how to make some of them. [. .] But, because I cut from, from August to make the crowns. And this is because she made them very big. And sometimes, well, she sold them as well.”

The Paper Flowers task elicited the funds of knowledge of the mother (Liliana), contributing to atypical patterns of participation and positioning between caregivers and teachers. Liliana's knowledge and experience in making these flowers as a part of the household economy contributed to how she positioned herself as a leader for the group. The workshop facilitators launched the task by recognizing experts in the task context, and as the groups solved the task, others recognized that expertise. For example, while they made their paper flowers after solving the task, Linda (T) commented that Liliana's (M) flower was “really pretty.” Melissa (T) said, “She's an expert. She used to make them.” Allowing time and intentionally planning a task connected to funds of knowledge facilitated the personal stories that emerged. In the next section, we present the interactions of a group of parents and teachers working on a different task and the patterns of participation and positioning that emerged.

Figure 1

Ordering Numbers Task Card

Ordering Numbers

Set up:

1. Lay out all cards on the table, face up. Set the blank cards aside.
2. Look at the cards and think about the values they represent.
3. Next, each parent in your group selects 2 cards.
4. Then, each teacher in your group selects 2 cards.
5. If there are any cards left, pass them out to members of your group.
6. Write your name ON THE FRONT of your card(s).
7. You may ONLY touch or move your card(s). No one else may touch or move your cards.

Part 1: Drawing Models and Writing Numbers

- For any card that only has a picture or diagram, write a number to represent the quantity.
- For any card that only has a symbol (a number), draw a picture to represent the quantity.
- For any card that only has words, write a number and draw a picture to represent the quantity.
- Each person only draws and writes on their own cards.

Part 2: Ordering the Cards

- Arrange the cards so the quantities they represent are ordered from least to greatest. Take turns placing your cards.
- Each time you place a card you must explain how you decided where to place the card.
- As a group, try to use as many different strategies as you can to place or arrange the cards.

Part 3: Blank Cards (Optional, if you have time)

- As a group, use your blank cards to add more numbers to your number line. You can think of numbers that are smaller than all the numbers in your line up, or bigger than all the numbers, or numbers that fit in between some of the cards on your line up.
- Record these new numbers (with a symbol and a picture) on the blank cards. Then add these cards to your line up. Be sure everyone in your group can explain your strategies and your justifications.

- ❑ Establishes the norms of interaction, designed to promote equitable participation.
- ❑ Determines who will go first in selecting their cards, to ensure caregiver/parental participation.
- ❑ Everyone touches or moves only their own cards to make sure no one person takes over solving the task.

- ❑ Varied models are required in order to encourage multiple representations
- ❑ Group members are directed to draw or write only on their own cards to ensure everyone's participation and contribution

- ❑ When you place a card, you must explain your reasoning, emphasizing sense-making.
- ❑ Multiple strategies are encouraged, with the goal of deepening understanding of fractions through listening and sharing mathematical ideas.

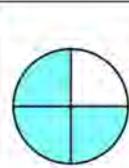
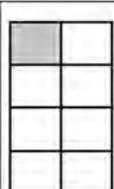
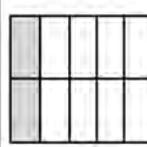
Ordering Numbers Task

The Ordering Numbers task was adapted from an existing task (www.cimath.org) grounded on the principles of equitable participation and group work (Cohen & Lotan, 2014). We selected this task (see Figures 1 and 2) because it was designed with structures to explicitly support

collaboration and promote equitable participation and to honor the mothers' requests to explore fractions. In this task, groups are given a set of cards with varied representations of fractions (see Figure 2) and asked to reason about their relative size by ordering them from least to greatest. To launch the task, a facilitator explained the instructions with examples, encouraging participants to share ideas and collaborate. Figure 1 shows the English version of the bilingual task card, along with features of the task explicitly designed to foster equitable participation and to build on multiple mathematical strengths identified within speech bubbles (added to clarify task features).

Figure 2

Examples of Ordering Numbers Cards

Una mitad one-half		$\frac{5}{4}$	
Dos tercios two-thirds		$\frac{10}{12}$	$\frac{1}{4}$

One group consisted of Liliana (mother of a 4th grader, from the previous task, bilingual), Araceli (mother of a 5th grader, bilingual), and Mercedes (fifth-grade teacher, bilingual). After the participants shared the cards as directed in the instructions, each group member started creating representations for their own cards. Below is a representative exchange that took place after they worked individually.

1. Araceli (M): Is it like that? [showing Mercedes (T) her drawing representing 5/6]
2. Mercedes (T): Five sixths, yes.

3. Liliana (M): [showing her card with $\frac{5}{4}$ written and looking towards the teachers] Y yo . . ., tengo que pintar 4. . .? (*And I . . ., have to shade in 4. . .?*)
4. Mercedes (T): Tienes que pintar. . . oooh, pero te voy a decir una cosa. (*You have to shade in. . . oooh, but I am going to tell you something.*)
5. Araceli (M): That's a whole and one fourth
6. Mercedes (T): It is an improper fraction. Quiere decir que hay más de uno, uno entero, porque el numerador es más grande que el denominador [. . .], entonces vas a tener uno y un cuarto. . . (*Which means that there is more than one, one whole, because the numerator is larger than the denominator, and so you will have one and one fourth.*)
7. Araceli (M): So, she would [have] two of these? [pointing at the rectangle representing one whole in Liliana's picture] [looking at Mercedes]
8. Mercedes (T): vas a tener que hacer dos, vas a pintar uno entero. . . (*You are going to have to do two, you are going to draw one whole. . .*) [continues with her explanation]

From the start, Araceli (M) positioned Mercedes (T) as “the teacher,” that is, the one with the authority to evaluate her work (line 1), and Mercedes accepted this position by evaluating Araceli's work (line 2). Then, Liliana (M) voiced her own puzzlement, seemingly unsure of how to represent $\frac{5}{4}$. Liliana stated out loud that she needed to color four parts showing a rectangle divided in five parts (line 3). It seemed that she was representing $\frac{4}{5}$ instead of $\frac{5}{4}$, a common misconception that may be due to school practices that overemphasize fractions less than one. Mercedes seemed to realize Liliana's mistake and began to explain to Liliana what an improper fraction was and to make sure that Liliana could represent it (line 4). Mercedes was clearly trying to help Liliana complete her part of the task while also re-stating Araceli's ideas (line 6). Despite Araceli demonstrating a solid understanding of fractions, including those greater than one (“That's a whole and a $\frac{1}{4}$ ”) (line 5), she still confirmed her work with Mercedes as the authority at the start of the interaction (“Is it like that?”) (line 1) and referred to her for her question (line 7).

As the interaction continued, Liliana listened carefully, trying to make sense of her fraction and Mercedes' explanation. Mercedes eventually said, “Ok, te voy a enseñar,” (*Ok, I am going to show you*), writing on a piece of paper and explaining how to represent $\frac{5}{4}$, including the procedure for dividing the numerator by the denominator to arrive at one whole and one fourth. When she finished, she placed the paper in front of Liliana, giving her the opportunity to copy the representation. As Liliana copied, she said, “Las fracciones no se me dan” (*fractions are not for me*). Then, when one of the facilitators approached

the group, Liliana said, “No, Marta, esto no es para mí.” (*no, Marta, this is not for me*). This interaction reflected the positioning of teacher and student on unequal footing, as Liliana and Araceli positioned Mercedes as knowledgeable and with mathematical authority. Mercedes accepted this position (whether because she felt she was supposed to because she is the teacher or because she genuinely felt she was more knowledgeable is not clear) and assumed the position of teacher with Liliana and, in the end, completed the work for her. Liliana accepted the position of a student who struggles with fractions, as evidenced in her comment to a facilitator (Marta). To further explore these shifts in participation and positions, we turn to a discussion of our analysis across the two tasks.

Discussion

Contrast of the Positioning Across Tasks

At our workshops, we provided spaces for teachers and mothers to collaborate through their engagement in different types of mathematics problem-solving tasks. This workshop environment of commitment to community, *confianza*, building rapport, and translanguaging came together in a fluid and natural way as caregivers and teachers engaged in mathematics tasks. This environment undoubtedly had important implications for the positioning that occurred during the mathematics tasks. However, despite these features of the environment, the contrasting positioning that occurred as participants engaged in the different tasks indicates the critical role of connections to funds of knowledge in positioning caregivers as experts. The interactions in the Paper Flowers task showed participants positioning each other as collaborators and as a source of mutual learning as they drew upon and utilized their funds of knowledge to approach the task. In contrast, the interactions in the Ordering Numbers task, which was more “school-like” and not based on funds of knowledge, showed classroom teachers taking on the position of teachers or facilitators as they may do with their students, thus reflecting more typical positions (a teacher as knowledge holder). Despite the Ordering Numbers task being designed to balance participation, the typical teacher-student positions emerged.

Although teachers did not find the school-like mathematics task (i.e., ordering numbers) problematic in terms of their confidence to engage in the task, some mothers did, prompting hierarchical rather than collaborative positions. A mathematics task grounded in the funds of knowledge of the caregivers, however, offered a challenge for both mothers and teachers in different ways. The task promoted participants to model with mathematics, reason abstractly and quantitatively, and critique the reasoning of others.

Another aspect of the tasks that influenced how participants were positioned was how open or closed they were for making decisions. The Paper Flowers task was designed to allow choices—only one quantity was provided (number of sheets per package), and all other quantities (how to fold sheets, in how many parts, how many “squares” per flower) were decisions participants had to make. School mathematics tasks are rarely this open; all quantities are typically provided, and even when sense making is required, the sense making focuses on “what to do” with the quantities and not making decisions about which quantities are important and what values for those quantities seem reasonable. The openness of the Paper Flowers task created a broader space for participation for both mothers and teachers, and the positioning that emerged among them was one of collaboration. Our strong focus on mathematics tasks that are grounded in the families’ and community’s funds of knowledge is an approach that not only engages caregivers in mathematics in a way that welcomes their cultural and linguistic repertoire but, more importantly, intentionally *positions* them as experts in relation to the task, while positioning teachers as problem solvers alongside them.

Moreover, the Paper Flowers task offered Liliana a personal connection with the context. She felt she knew where to start, likely as a result of her own experience with the activity. In fact, when the group transitioned from solving the problem to making the flowers, Liliana shared her experience making paper flowers with the other participants, further validating her position as an expert. In contrast, the Ordering Numbers task was more abstract in the sense that it had no obvious context beyond visual representations to support participants in making sense of the fractions or making connections to their own experiences. As soon as Liliana saw the fraction representations, she shared that she was not good at fractions and then repeated this, as seen in the exchange we included above. In contrast, the connection Liliana experienced in the context of the Paper Flowers task offered her an opportunity to see teachers as learners, an opportunity that parents rarely have. She felt empowered and self-confident, and she was able to redefine the typical positioning of parents on the receiving end of the teachers’ best-intended help.

Conclusion

Teacher and Parent Reflections on the Experience

One of the goals of our parent–teacher joint sessions was to expand parents’ and teachers’ relationships as collaborators and partners in supporting children’s mathematics learning. Building relationships of trust and engaging in

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discussions around mathematics are important components of engaging parents as intellectual resources. Engaging parents this way requires the disruption of deficit narratives of caregivers from minoritized working-class backgrounds and breaks with the pervasive top-down structures of the school system, which seek to standardize teachers’ communication with families.

The experience undoubtedly affected the teachers and parents who participated. The traditional hierarchy that positions teachers as knowledgeable and always “in control” of the teaching and learning situations also places an incredible responsibility on their shoulders, causing the need to be the “experts” in everything. Participating in this project allowed teachers to get to know caregivers and interact with them as partners with a common goal. Talking about the opportunities teachers had to interact with caregivers in traditional school settings, Lucy (fifth-grade teacher) reflected on the unidirectionality of the communication and the lack of opportunities to ask questions of caregivers in order to learn from them, in contrast to the interactions she had with the mothers in this project. She explained,

It’s actually fun to be on an actual equal ground and on an equal setting, because usually when you are talking about your kid, you’re the “teacher” [visually does air quotes and uses a deeper voice] and they’re the parent, and so you’re telling them stuff and you ask a little bit [. . .]. You know what I mean? (Focus Group Reflection, 04/06/2022)

Similarly, as a participant on a panel at a local mathematics education conference, Liliana (mother) talked about the same dynamic in reflecting on her experience of the project:

“Como mamá una piensa que la maestra está aquí [points high]. Que [la maestra] es la del poder y cómo voy a llegar a decirle ¡maestra! O sea, una mamá, ya una señora grande, preguntarle a una maestra, cuando tú ya tuviste una educación, es como ¡da pena, pues! O sea, va a decir la maestra, “no sabe nada”, o algo así. Pero ya al estar en la actividad [Juntos/Together Project] como son, que ellas también tienen sus preocupaciones, que hay veces que no pueden, igual que uno- no entender ciertas cosas, que tienen que practicar, que tienen que estudiarlo. Y dices, ¡pues somos iguales! Al final del día somos iguales.”

English Translation: “As a mom one thinks that the teacher is here [points high], that she has the power, and how would I ask, teacher! Like, a mother, a grown-up, ask the teacher, when you had an education, it’s like, shame! Like, the teacher will say “she does not know anything,” or something like that. But when we

were in the activities [. . .] how they are, that they also have their worries, that there are times they can't, like oneself, understand certain things, that they need to practice it, that they need to study it. And you say we are the same! At the end of the day, we are the same."

Liliana spoke of the fear of being embarrassed to approach the teacher if she needed support because teachers may perceive you as not knowing anything. However, she felt that the project allowed her to see that teachers and parents have much in common and it is okay for her to not know everything because teachers also struggle. Reflecting on the project, Linda (5th-grade teacher) shared:

It [the project] helped to destroy some of those misconceptions between you know, the teachers are always right, or the parents are always right, and you know. . . It's ok - we had that discussion about- It's ok to do it differently. (Focus Group Reflection, 04/06/2022)

Being able to embrace families' ways of doing mathematics and understand them not as competing with but enriching the school curriculum was an important takeaway for participant teachers.

This project opened and fostered a space of *confianza* that allowed teachers and parents to know each other and allowed them to get past the intimidation that parents and teachers may have toward each other in regular school settings, indicating a critical shift in power differentials. Isabel, a mother who participated in the project, described this shift:

"Lo que más aprendí fue que aparte de maestras son seres humanos y muchas veces nosotros como padres vemos a los maestros como si tuviéramos una barrera entre, "Oh es la maestra de mi hijo y" [Isabel puts her hand up like she is touching an invisible wall]. Pero no sé porque existe ese como todavía esa barrera de hielo que no sobrepasamos los maestros y los padres. Yo así lo siento y cuando convivía con las maestras, pues me sentía como si fuéramos iguales ahí en el salón. Sí, me gustó mucho esa convivencia."

English Translation: "What I learned the most, was that aside from being teachers, they are human beings and often we as parents see the teachers as if we had a barrier in between, "Oh, they are the teacher of my child and" [Isabel puts her hand up as if she is touching an invisible wall.] But I don't know why that barrier of ice still exists that we as parents and teachers cannot overcome. That is how I experience it, and when I shared with the teachers [in the project], I felt as if we were the same in that room. Yes, I enjoyed that sharing very much."

(Isabel, Interview 05/06/2022)

While complex, it is crucial to create spaces in which caregivers and teachers can be learners with and from each other, and engaging in mathematics tasks was one of the means we used to create these opportunities. Considering the historical alienation caused by mathematics education in communities of color, particular attention is needed to avoid reproducing exclusionary power dynamics. Within mathematics learning spaces, including classrooms, we argue that simply using problem-solving tasks is not enough because of the risk of typical power differentials emerging, as reflected in previous work in this area:

[P]retending that we can "improve" marginalized students' mathematics learning opportunities without taking into account their lived experiences, is educationally naïve at best. Some of these lived experiences involve navigating different worlds (e.g., literally geographically, Mexico and the United States, as well as home and school), different languages, negative perceptions (e.g., views of immigration), fears (e.g., their "status" in the United States), and areas of expertise that grow out of these lived experiences and that may be different from our own experiences and expertise. (Civil, 2014, p.11).

Selecting tasks to involve parents and teachers requires careful consideration to disrupt established hierarchies. Grounding mathematics tasks in families' and community's funds of knowledge enhanced caregivers' sense of belonging in the conversation, positioning them as experts and problem solvers. This integration is essential to redefining whose knowledge is valued in mathematical problem solving and learning experiences more generally. This positioning of multilingual children and community members from historically resilient communities as experts has the potential to shift their identity as mathematics learners and partners in education.

Lingering Tensions and Implications

It is important to acknowledge that working with teachers and caregivers in this way requires resources that are not easily found in schools or integrated into teacher preparation or professional development settings. We had the time and resources to foster a sense of community and build relationships with each other. In addition, while we had extended time to explore open-ended tasks, such as the funds of knowledge tasks, and no pressure to achieve any particular mathematical goal, we acknowledge that professional learning efforts, teacher preparation programs, and family engagement models do not always have sufficient time devoted to this work.

The work we have done in this project would not have been the same had we not had the deep roots in the community that we had as a group. When working with marginalized communities, it is essential to spend extensive time getting to know the community so we can understand their everyday activities, values, perspectives, and experiences more authentically. Each community, even those with similar origins (i.e., communities with Mexican origins), is unique. As researchers, mathematics educators, and teachers, we need to commit to engage with the communities we serve and learn from and with them about their practices, traditions, and specific funds of knowledge, as well as to purposely avoid falling into dehumanizing stereotypes. This might mean seeking out and connecting with a trusted community member if you are newer to a community. The risk of stereotyping communities of color is high given the dominant, deficit narratives in society, even with the best of intentions. Centering curriculum in the lives and experiences of marginalized and historically resilient communities requires collaborating with families and community members as essential, valuable partners.

Given the constraints on time, curricular freedom, and opportunities to interact with caregivers in meaningful ways in traditional school settings, what can classroom teachers and mathematics teacher educators do to provide a space of collaboration with caregivers with the common goal of students' success? This work suggests that teacher educators could support in-service or preservice teachers to find ways to connect with their students' families beyond the traditional family engagement practices; our work indicates that time invested in getting to know families deeply will prove to be highly beneficial in shifting power differentials typically present in home-school relationships. Teacher educators could support district and school family engagement structures to prioritize relationship-building between teachers and families, opening possibilities for transformative relationships and classrooms.

More specifically for mathematics teacher educators, this could mean supporting in-service and preservice teachers to engage with families and/or explore the community of their schools (Drake et al., 2015). In-service or preservice teachers could then be supported to develop meaningful tasks based on the funds of knowledge of the communities. In addition, teacher educators should examine the tasks that they use through the lens of funds of knowledge and find ways to model the integration of funds of knowledge. Finally, teacher educators and practicing teachers can integrate meaningful work with families around mathematics in their contexts by including activities intentionally designed to shift the traditional power differentials present in caregiver-teacher interactions. These activities could happen in assignments preservice teachers do in their field sites or professional learning opportunities with in-service teachers, or they could involve bringing

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preservice and in-service teachers and caregivers together outside of the school space, where those power differentials tend to persist. In turn, this has the potential to change what it means to do mathematics and whose knowledge is centered. Family and community knowledge and practices have the potential to disrupt exclusive patterns within the discipline of mathematics itself.

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Appendix

 Maestras/Teachers &
  Padres/Parents

Math Activity : Paper Flowers

Actividad de Matemáticas: Flores de Papel

Original task by Marta Civil and Amy Been-Bennett. This adaptation is for grades 3-5 from the EQSTEMM project (2021)




Elaborando flores de papel

Making paper flowers

https://www.youtube.com/watch?v=tZOHZL_N790



Elaborando flores de papel
Making paper flowers

¿Qué notaste?
What did you notice?



¿Cuántas flores de papel podemos hacer con un paquete de papel de seda?
How many flowers can we make with one package of tissue paper?

Algo de información útil:
Un paquete de papel de seda tiene 24 hojas.
Cada hoja mide 20 pulgadas por 26 pulgadas.

Some useful information:
A package of colored tissue paper has 24 sheets.
Each sheet of tissue paper is 20 inches by 26 inches.



¿Cuántas flores de papel podemos hacer con un paquete de papel de seda?
How many flowers can we make with one package of tissue paper?

Algo de información útil:
Some useful information:

<p>Papel cortado en cuartos Paper cut in 4ths</p> 	<p>Papel cortado en sextos Paper cut in 6ths</p> 	<p>Papel cortado en octavos Paper cut in 8ths</p> 
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COMPARTAMOS NUESTRAS SOLUCIONES SHARING SOLUTIONS



Extensión de la Actividad Extension Task:



Si necesitamos elaborar _____ flores, ¿Cuántos paquetes de papel de seda necesitamos?

If we want to make _____ flowers, how many packages of tissue paper will we need?

Reflexión Sobre la Actividad de Matemáticas Reflection on the Mathematics Activity



- ¿Cómo apoyó la actividad de matemáticas la colaboración, la participación y la discusión? *How did the math task support collaboration, participation and discussion?*
 - Habla sobre cómo las “características claves” de la actividad - (el formato, el contexto, la estructura, los diferentes componentes, soluciones o representaciones, etc.) - apoyaron la participación y discusión. *Discuss how “key features” of the task - (the format, the context, the structure, the different components, solutions or representations, etc...) - supported participation and discussion?*
- ¿Qué más notó acerca de cómo la actividad creó espacio para diferentes contribuciones e ideas? *What else did you notice about how the task created space for different contributions and ideas?*

