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Working with Families in Bilingual Mathematics: Supporting a Leadership Space for Latina Mothers

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Working with Families in Bilingual Mathematics: Supporting a Leadership Space for Latina Mothers

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Abstract

This paper analyzes the work developed with a group of Latina mothers in a mathematics afterschool program for a period of 3 ½ years. The analysis of the productive patterns of interaction of this group of mothers with a group of bilingual participants shows that the program's participation and activity structure closely determines the quality of the mothers' participation. We present a sequence of attempts developed to alter this structure in order to successfully capitalize on mothers' leadership roles and knowledge during intergenerational and bilingual mathematical activity. We further discuss key social processes—acknowledging mothers as facilitators, focusing on communication rather than on a specific language, and supporting mathematics performance through social interactions—that opened up a space for Latina mothers' leadership and dynamic participation during bilingual mathematical activity.

Keywords: bilingual mathematics, parent involvement and leadership, afterschool programs



Trabajando con Familias en Matemáticas Bilingües: Un Espacio de Liderazgo para las Madres Latinas

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Resumen

Este artículo analiza el trabajo desarrollado con un grupo de madres Latinas en un programa extraescolar de matemáticas durante un período de 3 ½ años. El análisis enfocado en patrones productivos de interacción entre el grupo de madres con el grupo de participantes bilingües demuestra que la estructura de participación y actividad del programa afecta la calidad de participación de las madres. Presentamos intentos desarrollados para alterar esa estructura y capitalizar en los roles y liderazgo de las madres durante actividad matemática intergeneracional y bilingüe. Además discutimos procesos claves—reconocimiento de madres como facilitadoras, enfoque comunicativo más que en un lenguaje específico, y apoyo a la actividad matemática a través de interacciones sociales—que abrieron un espacio para el liderazgo y la participación dinámica de las madres Latinas durante actividad matemática bilingüe.

Palabras clave: matemáticas bilingüe, liderazgo y participación de padres, programas extraescolares

Much of the rhetoric around parental involvement, especially among Latina mothers, defines it from a deficit perspective (Valdés, 1996). Questions range from parents' willingness to participate to their lack of preparation or ability to collaborate (Delgado-Gaitán, 1991, 2004; Valdés, 1996). Within the United States of America, the Latino population (encompassing those of Mexican, Puerto Rican, Cuban, Dominican, Central American, South American, and Other Hispanic origin) makes up 16.32% of the total population (about 50 million) (U.S. Census Bureau, 2011). As the Latino population continues to grow, it is crucial to provide them with equitable educational opportunities, capitalizing on their unique background, culture, language, etc. because within the dominant perspectives their knowledge, interests, and needs may be neglected (Civil, Planas, & Quintos, 2005).

Therefore, in this article we share our experience of working with mothers in a mathematics afterschool program, which was dedicated to their children's learning. We describe the challenges, shifts, and improvements in our work with them by explicitly considering and altering language and power dynamics within our work. Often, as Valdés (1996) asserts, family programs tend to change parents and as a result these actions marginalize the parents' culture and practices. Thus, Delgado-Gaitán (2004) asserts that when working with parents it is necessary to continuously examine the quality of relations established them and identify the possible barriers that may be limiting their participation. She suggests three actions to improve relations between parents and schools: (a) improving communication with families, (b) sharing information of how to support their children at home, and (c) improving and sustaining their involvement in school activities. The circumstances of our work with Mexican mothers asked us to reach beyond these actions because they were already involved in our afterschool program working with their bilingual (Spanish and English) children in mathematics on regular basis. We present in this paper, lessons learned to promote mother involvement *con respeto* (Valdés, 1996).

Los Rayos Afterschool Program

The afterschool program developed as part of The Center for the Mathematics Education of Latinos/as (CEMELA), which is an

interdisciplinary, multi-university consortium that aims to understand the interplay of mathematics education and the unique linguistic, cultural, social, and political issues that affect Latino/a communities. Specifically, the afterschool mathematics program, *Los Rayos* (Khisty, 2004)—an adaptation of *The Fifth Dimension* (Cole, 2006) and *La Clase Mágica* (Vásquez, 2003)—was implemented in a public elementary school in the Midwest of the U.S. This school has a Dual Language (Spanish-English) Program. The school itself is located in a low-income neighbourhood where the student population is nearly 100% Latina/o. Over the course of its duration (three and a half years), this afterschool program consisted mainly of one cohort of about 18 students who started in the program when were in 3rd and continued through 6th grade, about 7-8 mothers of these children, undergraduate pre-service teachers (facilitators), and graduate research fellows. The authors are part of the last group. The student curriculum include the following units: community mathematization project, family recipes, community math, science and math, pre-algebra, patterns, probability, problem posing, and mentoring younger students. The program was intentionally designed (Khisty, 2004) to promote intergenerational participation and communication. The group of mothers and their children alternated between working together and independently. In some units the mothers participated more frequently than in others. The curriculum in the mothers' group was determined in collaboration with the mothers themselves.

A Sociocultural Perspective

In this article and in our work with mothers, we embraced a sociocultural paradigm because it capitalizes on family's funds of knowledge and agency. We particularly acknowledge parents as contributors of knowledge in the mathematics education of their children. We envision and encourage collaboration with parents, but we argue that in such collaboration we must be conscious of and separate from previous deficit perspectives on parental participation (especially those perspectives related to culturally and/or linguistically diverse populations). The afterschool program was founded on the promotion of the principles that sustain a "Zone of Mathematical Practice" (Gonzalez, Andrade, Civil, & Moll, 2001); thus, we strived for the development of: a) inter-subjectivity, sense making in joint activity with

others, b) equalized social interaction, equal validation, c) a playful, accessible, “natural” kind of mathematics, and d) funds of knowledge transformed into meaningful activity. Despite this vision, these principles did not transfer immediately into our practice and our work with mothers. We agree that it is important for parents to learn about working together and to become a support system for one another (Delgado-Gaitán, 1991) and also with and for their children (Navarrette, 1996), but we argue that this is an especially crucial learning process for those who are working with parents and are promoting their greater participation and involvement in schools.

When mothers joined the group students and facilitators in the afterschool, the interactions in those groups almost kept having the usual kind of interactions as when the mothers were not present. This resulted in the mothers having a peripheral participation even though the facilitators tried to include the mothers in the conversation. It seemed that both groups (mothers’ and students and facilitators’) carried previous roles into this new situation. That is, the mothers being the visitors, the facilitators being the instructors, and the students being the learners. Previous studies (Cohen, 1984) describe that during social interactions previous status of the participants carries over across contexts and practices and interferes in current interactions and participation that the members have in the group. Cohen (1984) suggests that participation can become more equitable through the equalization of the members’ status in their groups. She suggested that it is important to first notice members with low status. In order to promote more equitable participation, Cohen suggests a status treatment process, which consists in recognizing multiple skills, and especially those of the members with low status so that their strengths, skills, and knowledge may be highlighted by the leaders and utilized in the groups. This way not only others, but also these members themselves, would notice strengths that everyone in the group may contribute with. Considering the promotion of more equalized participation, we embarked on an inquiry process to better support mothers’ participation in the afterschool. This led us to evaluate the activity (Engeström, 1999) developed in the mathematics afterschool program.

Data Collection and Analysis

Within these complex circumstances, our interest in this paper is to share the patterns of interactions developed in our program that productively supported everyone's (i.e., students, facilitators, fellows) participation in the afterschool. For this reflective process, we relied on both our experiences as participant observers in the program as well as through facilitators' field notes to select sessions and units in our program that were considered relevant especially regarding mothers' participation. All sessions were videotaped and we selected videotaped interactions that productively promoted mothers' involvement. By productive involvement, we refer to the kind of interactions in which group members had opportunities to contribute (e.g., with ideas and/or actions) to a collective goal without subordinating, ignoring, or marginalizing other members in the group. In the program we had several units such as: probability units, integrating science and mathematics, finding pattern, playing with probability, community mathematization, and family recipes. Because mothers had a greater involvement during two of these units (i.e., community mathematization and the recipe projects) our analysis focused mostly on these units. All selected videos were viewed and some episodes were tagged in those videos. Attention was given to situations when participants engaged in mathematical discussions and there was at least one mother in the group. Additionally, two rounds of mothers' focus group interviews were analysed. In these interviews, the mothers reflected on their participation in the program. The data corpus for this study included a total of thirty-four hours of videotaped interactions and interviews.

Focusing on productive and equalized participation, our data analysis included an open- and axial coding process, which resulted in three main themes or productive patterns of interactions. These patterns were triangulated across data sources. In the next section, we use these themes to present our findings. Productive patterns of interaction in mothers' participation were present throughout the program and at times they also occurred simultaneously. However, our findings have been arranged in a way that as the main three patterns or lessons that we learned are presented, a chronological description of the program is also included.

Lessons Learned

We present vignettes that illustrate the interaction patterns that supported mothers' productive participation in mathematics and in the afterschool program. Productive patterns of interaction emerged when: a) mothers participated as facilitators, b) interactions centred on communication, and c) mathematical inquiry became a collaborative, safe process.

a) Mothers Participated as Facilitators

Patterns of interactions or work between the mothers and the group of students and their facilitators seemed unproductive under the regular structure of the program, similar to school. It was not until the mothers had a more defined and valued role (as facilitators) that they had more agentic actions and shared their knowledge. Since we had a group of volunteer mothers willing to participate in the afterschool program, we wanted to capitalize on their presence. However, this process was neither easy nor readily obvious to us. Initially, mothers were asked to join a group of students (their child's group) while they were playing mathematical games or solving mathematics problems. Although there were positive experiences that stemmed from this approach, the mothers did not have much room for agentic actions since they had no specific roles to play in the groups. When they joined the groups, they attempted to be either another player or a problem solver of the mathematical task. But the tendency of the facilitators and students was to focus on each other (as they regularly did); thus, the mothers had a rather limited role during this phase. As a result, the potential and knowledge of the mothers was not exploited; it was unaccounted for. In subsequent sessions, the mothers were consulted with for suggestions to plan future projects. These consultations were an initial attempt at tapping the mothers' leadership potential.

One of the new projects entailed participants' visits local businesses and exploration of the mathematics that community members engaged in while working in their regular work. The mothers contacted the community members and informed them about the purpose of the visits. The mothers and coordinators arranged visits with the community workplaces such as a hair salon, fire department, florist shop, mechanic shop, pharmacy, and grocery store. The goal was to uncover the mathematics used in the

practices at these workplaces. During the visits, students, facilitators, and the mothers—distributed in groups—chose to visit a particular location. In this process the mothers played important roles as they not only served as a link between the student visitors and the community hosts, but they also posed genuine questions about practices at the sites. Such questions triggered students' curiosity. In fact, many of the mathematization tasks that students developed sprang up from the initial interest of a mother. For example, in the group that visited a local mechanic shop, a mother asked the mechanic about the function of a machine. The mechanic described that it was a machine that bent exhaust pipes and then operated it to demonstrate how to bend pipes and measure the bending angle. This scenario led to all of the students in this group to become interested in exploring how to measure angles. Similarly, at the florist shop, a mother asked why the florists kept the flowers in a refrigerator. The florist explained that keeping the flowers refrigerated doubles the life span of the flowers. Students in this group also became interested in this idea and ended up developing related projects. In neither case did mothers interact directly with students to develop these interests; rather, mothers' and students' interests intersected through collaborative interactions in Spanish outside of the program.

The mothers, however, worked more directly with students in the subsequent mathematization process by joining the student debriefing groups. Collaborating with their facilitators (pre-service teachers) and the mothers, the students recalled mathematical practices observed in the community. During the discussions, the mothers became a source of knowledge and information for the students. For example, one group discussed the mathematics related to driving a car by considering how the size and the speed of a car could influence the time that it takes for the car to come to a complete stop. Questions about this process emerged, and the students consulted a mother (Sonia) based on her experience as a driver:

Facilitator: Vamos a decir que tenemos una troca, OK? ¿Qué tan rápido van las trocas? ¿Qué tan rápido va un carro? ¿Cuál es una velocidad en que puede ir un carro? / *Let's say that we have a truck, OK? How fast can the trucks go? How fast does a car go? At what speed can a car go?*

Candy: A mmm, ochenta? / *Uh, mmm, eighty?*

Facilitator: ¿Ochenta? / *Eighty?*

Candy: Que diga, ¿cien? / *I mean, one hundred?*

Facilitator: Mmm? That does not sound right.

Candy: ¿Noventa? / *Ninety?*

Facilitator: ¿No han visto los speed-limit signs? Cuánto dice? / *Haven't you seen the speed-limit signs? How much do they say?*

Candy: [looks at mother across the table] Mamá, ¿no te acuerdas a cuánto...? ¿a dónde va la aguja? ¿a cuánta velocidad puedes ir? / *Mom, don't you remember how much? Where does the needle go? How fast can you go?*

Sonia: Puedes ir a treinta en la calle. / *You can go thirty on the street.*

Facilitator: [looks at mother and Candy] En la calle. / *On the street.*

Sonia: En el express puedes ir a cincuenta y cinco, sesenta. / *On the expressway you can go at fifty-five, sixty.*

Facilitator: [to Candy] So, en distintos lugares, puedes ir a distintas velocidades. / *Then at different places you can go at different speeds.*

Sonia, called upon by her daughter, contributed to the group with the information that she knew as a driver herself. This information helped the students develop their own ideas about using mathematics for accelerating and breaking in relation to different city limits. In other groups, mothers had similar experiences to Sonia's. Nonetheless, the pre-service teachers directed most of the interactions. Therefore, the mothers' participation remained peripheral. Yet the group of mothers successfully mathematized the practices on their own (see Willey, 2008). We realized that the limitations that evolved could have been related to the language used by the group of students. English was the predominant language choice between students and facilitators, while the mothers mostly used Spanish. Students and facilitators were bilingual (Spanish and English), but rarely code switched to Spanish. These hegemonic practices of language use limited access to group members who had other language skills. We noticed that when there was one English monolingual speaker in a group, the whole group code switched to English almost immediately, one of the facilitators (Marta) said: "so they would be included and understand what we are saying." The students also used this argument. However, when there was a Spanish dominant or monolingual speaker, the groups were not as

accommodating. Either they rarely code switched to Spanish or they did not code switch at all and used English exclusively.

The almost exclusive use of English in facilitator-student interactions constrained the mothers' opportunities to participate in discussions. Some mothers still tried to get involved in the communication by using Spanish and although they were acknowledged and understood, the continuous use of English reinforced the line of communication only among English users. Besides language, we noticed that the structure of the projects also contributed to the mothers' peripheral role. It was because mothers had a clear role during the visits to the local business, but back in the setting of debriefing sessions when students mathematized the practices, the mothers' role was undefined. So once again the structure of the project was school like. Facilitators and students had clear idea of their roles and actions. Language was also embedded in the activity structure; at the community Spanish was mostly used, and in the school like setting, English. We had yet to capitalize fully on the mothers' knowledge, actions, and language. Therefore, the next step was to promote situations in which the mothers could become more active participants so that they could also facilitate interactions. We envisioned this by providing more opportunities for the mothers to share their knowledge and play a central role within these interactions.

Through interviews and formal and informal interactions with the groups of students as well as with the mothers, we discovered that cooking was a relevant theme for both groups. During various occasions in the afterschool program, students had mentioned that cooking requires a great deal of mathematics and they wanted to use it as a way to learn mathematics. In a focus group interview with mothers, Sandra shared with the group some cooking practices that she partakes in with her children at home. The other mothers agreed that these practices were common at their homes as well:

Sandra: A mis niñas yo les tengo su copa para medidas y trato de siempre tenerles harina, cosas así para que se enseñen a hacer panecitos o pasteles para comida. Y está el vaso ahí. Y fíjense lo que dice la caja y fíjense qué dicen las instrucciones. Y ellas lo van haciendo. / *I have a measuring cup for my girls and I always try to have flour for them, things like that so they can teach themselves to*

make cupcakes or cakes for food. And the cup is there, and look to see what the box says, look to see what the directions say. And they do it.

Sandra mentioned that at home she promotes the integration of mathematics and cooking and through that process she noticed both not only that her children liked this practice, but also that they can make connections to mathematics as they can cook. When mothers were planning for activities with their children, the consideration of what they like and what they can do were like a compass to them in the process. As a result, the group of mothers, in coordination with the afterschool coordinators (of the group of mothers, students, and facilitators), developed a unit focusing on family recipes. This unit had several phases. The first phase developed within the regular structure of small workgroups had students investigate and create their own recipes with the assistance of the pre-service teachers and the mothers. In essence, the first patterned that we learned about working with mother is that their knowledge and skills were validated and nurtured in the program when we stepped back and let them be facilitators in the program activities. However, at times language became an issue. In the next section, we describe how the mothers in the afterschool program led a creation of a recipe and problem solving including fractions.

b) Interactions Centred on Communication

Productive patterns of interaction among the mothers, facilitators, and students emerged when the emphasis was made on topics that required communication in a meaningful context and where not only one language was utilized as the means to communicate and instead the goal or the emphasis was sharing messages and ideas and making sure that the audience or the others understood and shared their ideas. So the process of communication centred on meaning rather than form. Previous activities revealed to both the mothers and the coordinating team that the students preferred to use English while working in small groups, which in turn gave mothers peripheral roles. The new approach was to create a space and an activity in which the use of language was familiar to all, including the mothers, because they were to lead the whole group in making mole as well as in the process of making mathematical meaning (in Spanish). The goal

was also to have the small groups of students use the language that they preferred. During the family recipes unit, the mothers supported student groups in the investigation and development of recipes in which students explored concepts of measurement, proportional reasoning, and fractions. The mole making was planned for one session only. Mole was chosen for several reasons. First, it is a dish very representative of Mexican culture, it is only one dish (easier to make), and the mothers knew that their children liked it. Second, the making of mole was also useful for students to think about concepts of fractions and proportions, concepts that were of later use in the final part of the recipes unit. And finally, the making of mole also represented an activity that was familiar to students and where the use of Spanish was intimately related to the practice. The students knew the Spanish names of the ingredients and procedures.

Furthermore, once the mothers agreed on making mole, they suggested ways of making the target concepts evident through the making of the recipe. The group of mothers collaborated with a research fellow (Domínguez, 2011). The group chose to focus on having students think about how to divide the recipe ingredients, which were bought for all together and needed to be distributed amongst the five student groups. This process would lead students to think about fractions. Then the mothers worked directly with students by guiding them in the process of making the recipe. The mole activity was introduced by one of the mothers, Blanca. The rest of mothers interjected (in Spanish) as needed during the process. One of the ingredients was chocolate, but the mothers purposefully only had three circular tablets of chocolate, which needed to be distributed equally among the five groups. Blanca introduced the problem thus:

Blanca: (pointed to her mouth and then said) Shhh! ¿En cuánto lo dividimos? Si son tres y somos cinco grupos. ¿En cuánto lo dividimos, mija? ¿De a cómo nos tocaría? / *How do we divide it? If these are three and there are five groups? In how many pieces do we divide it (3 bars of chocolate), honey? How much would each of us get?*

Maria (student): Podemos partirla a la mitad. / *We could split it in half.*

Blanca: A la mitad dice. / *In half, she says.*

Mothers (at the front): Sobraría una mitad. / *We would have one half left out.*

Rosa (student): A lo mejor podemos partir más, ¿la otra mitad? / *Maybe we could divide more, half again?*

Mothers: (laugh)

Girl 2: ¿En cuatro pedazos? / *Into four pieces?*

Lety (mother): Pero, ¡faltaría uno! / *But, we would be missing one group!*

Otros: ¡Cinco pedazos! / *Five pieces!*

Francisco (student): ¡Tres pedazos! / *Three pieces!*

Audience: [Started arguing about different ways]

Blanca: Son tres tabletas. / *There are three bars of chocolate* (shows one).

Antonio (student): ¡Yo tengo una idea! Lo puedes romper en pedazos, y luego. Si hay tres, entonces le puedes dar tres a cada uno, a cada grupo. / *I have an idea! You can break it into pieces, and then. If there are three, then you can give three to each one, to each group* (there were 5 groups).

Juan (pre-service teacher): ¿Cómo así? ¿Por qué tres a cada uno, Antonio? / *How? Why three to each group, Antonio?*

Antonio: Si hay cinco pedazos de cada uno, si necesitan, y si hay tres, porque entonces le van a dar, cada grupo va a tener tres. / *If there are five pieces of each [bar], and if they need, if there are three [bars], because then they will give; each group is going to have three.*

Juan: Si le vas a dar tres a cada grupo y hay cinco grupos, ¿cuántas piezas vas a dar en total? / *If you are going to give three to each group and there are five groups, how many pieces are you going to have in total?*

Antonio: (No response)

Juan: Porque ésa era tu idea, pero ¿cómo se las vas a dar? / *Because it was your idea, but how are you going to give them out?*

Different voices go at the same time

Antonio: ¡Quince! / *Fifteen!*

Blanca: ¡Ah! Esa es una buena idea también, es muy buena idea porque 3 por 5, quince. ¿Otra manera? / *Well, that is a good idea also, it's a good idea because 3 times 5, fifteen. Any other way?*

Students discussed in their small groups, including facilitators, in both languages (Spanish and/or English) and shared with the whole group in Spanish multiple solutions to divide the chocolate. Students were encouraged to further discuss these possibilities in their groups. After the discussion the groups shared their ideas, and the whole group agreed to elaborate on Antonio's idea about dividing each piece of chocolate into fifths. Two answers were provided. Each group would get either $\frac{3}{5}$ of a bar or $\frac{3}{15}$ of the entire pieces of chocolate. Although both answers are correct, depending on what is considered the whole, these differences generated a discussion in which participants reasoned about the relation between fractions and the definition of a whole. This is a complex concept, but the mothers and the facilitators communicated their ideas, solved differences, and successfully explored these concepts—by building on the students' ideas and using either Spanish or English. Despite using different languages, the participants all communicated with one another and understood and agreed on a solution.

This process promoted a more inclusive participation for everyone. Here both languages (Spanish and English) were used and participants used different languages (hopefully of their choice) when they solved, understood, and discussed the problem. We also noticed that not only during this session, but also throughout the recipe unit, students made more use of Spanish than ever before. Furthermore, some of the facilitators commented on how they had already assumed that some of the students they worked with had only receptive Spanish skills, but under these circumstances they started using Spanish spontaneously. We argue that the change in language use may be related to having a unit that was related to an activity familiar to both the students and the mothers and which was also closely connected to the use of Spanish. The previous activities, however, were linked to a context where English the almost exclusive means of communication. In the previous context, students saw their pre-service teachers as a source of support and mothers as peripheral to the activity. In the new circumstances—the recipes—all participants had important ideas to contribute to the process and there was not a dominant language that excluded the other. The group of mothers commented that this process helped them feel integrated like in a “big family,” a mathematical community of learners in which they played a central role in their children's

education as never before, since they shared their knowledge with the students and were paid attention to (López Leiva & Domínguez, 2011).

Nevertheless, after this experience, the program continued and mothers were prompted to think about future projects and collaborations based on the development of the recipes unit, as in the following:

Eva: Para mí creo que estaría bien trabajar con los niños porque /
To me, I think it would be good to work with the kids because...

Sandra: Uno aprende de ellos. / *One learns from them.*

Eva: De ellos aprende uno de ellos, más o menos. / *From them, we learn, more or less.*

Sandra: Porque si los papás no sabemos mucho, pues entonces ahí nos quedamos. Y los niños como que son más inteligentes ellos saben más, y entonces ellos van a enseñar más, vamos a aprender de ellos, ¿verdad? / *Because if the parents don't know much, well then we stay there. And the kids are more intelligent, they know more, and then they are going to teach more, we're going to learn from them, right?*

Eva: Sí. / *Yes.*

Sandra: Probablemente si trabajamos un día con ellos y un día solos. / *We will probably work with them one day and one day alone.*

The mothers started to see themselves as more active participants, but still their view of themselves as potential facilitators or instructors of mathematics was limited. They actually saw their work with their children as a way to learn from them. It seems that this positioning of the mothers themselves may describe in part why in the beginning of the program their roles were more peripheral and they did not assert themselves in the conversations. It was perhaps because they felt they were there to learn with and from their children. A change in the structure needed to position these mothers in a school situation in which their knowledge, language, opinions, and decisions were valued as a source of learning. The group of mothers taught us that they are not a pushy group, that they respect the work of the teachers, and that they trust them. However, when given the opportunity and the adequate structure, they participated and provided us with new perspectives about teaching their children. When we started valuing the mothers through explicit actions, their participation and culture flourished

in the context of our program. We learned that it is not only about “bringing” the culture of the family into school, but about creating a structure and a safe space that supports that link (Civil, Planas, & Quintos, 2005; Delgado-Gaitán, 2004). These links need to make them welcome as integral part of the structure of education. Immigrant parents often are reminded of their condition as outsiders of this country; likewise, schools may promote that perspective on parents regarding their role in the education of their children. Then the inclusion or involvement of parents, especially from culturally and linguistically diverse communities, also requires an alteration of power dynamics (Delgado-Gaitán, 1991; Valdés, 1996) that keep them outside or at least at the periphery of their children’s education. We need structures of participation and communication that are inclusive. As a result further work with mothers included future activities in which mothers and students worked more closely and directly. We describe these in the following section.

c) Mathematical Inquiry became a Collaborative, Safe Process

Productive interaction patterns between the mothers and student groups evolved when the mathematical thinking and work was shared and all group members’ participation was valued. Besides that, all members were responsible to present ideas and to contribute to the solution of the problem or task at hand. The group of mothers and their facilitator started working independently in the afterschool program with the goal of planning tasks to interact with their children around mathematics. They created some mathematical scenarios to have their children work on them. But in this process, they encountered some barriers that they needed to overcome. In the following excerpt, a mother, Juana, created a problem that the group collaboratively solved:

Juana: ¿Dividir 36 galletas dentro de 3 niños? / *Divide 36 cookies among 3 children?*

Hugo (facilitator): OK, ¿cuánto les tocaría? / *How much would each get?*

Juana: Les tocaría, a ver: 3, 6, 9, 12, 15, 18, 20, mmm? Ay no, no! / *Each would get, let’s see: 3, 6, 9, 12, 15, 18, 20, mmm? Oh, no, no!*

Sandra: ¿Como 5? / *Like 5?*

Hugo: ¿Por qué cinco? / *Why five?*

Eva: No, porque 3 por 5, 15 / *No, because 3 times 5, 15.*

Juana: 10, 20, 30. No 10 tampoco. / *10, 20, 30. No, not ten either.*

Eva: De a 12, sería 12 completos. / *It'll be 12, 12 whole ones.*

Juana: A ver, mmm les tocaría a ver: 10, 11, 12. Les tocaría 12 galletas a cada uno. / *Let's see, mmm they will have, let see: 10, 11, 12. They will have 12 cookies each.*

Hugo: ¿Cómo sacó 12? / *How did you get 12?*

Juana: Pues 9 por 3. mmm y 9 por 4, 36. No, a ver cómo le multiplicaría. Pero se pasa porque son tres. / *Well, 9 times 3, mmm and 9 times 4, 36. No, let's see how I would multiply. But it goes over because there are three of them.*

Juana: A ver déjeme ver: 3 niños a 10, 30; me faltan 6, luego divido los 6 entre los tres: 2, 4, 6, luego dos a 10 y allí me dan 12. Le doy 12 galletas a cada niño. / *Let me see: 3 children each with 10, 30; I'm still missing 6, then I divide those 6 by three: 2, 4, 6, then 2 to 10 and then I have 12. I give 12 cookies to each child.*

Hugo: Pues, ¿si fuera 30 galletas en lugar de 36? / *So if it were 30 cookies instead of 36?*

Juana: ¡Les tocaría 10! / *Each gets 10!*

Hugo: Pero hay 6 más galletas, para 3 niños. / *But there are still 6 cookies for three kids.*

Juana: Le doy dos a cada 10. / *Then I give two to each 10.*

Hugo: Ah, dos, dos, dos. / *So, two, two, two.*

Juana: Yo le trabajo así en la mente más fácil, pero no en el papel. / *Yeah, I work better like this in my mind it is easier, but not on paper.*

It seems that mothers, especially Juana, were used to operating division mentally rather than on paper. The fact of planning and needing to work with students using a new strategy, namely paper and pencil, caused the group of mothers to feel insecure about their mathematics skills. As the excerpt above portrays, Juana seemed to have difficulty trying to focus on the process of dividing 36 cookies among 3 children. After this incident, the group of mothers started opening up about how insecure they felt about their mathematical skills because of the way they were taught at school. The following excerpt illustrates this issue:

Juana: Lo que pasa es que siento que a nosotras, bueno a mí me enseñaron diferente. Porque todo lo teníamos que aprender de memoria y escribir un montón de veces. Y así pues una no aprende bien, ya después yo mejor aprendí a hacerlo con la mente, porque es más fácil, como que una sabe cómo lo divide, pues. Y una no tiene que andar recordando todo. / *The thing is that I think that we, well at least me, I was taught differently. Because we had to learn everything by heart and write it over and over. One does not learn well that way, so then later on I just learned to do it in my head because it is easier and you know how to divide it. So you don't have to remember everything.*

Eva: ¡Ay, sí! Todo era de memorizar y por eso uno siente que no aprende bien, se le olvida a uno. Yo pues, para el trabajo mejor uso una calculadora y ya. O sea una va viendo cómo adaptarse y resolver los problemas. / *Yes! Everything was about memorization and for that reason one feels that one didn't learn well and forgets it. At work I prefer using a calculator and that's it. What I mean is that you try to adapt and solve the problems.*

Juana: Sí, lo que pasa es..., lo bueno es que ahora a nuestros niños como que les enseñan diferente y lo hacen más bonito, más agradable. A mis hijas les gusta y se sienten bien con matemática. / *Yes, what happens is... well the good thing is that now our children are being taught differently and they do everything nicer and more pleasantly. My daughters like it and they feel good about math.*

Sandra: Es que uno no aprende todo en la escuela. Yo me recuerdo de mi abuelo que era carpintero y él para hacer sus cálculos en la mente, era tan rápido y tan exacto. Y también un tío que era sastre también igual. Porque como les sirve y saben cómo usarlo y además lo hacen tanto que ya es tan fácil para ellos que no necesitan pensarlo tanto. / *One cannot learn everything at school. I remember my grandpa who was a carpenter and he was great at doing calculations in his mind. He was so fast and exact. Also an uncle who was a tailor and the same thing. Because it is useful to them and they know how to use it and they do it so often that it has become easy to them, so that they do not need to think about it too much.*

Hugo: Bueno, pero ustedes saben mucho y solo deben de confiar en Uds., en lo que saben. Y además aquí todos estamos aprendiendo. / *Well, but you know a lot and all you need to do is trust in yourselves, in what you know. Besides we are all learning here.*

The mothers revealed that part of not feeling safe about doing mathematics stemmed from their experiences as students in school and how irrelevant and limiting traditional schooling was to them growing up in Mexico, even though some were nurses and others almost completed secondary school over there. They argued that it was a kind of mathematics that they had to memorize but not necessarily understand. In addition, they noticed a mismatch between the way they learned and the way their children are learning in U.S. schools. They, however, argued that school is not the only place to learn and that everyday practitioners can be as good at doing a mathematics that relates to their practice. These facts made them self-conscious about their mathematical skills. Given this, how could the mothers support their own children's learning in mathematics? The group continued creating and solving new problems and engaging in them collectively as portrayed in the excerpt at the beginning of this section. Later on, based on what they learned in this situation, not only content wise but also about their respective experiences, fears, and accomplishments, they developed problems to work with students in the program.

The mothers concluded that situations like the ones they had experienced at the afterschool program empowered them, made them feel more confident, promoted productive dispositions toward working in mathematics, and especially convinced them that indeed they could understand mathematics. The group agreed that the relevance of mathematics is connected to a context in which it is used and is personally meaningful. The mothers asserted that everyday knowledge is as important as academic knowledge (Navarrette, 1996) and that it requires a context in which the mathematical relevance is essential and driven by meaning making, as in the example of Sandra's relatives, the carpenter and the tailor, or even their own daily practices, such as cooking. Thus, they decided to develop sessions solving problems collectively to learn more mathematics and also to start exploring what helps—or does not help—their children to learn mathematics better. They invited some of their children to these sessions and had them solve problems. The group of mothers discovered not only that they can work together and learn from each and their children, they also discovered that they provided a support system for each other, just as Delgado-Gaitán (1991) recommends. They also realized that they could

be resources for their children to learn academic content at school (Navarrette, 1996). This also eventually led them to share their insights with the children's teachers (see Domínguez, 2011). The goal of this communication was that their children could develop better dispositions and proficiency in mathematics. These results corroborate Civil's (2002, 2007) findings that through work with parents, in our case mothers only, we (researchers and facilitators) may see and learn about relevance or our actions in and necessity to capitalize on parents' resources in the education of their children. We also realized that we despite the fact that we are bilingual and many of us are Latin@s or Hispanics, we all needed and still need much more to learn about how to respect and support mothers' leadership and language as well as to promote a collaborative, safe, and productive environment to work with bilingual Latina families in bilingual mathematics.

Concluding Remarks

We learned that the process of including parents is more than simply having them sit next to their children in the classroom and work on a mathematical problem. When including parents, some structural issues may emerge. These relate to how can we position them as facilitators in the educational environment that we are a part of. This encompasses envisioning, positioning, and involving parents not as peripheral collaborators but as central contributors of curricular knowledge (Civil & Andrade, 2003). Considerations of language and power dynamics are important in the process of capitalizing on parents' and children's resources. We found it useful to centre our efforts on meaningful communicative situations that mediated the interference of these variables.

Additionally, we found that this group of mothers' previous experiences in mathematics acted as a barrier of unproductive dispositions, which could, however, be faced and overcome contextually through the process of capitalizing on both what they know and through high-quality social processes that became the means of engaging with mathematics. The process of deconstructing, altering, and promoting new roles or group status with mothers, facilitators, and students working together was an important process in the promotion of more equalized and distributed collaboration

(Cohen, 1984). The group of mothers moved from a peripheral to a central role in making decisions and facilitating learning for their children. This process was possible due to the safe and collaborative nature of the interactions and relations in their group, so that they were a support system for each other to learn and do mathematics among themselves and with their children. In this process, they also came to see themselves and act as agents of change and academic instructors for their children. Thus, mothers' agency and leadership are socially produced; these expand beyond one's skin or mothers' intentions and actions (Wertsch et al., 1993). Finally, we believe that we have only cracked the surface of the multiple resources that these mothers possess. Relying only on cooking would be a very narrow perspective of what we are suggesting. We, in consultation with mothers and students, selected the topic of family recipes because it was a relevant theme for both students and parents at the moment. Further exploration of the funds of knowledge (Gonzalez, et al., 2001; Moll, Amanti, Neff, & González, 1992) and interests of mothers, bilingual students, and their facilitators could further illuminate new and different opportunities and knowledge to capitalize on.

Notes

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