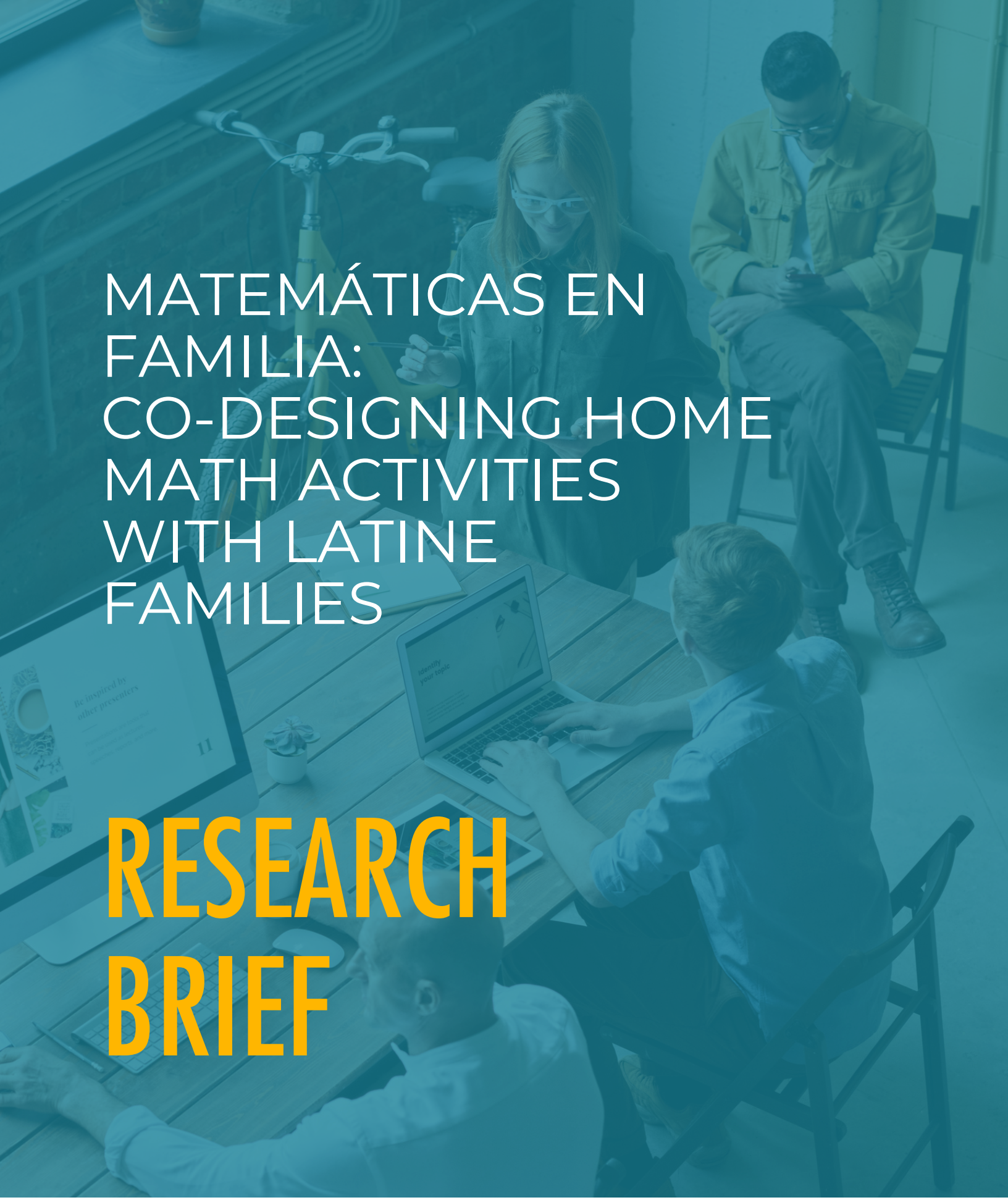

MATEMÁTICAS EN FAMILIA: CO-DESIGNING HOME MATH ACTIVITIES WITH LATINE FAMILIES

RESEARCH BRIEF

Center for Family Math

ABOUT AUTHOR

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OVERVIEW

This project is a partnership with Latine families from the Santa Ana Early Learning Initiative to create family games for early math learning based on their existing practices at home. This research emphasizes the importance of culturally relevant and playful tools that build from the experiences of families to support family engagement and early math learning at home.

Key takeaway(s)

- **Understand** how families naturally engage with math in their everyday routines. For many Latine families, cooking, shopping, and playing traditional games are key opportunities for young children to learn math.
- **Build** on families' experiences and cultural traditions to design math activities that spark engagement and foster positive attitudes toward math.
- **Use** playful and hands-on activities drawn from families' daily lives to encourage participation from mothers, fathers, siblings, and other family members alike.
- **Invite** caregivers and children to co-create math activities so they feel more relevant, practical, and meaningful.

ABOUT THE PROJECT

Early math matters. Creating supportive math experiences for young children from minoritized backgrounds is crucial for promoting equity in education and building a strong foundation for future academic success. Research shows that early math skills developed in preschool and the early elementary years are strong predictors of later math achievement and overall academic performance, even into high school.[1]

Enjoyable family interactions nurture interest. When children engage with math in enjoyable and interactive ways, they become more motivated to explore and persist in math-related activities, which helps grow their interest and confidence in the subject.[2] Caregivers and siblings play an important role in shaping young children's attitudes toward math and their early math learning experiences through everyday interactions. Simple moments, like talking about numbers during meals or discussing money while shopping, offer valuable opportunities for children to develop and deepen their understanding of math concepts.[3]

Recognizing the importance of these everyday experiences, previous studies have introduced home kits with resources such as books, playing cards, and board games to support early math learning.[4] However, some researchers have noted low usage of these kits, suggesting that families may find certain materials disconnected from their daily routines.

Partnering with families ensures relevance. To address previous challenges, I worked closely with Latine families to co-design fun and easy-to-use math games inspired by their everyday experiences and cultural practices. By building on families' ideas and insights, we create activities that are meaningful and practical to those who will use them.[5] Moreover, playful and culturally responsive tools help children see math as enjoyable, connect new concepts to their familiar knowledge, and enable families to feel recognized and valued.

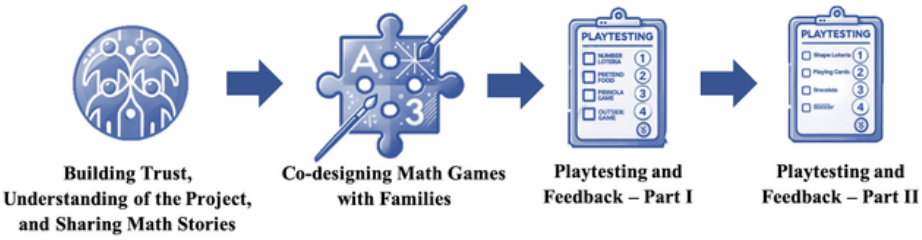
The project asked: *What activities result from blending Latine families' experiences with play and math through co-design? What are families' experiences playing with the finalized activities at home?*

ABOUT THE PROJECT

Our Partners

Santa Ana is a predominantly Latine community where Spanish is widely spoken, and many families are working class. The Santa Ana Early Learning Initiative (SAELI) unites nonprofits, public agencies, schools, and caregivers dedicated to improving early childhood outcomes and family well-being in the community. I partnered with SAELI's director, two promotoras (community advocates), 18 caregivers, and 21 children to carry out this work. Of those children, 43% were within the target age group of 4 to 6 years old, while 57% were older siblings.

Our Process



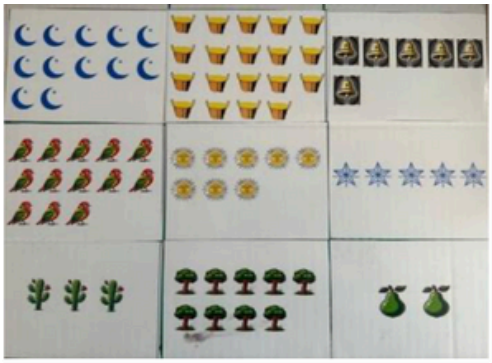
We held four design sessions in Spanish with families, each beginning with dinner to connect and create a welcoming atmosphere. Using storytelling prompts – such as "What activities do you enjoy doing as a family and why?" and "How do your children [or you] learn math at home and in the community?" – we encouraged participants to reflect on their experiences. We then engaged in a variety of hands-on activities, including building prototypes and playing games, to shape the design process. In the first two sessions, participants were separated into groups by their age to capture each group's unique ideas and experiences. Two groups consisted of parents, while five groups included children ranging in age from 3 to 15 years old. Children were grouped as follows: 3–6 years, 7–8 years, 9–11 years, and 12–15 years. During the playtesting sessions, families tried out the games together and shared their feedback.

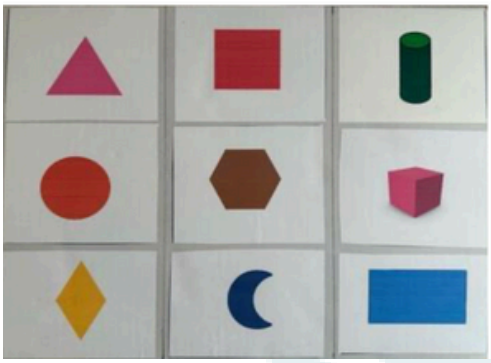
FAMILY MATH GAMES

Traditional board games: La Lotería de Mate

In the co-design sessions, families identified familiar games with embedded math concepts, such as the *pirinola* (a teetotum, a traditional six-sided top with instructions like “take one”), and games that could be adapted to include math concepts. One of the most recognized family games was *La Lotería*, a traditional Mexican game similar to bingo. Instead of numbers, *La Lotería* uses colorful illustrated cards featuring culturally significant images, such as *El Tambor* (drum), *El Nopal* (cactus), and *El Gallo* (rooster). More than just a game, *La Lotería* is a beloved tradition that brings families together, celebrates Mexican heritage, and fosters fun and community.

As part of this project, several parents and children proposed adapting the games to focus on math. The result was **La Lotería de Mate (Math Lotería)**, an adaptation incorporating three key elements: representations of the number of objects, symbolic numbers, and shapes. This version blends cultural practices with math learning, making it a familiar and engaging experience for families.





FAMILY MATH GAMES

Food pretend play: La Tiendita de la Esquina

Cooking at home and grocery shopping as a family are everyday ways Latine families naturally support children's math learning. These activities involve practices like counting items, measuring ingredients, comparing quantities, and using arithmetic when budgeting and handling money. Inspired by these real-life experiences and ideas shared by families during design sessions, we created **La Tiendita de la Esquina** (The Corner Store), a pretend play activity that brings these math-rich moments into a playful setting.

In this game, families used play money to "shop" for food items and worked with pots, paper, and markers to set prices, create their own recipes, and role-play cooking. By mirroring families' routines – budgeting, shopping, and preparing meals – the game encourages children to practice several early math skills in a fun and interactive way while also strengthening family connections through relatable experiences.

FAMILY MATH GAMES

Arts and crafts: Manos de Arte

Families shared how arts and crafts, such as making bracelets and necklaces, are a meaningful part of their traditions at home or when parents were growing up. These activities support young children's understanding of quantities, patterns, and symmetry as families select and arrange beads. Building on these experiences, we created **Manos de Arte** (Artful Hands), a playful activity where families use colorful beads and string to design jewelry while engaging in conversations about patterns, sequencing, and quantities. We also incorporated a visual guide to make these math concepts more explicit during play. The activity reinforces early math skills in a familiar and enjoyable way, celebrating the cultural significance of crafting by blending artistic expression with hands-on learning.

FAMILY MATH GAMES

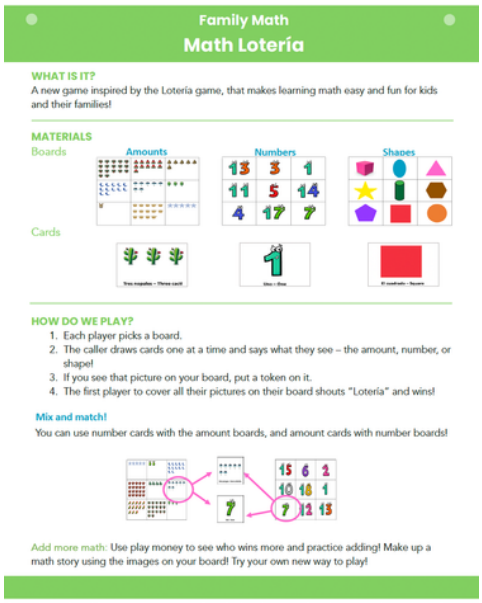
Active outside games: Tiro al Blanco

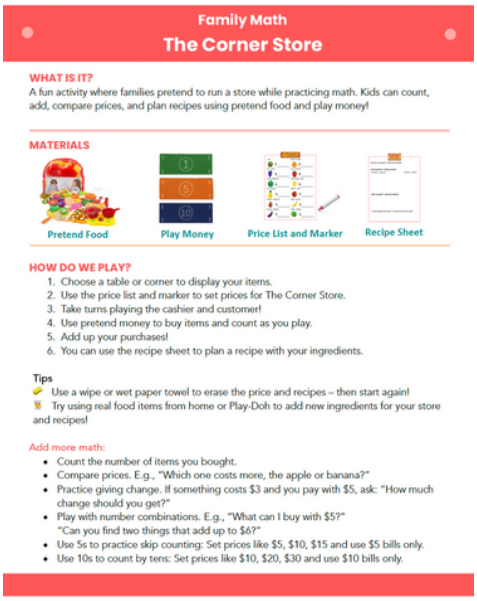
The fathers in the co-design session generally spoke about more physically active ways in which they played with their children and incorporated math. Those active forms included knocking down bottles with a *resortera* (slingshot), and playing volleyball and soccer, all while tracking and comparing points. Inspired by their ideas, we developed **Tiro al Blanco** (Hit the Target), a game that combines movement with math for a fun family learning experience.

In Tiro al Blanco, plastic rings labeled with numbers 1 to 5 are spread on the floor. Players take turns tossing bean bags, aiming to land them inside the rings. When a bag lands, the player identifies the number and adds those points to their score using a number line tracker and chips. Families brought their creativity to the game, making adaptations such as tossing the rings instead of the bean bags, arranging rings in a sequence for progressive scoring, or using colors to determine whether points were added or subtracted. These variations reinforced key math concepts like number recognition, addition, subtraction, and sequencing while keeping children engaged in active play.

FINAL GAMES AND GUIDES

In response to caregivers' interest in having additional support, each activity was accompanied by guides in Spanish and English that included materials, descriptions of how the activity works, and suggestions for "adding more math" to encourage additional math talk and extend learning. The guides were designed to offer support for families who wanted additional guidance, while also encouraging them to adapt the activities or create their own versions based on their interests. The Guides and additional materials are linked under the Resources section.





FINDINGS

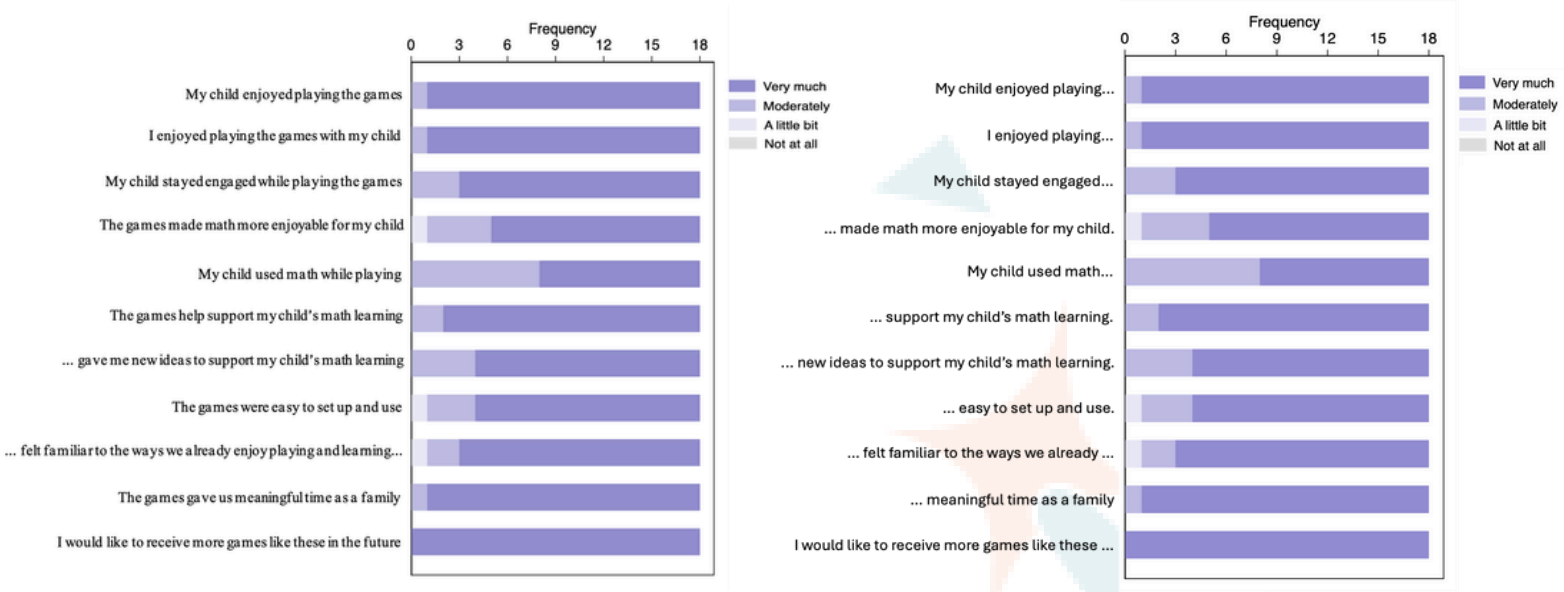
Insights from Families

"Matemáticas en Familia - Family Math" home kits with materials were distributed to families to learn about their experiences playing the finalized games at home. Latine caregivers who participated in the co-design sessions received the home kits and participated in follow-up interviews to share about their experiences. The main themes that emerged included caregivers seeing the games as relevant to their lives and valuable for supporting children's learning. The games also supported children's sustained engagement and joyful experiences for families. Furthermore, caregivers deeply appreciated that playing the games led to spending quality time as a family, and that older siblings also joined playtime to often help younger children with the math embedded in the games. Finally, the games were viewed as connected to their culture and their own childhood, providing opportunities not only for joyful math learning but also for bonding and sharing memories. Here are some examples from caregivers' voices:

Theme	Example	Translation
Relevance to Daily Life	"Me gustaron todos los juegos porque son cosas que usamos diario."	"I liked all the games because they're things we use every day."
Useful for Learning	"Hasta daban cambio. Así aprenden a saber el valor del dinero, están sumando y restando."	"They even gave change. That's how they learn the value of money, they're adding and subtracting."
Engagement	"Mi hijo estaba tan metido que no quería dejar de jugar."	"My son was so into it that he didn't want to stop playing."
Joyful Experience	"Nos reímos mucho jugando. Es algo que nos une."	"We laughed a lot while playing. It's something that brings us together."
Quality Family Time	"Yo noté en ellos que quieren estar en convivencia con la familia."	"I noticed that they want to spend time together as a family."
Involvement of Siblings	"Se ponían a jugar los tres juntos, el más grande ayudaba a los chiquitos."	"All three of them would play together, and the oldest would help the little ones."
Cultural Connection	"Yo creo que la lotería es algo que identifica a los latinos."	"I think lotería is something that identifies us as Latinos."
Mention of Own Childhood	"Es raro que hable de su niñez, pero esta vez sí lo hizo. Le dijo a nuestro hijo cómo jugaban en su pueblo."	"It's rare for him to talk about his childhood, but this time he did. He told our son how they used to play in his hometown."

FINDINGS

The home kits were also distributed through two kindergarten classrooms to understand whether the games created similar experiences for families who did not participate in the co-design process. Parents (15 mothers, 3 fathers) provided overwhelmingly positive feedback regarding the value of the games after three weeks of playtime at home, as seen in the Figure below. Out of the 18 parents, 17 parents reported themselves and their children enjoying playing the games "very much," and that the games "very much" led to a meaningful time as a family. In terms of learning value, parents perceived the games as facilitating children's use of math, supporting their child's math learning, and providing new ideas for supporting their child's math learning "moderately" to "very much." All parents were interested in receiving similar games in the future, indicating sustained interest and engagement in playful math activities. Most parents (n = 13) reported playing with the games two to three times a week, a few (n = 4) reported playing four or more times, and only one reported playing it once a week. Together, these findings show that when early math is integrated with play in collaboration with families, it becomes more than about math learning—*más que matemáticas*—it becomes a site of joy, connection, and meaningful engagement. As two parents shared: *"Jugar en familia nos permitió compartir momentos divertidos, risas, y anécdotas."* ("Playing as a family allowed us to share fun moments, laughter, and memories.") and "being able to learn with my son and have fun at the same time" was what they enjoyed the most about playing the games together at home.



MAIN TAKEAWAYS

Lessons Learned

This project revealed key insights about designing math games for families:

Understand how families engage in play. The games developed reflect Latine traditions, particularly of Mexican heritage, rather than mainstream U.S. games like Chutes and Ladders or UNO. Moreover, food pretend play and arts and crafts emerged as common ways Latine families engage and support children's math learning. These practices are rooted in traditions of collaboration, storytelling, and resourcefulness that can be traced back to indigenous practices.

This highlights the importance of acknowledging how minoritized families engage in play and ensuring that learning opportunities reflect their cultural backgrounds. When educational activities are rooted in families' lived experiences, they become more meaningful, engaging, and accessible. Furthermore, recognizing these everyday moments as valuable math-learning opportunities affirms families' contributions to their children's education.

Design inclusive activities for all family members. Gendered dynamics of play emerged as mothers and grandmothers gravitated toward brainstorming food-related activities, while fathers emphasized active physical games and sports. By inviting all family members – mothers, fathers, siblings, and grandparents – to participate in the co-design sessions, we developed a variety of family math games that encourage broader participation and multiple ways of engaging with math.

Apply this approach in schools. Educators can apply this approach in family math nights, home-learning activities, and classroom instruction by incorporating playful, culturally rooted experiences that reflect children's home lives. These games serve as simple, enjoyable ways to strengthen math skills while fostering family connections and engagement.

RESOURCES AND REFERENCES

Resources

Spanish Guides and Materials: https://tinyurl.com/familyandmathguides

English Guides and Materials:
https://tinyurl.com/matematicasenfamiliaguias

Note: You can use other materials available in your classroom or children's homes instead of the standard ones provided in the games.

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