

UC Irvine

UC Irvine Electronic Theses and Dissertations

Title

Empowering Family Learning: Centering Cultural Practices through Educational Technology with Latine Families

Permalink

<https://escholarship.org/uc/item/6hs38293>

ISBN

9798191601830

Author

Salazar, Julie

Publication Date

2026-09-21

Peer reviewed|Thesis/dissertation

UNIVERSITY OF CALIFORNIA,
IRVINE

Empowering Family Learning: Centering Cultural Practices through Educational Technology
with Latine Families

DISSERTATION

submitted in partial satisfaction of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

in Education

by

Julie Salazar

Dissertation Committee:
Associate Professor Andres S. Bustamante, Chair
Professor June Ahn
Professor Gustavo Carlo

DEDICATION

To

To my family and friends, for your
unconditional love, support, and care throughout this journey.

Especialty to my mom and dad:

sin ustedes, no habría logrado mis sueños.

Todo esto es gracias a ustedes.

And to the families I had the privilege of meeting along the way.
Thank you for sharing your stories, experiences, and time with me.

¡Muchísimas Gracias!

TABLE OF CONTENTS

	Page
<i>LIST OF FIGURES</i>	<i>v</i>
<i>LIST OF TABLES</i>	<i>vi</i>
<i>ACKNOWLEDGMENTS</i>	<i>vii</i>
<i>VITA</i>	<i>ix</i>
<i>ABSTRACT OF THE DISSERTATION</i>	<i>xi</i>
<i>CHAPTER 1: Introduction</i>	<i>1</i>
Dissertation Overview	4
Background	5
Theoretical Framework	13
References	23
<i>CHAPTER 2: Designing for Family Learning: Latina Mothers' Perspectives on Culturally Sustaining Educational Technology</i>	27
Background	28
Methodology	35
Results	38
Discussion	43
Conclusion.....	47
References	50
<i>CHAPTER 3: Engaging in Family Learning: Caregiver–Child Scaffolding and Everyday STEM Practices During Educational Technology Use</i>	55
Background	57
Methodology	64
Results	70
Discussion	78
Conclusion.....	82
References	84
<i>CHAPTER 4: Caregivers as Pedagogical Partners: Understanding Latine Caregivers' Pedagogical Sensemaking During Educational Technology Use</i>	88
Background	90
Methodology	96
Results	100
Discussion	108

Conclusion.....	116
References	118
<i>CHAPTER 5: Conclusion</i>	<i>122</i>
Designing from Families' Cultural Strengths	123
Designing for Family Learning	124
Recognizing Caregivers as Pedagogical Partners	126
Implications for Educational Technology Design and Research	128
Final Thoughts.....	130
References	132

LIST OF FIGURES

	Page
Figure 1 Playful Learning Landscapes.....	8
Figure 2 Bizumia: World of Play	9
Figure 3 Family Observations.....	66
Figure 4 Bizumia: World of Play Characters & Games.....	69
Figure 5 Ver–Pensar–Responder Framework for Caregiver Pedagogical Sensemaking.....	111

LIST OF TABLES

	Page
Table 1 Caregivers' Self-Identified Demographics	36
Table 2 Interview Questions in Spanish and English.....	36
Table 3 Families Demographics.....	65
Table 4 Families Demographics.....	96

ACKNOWLEDGMENTS

I would like to start by acknowledging all the families I had the privilege of meeting and working with. *Gracias por su cooperación, por integrarme en su comunidad, por la confianza que depositaron en mí y por permitirme ser parte de su historia.*

Dr. Andres S. Bustamante, thank you for the tremendous amount of support you have given me since the day we met. I appreciate you taking a chance on the undergraduate student who was eager to dive into co-design. I would not be here today without all the opportunities and endless support you have given me. Thank you for always believing in me!

Dr. June Ahn, you took me under your wing during my first year in the program. You saw potential in me, and since then, you have given me the tools I needed to succeed in academia. Thank you for always taking the time to make sure I was on the right track and for guiding me whenever I got lost.

Dr. Gustavo Carlo, you welcomed me not only into your lab but also into your projects, and for that, I am truly grateful. Thank you for always being a joy and making time for your students. All of our lab working sessions and coffee socials will always be among my favorite memories of the program.

I would also like to acknowledge the financial support that made this work and my doctoral journey possible. This work was supported by the Center of Family Math, the University of California, Irvine, Heising-Simons Foundation (2021-2810), and the National Science Foundation (2005776). This dissertation is based upon work supported by the National Science Foundation Graduate Research Fellowship Program under Grant No. [DGE-1839285]. Any opinions, findings, conclusions, or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the funding agencies.

I want to take a moment to thank the academic women who came before me Drs. Karlana D. Ochoa, Susie Beltrán-Grimm, LuEttaMae Lawrence, Daniela Alvarez-Vargas, and Vanessa N. Bermudez. You all continue to inspire me. Thank you for always mentoring me, for being a listening ear when I needed it most, and for paving the way. I could not have done this without our conference dinners, writing sessions, and many moments of laughter.

To Dr. Omar Ruvalcaba, thank you for believing in me and always supporting me. Because of your dedication to mentoring and research, I would not be here today. And to Dr. Gabriela Chavira, thank you for teaching me the ways of academia and more, making me a stronger researcher. *Muchas gracias a los dos.*

I also want to thank all the academic Latinas I have had the pleasure of working with in the STEM Learning Lab. To my future *Doctoras*, ¡*Sí se puede!* Thank you all for walking this path with me. I look forward to seeing your futures unfold.

To my friends in the graduate program, I could not have gone through this without you. I am grateful for all the beautiful memories we made together during our early-morning-to-late-night

working sessions, karaoke nights, and many gatherings. Without all your love, support, friendship, and kindness, I would not be here today. I want to give a special thank you to Dra. Patricia Fuentes Acevedo: *gracias por acompañarme durante este programa. Sola no lo habría logrado sin ti.*

To my hometown friends, thank you for supporting me from miles away. Whether we met in elementary school, high school, or college, you have shown me nothing but support throughout all my crazy adventures, this one being the biggest of them all. I love you all so much!

And to the many dogs who gave me so many walks, so much love, and so many giggles, you deserve all the treats in the world! A special thank you to Pisco, Olive, and Darryl.

Most importantly, I want to take a moment to thank my biggest cheerleaders of all: my family. Thank you for always waiting for me to come home with plenty of laughs and food. I will always cherish our coffee runs, carne asadas, and the many dinners in my parents' kitchen. I appreciate your patience, love, and support throughout this journey. And to my doggies, Rocky, Drago, and Novi, thank you for always putting a smile on my face. And to Cielo, thank you for starting this journey with me. I miss you every day!

Para mi mamá y mi papá, gracias por el futuro que me dieron. Por el gran esfuerzo que hicieron al venir a un nuevo país para poder darme el mundo, no tengo palabras suficientes para expresar lo agradecida que estoy por todo lo que han hecho por mí. Los quiero con todo mi corazón. Todo esto lo hice por ustedes. ¡Lo logramos! Esto es para ustedes.

Last but not least, I want to thank my younger self for pushing through the million-and-one obstacles it took to get here. You did it! *¡Felicidades, Doctora!*

VITA

Julie Salazar

EDUCATION

- 2019-21 Research Assistant, California State University, Northridge
- 2020 Research Assistant, University of California, San Diego
- 2020-21 Research Assistant, University of California, Irvine
- 2021 B.A., Psychology, California State University, Northridge
- 2024 M.A., Education, University of California, Irvine
- 2026 Ph.D., Education, University of California, Irvine

FIELD OF STUDY

Developmental Psychology, Learning Sciences, Educational Technology

PUBLICATIONS

- Anderson-Coto, M. J., **Salazar, J.**, Lopez, J. L.-S., Sedas, R. M., Campos, F., Bustamante, A. S., & Ahn, J. (2024). Towards culturally sustaining design: Centering community's voices for learning through Participatory Design. *International Journal of Child-Computer Interaction*, 39, 100621. <https://doi.org/10.1016/j.ijcci.2023.100621>
- Bermudez, V. N., **Salazar, J.**, Garcia, L., Ochoa, K. D., Pesch, A., Roldan, W., Soto-Lara, S., Gomez, W., Rodriguez, R., Hirsh-Pasek, K., Ahn, J., & Bustamante, A. S. (2023). "Designing culturally situated playful environments for early STEM learning with a Latine community. *Early Childhood Research Quarterly*. 65, 205-216, <https://doi.org/10.1016/j.ecresq.2023.06.003>
- Ochoa, K.D., Bermudez, V. N., Pesch, A., **Salazar, J.**, Gomez, W., Rodriguez, R., Ahn, J., Hirsh-Pasek, K., & Bustamante, A. S. (in press). "Los niños tienen derecho de jugar": Exploring Latina Mothers' Experiences as Co-Researchers and Advocates for Playful Learning in Community Spaces. *Frontiers in Education*.
- Pesch, A., Ochoa, K. D., Fletcher, K., Bermudez, V., Todaro, R., **Salazar, J.**, Gibbs, H. M., Ahn, J., Bustamante, A. S., & Hirsh-Pasek, K. (2022). Reinventing the public square and early educational settings through culturally informed, community co-design: Playful Learning Landscapes. *Frontiers in Psychology*, 13, 933320. <https://doi.org/10.3389/fpsyg.2022.933320>
- Pesch, A., Weisberg, D. S., Weisberg, M., Kennedy, K., Ochoa, K. D., Bermudez, V. N., **Salazar, J.**, Ahn, J., Bustamante, A. S., & Hirsh-Pasek, K. (2026). Leveraging community science to encourage a more inclusive and culturally representative

developmental science. *British Journal of Developmental Psychology*, 00, 1–14. <https://doi.org/10.1111/bjdp.70039>

Salazar, J., Seccia, I. T., Maldonado, J. V., Hernandez, L., Bermudez, V. N., Acevedo-Farag, L. M., Ahn, J., & Bustamante, A. S. (2025). Sustaining Latine Families' Cultural Values Through Technology Mediation Practices. *Journal of Latinos and Education*, 1–12. <https://doi.org/10.1080/15348431.2024.244494>

ABSTRACT OF THE DISSERTATION

Empowering Family Learning: Centering Cultural Practices through Educational Technology
with Latine Families

by

Julie Salazar

Doctor of Philosophy in Education

University of California, Irvine, 2026

Associate Professor Andres S. Bustamante, Chair

Educational technologies often overlook the cultural values, everyday practices, and lived experiences of historically minoritized communities, including Latine families. As a result, they may fail to recognize the cultural strengths families bring to learning or create meaningful opportunities for caregiver-child engagement. This dissertation examines how educational technology designed using culturally sustaining principles can support family learning by centering the perspectives and experiences of Latine caregivers and children.

Across three interconnected qualitative studies, the dissertation examines educational technology through the lenses of design, interaction, and interpretation. *Study 1* investigates how Latina mothers envision educational technologies that reflect their cultural values, family practices, and priorities for family learning. *Study 2* examines caregiver-child co-use of *Bizumia: World of Play*, a STEM-based educational application designed using culturally sustaining principles, focusing on how caregivers scaffold STEM reasoning and connect digital activities to everyday family practices. *Study 3* examines how caregivers interpret children's understanding and problem-solving and how those interpretations inform the support they provide during shared technology use.

Findings demonstrate that culturally sustaining educational technology involves more than representing culture within digital content. Caregivers' cultural values and priorities can

shape which technologies are designed to support learning, while everyday family knowledge can serve as a resource for STEM learning during caregiver-child interaction. Findings further position caregivers as pedagogical partners who observe children's learning, interpret their understanding, and respond with support. These processes inform the Ver-Pensar-Responder framework, which conceptualizes caregiver support as observing (*Ver*), interpreting (*Pensar*), and responding (*Responder*) to children's learning. This dissertation demonstrates how families' cultural strengths, everyday knowledge, and caregiver expertise can serve as meaningful resources for designing and supporting family learning with educational technology.

CHAPTER 1: Introduction

Digital technologies have now become deeply integrated into family life and are used as tools for communication, entertainment, and learning (Reid Chassiakos et al., 2016; Geurts et al., 2022; Wood et al., 2016). In the United States, access to digital devices is almost universal, with 97% of households having at least one smartphone, 75% owning a tablet, and 88% owning a computer (Konca, 2020; Rideout & Robb, 2020). Because of this greater accessibility, children are now using technology at an earlier age and in a number of learning settings, such as schools and at home (Reid Chassiakos et al., 2016)

Even though educational technology is widely used, many digital learning tools still reflect the beliefs and values of predominant cultural groups and do not account for the real-life experiences of historically marginalized families who are culturally and linguistically diverse (Anderson-Coto et al., 2024; Rosner et al., 2016). These educational technologies are generally based on the experiences of White, middle-class, English-speaking families and on the learning outcomes designers prioritize (Chaudron et al., 2018; Geurts et al., 2022; Rosner et al., 2016). Unfortunately, historically marginalized communities are often not adequately involved in the design process, leading to technologies that do not adequately respect how families engage in learning in their day-to-day lives (Connell et al., 2015; Salazar et al., 2025). Similarly, educational technologies tend to focus on children's individual interaction with digital content and pay less attention to the cultural values, family practices, and shared activities that influence how children learn together.

Learning is a social and cultural process, and children's understanding grows through interactions with their caregivers, family members, and communities (Rogoff, 1990; Vygotsky, 1978). Families contribute their cultural values, daily routines, and knowledge, all of which

influence how they communicate, solve problems, and make sense of things together (Moll et al., 1992). In Latine families, previous research has identified shared participation, collective learning, and family relationships as key strengths in children's learning experiences (Buhler-Wassmann et al., 2026). These views indicate that, to understand family learning, it is necessary to consider not only what children learn from educational technology but also the cultural and relational resources that families bring to their interactions with such technology.

As educational technologies become an increasingly important part of family life, digital learning tools need to go beyond accounting for cultural differences and instead provide opportunities for families to continue their own cultural practices, knowledge, and ways of learning together. Culturally sustaining pedagogy (CSP) argues that educational environments should not only recognize learners' cultural identities but also help to ensure that the linguistic and cultural practices which communities have developed over the generations are continued and maintained (Ladson-Billings, 1995; Paris, 2012). When this viewpoint is applied to educational technology, it means that digital tools can be designed not only to promote learning but offer opportunities for culturally rooted forms of family learning (Paris & Alim, 2014). If educational technology is examined from this point of view, the focus moves from viewing technology as the primary source of instruction to considering how it can provide opportunities for families to draw on their cultural knowledge, relationships, and everyday practices as resources for learning.

Even though researchers have looked at children's use of technology and the role of caregivers in digital learning (Bindman et al., 2021; Connell et al., 2015; Sobel et al., 2017), more work is needed to understand how educational technologies developed with culturally sustaining principles can support family learning in Latine communities. It is important to point out that Latine families are still underrepresented in educational technology research even though

Latines make up about 19% of the United States population (Creamer, 2021). By not paying sufficient attention to Latine families, researchers may fail to account for how their ways of knowing and cultural practices influence both how families view educational technologies and how they interact with them during learning (Anderson-Coto et al., 2024; Salazar et al., 2025).

This dissertation is guided by three related gaps. First, research on the cultural values, family practices, and community priorities that Latine caregivers think educational technologies should support remains limited. Understanding these views is important if we move from designing technologies *for* families to designing technologies that reflect families' priorities and strengths. The second gap is that little is known about what happens when caregivers and children use educational technologies designed on these principles. More research is needed, in particular, to understand how caregivers support children's science, technology, engineering, and mathematics (STEM) reasoning and problem-solving when using technology together, and how families link digital learning activities to their everyday routines. The third gap is that, although research on caregiver mediation has shown how caregivers direct children's use of technology, less attention has been paid to how caregivers interpret children's understanding as they use educational technology and how those interpretations influence decisions about when and how to provide support. Taken together, these gaps show the need to look at culturally sustaining educational technology in terms of design, interaction, and interpretation.

Filling these gaps would lead to a more thorough understanding of family learning in the context of educational technology. Instead of viewing culture as something that is reflected in digital content or caregivers as separate individuals who watch over their children's use of technology, this dissertation looks at how the cultural strengths of families can influence technology design, how those strengths arise as a result of interaction between caregivers and

children, and how caregivers interpret and support their children's learning during those interactions.

Dissertation Overview

This dissertation explores how educational technology, when designed using culturally sustaining principles, can provide meaningful learning experiences for Latine families. Instead of seeing technology as a means of delivering academic content, the dissertation examines how educational technologies can enable families to draw on their cultural values and everyday practices, participate together in STEM learning, and support children's developing understanding. To achieve this aim, the dissertation comprises three closely related qualitative studies that examine educational technology in terms of design, interaction, and interpretation.

Study 1 focuses on design by exploring how Latina mothers envision educational technologies that support family learning within their communities. Through semi-structured interviews, the study investigates the cultural values, family practices, and community priorities that caregivers believe educational technology should promote. In doing so, Study 1 emphasizes Latine caregivers' viewpoints, considering not only what educational technologies should include but also what kinds of family interactions and learning experiences they should enable.

Building on this research, *Study 2* examines interaction by investigating how caregivers and children use *Bizumia: World of Play*, an educational application designed on culturally sustaining principles. In particular, the study examines how caregivers support children's STEM reasoning and problem-solving during joint technology use and how families connect the STEM concepts in the application to their everyday family activities. Unlike previous work focused on educational technology design, this study examines how families engage with the technology and the meaning they assign to it when using it together.

Lastly, *Study 3* examines interpretation by exploring how caregivers understand children's learning as they participate in *Bizumia: World of Play*. This study examines how caregivers interpret children's understanding and problem-solving processes and how these interpretations influence the support they provide. Rather than examining only the observable scaffolding caregivers provide, *Study 3* considers the pedagogical reasoning behind caregivers' responses to children's learning.

These three studies show a development that begins with how Latine caregivers think about educational technology, moves on to how caregivers and children use technology grounded in families' cultural strengths, and ends with how caregivers interpret and support their children's learning in those interactions. By focusing on Latine families at all stages, during the design of the technology, interaction with it, and its interpretation, the dissertation contributes to the research areas of culturally sustaining educational technology, informal family STEM learning, and caregiver mediation of technology. This dissertation examines how families' cultural knowledge, everyday practices, and caregiver expertise can serve as resources for designing and supporting meaningful technology-mediated learning experiences.

Background

This dissertation results from a long-term partnership between researchers, a community organization, and Latine families in Southern California. Before this dissertation, the partnership carried out several collaborative research and design projects that helped us understand the cultural values, everyday practices, and community priorities families wanted included in educational technologies. These projects contributed to the creation of physical and digital learning tools based on the strengths and lived experiences of Latine families (see Anderson-Coto et al., 2024; Bermudez et al., 2023). Building on this, the current dissertation shifts its focus

from how culturally rooted learning technologies are designed to how families interact with them and how caregivers interpret and support their children's learning when using them together. The following sections explain the community partnership and the earlier studies which laid the foundation for this work.

Community Partnership

This project builds from a long-term collaboration between the STEM Learning Lab and Design & Partnership Lab at the University of California, Irvine with the Santa Ana Early Learning Initiative (SAELI). SAELI is a nonprofit organization made up of 200 local families, teachers, community leaders, school district representatives, and various public agencies, all committed to providing enriching learning opportunities for children ages 0 to 9 in Santa Ana, California. The partnership serves a predominantly Latine community, with about 96% of the local student body Latine, 78% eligible for free or reduced-price lunch, and 41% English learners.

The partnership with SAELI began in 2018, when one of the principal investigators joined SAELI's steering committee. From the very beginning, the partnership was intended to go beyond just recruiting participants by involving community members as collaborators at all stages of the research. Over time, SAELI became an active partner in several projects designing playful learning environments and educational technologies for young children and their families. This approach meant families were not just research participants but contributors whose cultural knowledge and daily practices could shape how learning environments were created and designed.

Playful Learning Landscapes

The first major collaborative project involving SAELI was the implementation of Playful Learning Landscapes (PLL), an initiative designed to turn ordinary community areas into opportunities for playful science, technology, engineering, and mathematics (STEM) learning (Belgrave et al., 2022; Bermudez et al., 2023; Bustamante et al., 2019; Pesch et al., 2022). The aim of the PLL initiative was to integrate educational experiences into familiar community settings, such as grocery stores, bus stops, and parks, where families usually spend time together. As a result of the partnership with SAELI, the project went beyond setting up learning activities in everyday environments to include the cultural values, experiences, and practices that Latine families had identified as important for family learning.

To ensure the installations would reflect community priorities, the research team involved caregivers and their children in a participatory design process. As a result of this effort, Bermudez and colleagues (2023) found a number of values and practices that families wished to be included in community learning environments. The caregivers stressed the importance of *familismo*, highlighting the interconnectedness of family relationships and the key role families play in children's learning and development (Calzada, 2010; Steidel & Contreras, 2003). They also said they wanted to be genuinely represented in educational settings in terms of their cultural identities and personal experiences. Families described STEM learning as occurring naturally in everyday activities such as cooking, shopping, playing cultural games, and outdoor experiences. These findings showed that families' cultural values and everyday practices could serve as resources when designing learning environments, rather than as background features.

Based on the findings, the research team and SAELI created four Playful Learning Landscape installations at a community bus stop and a neighborhood grocery store (Bermudez et

al., 2023; see Figure 1). For instance, the *Abacus Bus Stop* drew on caregivers' experiences using an abacus in their home countries to learn numbers and mathematical operations, and their wish to pass this experience on to their children. Further installations were designed for use in a grocery store, since families had identified it as a place where family learning often took place. The activities encouraged caregivers and children to engage in STEM practices such as observing and comparing produce, estimating weight, and working with pounds and kilograms. One measurement activity came directly from caregivers' experiences coping with differences between measurement systems after they moved to the United States (Belgrave et al., 2022).

Figure 1
Playful Learning Landscapes



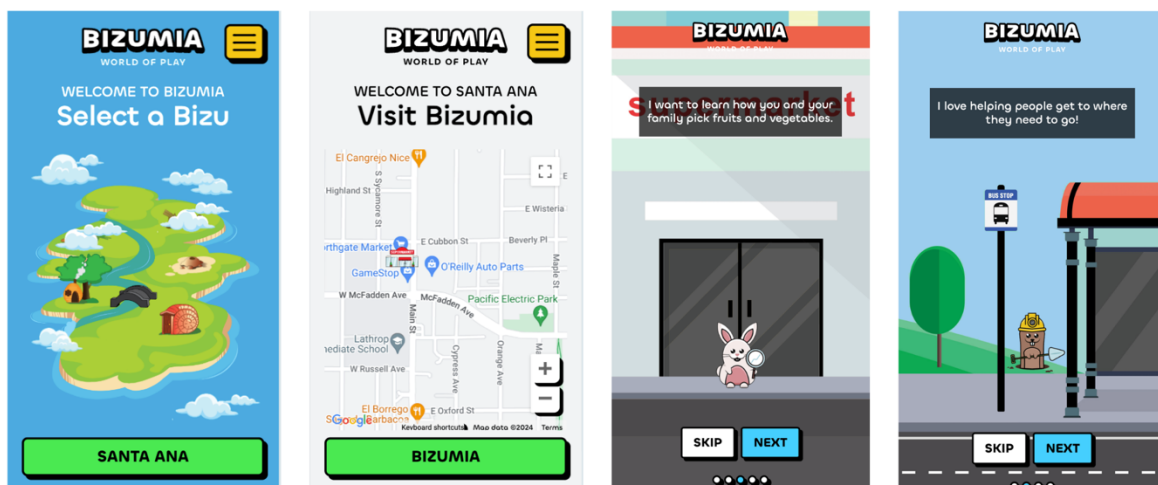
The PLL installations went beyond incorporating culturally familiar content. Families' experiences shaped the activities designed, the places where learning took place, and how caregivers and children could participate together. This effort laid the foundation for subsequent

projects in the partnership by demonstrating that cultural knowledge and everyday family practices could serve as design resources to create meaningful opportunities for STEM learning. The following phase of the partnership focused on applying these principles in a digital setting by developing *Bizumia: World of Play*.

Bizumia: World of Play

Building on the Playful Learning Landscapes initiative, the research team aimed to go beyond the physical installations by creating a mobile educational application. Even though the PLL installations offered opportunities for STEM learning in familiar community areas, families could participate only while at those locations. To give families more opportunities to learn in a variety of settings, the research team and I developed *Bizumia: World of Play*, a STEM-oriented mobile application grounded in culturally sustaining principles and building on ideas from the PLL initiative (see Figure 2). This approach was based on research indicating that technology can support learning across a variety of contexts by drawing on community strengths and fostering connections among home, school, and community (Ahn et al., 2018)

Figure 2
Bizumia: World of Play



The project, *Bizumia: World of Play*, ran from October 2021 to June 2022 and brought together over 40 SAELI caregivers, children, and community leaders for six co-design sessions. During these sessions, the focus was on how families use technology together, how digital tools could support learning in community settings, and what kinds of educational experiences would be meaningful to Latine families. By taking an active role as co-designers, the community members developed ideas for narratives, characters, and learning activities grounded in their everyday lives and cultural values (Anderson-Coto et al., 2024; Bang et al., 2014).

During the co-design process, several culturally and community-based goals emerged. Anderson-Coto and colleagues (2024) identified themes of resilience, empathy, helping one another, safety, respect, and positive behavior. These values were particularly apparent when the children participated in storytelling and character design activities, as they developed characters and explained their personalities, relationships, and life experiences. The research team and I then incorporated these themes into the application's narrative world and characters so the digital environment would include not only familiar settings and activities but also the relationships and values Latine families had regarded as important.

The design process also stressed intergenerational participation and the incorporation of community knowledge and ordinary family practices. *Bizumia: World of Play* was developed in both English and Spanish to be usable by multiple family members. The activities were set in everyday situations such as going to the grocery store, cooking, selecting fruit and vegetables, and moving around the neighborhood, giving caregivers and children opportunities to draw on prior knowledge and shared experiences when using the application. By doing this, the design process aimed to create room for family members to participate rather than treating children as the only intended users of the learning experience.

Bizumia: World of Play is the result of many years of collaborative design efforts to develop educational technology that draws on the cultural strengths, daily experiences, and priorities identified by Latine families. At the same time, the co-design process did not include how caregivers and children would actually engage with the resulting application during shared use. Next steps would involve examining how caregivers can support children's STEM reasoning and how families might connect activities within the application to their own everyday experiences.

Exploring Latine Families' Technology Practices

While developing *Bizumia: World of Play*, the research team and I conducted a subsequent study that examined how Latine caregivers had already used technology in their daily family lives. This study examined the cultural values embedded in caregivers' technology mediation practices and the role technology played in family learning (Salazar et al., 2025).

Salazar and colleagues' (2025) study, based on interviews with Latine caregivers, found that technology's role extended beyond simply managing children's screen time. Latine caregivers explained that they used technology to promote values such as *familismo*, *educación*, and resilience by having conversations, using it together, and setting expectations within their households. Technology also provided a setting in which caregivers could support learning, for example by helping children with their homework, showing them how to keep going when they faced difficulties, and improving family relationships. Often, caregivers said that using technology with their children was a chance to learn together.

The results indicated that caregivers' roles in relation to technology go beyond monitoring or controlling how children use it; they also engage in collaborative learning and cultural socialization (Salazar et al., 2025). This prior work complemented the participatory

design research behind *Bizumia: World of Play* by showing that the collaborative family learning envisioned during the design process was already present within many caregivers' everyday technology practices. Suggesting that educational technology designed to be culturally sustaining should not only represent families' cultural identities but also create opportunities for families to draw upon the ways they already communicate, support one another, and learn together (Anderson-Coto et al., 2024; Champion et al., 2020).

However, questions remained. Previous studies (Anderson-Coto et al., 2024; Salazar et al., 2025) relied on caregivers' descriptions of their general experiences and technology practices. It therefore could not show how caregivers would directly support children's STEM reasoning and problem-solving as those interactions unfolded, how families might connect digital activities to everyday family practices, or how caregivers would interpret children's understanding and decide whether and how to provide support.

The Playful Learning Landscapes work, the development of *Bizumia: World of Play*, and the prior study of Latine families' technology practices established two important foundations for the current dissertation. First, Latine families' cultural values, everyday experiences, and community knowledge could serve as resources for designing learning tools. Second, caregivers already bring culturally grounded, collaborative practices to technology use in their homes. What remains is understanding how caregivers and children engage with educational technology designed around these principles, how family knowledge and everyday practices become part of STEM learning during shared use, and how caregivers make sense of and respond to children's learning as it unfolds.

Theoretical Framework

Understanding how educational technology designed using culturally sustaining principles can support family learning requires attention to how learning occurs through social interaction, the knowledge and experiences that families bring to learning, and the ways caregivers support children's engagement with technology. This dissertation is based on three complementary theoretical and conceptual approaches: Sociocultural Theory, Funds of Knowledge, and Caregiver Mediation Theory. Sociocultural Theory serves as the primary learning theory, viewing learning as a process situated within social and cultural contexts (Gutiérrez & Rogoff, 2003; Vygotsky, 1978). Funds of Knowledge offers a strengths-oriented perspective on the everyday knowledge, practices, and experiences families bring to learning (Moll et al., 1992). Caregiver Mediation Theory focuses on how caregivers influence children's engagement with technology through co-use, guidance, and applied limitations (Clark, 2011). These perspectives form a framework for examining how families' cultural knowledge can inform educational technology design, how families use that knowledge during shared interactions with their children, and how caregivers support and interpret children's learning when using technology together.

Sociocultural Theory and Family Learning

Sociocultural Theory offers a framework for understanding how learning develops through social and cultural interactions and activities (Vygotsky, 1978). Rather than seeing learning as an individual process, sociocultural theory views knowledge as constructed through interactions with others and shaped by broader cultural, historical, and social contexts (Gutiérrez & Rogoff, 2003; Rogoff et al., 2016). Through this lens, caregivers, siblings, peers, and other members of a child's community can all play significant roles in the learning process by guiding

participation, providing feedback, and creating opportunities for joint meaning construction (Rogoff et al., 2016).

A key idea of sociocultural theory is that learning begins in social interaction and is then internalized by the learner (Vygotsky, 1978). When children take part in shared activities, they acquire the knowledge, skills, and ways of thinking considered important in their communities. Language is important in this process because it provides a means for children and caregivers to reach a mutual understanding, solve problems, and create shared meaning (Schieffelin & Ochs, 1986; Vygotsky, 1978). Learning can then be seen as a collaborative process in which understanding emerges from participation and interaction with others.

Building on Vygotsky's ideas, Rogoff (1990) developed the idea that learning occurs through participation in shared cultural activities. According to Rogoff's concept of guided participation, children acquire knowledge by actively participating in the everyday practices they share with more experienced members of their families and communities. Instead of treating learning as something separate from daily life, guided participation acknowledges that children learn by engaging in activities such as preparing food, shopping for groceries, and doing household chores (Rogoff, 2003). In these interactions, caregivers can provide different levels of support, adjust their guidance based on how children participate, and offer children opportunities to act on their own. Learning happens not only through direct instruction but also through participation in significant social and cultural experiences.

These views are especially useful for understanding family learning, since learning within families goes beyond formal teaching to include everyday conversations, routines, shared experiences, and working together to find solutions (Rogoff, 2014). Caregivers can support learning by posing questions, encouraging exploration, directing a child's attention, giving

explanations, and building on ideas that arise in conversation (Callanan et al., 2017; Rogoff et al., 1993; Rogoff et al., 2016). Both caregivers and children can shape their understanding together rather than assuming fixed teacher and learner roles.

In Latine families, cultural practices and values that emphasize family involvement and responsibility can also shape family learning. Previous studies show that learning occurs through observation, shared responsibilities, storytelling, family collaboration, and participation in community life (Paradise & Rogoff, 2009; Rogoff, 2014). *Familismo* and family obligation may further shape children's participation in everyday activities and relationships with adults (Fuller & García-Coll, 2010). These perspectives position children as active participants in family life while recognizing caregivers and extended family members as important partners in children's learning (Rogoff et al., 1993). However, it is important not to assume these practices apply to all Latine families. Instead, they highlight the need to consider the culturally specific ways in which individual families arrange participation and learning.

Sociocultural theory also offers a helpful way of understanding educational technology as a tool that can mediate social interaction. Rather than conceptualizing technology as the only source of learning, this approach focuses on the kinds of interactions that occur around technology (Ewin et al., 2021). When designed to promote engagement between caregivers and children, educational technologies can provide opportunities for dialogue, collaborative exploration, and co-constructing meaning. Technology can therefore become one component of a broader learning ecology in which families participate in learning by drawing upon their relationships, experiences, and culturally meaningful ways of interacting.

Sociocultural Theory serves as the overarching learning perspective for this dissertation. In all three studies, learning is conceptualized as a collaborative and culturally situated process.

This dissertation extends this perspective by examining how culturally situated family knowledge and caregiver involvement influence learning through technology. More specifically, Studies 2 and 3 focus on how caregivers direct children's participation when using technology together, and how this direction can change based on caregivers' understanding of what the children are doing and the kind of support the children may need. This dissertation examines not only the guidance caregivers provide but also the processes that shape how caregivers organize and adjust children's participation in technology-mediated learning.

Funds of Knowledge

Funds of Knowledge is a strengths-based framework that recognizes the knowledge, skills, practices, and cultural experiences households have accumulated over time through everyday life and social histories (Moll et al., 1992; Vélez-Ibáñez & Greenberg, 1989). The Funds of Knowledge framework recognizes families as holders of valuable expertise developed through cultural traditions, language practices, occupations, household responsibilities, social relationships, and everyday problem-solving. These experiences provide meaningful resources for children's learning and can serve as foundations for educational practice.

A key aspect of Funds of Knowledge is the idea that learning is linked to families' daily experiences. Activities carried out on a daily basis, such as cooking, taking care of household duties, participating in cultural traditions, shopping, and interacting with family and community members, provide opportunities for children to acquire knowledge, skills, and different ways of thinking (Moll et al., 1992; Rogoff, 2014). When everyday practices are seen as valuable forms of knowledge, Funds of Knowledge underscores the expertise within households and communities.

Funds of Knowledge is relevant to the present dissertation because educational technologies can connect STEM learning with knowledge and practices that already exist in family life. Previous work has used Funds of Knowledge to inform culturally responsive learning environments by encouraging educators and researchers to build on families lived experiences rather than treating those experiences as separate from academic learning (Belgrave et al., 2022; Bermudez et al., 2023). More recent work has extended this perspective to educational technology by considering how digital learning tools can be designed around cultural knowledge and everyday experiences identified by families (Anderson-Coto et al., 2024; Chen et al., 2019). From this perspective, educators can use everyday family practices as resources to design meaningful educational experiences.

This dissertation builds on Funds of Knowledge by examining two ways family knowledge can become a resource in educational technology: through *design* and *interaction*. *Study 1* examines how Latina mothers draw upon cultural values, family practices, and community experiences when envisioning educational technologies for family learning. *Study 1* considers how Funds of Knowledge can inform not only which cultural experiences educational technology represents but also the kinds of participation and learning experiences caregivers believe technology should support.

Study 2 moves from *design* to *interaction* by examining how caregivers draw on everyday family experiences to support children's STEM learning during shared technology use. Caregivers may encounter activities intentionally designed around familiar experiences, but they also bring additional knowledge into those interactions. Examining these interactions allows Funds of Knowledge to be considered not only as a design resource researchers can incorporate into educational tools but also as an interactional resource families can draw on as they explain

ideas, make connections, and support children's reasoning. This perspective recognizes families as active contributors to the learning experience rather than simply recipients of educational content.

Caregiver Mediation Theory

As digital technologies become increasingly integrated into children's everyday lives (Mannell et al., 2024), researchers have examined the role caregivers play in shaping children's experiences with technology. Caregiver mediation theory examines how adults guide, support, and regulate children's interactions with digital media (Clark, 2011; Valkenburg et al., 1999). Although early research often focused on parents, this dissertation uses the broader term *caregiver mediation* to recognize that parents, grandparents, and other family members may shape children's technology experiences and learning (Salazar et al., 2025).

Caregiver mediation research has identified three primary forms of mediation: *active mediation*, *co-use* or *co-viewing*, and *restrictive mediation* (Clark, 2011; Sobel et al., 2017; Valkenburg et al., 1999; Yu et al., 2021). *Active mediation* involves caregivers engaging children in conversations about digital content by asking questions or providing guidance during media use. *Co-use* refers to caregivers and children engaging with technology together, creating opportunities for shared exploration, collaborative problem-solving, and discussion. *Restrictive mediation* focuses on establishing rules and limits surrounding children's media use to promote safe and appropriate technology engagement.

Although all three forms of mediation contribute to children's technology experiences, this dissertation primarily focuses on active mediation and co-use, as these forms of engagement are most relevant to collaborative learning. During shared use of educational technology, caregivers may do more than supervise children's engagement with a device. They can ask

questions, direct attention, encourage reasoning, provide feedback, offer explanations, and solve problems alongside their children (Ewin et al., 2021; Sheehan et al., 2019). Using a sociocultural perspective, these interactions can transform technology from an individual activity into a shared learning experience in which understanding develops through dialogue and participation.

Caregiver mediation is also culturally situated. Families' values, beliefs, relationships, and everyday practices can shape how caregivers engage with technology alongside their children (Salazar et al., 2025). Although much caregiver mediation research has focused on White, middle-class families (Geurts et al., 2022; Livingstone & Helsper, 2008; Nikken & Jansz, 2014; Smahelova et al., 2017), emerging research with Latine families suggests that shared technology use can provide opportunities to strengthen family relationships, spend time together, support children's learning, and reinforce values such as *familismo*, *educación*, and resilience (Ochoa & Reich, 2020; Salazar et al., 2025). These findings demonstrate the importance of examining caregiver mediation within families' broader cultural and relational contexts.

Despite this growing body of work, caregiver mediation research has often focused on caregivers' observable practices surrounding children's media use, including restriction, co-use, discussion, and guidance (Livingstone & Helsper, 2008; Nikken & Schols, 2015; Valkenburg et al., 1999). These perspectives provide important insight into what caregivers do with technology but offer less insight into the interpretive processes that may inform caregivers' support when technology is used for learning. For example, identifying that a caregiver asks a question, redirects a child's attention, provides an explanation, or allows a child to continue independently does not necessarily explain why the caregiver selected that response at a particular moment. Understanding educational technology as a context for learning therefore requires greater

attention to how caregivers make sense of children's actions and understanding as they determine whether and how to provide support.

Within this dissertation, caregiver mediation provides a lens for examining both caregivers' observable support and the reasoning that informs that support. *Study 2* examines the scaffolding practices caregivers use during co-use, including how they direct attention, redirect thinking, encourage explanation, and support problem-solving. *Study 3* moves beyond these observable practices to examine how caregivers make sense of children's understanding and how those interpretations inform decisions about whether and how to respond. The dissertation builds upon caregiver mediation perspectives by examining mediation not only as management of children's technology experiences but also as a pedagogical process through which caregivers support learning.

Theoretical Contributions Across the Dissertation

Sociocultural Theory, Funds of Knowledge, and Caregiver Mediation Theory provide complementary perspectives for understanding family learning with educational technology designed using culturally sustaining principles. Instead of applying these perspectives in the same way across all three studies, the dissertation uses them to examine different stages of family engagement with educational technology and, in turn, to develop distinct theoretical contributions in design, interaction, and interpretation.

Study 1 primarily builds upon Funds of Knowledge by examining how Latina mothers draw upon cultural values, everyday family practices, and community experiences when envisioning educational technologies for family learning. The study considers how family knowledge can inform more than the cultural content represented within technology. It examines how caregivers' knowledge and priorities can also inform the design of educational technology,

including how family members participate and learn together. *Study 1* elaborates the application of Funds of Knowledge within educational technology design by positioning families' knowledge and experiences as resources for shaping both learning content and opportunities for participation.

Study 2 moves from design to interaction by drawing on Funds of Knowledge, Sociocultural Theory, guided participation, and Caregiver Mediation Theory to examine caregiver-child co-use. The study examines how caregivers scaffold children's STEM reasoning and problem-solving and how families connect activities within educational technology to everyday family practices. The theoretical contribution of *Study 2* is, first, that it examines how Funds of Knowledge can function as interactional resources that caregivers actively use during technology-mediated learning rather than only as resources incorporated into technology by designers. Secondly, it builds on sociocultural and caregiver mediation perspectives by examining how caregiver-child dialogue, questioning, and collaborative problem-solving organize children's participation in STEM learning during co-use. These perspectives position family interaction as part of the learning process and not just around technology.

Study 3 moves from observable interaction to caregiver interpretation by drawing primarily on guided participation and Caregiver Mediation Theory. Whereas *Study 2* examines the forms of scaffolding caregivers provide, *Study 3* examines how caregivers make sense of children's actions, understanding, and problem-solving processes and how those interpretations inform decisions about whether and how to provide support. *Study 3* focuses on the interpretive decision-making that informs caregiver scaffolding during the use of educational technology. This perspective further develops guided participation by paying greater attention to how caregivers assess and adjust children's participation as learning unfolds, and by expanding

caregiver mediation beyond technology management to understand caregivers as pedagogical partners in children's technology-mediated learning.

Across the three studies, these theoretical contributions form a progression from design, to interaction, to interpretation. *Study 1* examines how families' cultural knowledge and everyday practices can inform the design of educational technology to support learning. *Study 2* examines how those resources are enacted and expanded through caregiver-child interaction during technology-mediated STEM learning. *Study 3* examines the interpretive processes through which caregivers make sense of children's learning and determine how to respond. All three studies conceptualize culturally sustaining educational technology not only in terms of the cultural knowledge represented within a digital tool, but also in terms of the opportunities technology creates for families to enact their knowledge, relationships, and ways of supporting learning. This theoretical progression positions families' cultural knowledge as a design resource, everyday family practices as resources for interaction and learning, and caregivers' interpretations as important resources for supporting children's developing understanding.

References

- Ahn, J., Clegg, T., Yip, J., Bonsignore, E., Pauw, D., Cabrera, L., Hernly, K., Pitt, C., Mills, K., Salazar, A., Griffing, D., Rick, J., & Marr, R. (2018). Science Everywhere: Designing Public, Tangible Displays to Connect Youth Learning Across Settings. *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems*, 1–12. <https://doi.org/10.1145/3173574.3173852>
- Anderson-Coto, M. J., Salazar, J., Lopez, J. L.-S., Sedas, R. M., Campos, F., Bustamante, A. S., & Ahn, J. (2024). Towards culturally sustaining design: Centering community's voices for learning through Participatory Design. *International Journal of Child-Computer Interaction*, 39, 100621. <https://doi.org/10.1016/j.ijcci.2023.100621>
- Bang, M., Curley, L., Kessel, A., Marin, A., Suzukovich, E. S., & Strack, G. (2014). Muskrat theories, tobacco in the streets, and living Chicago as Indigenous land. *Environmental Education Research*, 20(1), 37–55. <http://dx.doi.org/10.1080/13504622.2013.865113>.
- Belgrave, A. B., Bermudez, V. N., Chew, P., Lin, Y., Ahn, J., & Bustamante, A. S. (2022). Using a participatory design approach for co-creating culturally situated STEM enrichment activities. *Journal of Applied Developmental Psychology*, 82, 101451. <https://doi.org/10.1016/j.appdev.2022.101451>
- Bermudez, V. N., Salazar, J., Garcia, L., Ochoa, K. D., Pesch, A., Roldan, W., Soto-Lara, S., Gomez, W., Rodriguez, R., Hirsh-Pasek, K., Ahn, J., & Bustamante, A. S. (2023). Designing culturally situated playful environments for early STEM learning with a Latine community. *Early Childhood Research Quarterly*, 65, 205–216. <https://doi.org/10.1016/j.ecresq.2023.06.003>
- Bindman, S. W., Sobel, K., Behbakht, S. M., Divanji, R. A., Shahn, E., & Scanlon, M. (2021). “Let’s Draw Chocolate Milk Together”: Supports and Challenges for Families’ Joint Engagement with Artistic Tablet Apps. *Interaction Design and Children*, 183–195. <https://doi.org/10.1145/3459990.3460693>
- Buhler-Wassmann, A. C., Zhang, H., Buhler, A., Callanan, M. A., Haden, C. A., & Melzi, G. (2026). Early STEM learning in Latine family contexts. *Frontiers in Developmental Psychology*, 4, 1656327. <https://doi.org/10.3389/fdpys.2026.1656327>
- Bustamante, A. S., Hassinger-Das, B., Hirsh-Pasek, K., & Golinkoff, R. M. (2019). Learning Landscapes: Where the Science of Learning Meets Architectural Design. *Child Development Perspectives*, 13(1), 34–40. <https://doi.org/10.1111/cdep.12309>
- Calzada, E. J. (2010). Bringing Culture Into Parent Training With Latinos. *Cognitive and Behavioral Practice*, 17(2), 167–175. <https://doi.org/10.1016/j.cbpra.2010.01.003>
- Champion, D. N., Tucker-Raymond, E., Millner, A., Gravel, B., Wright, C. G., Likely, R., Allen-Handy, A., & Dandridge, T. M. (2020). (Designing for) learning computational STEM and arts integration in culturally sustaining learning ecologies. *Information and Learning Sciences*, 121(9/10), 785–804. <https://doi.org/10.1108/ILS-01-2020-0018>
- Chaudron, S., Marsh, J., Donoso Navarette, V., Ribbens, W., Mascheroni, G., Smahel, D., Cernikova, M., Dreier, M., Korkeamäki, R.-L., Livingstone, S., Ottovordemgentschenfelde, S., Plowman, L., Fletcher-Watson, B., Richardson, J., Shlyapnikov, V., & Soldatova, G. (2018). Rules of Engagement: Family Rules on Young Children’s Access to and Use of Technologies. In S. J. Danby, M. Fleer, C. Davidson, & M. Hatzigianni (Eds.), *Digital Childhoods* (Vol. 22, pp. 131–145). Springer Singapore. https://doi.org/10.1007/978-981-10-6484-5_9

- Chen, Y., Mayall, H. J., York, C. S., & Smith, T. J. (2019). Parental perception and English Learners' mobile-assisted language learning: An ethnographic case study from a technology-based Funds of Knowledge approach. *Learning, Culture and Social Interaction*, 22, 100325. <https://doi.org/10.1016/j.lcsi.2019.100325>
- Clark, L. S. (2011). Parental Mediation Theory for the Digital Age. *Communication Theory*, 21(4), 323–343. <https://doi.org/10.1111/j.1468-2885.2011.01391.x>
- Connell, S. L., Lauricella, A. R., & Wartella, E. (2015). Parental Co-Use of Media Technology with their Young Children in the USA. *Journal of Children and Media*, 9(1), 5–21. <https://doi.org/10.1080/17482798.2015.997440>
- Creamer, J. (2021, December 9). *Inequalities persist despite decline in poverty for all major race and hispanic origin groups*. Census.gov. <https://www.census.gov/library/stories/2020/09/poverty-rates-for-blacks-and-hispanics-reached-historic-lows-in-2019.html>
- Ewin, C. A., Reupert, A. E., McLean, L. A., & Ewin, C. J. (2021). The impact of joint media engagement on parent–child interactions: A systematic review. *Human Behavior and Emerging Technologies*, 3(2), 230–254. <https://doi.org/10.1002/hbe2.203>
- Fuller, B., & García-Coll, C. (2010). Learning from Latinos: Contexts, families, and child development in motion. *Developmental Psychology*, 46(3), 559–565. <https://doi.org/10.1037/a0019412>
- Geurts, S. M., Koning, I. M., Vossen, H., & Van den Eijnden, R. J. J. M. (2022). A Qualitative Study on Children's Digital Media Use and Parents' Self-interest. *Journal of Child and Family Studies*, 31(7), 2015–2026. <https://doi.org/10.1007/s10826-021-02074-3>
- Gutiérrez, K. D., & Rogoff, B. (2003). Cultural Ways of Learning: Individual Traits or Repertoires of Practice. *Educational Researcher*, 32(5), 19–25. <https://doi.org/10.3102/0013189X032005019>
- Konca, A. S. (2022). Digital Technology Usage of Young Children: Screen Time and Families. *Early Childhood Education Journal*, 50(7), 1097–1108. <https://doi.org/10.1007/s10643-021-01245-7>
- Ladson-Billings, G. (1995). Toward a Theory of Culturally Relevant Pedagogy. *American Educational Research Journal*, 32(3), 465–491. <https://doi.org/10.3102/00028312032003465>
- Livingstone, S., & Helsper, E. J. (2008). Parental Mediation of Children's Internet Use. *Journal of Broadcasting & Electronic Media*, 52(4), 581–599. <https://doi.org/10.1080/08838150802437396>
- Mannell, K., Bloul, S., Sefton-Green, J., & Willcox, M. (2024). Digital media and technology use by families with infants, toddlers, and young children: A scoping review and call for forward momentum. *Journal of Children and Media*, 18(4), 605–628. <https://doi.org/10.1080/17482798.2024.2394939>
- Moll, L. C., Amanti, C., Neff, D., & Gonzalez, N. (1992). Funds of Knowledge for Teaching: Using a Qualitative Approach to Connect Homes and Classrooms. *Theory into Practice*, 31(2), 132–141.
- Nikken, P., & Jansz, J. (2014). Developing scales to measure parental mediation of young children's internet use. *Learning, Media and Technology*, 39(2), 250–266. <https://doi.org/10.1080/17439884.2013.782038>

- Nikken, P., & Schols, M. (2015). How and Why Parents Guide the Media Use of Young Children. *Journal of Child and Family Studies*, 24(11), 3423–3435.
<https://doi.org/10.1007/s10826-015-0144-4>
- Ochoa, W., & Reich, S. M. (2020). Parents' Beliefs About the Benefits and Detriments of Mobile Screen Technologies for Their Young Children's Learning: A Focus on Diverse Latine Mothers and Fathers. *Frontiers in Psychology*, 11, 570712.
<https://doi.org/10.3389/fpsyg.2020.570712>
- Paradise, R., & Rogoff, B. (2009). Side by Side: Learning by Observing and Pitching In. *Ethos*, 37(1), 102–138. <https://doi.org/10.1111/j.1548-1352.2009.01033.x>
- Paris, D. (2012). Culturally Sustaining Pedagogy: A Needed Change in Stance, Terminology, and Practice. *Educational Researcher*, 41(3), 93–97.
<https://doi.org/10.3102/0013189X12441244>
- Paris, D., & Alim, H. S. (2014). What Are We Seeking to Sustain Through Culturally Sustaining Pedagogy? A Loving Critique Forward. *Harvard Educational Review*, 84(1), 85–100.
<https://doi.org/10.17763/haer.84.1.9821873k2ht16m77>
- Pesch, A., Ochoa, K. D., Fletcher, K. K., Bermudez, V. N., Todaro, R. D., Salazar, J., Gibbs, H. M., Ahn, J., Bustamante, A. S., & Hirsh-Pasek, K. (2022). Reinventing the public square and early educational settings through culturally informed, community co-design: Playful Learning Landscapes. *Frontiers in Psychology*, 13, 933320.
<https://doi.org/10.3389/fpsyg.2022.933320>
- Reid Chassiakos, Y. L., Radesky, J., Christakis, D., Moreno, M. A., Cross, C., Hill, D., Ameenuddin, N., Hutchinson, J., Levine, A., Boyd, R., Mendelson, R., & Swanson, W. S. (2016). Children and adolescents and digital media. *Pediatrics*, 138(5), e20162593.
<https://doi.org/10.1542/peds.2016-2593>
- Rideout, V., & Robb, M. B. (2020). *The common sense census: Media use by kids age zero to eight*. Common Sense Media.
- Rogoff, B. (1990). An Advance in Understanding Development, for Students and Scholars. *Psychological Science*, 1(1), 42–45.
- Rogoff, B. (2014). Learning by Observing and Pitching In to Family and Community Endeavors: An Orientation. *Human Development*, 57(2–3), 69–81. <https://doi.org/10.1159/000356757>
- Rogoff, B., Callanan, M., Gutiérrez, K. D., & Erickson, F. (2016). The Organization of Informal Learning. *Review of Research in Education*, 40(1), 356–401.
<https://doi.org/10.3102/0091732X16680994>
- Rogoff, B., Mistry, J., Göncü, A., Mosier, C., Chavajay, P., Heath, S. B., & Goncu, A. (1993). Guided Participation in Cultural Activity by Toddlers and Caregivers. *Monographs of the Society for Research in Child Development*, 58(8), i. <https://doi.org/10.2307/1166109>
- Rogoff, B., Paradise, R., Arauz, R. M., Correa-Chávez, M., & Angelillo, C. (2003). Firsthand Learning Through Intent Participation. *Annual Review of Psychology*, 54(1), 175–203.
<https://doi.org/10.1146/annurev.psych.54.101601.145118>
- Rosner, D. K., Kawas, S., Li, W., Tilly, N., & Sung, Y.-C. (2016). Out of Time, Out of Place: Reflections on Design Workshops as a Research Method. *Proceedings of the 19th ACM Conference on Computer-Supported Cooperative Work & Social Computing*, 1131–1141.
<https://doi.org/10.1145/2818048.2820021>
- Salazar, J., Seccia, I. T., Maldonado, J. V., Hernandez, L., Bermudez, V. N., Acevedo-Farag, L. M., Ahn, J., & Bustamante, A. S. (2025). Sustaining Latine Families' Cultural Values

- Through Technology Mediation Practices. *Journal of Latinos and Education*, 1–12.
<https://doi.org/10.1080/15348431.2024.2444942>
- Schieffelin, B. B., & Ochs, E. (1986). Language socialization. *Annual review of anthropology*, 15, 163–191.
- Sheehan, K. J., Pila, S., Lauricella, A. R., & Wartella, E. A. (2019). Parent-child interaction and children’s learning from a coding application. *Computers & Education*, 140, 103601.
<https://doi.org/10.1016/j.compedu.2019.103601>
- Smahelova, M., Juhová, D., Cermak, I., & Smahel, D. (2017). Mediation of young children’s digital technology use: The parents’ perspective. *Cyberpsychology: Journal of Psychosocial Research on Cyberspace*, 11(3). <https://doi.org/10.5817/CP2017-3-4>
- Sobel, K., Bhattacharya, A., Hiniker, A., Lee, J. H., Kientz, J. A., & Yip, J. C. (2017). It wasn’t really about the Pokémon: Parents’ Perspectives on a Location-Based Mobile Game. *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems*, 1483–1496. <https://doi.org/10.1145/3025453.3025761>
- Steidel, A. G. L., & Contreras, J. M. (2003). A New Familism Scale for Use with Latino Populations. *Hispanic Journal of Behavioral Sciences*, 25(3), 312–330.
<https://doi.org/10.1177/0739986303256912>
- Valkenburg, P. M., Krcmar, M., Peeters, A. L., & Marseille, N. M. (1999). Developing a scale to assess three styles of television mediation: “Instructive mediation,” “restrictive mediation,” and “social covieing.” *Journal of Broadcasting & Electronic Media*, 43(1), 52–66.
<https://doi.org/10.1080/08838159909364474>
- Vélez-Ibáñez, C. G., & Greenberg, J. B. (1989). Formation and transformation of funds of knowledge among US Mexican households in the context of the borderlands. In *annual meeting of the American Anthropological Association, Washington, DC*.
- Vygotsky, L.S. (1978) *Mind in society: the development of higher psychological processes*. Harvard University Press.
- Wood, E., Petkovski, M., De Pasquale, D., Gottardo, A., Evans, M. A., & Savage, R. S. (2016). Parent Scaffolding of Young Children When Engaged with Mobile Technology. *Frontiers in Psychology*, 7. <https://doi.org/10.3389/fpsyg.2016.00690>
- Yu, J., DeVore, A., & Roque, R. (2021). Parental Mediation for Young Children’s Use of Educational Media: A Case Study with Computational Toys and Kits. *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*, 1–12.
<https://doi.org/10.1145/3411764.3445427>

CHAPTER 2: Designing for Family Learning: Latina Mothers' Perspectives on Culturally Sustaining Educational Technology

The continued growth of the U.S. Latine population highlights the importance of understanding and supporting how Latine children learn within their families and communities. Research demonstrates that families play a critical role in children's learning and development through everyday activities, cultural practices, and social interactions (Bricker & Bell, 2014; González et al., 2005; Hernández et al., 2016). From a Funds of Knowledge perspective, Latine families possess valuable knowledge, skills, and practices that serve as significant resources for children's learning (Moll et al., 1992; Vélez-Ibáñez & Greenberg, 1989). Developmental research indicates that cultural values and socialization goals shape what caregivers prioritize for children's learning, behavior, and participation within family and community life (Gibbons et al., 2024; Keller et al., 2006). Recognizing these strengths and priorities enables the development of learning opportunities that build upon families' existing practices and values, rather than relying on assumptions about what families need.

Previous research has shown the value of collaboration between Latine communities and researchers in designing learning environments and digital tools that reflect families' cultural practices and experiences (Anderson-Coto et al., 2024; Belgrave et al., 2022; Bermudez et al., 2023). However, educational technologies often still prioritize designers' assumptions about how children should learn, how families should engage with technology, and which learning outcomes matter most (Anderson-Coto et al., 2024; Rosner et al., 2016). As a result, technologies intended for families may not reflect the cultural values, everyday practices, and developmental priorities that caregivers consider important.

The current study adopts a Funds of Knowledge perspective to examine how Latina mothers envision technologies designed to support family learning within their communities.

This study examines the cultural values, everyday practices, and caregiving priorities mothers draw on when imagining technology's potential role in family learning. By centering Latina mothers' perspectives, the study identifies the learning priorities, cultural values, and caregiving goals that mothers believe educational technologies should support. The findings offer insights to inform future efforts to design educational technologies with Latine families, grounded in the priorities that families themselves identify as meaningful.

Background

Educational Technology and Culture

Educational technology is the design, implementation, and evaluation of technological tools and systems intended to support teaching and learning (Bishop et al., 2020; Spector, 2015). Educational technologies can give children and families opportunities to engage with academic content, problem-solving, and learning across formal and informal settings (Lavigne et al., 2023; Yu et al., 2023). However, educational technology design does not exist independently of culture. Designers decide what forms of learning to support, how users should use technology, and what outcomes are considered valuable (Abramenka-Lachheb et al., 2025; Litts et al., 2021; McLoughlin, 1999). These decisions can reflect assumptions about children, families, learning, and technology use that may not align with the experiences and priorities of the communities these technologies are intended for.

Research has demonstrated that many educational technologies do not account for the cultural values and practices of marginalized communities, neglecting local knowledge and participant preferences by relying on designers' assumptions about learning processes, technology use, and valued outcomes (Anderson-Coto et al., 2024; Rosner et al., 2016). Educational technologies have also commonly been developed around the experiences and

practices of White, European, middle-class families (Geurts et al., 2022; Chaudron et al., 2018), contributing to the low representation of minoritized families in technology research and design (Connell et al., 2015; Salazar et al., 2025). As a result, technologies may not align with families' goals, cultural practices, or daily routines and may miss opportunities to build on the cultural strengths and relationships that already support children's learning.

Addressing this limitation requires understanding families not simply as users of educational technologies but as knowledgeable partners whose perspectives can inform which technologies to support. Scholars have increasingly advocated for approaches that work directly with families and communities to understand how learning is embedded within everyday activities, values, and local contexts (Moll et al., 1992; McWayne & Melzi, 2023). For Latine families, understanding the cultural values, socialization goals, and everyday practices that shape family life can provide a foundation for designing technologies that respond to families' priorities rather than designers' assumptions about what families need.

Cultural Values and Socialization in Latine Families

Latine families vary in national origins, migration histories, socioeconomic circumstances, language practices, and family structures; therefore, cultural values and parenting practices should not be assumed to be uniform across Latine families (Calzada, 2010; Perez-Brena et al., 2024; Rodriguez-JenKins, 2014). At the same time, developmental research has identified cultural values and socialization goals that are salient across many Latine families and can shape caregiver-child relationships and children's participation in family and community life (Barragan & Meltzoff, 2025; Calzada, 2010; Calzada et al., 2012; Tamis-LeMonda et al., 2020). Caregivers play an important role in cultural socialization by communicating expectations and values and by organizing everyday experiences in which children can observe, contribute, and

learn how to participate within their families and communities (Ayón et al., 2020; Paradise & Rogoff, 2009). Through everyday interactions and routines, caregivers can transmit not only knowledge and skills, but also understandings of relationships, responsibilities, appropriate behavior, and obligations toward others.

One cultural value frequently discussed within Latine developmental literature is *familismo*. *Familismo* emphasizes strong identification and attachment to family, maintaining close family relationships, and expecting family members to provide emotional and instrumental support to one another (Calzada et al., 2013; Halgunseth, 2019; Negy & Woods, 1992; Staples & Mirandé, 1980). *Familismo* also emphasizes interconnectedness and responsibilities to extended family, rather than prioritizing individual goals independent of family relationships (Steidel & Contreras, 2003). Within family socialization, caregivers can play an important role in communicating and modeling these expectations for children (Durand, 2011; Villalobos & Smetana, 2012). These values may shape how caregivers conceptualize children's learning and development by emphasizing opportunities for shared participation, intergenerational interaction, and responsibility toward family members.

Another cultural value is *educación*, a cultural construct that extends beyond formal schooling and academic achievement to encompass children's moral and social development (Evans et al., 2011; Halgunseth, 2019; Reese, 2012). *Educación* showcases caregivers' expectations that children learn respect, responsibility, appropriate social behavior, and regard for others (Cruz & Carlo, 2026). Within this cultural framework, describing a child as *bien educado* is more than academic competence; it can refer to a child who demonstrates appropriate behavior and understands how to interact respectfully and responsibly with family members and others (Gonzalez-Ramos et al., 1998; Harwood et al., 2000; Lopez et al., 2023). Caregivers

therefore contribute to children's development not only by supporting academic learning but also by the everyday socialization of values and behaviors considered important for participating in family and community life.

Cultural values such as *familismo* and *educación* are not simply abstract beliefs. They are communicated and reinforced through everyday family interactions, routines, and participation in community life (Calzada et al., 2013; Cruz & Carlo, 2026). For example, food-related practices, family gatherings, storytelling, caregiving responsibilities, and other routine activities can provide contexts in which children learn through participation alongside family members while also developing an understanding of relationships and responsibilities (Ayón et al., 2018; Bermudez et al., 2023; Paradise & Rogoff, 2009). These experiences show how children's learning and development connect with the cultural and relational practices of family life.

Understanding these cultural values and socialization goals is essential when considering technologies intended to support family learning. If caregivers prioritize children's development in areas such as family relationships, appropriate behavior, and shared participation, in addition to academic learning, educational technologies may not always reflect what families themselves consider important. This study seeks to identify the values and priorities Latine caregivers want educational technologies to support. Examining caregivers' perspectives can help determine which goals to consider when designing technologies for Latine families.

Funds of Knowledge and Learning in Family and Community Life

A Funds of Knowledge perspective offers an additional framework for understanding the knowledge, skills, and practices families develop through everyday life. Funds of Knowledge refer to historically accumulated bodies of knowledge and skills that support household and community functioning and well-being (Moll et al., 1992; González et al., 2005; Vélez-Ibáñez &

Greenberg, 1989). Instead of focusing on what minoritized families may lack, the Funds of Knowledge framework takes a strengths-based approach, recognizing the intellectual, social, cultural, and practical resources embedded within households and communities. From this perspective, everyday family activities are not separate from learning but can provide meaningful contexts through which knowledge is developed, shared, and applied.

Research on learning within many Indigenous and Latine communities similarly demonstrates how children develop knowledge through participation in everyday family and community activities (Rogoff, 2014; Rogoff et al., 2016). Children may learn by observing others, participating in shared activities, communicating with more experienced family members, and gradually taking on greater responsibility for meaningful tasks (Paradise & Rogoff, 2009; Rogoff, 2014). Learning can therefore occur through collaborative participation in activities already part of family and community life, rather than exclusively through direct instruction or formal educational settings. These perspectives position family and community practices as meaningful contexts for children's learning and development.

In science, technology, engineering, and mathematics (STEM) learning, families' everyday activities can offer opportunities to engage with mathematical and scientific ideas through familiar experiences. Activities such as cooking, shopping, sharing resources, navigating community spaces, playing, and completing household responsibilities can involve measurement, quantity, spatial reasoning, observation, prediction, and problem-solving (Bermudez et al., 2023; Swirbul & Melzi, 2024). Research with Latine families has similarly demonstrated how everyday play, family interactions, and community experiences can support STEM learning in informal settings (Bermudez et al., 2023). This work challenges assumptions that meaningful STEM

learning occurs primarily in formal educational settings by showing how families' existing practices and experiences can serve as learning resources.

Building on these perspectives, researchers have partnered with families and community organizations to develop learning opportunities in everyday locations such as parks, bus stops, grocery stores, and other public spaces where families already spend time (Bermudez et al., 2023; Hurst et al., 2019). This work shows how learning environments can build upon the knowledge, relationships, routines, and practices already present within communities rather than requiring families to adopt unfamiliar ways of learning. For educational technology design, a Funds of Knowledge perspective encourages researchers to consider not only what academic content a technology should teach, but also how technologies might build on the knowledge and practices families already possess.

Caregiver Mediation of Technology

Caregivers also play an important part in influencing children's engagement with technology. Research on caregiver or parental mediation has examined how caregivers establish rules, monitor technology use, discuss digital content, and participate alongside children during media and technology experiences (Livingstone et al., 2015; Sobel et al., 2017). Through these practices, caregivers decide when, where, and how children should engage with technology, balancing perceived opportunities for learning and entertainment against safety and privacy concerns, inappropriate content, and excessive technology use (Livingstone et al., 2015; Salazar et al., 2025).

Caregivers' approaches to technology are also guided by their general beliefs about learning, family relationships, and appropriate behavior (Navarro & Jensen, 2026; Ochoa & Reich, 2020; Salazar et al., 2025). Caregivers might ask themselves whether it supports or

interferes with family relationships, whether children's behavior while using technology is appropriate in shared spaces, or whether particular technologies raise concerns about children's privacy and safety (Salazar et al., 2025; Young et al., 2024). Examining caregiver mediation through a cultural lens can provide insight into how families' priorities influence the role technology should play within their children's daily lives.

Although caregiver mediation has been widely studied, more research is needed to examine how Latine caregivers' cultural values, everyday experiences, and socialization priorities shape their visions of what educational technologies should support (Salazar et al., 2025). Understanding these perspectives is important for technologies that are designed and intended to for family learning because expectations of learning experiences may differ between families. Rather than beginning with predetermined design ideas, technology use or learning outcomes, examining caregivers' priorities and goals offers an opportunity to understand what families consider important when envisioning technology's role in family and community life.

Current Study

Building on strengths-based perspectives on Latine family learning, the current study examines the priorities and values that Latina mothers draw on when envisioning technologies to support family learning within their communities. Rather than starting with predetermined assumptions about what educational technologies should provide, Latina mothers were invited to imagine idealized technological futures and describe the roles they believed technology could play in family and community life. Through their interviews, the study examines how Latina mothers' cultural values, daily experiences, and caregiving priorities shape their expectations for technologies that support family learning.

Given caregivers' significant role in managing children's technology experiences, this study examines how mothers' cultural values and beliefs inform their perspectives on children's technology use within shared community spaces. This approach provides insight into the learning, cultural, and caregiving priorities that Latina mothers consider important as they envision future technologies for their families. Identifying these priorities can inform future efforts to design educational technologies for Latine families by grounding design decisions in the values and goals they identify as meaningful.

The following research questions guided this study:

1. How do Latina mothers envision technology's role in fostering family STEM learning within their communities?
2. What cultural values and practices emerge when Latina mothers envision idealized uses of technology?
3. What cultural values and practices shape how Latina mothers mediate their children's use of technology in public spaces?

Methodology

Participants

For this study, 10 Latina mothers were recruited from a nonprofit organization, the Santa Ana Early Learning Initiative (SAELI), which comprises over 200 families, teachers, and administrators from the local school district and nonprofit agencies in Southern California and provides enriching opportunities for children ages 0-9. The organization's director assisted with recruitment by contacting mothers who met the following inclusion criteria: self-identified as Latina and had at least one child between the ages of 0 and 7 years.

The present analysis comprised 10 individual semi-structured interviews (see Table 2.1). All participants were Latina mothers born outside the U.S. (e.g., in Mexico and Guatemala). Their ages ranged from 30 to 47 years, with an average of 39 years living in Southern California. They had 2 to 7 children, with an average age of 11 years. All participants had children enrolled in the local school district, which is made up of 96% Latine families and 78% on free/reduced-price lunch.

Table 2.1
Caregivers' Self-Identified Demographics

Participant	Gender	Ethnicity	Birthplace	Age	No. of Children
Nancy	Female	Latina	Mexico	43	3
Ruby	Female	Latina	Mexico	44	4
Victoria	Female	Latina	Mexico	42	2
Alena	Female	Latina	Mexico	30	2
Laura	Female	Latina	Mexico	46	3
Vero	Female	Latina	Mexico	44	3
Nena	Female	Latina	Mexico	47	3
Renee	Female	Latina	Mexico	36	2
Erica	Female	Latina	Mexico	38	7
Sandy	Female	Latina	Guatemala	36	3

Data Collection

Participants were recruited in 2021 and gave consent in accordance with the University of California IRB protocol 2818. Data was collected through semi-structured Zoom interviews, each lasting approximately 30 minutes. All the interviews were conducted in Spanish, and participants received a \$50 stipend for their time. The interview protocol was flexible, allowing participants to discuss how technology could be designed and embedded in community spaces to foster family learning (see Table 2.2).

Table 2.2
Interview Questions in Spanish and English

QUESTION NUMBER	Spanish	English
1	Vamos a imaginarnos que somos diseñadores/ ingenieros y tenemos todo el dinero y los recursos en el mundo ... ¿Cuénteme cómo imagina usted que la tecnología se puede integrar en su comunidad para promover el aprendizaje entre familia? [Piense en las cosas que rodean a su comunidad]	Now, let's imagine you have all the money and resources in the world to implement technology in your community. How do you imagine technology being integrated into your own community to promote family learning? [Think about the places around your community]
2	¿Cómo imagina a sus hijos y también a otros niños de su comunidad usando esta tecnología?	How do you imagine your children and children in your neighborhood using this technology?
3	¿Qué tipo de reglas tendría esta nueva instalación? [Si la respuesta es diferente a las reglas que tienen en casa...] Pensando en la reglas que creó para la nueva instalación, crees que son diferentes de las reglas que tienes en su casa?	What kind of rules would this new installation have? [If the response is different from the rules they have at home...] Why are the rules you have for your imaginary space different from the rules you have at home?

By prompting Latina mothers to imagine themselves as designers, these interviews enabled participants to articulate how they would create and mediate educational technology in their communities. They also shared their views on the rules and norms they believe should guide technology use in these community spaces.

Data Analysis

Data analysis was carried out using MAXQDA, a qualitative analysis software, to identify emergent themes and patterns throughout all ten interviews through thematic analysis (Saldaña, 2016). The data analysis proceeded in multiple stages. In the first stage, all interview transcripts were coded for ideal uses of technology, envisioned learning opportunities in community settings, and expectations for technology use. In the second stage, I used an inductive coding approach to identify patterns. Iterative coding and weekly research meetings facilitated the comparison and refinement of patterns across participants, resulting in broader themes

(Saldaña, 2016). As the analysis continued, themes related to collective learning, *bien educado* practices, and digital safety consistently emerged across participants' imagined technological futures.

Results

The findings highlight how Latina mothers imagined technologies that support family learning within their communities. Three themes emerged from the interview data: Envisioning Collective Learning Through Technology, Emphasizing *Bien Educado* Practices, and Digital Safety. Together, these themes illustrate how mothers drew upon cultural values, family practices, and community experiences to envision technologies that foster learning, strengthen relationships, and support children's well-being.

Envisioning Collective Learning Through Technology

The analysis found that Latina mothers envisioned technology as a tool for collective learning that goes beyond individual children to include caregivers, siblings, and other family and community members. Rather than imagining technology as a child-centered resource, mothers described technologies that support learning through shared experiences, everyday routines, and intergenerational interactions.

Latina mothers imagined technology as a way to support learning through existing family practices and daily routines. Rather than separating learning from everyday life, mothers envisioned technologies that could be integrated into activities families already do together, creating opportunities for collaborative learning and shared participation.

Laura imagined a technology design that supports children's learning about fruits and vegetables while also assisting families during routine activities like grocery shopping. She shared, "...yo me imaginaba que en esas paradas [de autobús] pusieran... como algo de la

comida, que si van ir al super[mercado] y ven así como vegetales o frutas, que diga: ¡Oh, mira esto!” (...I imagined that at those [bus] stops they could put...like something related to food, so that if they go to the supermarket and see vegetables or fruits, they'll say, ‘Oh, look at this!’) Laura further explained that their design mirrors existing family practices, such as creating a grocery plan “si vamos a ir al mercado, vamos a comprar esto, esto, esto otro... y [mis hijos] me ayudan a hacer la lista y haciéndolo como en matemáticas” (If we're going to the market, we're going to buy this, this, and this other thing... and [my children] help me make the list, doing it like a math exercise.) Through these excerpts, Laura’s vision illustrates how daily routines serve as meaningful sites for learning, where nutritional and mathematical knowledge is co-constructed through family participation and shared responsibility.

Other Latina mothers imagined these ideas beyond the household and into community spaces where families regularly gather. Nena and Renee envisioned family-centered learning technologies embedded in public gathering spaces, suggesting that learning opportunities could be integrated into places already associated with family interaction and community engagement. Nena expressed a desire for educational technologies in parks where families naturally gather, stating, “...me gustaría en un futuro como que hubiera [tecnología educativa] en un parque... Donde tú puedes hacer tu carne, puedes estar, convivir con tu familia y estar con tu familia. Entonces en esas áreas me gustaría que hubiera tecnología, pero tecnología educativa...” (...I would like in the future to have [educational technology] in a park... where you can make your barbeque, you can be, engage with your family and be with your family. So, in those areas, I'd like to see technology, but educational technology...) Similarly, Renee envisioned digital tools that promote collective participation, emphasizing activities designed for families to engage in together, “Promovería mucho más...donde se involucre la familia como programas así como no

sé, al aire libre y...hacer trabajos [que] se hagan en familia...en una tablet o como juegos educativos así, donde también estén jugando toda la familia junta y también a la vez aprendiendo pero entre todos.” (I would advocate much more for...where the family is involved, like programs like, I don't know, outdoors and...doing projects [that] are done as a family...on a tablet or like educational games like that, where the whole family is also playing together and also learning at the same time but together.)

These excerpts show how Latina mothers envisioned technology as a resource that supports learning through family participation, intergenerational engagement, and shared experiences across household and community settings.

Emphasizing Bien Educado Practices

Latina mothers described using technology as an opportunity to reinforce values associated with being *bien educado*. Mothers emphasized the importance of children demonstrating respect, patience, and consideration for others when using technology in shared community spaces. Many of the rules mothers imagined for their technology designs reflected expectations they already teach at home, suggesting that technology use should support the development of appropriate social behavior across settings.

Ruby emphasized turn-taking as a way of teaching children to be respectful and considerate of others. When imagining how children would use her technology design in the community, Ruby stated, “Yo pienso que serían darles como los tiempos... y poder estar ahí 30 minutos...y poderles dar oportunidad a otros niños para que todos puedan estar ingresando a ese lugar y experimentar lo que es eso.” (I think it would be about giving them time... and being able to be there for 30 minutes and giving other children the opportunity so that everyone can be there, entering that place and experiencing what it's like.) While Ruby's imagined design

encouraged equitable participation, she framed these expectations as lessons in discipline and respect. She further connected turn-taking to values taught at home, explaining, “Creo que el tiempo es como una disciplina y que creo que eso se debe de implementar desde casa...” (“I believe that time management is like a discipline, and I think that this should be implemented from home...”.) Ruby’s reflections suggest that technology use can serve as an extension of home-based teachings by reinforcing patience, self-regulation, and consideration for others.

Other caregivers similarly emphasized etiquette and mindfulness when picturing how children would engage with technology within communal spaces. Nena drew parallels between public-space rules and expectations maintained within the home. When asked about this connection, Nena shared, “...son similares porque por ejemplo, yo aquí a mis niños yo también siempre les digo que ellos entre ellos se tienen que respetar su tiempo y su espacio.” (...they are similar because, for example, here with my children, I always tell them that they have to respect each other's time and space). She further described how she reminds her children, saying, “hijo, tu hermanito, estás haciendo tarea, de de la oportunidad que él haga sus cosas” (Son, your little brother is doing his homework, give him the chance to do his own thing), reinforcing the importance of respecting others’ time and space. These examples illustrate how mothers envisioned using technology to reinforce continuity between home-based teachings and appropriate behavior in community settings.

Digital Safety

In the interviews, Latina mothers talked about the importance of protecting children when engaging with technology. As participants imagined technologies accessible in community settings, concerns about privacy, safety, and exposure to harmful content emerged as key

considerations. Latina mothers also envisioned community technology as a space that requires guidance, protection, and responsible use.

Valeria discussed the need to protect children from potential dangers posed by public or networked technologies. She explained, “... por ejemplo poniéndolo en un contexto así de la comunidad y creando esta idea de que los niños tienen que ser muy cuidadosos con la tecnología...[y] no compartir tu información personal” (...for example, by putting it in a community context like this and creating the idea that children need to be very careful with technology... [and] not share their personal information.) As she envisioned the design as a tool accessible to all in the community, she reflected, “Estoy asumiendo que va a estar abierto al público. So, ese tipo de privacidad que no puedes dar demasiada información personal. Esa sería una de las reglas.” (I'm assuming it's going to be open to the public. So, there's a certain level of privacy involved, meaning you can't give out too much personal information. That would be one of the rules.) These concerns suggest that mothers viewed privacy protection as an important component of children's participation in community-based technologies.

Similarly, Erica highlighted the importance of safeguards that prevent children from accessing inappropriate content. She expressed a desire for a filtering system where children cannot be “...buscando cosas que no tenga que buscar ahí,” (...looking for things that they shouldn't have to look for there.) Through this example, Latina mothers highlighted imagined technologies that balance opportunities for learning and participation with mechanisms that protect children from potential harm. By doing this, Latina mothers positioned digital safety as a shared responsibility that supports children's well-being as they engage with technology.

Discussion

This study explored how Latina mothers envisioned technology's role in fostering family learning within their communities. The findings provide a strengths-based foundation for designing educational technologies with Latine families by centering the values and practices that matter most to them. Three themes emerged from the analysis: collective learning, emphasizing on *bien educado* practices, and digital safety. Findings suggest that Latina mothers do not view technology primarily as an individual tool for academic advancement. Instead, they imagine technologies that support collective learning experiences, reinforce social and moral values, and protect children's well-being within family and community contexts.

Collective Learning as an Expression of Familismo

Participants' emphasis on collective learning highlights how they imagine technology as a shared family resource that can support intergenerational engagement. Latina mothers described idealized technologies that integrate into existing family and community routines, such as grocery shopping, cooking, outdoor gatherings, and other everyday activities, positioning learning as a collective and ongoing process similar to past literature (Bermudez et al., 2023; Buhler-Wassmann et al., 2026; Williams et al., 2020). Findings demonstrate an understanding of *familismo* by showing how family interconnectedness and shared responsibility can shape aspirations for educational technology and learning environments. In particular, mothers envisioned technologies that support collective participation among caregivers, children, siblings, and community members. In this context, *familismo* is enacted through co-use, shared responsibility, and intergenerational engagement, strengthening the central role of family in everyday social life (Calzada et al., 2013). By incorporating values like familismo can strengthen children's inspiration during adversity, which contributes to academic motivation and fuels the

desire to repay their family members for the sacrifices they made in immigrating to the United States (Gonzales, 2019; Ong et al., 2006; Parra Cardona et al. 2006).

The results also align with research on learning through participation in family and community activities, in which children develop knowledge and skills through observing, contributing to, and collaborating in shared endeavors (Rogoff, 2014; Rogoff et al., 2016). Rather than positioning children as individual learners, mothers imagined learning as emerging through collaboration and shared experiences. This perspective was mentioned in mothers' descriptions of family-centered activities such as grocery shopping and community gatherings, where learning could emerge through participation in meaningful social practices. Similar research has shown that children's participation in everyday family activities can create opportunities for learning, contribution, and collaborative engagement (Alcalá et al., 2014; Coppens et al., 2014). These findings suggest that educational technologies designed for Latine families may benefit from moving beyond individualized learning models to create greater opportunities for collaborative and intergenerational engagement (Ewin et al., 2021).

Importantly, mothers envisioned these learning opportunities in community spaces families already frequent, including parks, bus stops, and community gathering areas. By situating learning technologies in these environments, participants reimaged education as extending beyond formal institutions and integrating into everyday life (Moll et al., 1992; Rogoff et al., 2016). This finding aligns with prior work demonstrating how community spaces can function as meaningful sites of STEM learning and family engagement (Bermudez et al., 2023; Hurst et al., 2019).

Mothers' visions of collective learning were also accompanied by an emphasis on equitable participation. Participants frequently described turn-taking, shared access, and the

inclusion of multiple users as important features of technology use. Rather than viewing technology as a resource for a single user, mothers emphasized ensuring that children, families, and community members had fair opportunities to participate. Participants also highlighted the importance of including older adults and providing access to community resources, expanding technology's role beyond child-centered learning. These findings suggest that collective learning is more than learning together; it's about creating conditions that enable meaningful participation for others (Rogoff, 1994). Equitable participation serves as a mechanism for collective learning, reflecting broader values of shared responsibility, consideration, and inclusion (Paradise & Rogoff, 2009).

This theme also aligns with the Funds of Knowledge framework (Moll et al., 1992), as mothers drew on everyday family routines and community experiences as important sites of learning. Activities such as grocery shopping, exercising at the park, and spending time with family were not viewed as separate from education but as opportunities for developing skills such as counting, planning, problem-solving, and decision-making. Technology, in turn, was imagined as a tool that amplifies these existing practices rather than replacing them. These findings suggest that culturally sustaining technologies should build on existing family knowledge systems and everyday experiences, supporting learning embedded in meaningful social and cultural contexts (Anderson-Coto et al., 2024; Bermudez et al., 2023).

Emphasizing *Bien Educado*: Moral Values in Technology Use

The theme of *bien educado* highlights how participants embedded moral and social values into their imagined technology designs. Latina mothers described rules and expectations that reflect respect, patience, and consideration for others, drawing clear parallels between home practices and behavior in public spaces. These expectations were not limited to maintaining

order; they were also framed as opportunities to teach children how to interact responsibly in shared public spaces.

In this way, technology becomes a site of moral socialization. Participants extended intergenerational teachings into digital and public contexts, reinforcing values associated with *educación* and being *bien educado* (Bridges et al., 2012; Cruz & Carlo, 2022). This finding highlights how cultural norms around *respeto* shape not only behavior but also expectations for how technologies should function in communal settings (Anderson-Coto et al., 2024). Instead of viewing rules as restrictive, mothers framed them as essential for fostering ethical and socially aware technology use. The continuity between home-based teachings and public technology use suggests that educational technologies can serve as spaces where cultural values are reinforced and practiced across contexts.

Digital Safety as Ethical and Relational Care

Concerns about digital safety show how mothers view technology as a space that requires guidance, protection, and ethical engagement. Although digital safety may appear distinct from the cultural values discussed throughout this study, Latina mothers consistently framed privacy and safety concerns in terms of their responsibilities as caregivers. Latina mothers emphasized protecting children's privacy, limiting exposure to inappropriate content, and preventing interactions with strangers. These concerns were particularly significant when imagining technologies situated within community contexts and accessible to the public.

These findings extend existing research on parental mediation by showing that safety is not only about controlling access but also about cultivating ethical digital participation (Salazar et al., 2025). Latina mothers' imagined designs suggest that digital safety should be embedded within the technology itself and supported through communal accountability. Even when invited

to imagine enjoyable and educational technological futures, participants frequently returned to concerns about privacy, protection, and responsible use. This emphasis suggests that aspirations for educational technology are closely intertwined with caregiving responsibilities and concerns for children's well-being (Ewin et al., 2021).

This perspective challenges deficit-based assumptions that position families as overly restrictive or technologically hesitant (Clark, 2011, 2012). Instead, participants demonstrated nuanced understandings of digital risks and proactively envisioned systems that balance learning opportunities with mechanisms that protect children from potential harm. In doing so, they positioned digital safety as an important component of ethical, community-centered technology design.

Conclusion

This study examined how Latina mothers envisioned technology as a tool for fostering family and community learning. Three themes emerged from the findings: collective learning, emphasizing *bien educado* practices, and digital safety. These themes highlight how Latina mothers embedded cultural values, caregiving priorities, and everyday family practices into their imagined technological futures.

Collective learning reflected Latina mothers' desires for technologies that support shared responsibility, intergenerational engagement, and participation in everyday family and community activities. Participants imagined technologies that build upon existing routines, such as grocery shopping, outdoor gatherings, and family-centered activities, positioning learning as a collaborative process rather than an individualistic one. The theme of *bien educado* highlighted how mothers envisioned technology as a space where children could practice respect, patience, discipline, and consideration for others. Finally, digital safety revealed the importance that

Latina mothers placed on protecting children's well-being through privacy protections, appropriate content, and responsible technology use. Overall findings suggest that Latina mothers do not view educational technology as a single tool for delivering content, but as a resource that supports learning, social development, and caregiving goals.

This study contributes to strengths-based scholarship and the Funds of Knowledge framework by showing that Latine families possess rich cultural assets that can inform educational technology design. Rather than designing technologies for families based on assumptions about their needs, the findings suggest that designers should work alongside families to understand how learning is embedded in everyday routines, relationships, and community practices. Educational technologies designed with these values in mind may be better positioned to support meaningful family engagement, intergenerational participation, and culturally sustaining learning experiences.

Findings also offer practical implications for educational technology design. Designers should consider creating technologies that support collaborative rather than individual use, encourage equitable participation among multiple users, and account for the social and moral dimensions of technology use. Technologies that build upon existing family routines and community spaces may create more meaningful opportunities for engagement than tools that isolate learning from everyday life. Additionally, designers should recognize that safety and privacy are not merely technical concerns but important caregiving priorities that shape how families evaluate and engage with technology.

Several limitations should be considered when interpreting these findings. The study focused on a small sample of Latina mothers from a single community partner organization, and participants' imagined technologies may not reflect the perspectives of all Latine families.

Furthermore, the semi-structured interviews captured participants' aspirations and imagined futures rather than their actual technology use practices. Future research should explore how these findings translate into the design and implementation of educational technologies and examine how families engage with tools intentionally designed around collective learning, culturally grounded values, and digital safety. Such work can further our understanding of how educational technologies can support not only learning outcomes but also the cultural practices and relationships that sustain family and community life.

References

- Abramenka-Lachheb, V., Lachheb, A., & Ozogul, G. (2025). Value-sensitive design in the praxis of instructional design: A view of designers in situ. *British Journal of Educational Technology*, 56(4), 1311–1349. <https://doi.org/10.1111/bjet.13574>
- Alcalá, L., Rogoff, B., Mejía-Arauz, R., Coppens, A. D., & Dexter, A. L. (2014). Children's Initiative in Contributions to Family Work in Indigenous-Heritage and Cosmopolitan Communities in Mexico. *Human Development*, 57(2–3), 96–115. <https://doi.org/10.1159/000356763>
- Anderson-Coto, M. J., Salazar, J., Lopez, J. L.-S., Sedas, R. M., Campos, F., Bustamante, A. S., & Ahn, J. (2024). Towards culturally sustaining design: Centering community's voices for learning through Participatory Design. *International Journal of Child-Computer Interaction*, 39, 100621. <https://doi.org/10.1016/j.ijcci.2023.100621>
- Ayón, C., Nieri, T., & Ruano, E. (2020). Ethnic-Racial Socialization among Latinx Families: A Systematic Review of the Literature. *Social Service Review*, 94(4), 693–747. <https://doi.org/10.1086/712413>
- Ayón, C., Ojeda, I., & Ruano, E. (2018). Cultural socialization practices among Latino immigrant families within a restrictive immigration socio-political context. *Children and Youth Services Review*, 88, 57–65. <https://doi.org/10.1016/j.childyouth.2018.02.042>
- Barragan, R. C., & Meltzoff, A. N. (2025). The Socialization of Cultural Values and the Development of Latin American Prosociality. *Child Development Perspectives*, 19(4), 209–216. <https://doi.org/10.1111/cdep.12545>
- Belgrave, A. B., Bermudez, V. N., Chew, P., Lin, Y., Ahn, J., & Bustamante, A. S. (2022). Using a participatory design approach for co-creating culturally situated STEM enrichment activities. *Journal of Applied Developmental Psychology*, 82, 101451. <https://doi.org/10.1016/j.appdev.2022.101451>
- Bermudez, V. N., Salazar, J., Garcia, L., Ochoa, K. D., Pesch, A., Roldan, W., Soto-Lara, S., Gomez, W., Rodriguez, R., Hirsh-Pasek, K., Ahn, J., & Bustamante, A. S. (2023). Designing culturally situated playful environments for early STEM learning with a Latine community. *Early Childhood Research Quarterly*, 65, 205–216. <https://doi.org/10.1016/j.ecresq.2023.06.003>
- Bishop, M. J., Boling, E., Elen, J., & Svihla, V. (Eds.). (2020). *Handbook of Research in Educational Communications and Technology: Learning Design*. Springer International Publishing. <https://doi.org/10.1007/978-3-030-36119-8>
- Bricker, L. A., and Bell, P. (2014). “What comes to mind when you think of science? The perfumes!”: documenting science-related cultural learning pathways across contexts and timescales. *J. Res. Sci. Teach.* 51, 260-285. Doi: 10.1002/tea.21134
- Bridges, M., Cohen, S. R., McGuire, L. W., Yamada, H., Fuller, B., Mireles, L., & Scott, L. (2012). Bien Educado: Measuring the social behaviors of Mexican American children. *Early Childhood Research Quarterly*, 27(3), 555–567. <https://doi.org/10.1016/j.ecresq.2012.01.005>
- Buhler-Wassmann, A. C., Zhang, H., Buhler, A., Callanan, M. A., Haden, C. A., & Melzi, G. (2026). Early STEM learning in Latine family contexts. *Frontiers in Developmental Psychology*, 4, 1656327. <https://doi.org/10.3389/fdpys.2026.1656327>
- Calzada, E. J. (2010). Bringing Culture Into Parent Training With Latinos. *Cognitive and Behavioral Practice*, 17(2), 167–175. <https://doi.org/10.1016/j.cbpra.2010.01.003>

- Calzada, E. J., Huang, K.-Y., Anicama, C., Fernandez, Y., & Brotman, L. M. (2012). Test of a cultural framework of parenting with Latino families of young children. *Cultural Diversity & Ethnic Minority Psychology*, 18(3), 285–296. <https://doi.org/10.1037/a0028694>
- Calzada, E. J., Tamis-LeMonda, C. S., & Yoshikawa, H. (2013). *Familismo* in Mexican and Dominican Families From Low-Income, Urban Communities. *Journal of Family Issues*, 34(12), 1696–1724. <https://doi.org/10.1177/0192513X12460218>
- Chaudron, S., Marsh, J., Donoso Navarette, V., Ribbens, W., Mascheroni, G., Smahel, D., Cernikova, M., Dreier, M., Korkeamäki, R.-L., Livingstone, S., Ottovordemgentschenfelde, S., Plowman, L., Fletcher-Watson, B., Richardson, J., Shlyapnikov, V., & Soldatova, G. (2018). Rules of Engagement: Family Rules on Young Children’s Access to and Use of Technologies. In S. J. Danby, M. Fler, C. Davidson, & M. Hatzigianni (Eds.), *Digital Childhoods* (Vol. 22, pp. 131–145). Springer Singapore. https://doi.org/10.1007/978-981-10-6484-5_9
- Clark, L. S. (2011). Parental Mediation Theory for the Digital Age. *Communication Theory*, 21(4), 323–343. <https://doi.org/10.1111/j.1468-2885.2011.01391.x>
- Clark, L. S. (2012). *The parent app: Understanding families in the digital age*. Oxford University Press.
- Connell, S. L., Lauricella, A. R., & Wartella, E. (2015). Parental Co-Use of Media Technology with their Young Children in the USA. *Journal of Children and Media*, 9(1), 5–21. <https://doi.org/10.1080/17482798.2015.997440>
- Coppens, A. D., Silva, K. G., Ruvalcaba, O., Alcalá, L., López, A., & Rogoff, B. (2014). Learning by Observing and Pitching In: Benefits and Processes of Expanding Repertoires. *Human Development*, 57(2–3), 150–161. <https://doi.org/10.1159/000356770>
- Cruz, A. M., & Carlo, G. (2026). Latine mothers’ conceptions of *bien educado* in U.S. Latine adolescents: Respect, humility, good manners, and consideration for others as Core aspects. *Journal of Research on Adolescence*, 36(3), e70227. <https://doi.org/10.1111/jora.70227>
- Durand, T.M. (2011). Latino parental involvement in kindergarten: Findings from the Early Childhood Longitudinal Study. *Hispanic Journal of Behavioral Sciences*, 33, 469–489.
- Evans, A., Chow, S., Jennings, R., Dave, J., Scoblick, K., Sterba, K. R., & Loyo, J. (2011). Traditional foods and practices of Spanish-speaking Latina mothers influence the home food environment: Implications for future interventions. *Journal of the American Dietetic Association*, 111(7), 1031–1038. <https://doi.org/10.1016/j.jada.2011.04.007>
- Ewin, C. A., Reupert, A. E., McLean, L. A., & Ewin, C. J. (2021). The impact of joint media engagement on parent–child interactions: A systematic review. *Human Behavior and Emerging Technologies*, 3(2), 230–254. <https://doi.org/10.1002/hbe2.203>
- Geurts, S. M., Koning, I. M., Vossen, H., & Van den Eijnden, R. J. J. M. (2022). A Qualitative Study on Children’s Digital Media Use and Parents’ Self-interest. *Journal of Child and Family Studies*, 31(7), 2015–2026. <https://doi.org/10.1007/s10826-021-02074-3>
- Gibbons, J. L., Niklaus, A. B., & Serverian-Wilmeth, K. (2024). “What Defines Us as People Is How We Treat Others”: Ethnotheories, Socialization Goals, and Practices of “Exemplary” Guatemalan Mothers. *Journal of Cross-Cultural Psychology*, 55(2), 145–163. <https://doi.org/10.1177/00220221231213591>

- Gonzales, S. M. (2019). Cultivating familismo: Belonging and inclusion in one Latina/o learning community. *International Journal of Inclusive Education*, 23(9), 937–949.
<https://doi.org/10.1080/13603116.2019.1602362>
- González, N., Moll, L. C., & Amanti, C. (Eds.). (2005). *Funds of knowledge: Theorizing practice in households, communities, and classrooms*. L. Erlbaum Associates.
- Gonzalez-Ramos, G., Zayas, L. H., & Cohen, E. V. (1998). Child-rearing values of low-income, urban Puerto Rican mothers of preschool children. *Professional Psychology: Research and Practice*, 29(4), 377–382. <https://doi.org/10.1037/0735-7028.29.4.377>
- Halgunseth, L. C. (2019). Latino and Latin American Parenting. In M. H. Bornstein (Ed.), *Handbook of Parenting* (3rd ed., pp. 24–56). Routledge.
<https://doi.org/10.4324/9780429398995-2>
- Harwood, R. L., Schölmerich, A., & Schulze, P. A. (2000). Homogeneity and heterogeneity in cultural belief systems. In W. Damon, S. Harkness, C. Raeff, & C. M. Super (Eds.), *New directions for child and adolescent development: Variability in the social construction of the child* (pp. 41–57). Jossey-Bass.
- Hernandez, D., Rana, S., Alemandar, M., Rao, A., and Usselman, M. (2016). Latino parents' educational values and STEM beliefs. *J. Multicult. Educ.* 10, 356-367. Doi: 10.1108/JME-12-2015-0042
- Hurst, M. A., Polinsky, N., Haden, C. A., Levine, S. C., & Uttal, D. H. (2019). Leveraging research on informal learning to inform policy on promoting early STEM. *Social Policy Report*, 32(3), 1–33. <https://doi.org/10.1002/sop2.5>
- Keller, H., Lamm, B., Abels, M., Yovsi, R., Borke, J., Jensen, H., Papaligoura, Z., Holub, C., Lo, W., Tomiyama, A. J., Su, Y., Wang, Y., & Chaudhary, N. (2006). Cultural models, socialization goals, and parenting ethnotheories: A multicultural analysis. *Journal of Cross-Cultural Psychology*, 37(2), 155–172. <https://doi.org/10.1177/0022022105284494>
- Lavigne, H. J., Presser, A. L., Rosenfeld, D., Cuellar, L., Vidiksis, R., Ferguson, C., Wolsky, M., & Andrews, J. (2023). Computational thinking with families: Studying an at-home media intervention to promote joint media engagement between preschoolers and their parents. *Early Childhood Research Quarterly*, 65, 102–114.
<https://doi.org/10.1016/j.ecresq.2023.05.009>
- Litts, B. K., Searle, K. A., Brayboy, B. M. J., & Kafai, Y. B. (2021). Computing for all?: Examining critical biases in computational tools for learning. *British Journal of Educational Technology*, 52(2), 842–857. <https://doi.org/10.1111/bjet.13059>
- Livingstone, S., Mascheroni, G., Dreier, M., Chaudron, S., & Lagae, K. (2015). *How parents of young children manage digital devices at home: The role of income, education and parental style*.
- Lopez, C., Vazquez, M., & McCormick, A. S. (2023). Familismo, respeto, and bien educado: Traditional/cultural models and values in Latinos. In J. E. Gonzalez, J. Liew, G. A. Curtis, & Y. Zou (Eds.), *Family literacy practices in Asian and Latinx families* (pp. 137–161). Palgrave Macmillan. https://doi.org/10.1007/978-3-031-14470-7_6
- McLoughlin, C. (1999). Culturally responsive technology use: Developing an on-line community of learners. *British Journal of Educational Technology*, 30(3), 231–243.
<https://doi.org/10.1111/1467-8535.00112>
- Moll, L. C., Amanti, C., Neff, D., & Gonzalez, N. (1992). Funds of Knowledge for Teaching: Using a Qualitative Approach to Connect Homes and Classrooms. *Theory into Practice*, 31(2), 132–141.

- McWayne, C. M., & Melzi, G. (2023). Young children co-constructing science: The importance of their families and cultural communities. *Science Education*, 107(6), 1655–1669. <https://doi.org/10.1002/sce.21823>
- Navarro, J. L., & Jensen, M. (2026). Styles of Digital Parental Mediation: A Multi-Group Person-Centered Approach. *Journal of Child and Family Studies*, 35(2), 481–501. <https://doi.org/10.1007/s10826-025-03229-2>
- Negy, C., and Woods, D.J. (1992). The importance of acculturation in understanding research with Hispanic Americans. *Hispanic Journal of Behavioral Sciences*, 14, 224–247.
- Ochoa, W., & Reich, S. M. (2020). Parents’ Beliefs About the Benefits and Detriments of Mobile Screen Technologies for Their Young Children’s Learning: A Focus on Diverse Latine Mothers and Fathers. *Frontiers in Psychology*, 11, 570712. <https://doi.org/10.3389/fpsyg.2020.570712>
- Ong, A. D., Phinney, J. S., & Dennis, J. (2006). Competence under challenge: Exploring the protective influence of parental support and ethnic identity in Latino college students. *Journal of Adolescence*, 29(6), 961–979. <https://doi.org/10.1016/j.adolescence.2006.04.010>
- Paradise, R. and Rogoff, B. (2009), Side by Side: Learning by Observing and Pitching In. *Ethos*, 37: 102-138. <https://doi.org/10.1111/j.1548-1352.2009.01033.x>
- Parra Cardona, J. R., L. A. Bullock, D. R. Imig, F. A. Villarruel, and S. J. Gold. 2006. “‘Trabajando Duro Todos Los Días’: Learning From the Life Experiences of Mexican-Origin Migrant Families.” *Family Relations* 55 (3): 361–375.
- Perez-Brena, N. J., Bámaca, M. Y., Stein, G. L., & Gomez, E. (2024). Hasta la Raiz: Cultivating racial-ethnic socialization in Latine families. *Child Development Perspectives*, 18(2), 88–96. <https://doi.org/10.1111/cdep.12502>
- Reese, L. (2012). Storytelling in Mexican homes: Connections between oral and literacy practices. *Bilingual Research Journal*, 35(3), 277–293. <https://doi.org/10.1080/15235882.2012.734006>
- Rodriguez-JenKins, J. (2014). Complex inequality: A contextual parenting framework for Latino infants. *Children and Youth Services Review*, 44, 317–327. <https://doi.org/10.1016/j.childyouth.2014.06.026>
- Rogoff, B. (1994). Developing understanding of the idea of communities of learners. *Mind, Culture, and Activity*, 1(4), 209–229. <https://doi.org/10.1080/10749039409524673>
- Rogoff, B. (2014). Learning by Observing and Pitching In to Family and Community Endeavors: An Orientation. *Human Development*, 57(2–3), 69–81. <https://doi.org/10.1159/000356757>
- Rogoff, B., Callanan, M., Gutiérrez, K. D., & Erickson, F. (2016). The Organization of Informal Learning. *Review of Research in Education*, 40(1), 356–401. <https://doi.org/10.3102/0091732X16680994>
- Rosner, D. K., Kawas, S., Li, W., Tilly, N., & Sung, Y.-C. (2016). Out of time, out of place: Reflections on design workshops as a research method. In Proceedings of the 19th ACM conference on computer-supported cooperative work & social computing (pp. 1131–1141). New York, NY, USA: Association for Computing Machinery, <http://dx.doi.org/10.1145/2818048.2820021>.
- Salazar, J., Seccia, I. T., Maldonado, J. V., Hernandez, L., Bermudez, V. N., Acevedo-Farag, L. M., Ahn, J., & Bustamante, A. S. (2025). Sustaining Latine Families’ Cultural Values

- Through Technology Mediation Practices. *Journal of Latinos and Education*, 1–12. <https://doi.org/10.1080/15348431.2024.2444942>
- Saldana, J. (2016). *The coding manual for qualitative researchers*. Sage.
- Sobel, K., Bhattacharya, A., Hiniker, A., Lee, J. H., Kientz, J. A., & Yip, J. C. (2017). It wasn't really about the Pokémon: Parents' Perspectives on a Location-Based Mobile Game. *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems*, 1483–1496. <https://doi.org/10.1145/3025453.3025761>
- Spector, J. M. (2015). *Foundations of educational technology: Integrative approaches and interdisciplinary perspectives*. New York: Routledge.
- Staples, R., and Mirandé, A. (1980). Racial and cultural variations among American families: A decennial review of the literature on minority families. *Journal of Marriage and the Family*, 42, 887–903.
- Steidel, A. G. L., & Contreras, J. M. (2003). A New Familism Scale for Use with Latino Populations. *Hispanic Journal of Behavioral Sciences*, 25(3), 312–330. <https://doi.org/10.1177/0739986303256912>
- Swirbul, M., & Melzi, G. (2024). Family math engagement with young Latine children in the United States. *Child Development Perspectives*, 18(1), 3–9. <https://doi.org/10.1111/cdep.12490>
- Tamis-LeMonda, C. S., Caughy, M. O., Rojas, R., Bakeman, R., Adamson, L. B., Pacheco, D., Owen, M. T., Suma, K., & Pace, A. (2020). Culture, parenting, and language: Respeto in Latine mother–child interactions. *Social Development*, 29(3), 689–712. <https://doi.org/10.1111/sode.12430>
- Vélez-Ibáñez, C. G., & Greenberg, J. B. (1989). Formation and transformation of funds of knowledge among US Mexican households in the context of the borderlands. In *annual meeting of the American Anthropological Association, Washington, DC*.
- Villalobos, M., and Smetana, J.G. (2012). Puerto Rican adolescents' disclosure and lying to parents about peer and risky activities: Associations with teens' perceptions of Latino values. *Journal of Adolescence*, 35, 875–885.
- Williams, J. J., Tunks, J., Gonzalez-Carriedo, R., Faulkenberry, E., & Middlemiss, W. (2020). *Supporting Mathematics Understanding Through Funds of Knowledge*.
- Young, R., Tully, M., Parris, L., Ramirez, M., Bolenbaugh, M., & Hernandez, A. (2024). Barriers to mediation among U.S. parents of adolescents: A mixed-methods study of why parents do not monitor or restrict digital media use. *Computers in Human Behavior*, 153, 108093. <https://doi.org/10.1016/j.chb.2023.108093>
- Yu, J., Widman, S., & Roque, R. (2023). Family Negotiation in Joint Media Engagement with Creative Computing. *Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems*, 1–15. <https://doi.org/10.1145/3544548.3580667>

CHAPTER 3: Engaging in Family Learning: Caregiver–Child Scaffolding and Everyday STEM Practices During Educational Technology Use

Digital technologies often support young children's science, technology, engineering, and mathematics (STEM) learning through interactive games, educational applications, and play-based learning experiences (Gözüm, 2022). These technologies are commonly designed to promote exploration, problem-solving, and engagement with STEM concepts. However, much research on educational technology has focused on children's individual interactions with technology, with less attention to the social interactions that occur when children use these tools alongside family members (Yatmaz & Demiral, 2022). This highlights the need to understand the role caregivers play during collaborative technology use and how they support children's reasoning and problem-solving as they engage with educational technologies together.

STEM learning in early childhood is facilitated through social interaction, particularly through conversations between children and their caregivers (Sobel, 2023). By using questioning, explanation, guidance, and joint problem-solving, caregivers scaffold children's understanding of mathematical and scientific concepts and help them make sense of new learning experiences (Møller & Kaup, 2023). From a sociocultural perspective, these collaborative interactions position caregivers as knowledgeable partners who support children's participation and comprehension during learning activities. Examining caregiver-child interactions during STEM activities can provide valuable insights into the pedagogical practices caregivers use to foster children's developing STEM knowledge (Alexandre et al., 2022; Sobel, 2023) as well as the nature of these scaffolding practices when caregivers and children engage collaboratively with educational technologies.

Research on caregiver mediation provides a framework for understanding caregivers' involvement in children's technology use. Traditionally, caregiver mediation research has examined how caregivers manage children's digital experiences using practices such as restrictive mediation, active mediation, and co-use or co-viewing (Clark, 2011). While past studies provide important insights into how caregivers regulate and participate in children's technology use (Salazar et al., 2025), there is an opportunity to understand the pedagogical roles caregivers may assume during co-use. Specifically, existing conceptualizations of co-use do not always account for how caregivers actively guide children's attention, encourage reasoning, redirect problem-solving, or prompt children to articulate their thinking while engaging with educational technologies. Investigating these interactions can expand the understanding of caregiver co-use by considering caregivers not only as managers of children's technology experiences but also as active partners in children's learning.

Understanding caregiver-child learning interactions, especially within Latine families, can provide insight into how learning occurs in the home. For example, research on Funds of Knowledge shows that families possess knowledge developed through everyday household, cultural, and community experiences that can serve as valuable resources for children's learning (Hogg, 2011; Moll et al., 1992). Routine activities such as preparing food, grocery shopping, sharing resources among family members, and completing household tasks offer opportunities for mathematical and scientific reasoning (Bermudez et al., 2023; Leyva et al., 2021). For Latine families, these everyday practices and experiences may provide caregivers and children with familiar resources for interpreting STEM concepts. Understanding how Latine families collaborate with educational technology can inform how these forms of knowledge and family experiences function as resources.

Culturally sustaining design offers a framework for examining these interactions. Culturally sustaining approaches aim to integrate families' cultural knowledge, lived experiences, language practices, and community practices into educational experiences, rather than treating culture as separate from learning (Allen Kuyenga, 2026). Previous research has demonstrated how culturally sustaining principles can inform the design of educational technologies for Latine families (Anderson-Coto et al., 2024). Technologies built around familiar practices and experiences may help caregivers and children connect STEM concepts to knowledge already present in their everyday lives. However, understanding these opportunities requires examining family practices during co-use, including how caregivers support children's STEM reasoning and how families relate technology-mediated learning to their everyday experiences.

This study investigates caregiver-child interactions during use of *Bizumia: World of Play*, a STEM learning application designed to be culturally sustaining and co-developed with local Latine families. Specifically, the study explores how Latine caregivers scaffold children's STEM reasoning and problem-solving during collaborative technology use, and how families connect STEM concepts in the application to everyday family practices and experiences. By analyzing these interactions, the study aims to broaden understanding of caregiver co-use by positioning caregivers as active learning partners and to show how everyday family knowledge and practices can support children's STEM learning during technology-mediated experiences.

Background

Sociocultural Perspectives on Caregiver-Child Learning

Sociocultural theories of learning emphasize that learning develops through participation in social and cultural activity (Rogoff, 2014; Gutiérrez & Rogoff, 2003; Vygotsky, 1978).

Children's learning is formed by interactions with others and by participation in the practices,

language, and culturally developed tools of their families and communities. Children develop knowledge not only independently, but also through opportunities to observe, collaborate, and participate alongside others through meaningful activities (Rogoff, 2014; Rogoff et al., 1993). A key concept in sociocultural theory is Vygotsky's Zone of Proximal Development (ZPD), which describes the range between what a learner can accomplish independently and what they can accomplish with help or collaboration from a more experienced partner (Vygotsky, 1978). Through interactions happening within the ZPD, more experienced partners can provide support that enables children to participate in activities and engage with ideas that they may not yet be able to navigate independently (Vygotsky, 1978; Wood et al., 1976). As children develop greater understanding and competence, this support can shift to meet their needs, allowing them to take greater responsibility for the activity (Wood et al., 1976).

Rogoff's concept of guided participation further reiterates how learning occurs as children participate alongside more experienced members of their families and communities (Rogoff et al., 1993; Rogoff, 2014). Guided participation does not require formal instruction. Instead, guidance can occur through the ways caregivers and children organize their involvement in shared activities, communicate with one another, observe each other's actions, and coordinate participation. Within informal learning environments, caregivers may extend children's thinking by asking questions, providing explanations, directing attention, and supporting problem-solving during everyday activities (Weisberg et al., 2013). Through these efforts, caregivers can support children's participation while creating opportunities for collaborative exploration and sense-making.

Language and communication are particularly important within collaborations because they provide tools through which caregivers and children can coordinate activities and construct

meaning together. Caregivers may use questions, explanations, and prompts to encourage children to articulate their thinking, or reconsider their approach. Prior research has shown that caregiver-child conversations involving questioning, explaining, and reasoning can support children's mathematical and scientific thinking by encouraging active participation, reflection, and reasoning (Levine et al., 2010; Verdine et al., 2017). From a sociocultural perspective, these conversational practices are not simply exchanges of information; they are part of the social processes through which children participate in and develop understanding of STEM ideas.

The sociocultural perspective positions caregivers as important learning partners who can support children's participation and sense-making through shared activity. Although research demonstrates the importance of caregiver-child interaction for learning, this study aims to understand how these processes unfold during collaborative use of educational technologies. Examining caregiver-child interactions during technology-mediated STEM activities can therefore provide insight into how caregivers guide children's participation, respond to children's developing understanding, and scaffold STEM reasoning and problem-solving during co-use.

Families' Everyday Practices as Resources for STEM Learning

Funds of Knowledge refers to the values, beliefs, practices, and skills accumulated over time that support the functioning and well-being of minoritized communities (Moll et al., 1992; Vélez-Ibáñez & Greenberg, 1989). Rather than viewing families through a deficit lens, the Funds of Knowledge framework recognizes households and communities as sites of valuable knowledge and expertise. Funds of Knowledge have served as a protective factor for marginalized communities against social disparities such as racism and xenophobia (García-Coll et al., 1996), and within Latine families, they have been associated with stronger caregiver-child

relationships and positive learning and developmental outcomes (Denmark et al., 2014; Gamble & Modry-Mandell, 2008).

Recent research has used the Funds of Knowledge framework to design learning environments that reflect Latine families' everyday practices, cultural values, and lived experiences (Belgrave et al., 2022; Bermudez et al., 2023). This work has increasingly expanded into the design of educational technologies that intentionally center the expertise and experiences of minoritized communities (Anderson-Coto et al., 2024). Instead of treating cultural practices as separate from academic learning, Funds of Knowledge perspectives position families' daily experiences as valuable resources that support children's learning, participation, and sense-making.

Within Latine communities, daily practices such as cooking, shopping, storytelling, caregiving, and problem-solving often involve mathematical and scientific reasoning (Bermudez et al., 2023). These activities give children opportunities to engage with concepts related to counting, measurement, spatial reasoning, patterns, prediction, and problem-solving in familiar contexts. For example, families may draw upon mathematical reasoning when dividing food among family members, measuring ingredients while cooking, comparing quantities during shopping trips, or coordinating responsibilities during shared household activities (González et al., 2001; Swirbul & Melzi, 2024). As active participants in everyday routines, children encounter STEM concepts embedded in family and community practices.

Viewing cultural practices as resources for STEM learning challenges deficit-based perspectives that position minoritized families as lacking STEM knowledge. Instead, this perspective highlights how families already engage in cultivated forms of reasoning and problem-solving in their everyday lives. Research has shown that when learning environments

connect STEM concepts to children's lived experiences and community practices, families tend to engage in collaborative learning and participation (Barton & Tan, 2009). Understanding how caregivers and children draw upon these experiences during STEM-related interactions can therefore provide important insight into how culturally sustaining learning environments support engagement, sense-making, and family learning.

Caregiver Mediation in Children's Engagement with Technology

As digital media becomes increasingly integrated into children's daily lives (Mannell et al., 2024), caregivers play a critical role in shaping children's engagement with technology. Parental mediation theory provides a framework for understanding the strategies caregivers employ to guide children's media and technology experiences (Clark, 2011). In this study, the term "caregiver mediation" refers to all adults involved in a child's life, including grandparents and extended family members. The literature on caregiver mediation identifies three primary forms: restrictive mediation, active mediation, and co-viewing or co-use. *Restrictive mediation* involves establishing rules or limits on children's media use, such as regulating screen time or restricting access to specific content (Nikken & Jansz, 2006; Sobel et al., 2017). *Active mediation* consists of conversations between caregivers and children about media content and use, including explanations, evaluations, or discussions of potential encounters (Clark, 2011; Sobel et al., 2017; Valkenburg et al., 1999; Yu et al., 2021). *Co-viewing* or *co-use* refers to caregivers and children engaging with media or technology together, which may involve teaching, collaborating, and learning alongside one another (Clark, 2011; Sobel et al., 2017; Valkenburg et al., 1999). These mediation practices demonstrate that caregivers influence children's digital experiences both by setting boundaries and by participating during technology use.

Focusing on co-usage is important to understand children's engagement with educational technologies, as it enables and encourages caregivers and children to participate in shared activities (Griffith & Arnold, 2019; Griffith et al., 2022). Research on joint media engagement indicates that shared technology use can support conversation, engagement, and sense-making as caregivers and children engage with digital content (Dore & Zimmermann, 2020; Takeuchi & Stevens, 2011). Rather than being present during their children's technology use, caregivers direct their attention to specific features, interpret or clarify content, pose questions, and connect media experiences to children's prior knowledge (Ewin et al., 2020). These interactions can transform technology use from an individual activity into a collaborative process in which caregivers and children jointly construct understanding.

However, defining caregiver involvement as co-use may not completely capture the diversity of interactions that occur when caregivers and children use technology together. Caregiver-child co-use contains a range of participatory forms. For instance, a caregiver may observe as a child independently navigates an application, assist with device operation, provide answers when needed, ask questions about the child's reasoning, or collaborate to solve problems (Neumann, 2018; Wood et al., 2016). While all these communications fall under co-use, they represent different forms of caregiver participation and may offer various opportunities for children's learning (Ewin et al., 2020). Understanding caregiver involvement within educational technology requires attention not only to the occurrence of co-use but also to the specific ways caregivers participate in these collaborative experiences.

A sociocultural perspective enables a more in-depth examination of these interactions by considering the processes through which caregivers support children's participation and the development of understanding. As discussed previously, learning through collaboration can

involve guidance, questioning, directing attention, and other forms of support that help children engage with ideas and problems beyond their capabilities (Mermelshtine, 2017; Rogoff, 1993). This suggests that technology co-use can involve more than shared participation, as caregivers can actively support children's learning and reasoning skills. Caregivers can respond to their children's actions by directing attention to relevant information, encouraging them to articulate their reasoning, or providing support during challenges. Analyzing these moment-to-moment interactions can provide greater insights into the learning processes that occur during caregiver-child technology use.

Understanding these learning processes matters in the context of educational technology, where caregivers may act not only as mediators of children's technology experiences but also as partners in learning. Although caregiver mediation research offers a valuable framework for identifying caregiver involvement in children's media use, this study centers on the specific pedagogical practices caregivers enact during collaborative educational technology experiences, particularly in STEM learning contexts. Investigating interactions within co-use can expand current understandings of caregiver mediation by showing how caregivers support children's reasoning, problem-solving, and participation during shared technology use. Rather than defining co-use as shared technology engagement, this approach emphasizes the learning interactions within co-use and the roles caregivers assume in supporting children's understanding.

Current Study

This study uses video observations to examine how Latine caregivers and children interact with *Bizumia: World of Play*, a STEM-based learning app designed using a culturally sustaining framework, during a structured, researcher-facilitated session. Caregivers and children were invited to use the app together on a tablet for approximately 20–25 minutes. During this

time, families were asked to complete the app's tutorial, explore the app, and engage with at least two mini-games while interacting as they normally would. Afterward, caregivers participated in a post-interview to discuss some of their interactions with their child. Researchers recorded interactions with video cameras and wireless microphones and later transcribed them for analysis.

This study analyzes caregiver–child dialogue during app use, focusing on the types of STEM-related talk that emerge in this context. In addition, this study examines how families draw on cultural references and lived experiences in their interactions, particularly when making sense of STEM learning games. Specifically, the analysis focuses on instances of mathematical reasoning, STEM-related language, and cultural references in caregiver–child conversations.

Through examining these co-interactions in a structured setting, this study intends to understand how culturally sustaining digital tools might support meaningful family engagement and STEM learning while also reflecting and sustaining the cultural practices of Latine families. This study is guided by the following research questions:

- What types of STEM-related talk do Latine caregivers and children engage in while interacting with the Bizumia app?
- How do caregivers and children incorporate cultural references and lived experiences into their interactions during app use?

Methodology

The study used a qualitative observational design using video-recorded caregiver-child interactions to examine STEM-related dialogue during co-engagement with the *Bizumia: World of Play* app.

Participants

Participants were recruited through a community partnership with the Santa Ana Early Learning Initiative (SAELI), a nonprofit organization focused on positive early childhood development for children ages 0 to 9. For recruitment, the director of SAELI collaborated with researchers to identify participants who met the following criteria: identified as Latine, had a child aged 4–11, and resided in the city served by the nonprofit.

Twelve families participated in the study (see Table 3), comprising twelve caregivers, ten of whom were female. The caregivers had a mean age of 38 years, with 75% primarily Spanish-speaking and an average of 18 years of community residence. Four caregivers had less than a high school education, five held a high school diploma, two had attended trade or vocational school, and one had a bachelor's degree. Fifteen children participated, aged 4 to 11 years; approximately 73% were male. Among the children, nine primarily spoke English, five preferred Spanish, and one was equally comfortable speaking both languages.

Table 3
Families Demographics

Family ID	CAREGIVER SEX	CAREGIVER AGE	CHILD 1 SEX	CHILD 1 AGE	CHILD 2 SEX	CHILD 2 AGE
FAMILY 01	Female	35	Female	5	-	-
FAMILY 02	Female	34	Male	8	-	-
FAMILY 03	Female	37	Male	4	-	-
FAMILY 04	Female	42	Male	5	Male	9
FAMILY 05	Female	38	Female	7	-	-
FAMILY 06	Male	38	Male	8	-	-
FAMILY 07	Female	33	Male	8	-	-
FAMILY 08	Female	40	Male	8	-	-
FAMILY 09	Female	31	Male	4	Male	9

FAMILY 10	Female	44	Female	9	-	-
FAMILY 11	Female	40	Male	9	Female	11
FAMILY 12	Male	35	Male	8	-	-

Setting and Procedure

Researchers recruited participating families in February 2026, obtained informed consent in accordance with University of California IRB protocol 2818, and obtained children's assent.

Observations took place at the SAELI office, where caregivers and children participated in a structured observational session. Researchers used a lounge area within the office to create a comfortable setting for families during the study. Each caregiver–child dyad received an iPad Pro (3rd generation) and was invited to interact with *Bizumia: World of Play* for about 20 minutes. Families were instructed to complete the tutorial, explore the app freely, and engage with at least two mini-games while interacting as they normally would (see Figure 3).

Figure 3
Family Observations



During the session, the research team recorded caregiver–child interactions to capture both verbal and physical engagement with the app. Participants wore microphones to capture dialogue and other verbal interactions, while a video camera was positioned behind the dyads to protect participant privacy and keep the iPad screen visible throughout the session. In addition, the research team collected screen recordings to document participants’ navigation and interactions throughout the app. Research assistants also took observational field notes during each session to document participant behaviors, engagement, and situational details not entirely captured in the recordings.

Following the observation, caregivers participated in a semi-structured post-interview focused on their perceptions of their child’s thinking and learning during app use, as well as reflections on their own learning experiences. All sessions were facilitated by a bilingual

researcher and supported by one to two bilingual and non-bilingual research assistants who assisted with technology setup, troubleshooting, and note-taking.

Bizumia: World of Play

Bizumia: World of Play is a web-based STEM learning application designed with Latine families from Southern California using a culturally sustaining design framework (Anderson-Coto et al., 2024). Developed through a participatory design process with community members, the app reflects community values, experiences, and cultural practices while supporting children's engagement with STEM concepts.

At the time of this study, the app contained four mini-games, each designed to support a different STEM concept through interactive gameplay. During the study, families interacted with four characters and their associated activities.

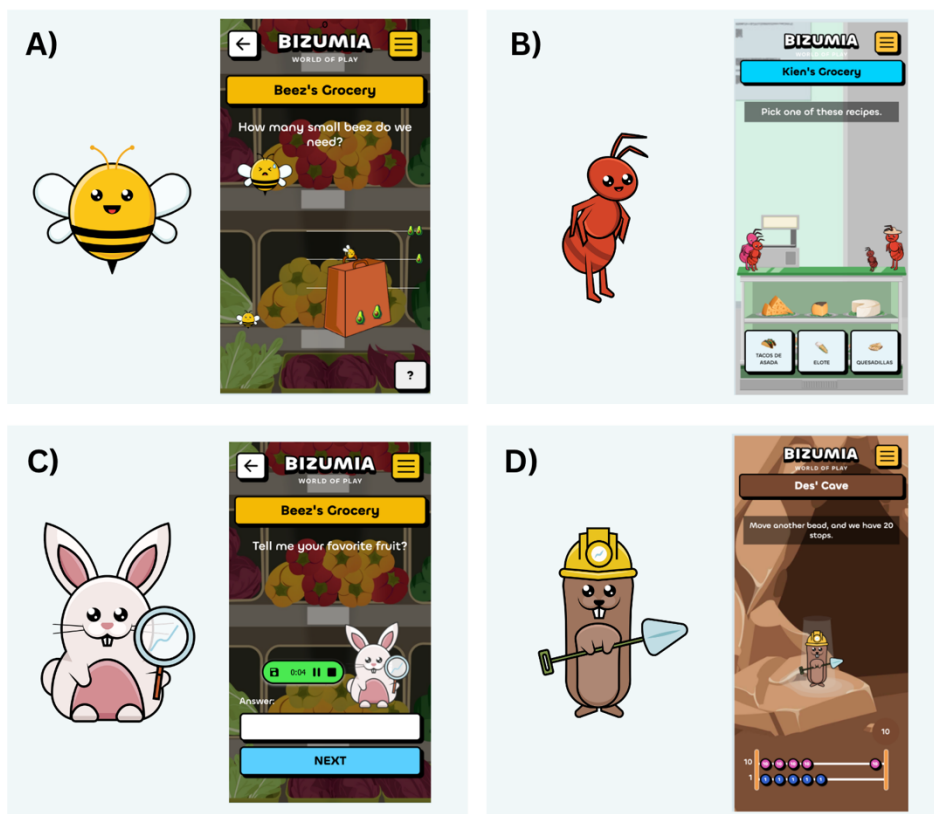
The first activity featured Beez, a bee-like character who helps community members carry groceries. In this game, children engaged in pattern recognition and problem-solving by determining the size and number of Beez needed to carry different amounts of produce (see Figure 4a).

The second activity includes the Kien family, who prepare meals for family gatherings. This game focused on measurement, proportions, and quantity reasoning. Children used ingredient lists to determine the correct amount of ingredients needed based on the number of people being served (see Figure 4b).

The third mini game is with Queso, a character who helps users think about how fruits and vegetables are selected. Through prompts related to sight, touch, smell, and other sensory observations, children engaged in observation and descriptive reasoning while discussing characteristics of produce (see Figure 4c).

The fourth game is about Des, a tunnel builder who uses an abacus to travel throughout the city. This game focused on counting, addition, and subtraction by asking children to use an abacus to determine how many stops were needed to travel between locations (see Figure 4d). Through gameplay, children practiced counting by ones, fives, and tens while reasoning about numerical relationships.

Figure 4
Bizumia: World of Play Characters & Games



Data Analysis

Video recordings from the caregiver–child observation sessions were transcribed and analyzed in their original language, including both Spanish and English. I used a combined deductive and inductive coding approach to examine caregiver–child interactions during app use.

First, I used deductive coding to identify types of STEM-related talk and interaction patterns recorded during the sessions. Drawing on prior literature on STEM dialogue and caregiver–child interaction (Bustamante et al., 2020; Hassinger-Das et al., 2018; Ridge et al., 2015), research team developed an initial coding framework to categorize instances of STEM language, reasoning practices, questioning, explanations, and joint interactions. Codes related to cultural references and lived experiences were also included to capture moments when families drew on everyday experiences, cultural practices, or family knowledge during interactions.

Following the initial coding round, excerpts from STEM-related talk, collaborative interactions, and cultural references were examined to identify patterns across interactions. The team reviewed excerpts more closely using an inductive thematic analysis approach to identify emergent themes related to how families used cultural knowledge and lived experiences to support STEM sense-making during app use (Braun & Clarke, 2006; Braun & Clarke, 2022). Through iterative review and weekly discussion among the research team, themes were refined and organized to reflect recurring patterns throughout caregivers–child dyads.

Results

Analysis of caregiver-child interactions during app use and caregiver post-interviews revealed two findings that address the study's research questions. First, caregivers scaffolded children's STEM reasoning and problem-solving skills by directing attention to relevant information, redirecting children's thinking, and prompting explanation, prediction, and reflection during co-use. Second, families connected app experiences to their everyday lives by relating STEM concepts and app narratives to familiar family practices, relationships, and lived experiences. Together, these findings show how learning within *Bizumia: World of Play* emerged

through both caregiver-child interaction and families' connections between the app and their everyday experiences.

Caregiver Scaffolded STEM Reasoning and Problem Solving

Latine caregivers engaged their children in STEM talk by scaffolding attention to quantities, measurements, counting, problem-solving strategies, predictions, and explanations. Across families, Latine caregivers supported children's engagement with STEM concepts by directing attention to relevant information, redirecting children's thinking when they encountered challenges, and motivating them to explain, predict, and reflect on their reasoning.

Directing Attention to Relevant Information

One way Latine caregivers supported STEM reasoning was by directing children's attention to relevant information within the app's activities. These interactions involved helping children identify quantities, interpret instructions, recall numerical information, and focus on important details needed to solve problems.

For example, when Family 02 was playing Des' counting game, the app prompted users to identify and count avocados on the screen. In response, Family 02's caregiver asked, “¿Cuántos avocados hay? ¿Cuántos miras?” (“How many avocados are there? How many do you see?”) Although the game instructions were presented in English, the caregiver restated the task in Spanish while simultaneously directing the child toward the counting objective. Family 02's caregiver later on in Kien's game reminded the child of their role within the game before posing a question: “...tú tienes que ayudarle a buscar lo de la lista. Oi. ¿Cuántos tomates quiere?” (“...you have to help find what is on the list. Hey. How many tomatoes does he want?”) Rather than simply repeating the app instructions, the caregiver narrowed the task to a specific goal by focusing the child's attention on identifying the quantity of tomatoes needed.

Latine caregivers also directed children's attention toward mathematical strategies and numerical relationships. For example, while working with the Des' abacus activity, Family 06's caregiver instructed their child to "Ponle a tres. Tres paradas." ("Put it at three. Three stops.") before following up with "¿Cuántos [cuentitas] usaste?" ("How many [beads] did you use?") In other cases, caregivers posed a question and immediately modeled a possible solution. While using the abacus, Family 09's caregiver asked, "Okey, ¿Cómo podemos hacer el número ocho? Con el cinco, porque aquí hay cinco, ¿verdad?" ("Okay, how can we make the number eight? With the five, because there are five here, right?") These instructions allowed their children to think through their own strategies and identify numerical relationships to solve each problem without providing an answer.

In addition to guiding strategy use, Latine caregivers emphasized numerical information that was important for completing the task. For example, caregivers directed their children to recall quantities and measurements during the activities, such as Family 03's caregiver saying "Let's add another [bead]" while using the abacus or Family 06's caregiver redirecting their child by stating "Son muchos. Quítale uno." ("That's too many. Take one away.") Other caregivers emphasized critical information needed to solve the problem, such as Family 05's caregiver stating "Mira, para dos. Este es para dos personas." ("Look, for two. This is for two people.") Emphasizing numerical information allowed children to adjust their approaches to the problems.

Latine caregivers often read Kien's ingredient lists aloud and repeated numerical values to ensure children could recall the quantities needed. Examples included statements such as those from Family 05's caregiver, who said, "Extracto de vainilla, uno. Pero tienes que mirar que son cuatro cucharadas, dos cucharadas y una cucharada." ("Vanilla extract, one. But you have to look that it is four tablespoons, two tablespoons, and one tablespoon.") When Family 05's children

moved too quickly through a task, the caregiver redirected their attention to the available information, saying, “Espérate. Cuatro cucharadas de leche, dos de azúcar y una de vainilla.” (“Wait. Four tablespoons of milk, two of sugar, and one of vanilla.”) Similar practices were seen across families as caregivers verbalized numerical information aloud, such as Family09's caregiver stating “Mira, hay dos unidades de pollo, cuatro tortillas, una onza de queso, dos cucharadas de crema,” (“Look, there are two units of chicken, four tortillas, one ounce of cheese, and two tablespoons of cream,”) and Family04's caregiver reminding their child, “Mira esta cantidad es para dos personas. Y son seis personas.” (“Look, this amount is for two people. And there are six people.”)

Redirecting Children's Thinking

Beyond directing attention to information, Latine caregivers also supported problem solving by redirecting children toward alternative strategies and encouraging them to revisit relevant information. These interactions frequently occurred when children became stuck, overlooked important details, or selected incorrect solutions.

For example, when figuring out how many Beez were needed to lift a bag of produce, Family 07's caregiver asked, “Do they need another one?” and later followed up with “Let's try another one. No?” to encourage the child to rethink their approach. Similarly, Family 06's caregiver asked, “¿Con un beez grande nomás?” (“With only one big Beez?”) suggesting that a single Beez might not be enough to carry the groceries. Other caregivers incorporated more realistic interpretations of the problem, such as Family 02's caregiver, who responded, “No la puede. Está chiquita. ¿Cuántas beez necesitas? Para que pueda en la bolsa.” (“She can't do it. It's little. How many Beez do you need so she can carry the bag?”) Rather than providing an answer, these caregivers redirected their children to consider alternatives and evaluate whether their initial choices fit the problem.

Latine caregivers also redirected children back to information they had previously encountered in the game. For example, when Family 07's caregiver noticed that their child was entering an incorrect response, they redirected the child by stating, "Remember, it gives us a recipe, but we have to make the recipe for four." Instead of correcting the answer directly, the caregiver reminded the child of the information needed to solve the problem. Similarly, when their child became stuck while completing Des' task, Family 03's caregiver stated, "No, we have three here. But how many did we need to get to the grocery store?" This intervention redirected the child's attention to Des's original goal and encouraged them to consider the remaining quantity needed to reach the targeted amount.

Prompting Explanation, Prediction, and Reflection

In addition to directing and redirecting children's thinking, caregivers frequently used prompts that encouraged children to explain their reasoning, make predictions, and reflect on possible outcomes. These interactions extended engagement beyond obtaining the correct answer and created opportunities for deeper STEM reasoning.

For example, caregivers often adapted game prompts to generate additional discussion. While playing Kien's game, Family 10's caregiver asked, "¿Cuántas libras sientes que se van a comer las hormigas?" ("How many pounds do you think the ants are going to eat?"), extending the activity beyond the information provided in the game and encouraging the child to estimate a possible outcome.

Latine caregivers also encouraged children to predict and test outcomes. For example, Family 03's caregiver encouraged the child to consider what might happen if a bead was added back after being removed by asking, "So what if we add it back? Take this one over here and let's see if we go back to the store. Let's see. Are we going to go back to the store?" Instead of

directing the child toward an answer, the caregiver used a series of questions to foster prediction and experimentation.

In other cases, Latine caregivers prompted children to explain and justify their thinking. For example, after a child determined how many Beez were needed to carry a grocery bag with produce, Family 12's caregiver asked, "¿Por qué crees que necesita tres Beez para cargar la bolsa?" ("Why do you think it needs three Beez to carry the bag?") The caregiver encouraged their child to articulate their thinking and provide evidence for their response, rather than giving them an answer.

Latine caregivers also prompted reflection when their children appeared uncertain about their responses. For example, in Queso's game, children were asked to use their senses to identify characteristics of fruits and vegetables. When Family 10 encountered the prompt "what does it smell like?" in reference to a carrot, the child initially hesitated to answer. The caregiver suggested, "dulce" ("sweet"), which the child rejected by shaking her head. The child then responded with "seca" ("dry"), prompting the caregiver to respond, "Seca. ¿Huele seca? [se ríe] No es a lo mejor como se siente, pero puede oler así, fresca también." ("Dry. Does it smell dry? [laughs] Maybe that's how it feels, but it could smell fresh too.") In this interaction, the caregiver encouraged their child to reconsider the relationship among the different senses discussed and to think more carefully about the question being asked.

Across families, directing attention, redirecting thinking, and prompting explanation, prediction, and reflection were important ways in which Latine caregivers scaffolded children's engagement with STEM concepts. Through these interactions, Latine caregivers supported their children in focusing on relevant information, evaluating possible solutions, and articulating their reasoning while co-engaging with the app.

Families Connected STEM Concepts to Everyday Practices

Beyond engaging with STEM concepts within the app, families frequently connected mathematical ideas to practices already embedded in their everyday lives. Latine caregivers described how concepts such as sharing, portioning, and measurement were not new experiences introduced by the app but rather reflected routines and conversations that regularly occurred in their households. Across interviews, Latine caregivers' reflections suggested that STEM reasoning was often closely linked to everyday family activities, allowing their children to connect concepts encountered in the app to familiar experiences at home.

One way Latine families connected STEM concepts to everyday life was by sharing food and dividing portions among family members. Caregivers described how mathematical reasoning around quantities, fractions, and distribution was already part of their daily routines during meals and family activities. For example, Family 09's caregiver reflected on how Kien's game connected to the way their family divides food and discusses portions at mealtimes. During the post-interview, Family 09's caregiver explained how conversations about sharing and dividing food regularly occur within their household:

Interviewer: ¿Por qué le nació eso de explicarles a los niños esas porciones?

Family 09's caregiver: ...Soy así en la casa, por lo menos hay un aguacate, como somos tres, porque al más pequeño no le gusta el aguacate. Entonces, digo yo, entonces partimos el aguacate entre los tres. Y ya dice, y dice: Sí, yo quiero más. Entonces, vamos a partir dos aguacates... Y te vamos a dar la mitad de un aguacate y nosotros vamos a comer los otros. Okey, ya dice: okey, está bien. Y a veces al revés, porque al más grande no le gusta el queso y al más pequeño sí... Entonces, yo los parto en cuadritos ya, entonces ya los tengo listos. Entonces, ya sacó tres pedacitos, ya sé que uno es para él, uno para mi esposo y uno para mí.

English Translation

Interviewer: Why did it come naturally for you to explain those portions to the children?

Family 09's caregiver: ...I'm like that at home. For example, if there is one avocado, since there are three of us, because the youngest does not like avocado. Then I say, we divide the avocado among the three of us. And then he says, yes, I want more. So, we

will cut two avocados... And we will give you half an avocado, and we will eat the other half. Okay, then he says, okay, that's fine. And sometimes it is the opposite because the oldest does not like cheese and the youngest does... So I cut it into little squares and have them ready. Then I take out three pieces, and I already know one is for him, one is for my husband, and one is for me.

Family 09's caregiver's example illustrates how mathematical ideas related to portions, division, and sharing were already embedded within everyday family routines. Instead of relying on the app to teach these concepts, families drew on existing practices involving reasoning about quantities and fair distribution.

Families also connected app activities to food-preparation practices familiar in their households. Through recipe-based activities, this prompted Latine caregivers to draw on foods, ingredients, and cooking experiences that reflected their children's interests and family preferences. For example, Family 11's caregiver explained how their choice of recipe was informed by their children's interests, “cuando ellos preguntaron que que quería yo este receta, so pensé primero en en qué es lo que les gusta a ellos para compartir. Ellos les encantan las enchiladas, entonces fue el platillo que yo elegí para que, pues, ellos, um, supieran los ingredientes que lleva.” (“When they asked me what recipe I wanted, I first thought about what they like to share. They love enchiladas, so that was the dish I chose so that they would know the ingredients that go into it.”) In these instances, Latine caregivers used familiar foods and preferences to make the activities more personally meaningful and relevant to their children.

Across families, activities involving recipes and portion sizes mirrored the experiences children encountered outside the app. Latine caregivers described how counting, measuring, and reasoning about quantities naturally emerged through routine household activities such as meal preparation and distributing food among family members. Rather than viewing mathematics as separate from daily life, families interpreted STEM concepts through familiar practices already

meaningful at home. Findings suggest that the app's STEM activities resonated with existing family routines, helping Latine caregivers and children connect mathematical concepts to everyday experiences.

Discussion

This study examined how Latine caregivers and children interacted with *Bizumia: World of Play*, a STEM-based learning app co-designed with local families using culturally sustaining principles. Analysis of caregiver-child interactions along with post-interviews revealed two primary findings. First, caregivers actively scaffolded children's STEM reasoning and problem-solving by directing attention to relevant information, redirecting children's thinking, and prompting explanation, prediction, and reflection. Second, families connected STEM concepts and app narratives to their everyday practices and lived experiences. Findings show that caregiver-child learning with educational technology developed using a culturally sustaining framework is both a social and cultural process. Latine caregivers acted as learning partners, supporting their children's STEM engagement and helping them connect app-based experiences to familiar aspects of family life.

Caregivers as Scaffolders of STEM Reasoning and Problem Solving

One finding of this study was the active role caregivers played in supporting their children's STEM reasoning during app use. Across interactions, caregivers frequently directed children's attention toward relevant information, redirected their thinking when they encountered challenges, and prompted them to explain, predict, and reflect on their reasoning. These findings align with previous research showing that caregivers mediate children's learning by scaffolding participation and supporting sense-making in informal learning experiences (Dore & Zimmerman, 2020; Vygotsky, 1978).

Latine caregivers supported children's engagement in STEM reasoning in multiple ways. At times, they directed children's attention to quantities, measurements, or other information needed to complete a task. In other instances, Latine caregivers redirected children's thinking by encouraging them to reconsider strategies or revisit information encountered earlier in the activity. Latine caregivers also extended their children's thinking by asking questions that prompted prediction, explanation, and justification. The findings reflect forms of guided participation in which learning occurs through shared activity and social interaction (Rogoff et al., 1993).

Additionally, these findings show that *Bizumia: World of Play* was not the only source of learning. Instead, the app created opportunities for caregivers and children to engage collaboratively with STEM concepts. Through conversation and joint problem-solving, caregivers helped children interpret information, evaluate solutions, and share their reasoning. This finding supports prior work suggesting that educational technologies may be most effective when they create opportunities for meaningful caregiver-child interaction rather than replacing caregiver involvement altogether (Anderson-Coto et al., 2024; Lavigne et al., 2023).

Findings also suggest that Latine caregivers supported forms of STEM reasoning that went beyond task completion. By encouraging prediction, explanation, and reflection, caregivers transformed app-based activities into opportunities for collaborative sense-making. This allowed children to engage in reasoning practices foundational to STEM learning and supported research showing that conversations involving explanation, elaboration, and justification contribute to deeper conceptual understanding in early childhood (Fender & Crowley, 2007; Haden et al., 2014; Jant et al., 2014). Rather than focusing on getting the correct answer, caregivers supported

children in thinking through why an answer made sense and how different solutions might lead to different outcomes.

Everyday Family Practices as Resources for STEM sense-making

A second major finding was that families frequently connected STEM concepts and app narratives to their everyday practices and lived experiences. Caregivers drew on daily routines, such as sharing food, preparing meals, and participating in family gatherings, to help children make sense of the STEM concepts presented in the app. The findings correspond with Funds of Knowledge perspectives, which position families' lived experiences, cultural practices, and everyday expertise as valuable assets for learning (Belgrave et al., 2022; Bermudez et al., 2023; Moll et al., 1992).

The families did not see STEM concepts as abstract ideas disconnected from daily life. They interpreted app-based activities through experiences already meaningful within their households. Discussions about recipes, portions, and sharing frequently prompted caregivers to draw upon existing family practices involving measurement, division, and distribution. Similarly, children connected app storylines and characters to their own family experiences, particularly experiences involving large family gatherings and relationships with extended family members. These interactions suggest that STEM learning often occurred through connections to personal routines and experiences rather than through isolated engagement with academic content alone.

The data also supported culturally sustaining approaches to educational technology design. Because *Bizumia: World of Play* was developed through a culturally sustaining design process that incorporated the values, experiences, and priorities of Latine families (Anderson-Coto et al., 2024), caregivers could recognize aspects of their own lives in the app's activities and

narratives. Instead of requiring families to leave their cultural practices outside the learning experience, the app created opportunities for those practices to serve as learning resources.

Importantly, Latine caregivers' reflections on their children's participation suggest that these connections went beyond engagement alone. As families interacted with the app, Latine caregivers described noticing their children's competencies and understandings that they had not previously observed in other contexts. This evidence suggests that culturally sustaining educational technologies may not only support children's learning but may also create opportunities for caregivers to recognize and build upon their children's developing knowledge and abilities.

Implications for Culturally Sustaining Educational Technology

This study offers important implications for designing culturally sustaining educational technologies. Much of the existing research on educational technology focuses on engagement, usability, or learning outcomes and centers individual interactions between children and technology (Baykal et al., 2023; Harverson et al., 2026; Herodotou, 2018). The findings suggest that educational technologies can also facilitate family dialogue, joint problem-solving, and shared STEM learning experiences.

More specifically, the study indicates that culturally sustaining educational technologies should be designed not only to support children's engagement with STEM concepts but to create opportunities for caregiver participation and family STEM conversation. By incorporating features that encourage discussion, problem-solving, and reflection, technology use can shift from an individualistic activity to a joint learning experience.

Findings further suggest that educational technologies can be meaningful when they incorporate scenarios, practices, and narratives that Latine families recognize from their own

lives. When Latine families can connect learning activities to familiar routines and experiences, STEM concepts may become more relevant and accessible. This would enable culturally sustaining educational technologies to intentionally create opportunities for families to draw on their own cultural knowledge and everyday practices as part of the learning process.

Conclusion

This study examined how Latine caregivers and children engaged with *Bizumia: World of Play*, a culturally sustaining STEM learning application designed to support family learning. Findings showed that Latine caregivers played an active role in facilitating children's engagement with STEM concepts by scaffolding reasoning and problem-solving through directing attention, redirecting thinking, and prompting explanation, prediction, and reflection. These interactions positioned caregivers as collaborative learning partners who helped children make sense of STEM-related challenges as they used the app.

Findings also demonstrated that families frequently connected STEM concepts and app narratives to their everyday practices and lived experiences. Latine caregivers and their children pulled from daily routines such as sharing food, preparing meals, and participating in family gatherings to interpret and make meaning of activities within the app. These connections suggest that STEM learning was not experienced as separate from family life, but rather became intertwined with existing practices and cultural experiences.

These findings highlight the importance of viewing educational technology as a tool that supports family interaction and sense-making rather than as a single source of learning. By creating opportunities for caregiver participation and incorporating experiences that resonate with families' everyday lives, culturally sustaining educational technologies may foster richer forms of engagement with STEM concepts. This study contributes to growing efforts within the

learning sciences and educational technology communities to design learning experiences that recognize families' cultural knowledge, lived experiences, and everyday practices as valuable resources for STEM learning.

References

- Alexandre, S., Xu, Y., Washington-Nortey, M., & Chen, C. (2022). Informal STEM Learning for Young Children: A Systematic Literature Review. *International Journal of Environmental Research and Public Health*, 19(14), 8299. <https://doi.org/10.3390/ijerph19148299>
- Allen Kuyenga, M. C. (2026). Being culturally sustaining in computing education: A systematic literature review. *Computer Science Education*, 1–32. <https://doi.org/10.1080/08993408.2026.2665179>
- Anderson-Coto, M. J., Salazar, J., Lopez, J. L.-S., Sedas, R. M., Campos, F., Bustamante, A. S., & Ahn, J. (2024). Towards culturally sustaining design: Centering community's voices for learning through Participatory Design. *International Journal of Child-Computer Interaction*, 39, 100621. <https://doi.org/10.1016/j.ijcci.2023.100621>
- Barton, A. C., & Tan, E. (2009). Funds of knowledge and discourses and hybrid space. *Journal of Research in Science Teaching*, 46(1), 50–73. <https://doi.org/10.1002/tea.20269>
- Baykal, G. E., Eriksson, E., & Torgersson, O. (2023). Assessment of learning in child–computer interaction research: A semi-systematic literature review. *International Journal of Child-Computer Interaction*, 36, 100578. <https://doi.org/10.1016/j.ijcci.2023.100578>
- Belgrave, A. B., Bermudez, V. N., Chew, P., Lin, Y., Ahn, J., & Bustamante, A. S. (2022). Using a participatory design approach for co-creating culturally situated STEM enrichment activities. *Journal of Applied Developmental Psychology*, 82, 101451. <https://doi.org/10.1016/j.appdev.2022.101451>
- Bermudez, V. N., Salazar, J., Garcia, L., Ochoa, K. D., Pesch, A., Roldan, W., Soto-Lara, S., Gomez, W., Rodriguez, R., Hirsh-Pasek, K., Ahn, J., & Bustamante, A. S. (2023). Designing culturally situated playful environments for early STEM learning with a Latine community. *Early Childhood Research Quarterly*, 65, 205–216. <https://doi.org/10.1016/j.ecresq.2023.06.003>
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative research in psychology*, 3(2), 77–101.
- Braun, V., & Clarke, V. (2022). Conceptual and design thinking for thematic analysis. *Qualitative psychology*, 9(1), 3.
- Bustamante, A. S., Begolli, K. N., Shahidi, N., Riesen, C., Schlesinger, M., Golinkoff, R. M., Zonji, S., Evans, N., & Hirsh-Pasek, K. (2020). *More Than Just a Game: Transforming Social Interaction and STEM Play With Parkopolis*.
- Clark, L. S. (2011). Parental Mediation Theory for the Digital Age. *Communication Theory*, 21(4), 323–343. <https://doi.org/10.1111/j.1468-2885.2011.01391.x>
- Denmark, N. M., Harden, B. J., & Gonzalez, M. (2014). Low-income Central American immigrant mothers' goals and their children's classroom competencies in preschool. *Early Education and Development*, 25(5), 723–745.
- Dore, R. A., Shirilla, M., Hopkins, E., Collins, M., Scott, M., Schatz, J., Lawson-Adams, J., Valladares, T., Foster, L., Puttre, H., Toub, T. S., Hadley, E., Golinkoff, R. M., Dickinson, D., & Hirsh-Pasek, K. (2021). The impact of joint media engagement on parent–child interactions: A systematic review. *Human Behavior and Emerging Technologies*, 3(2), 230–254. <https://doi.org/10.1002/hbe2.203>
- Dore, R. A., & Zimmermann, L. (2020). Coviewing, Scaffolding, and Children's Media Comprehension. In J. Bulck (Ed.), *The International Encyclopedia of Media Psychology* (1st ed., pp. 1–8). Wiley. <https://doi.org/10.1002/9781119011071.iemp0233>

- Ewin, C. A., Reupert, A. E., McLean, L. A., & Ewin, C. J. (2020). The impact of joint media engagement on parent-child interactions: A systematic review. *Human Behavior and Emerging Technologies*, 3(2), 230–254. <https://doi.org/10.1002/hbe2.203>
- Fender, J. G., & Crowley, K. (2007). How parent explanation changes what children learn from everyday scientific thinking. *Journal of Applied Developmental Psychology*, 28(3), 189–210. <https://doi.org/10.1016/j.appdev.2007.02.007>
- Gamble, W. C., & Modry-Mandell, K. (2008). Family Relations and the Adjustment of Young Children of Mexican Descent: Do Family Cultural Values Moderate These Associations? *Social Development*, 17(2), 358–379. <https://doi.org/10.1111/j.1467-9507.2007.00429.x>
- García-Coll, C., Crnic, K., Lamberty, G., Wasik, B. H., Jenkins, R., Garcia, H. V., & McAdoo, H. P. (1996). An integrative model for the study of developmental competencies in minority children. *Child development*, 67(5), 1891–1914.
- González, N., Andrade, R., Civil, M., & Moll, L. (2001). Bridging Funds of Distributed Knowledge: Creating Zones of Practices in Mathematics. *Journal of Education for Students Placed at Risk (JESPAR)*, 6(1–2), 115–132. https://doi.org/10.1207/S15327671ESPR0601-2_7
- Gözüm, A.İ.C. (2022). Digital Games for STEM in Early Childhood Education: Active Co-playing Parental Mediation and Educational Content Examination. In: Papadakis, S., Kalogiannakis, M. (eds) *STEM, Robotics, Mobile Apps in Early Childhood and Primary Education*. Lecture Notes in Educational Technology. Springer, Singapore. https://doi.org/10.1007/978-981-19-0568-1_21
- Griffith, S. F., & Arnold, D. H. (2019). Home learning in the new mobile age: Parent–child interactions during joint play with educational apps in the US. *Journal of Children and Media*, 13(1), 1–19. <https://doi.org/10.1080/17482798.2018.1489866>
- Griffith, S. F., Hart, K. C., Mavrakakis, A. A., & Bagner, D. M. (2022). Making the best of app use: The impact of parent-child co-use of interactive media on children’s learning in the U.S. *Journal of Children and Media*, 16(2), 271–287. <https://doi.org/10.1080/17482798.2021.1970599>
- Gutiérrez, K. D., & Rogoff, B. (2003). Cultural Ways of Learning: Individual Traits or Repertoires of Practice. *Educational Researcher*, 32(5), 19–25. <https://doi.org/10.3102/0013189X032005019>
- Haden, C. A., Jant, E. A., Hoffman, P. C., Marcus, M., Geddes, J. R., & Gaskins, S. (2014). Supporting family conversations and children’s STEM learning in a children’s museum. *Early Childhood Research Quarterly*, 29(3), 333–344. <https://doi.org/10.1016/j.ecresq.2014.04.004>
- Hassinger-Das, B., Bustamante, A. S., Hirsh-Pasek, K., & Golinkoff, R. M. (2018). Learning Landscapes: Playing the Way to Learning and Engagement in Public Spaces. *Education Sciences*, 8(2), 74. <https://doi.org/10.3390/educsci8020074>
- Harverson, J., Zomer, C., Chu, C., Horwood, S., Horwood, M., Nicholas, M., & Paatsch, L. (2026). Children’s engagement with digital technology in educational spaces: A scoping review. *Computers & Education*, 240, 105454. <https://doi.org/10.1016/j.compedu.2025.105454>
- Herodotou, C. (2018). Young children and tablets: A systematic review of effects on learning and development. *Journal of Computer Assisted Learning*, 34(1), 1–9. <https://doi.org/10.1111/jcal.12220>

- Hogg, L. (2011). Funds of Knowledge: An investigation of coherence within the literature. *Teaching and Teacher Education*, 27(3), 666–677. <https://doi.org/10.1016/j.tate.2010.11.005>
- Jant, E. A., Haden, C. A., Uttal, D. H., & Babcock, E. (2014). Conversation and Object Manipulation Influence Children’s Learning in a Museum. *Child Development*, 85(5), 2029–2045. <https://doi.org/10.1111/cdev.12252>
- Lavigne, H. J., Presser, A. L., Rosenfeld, D., Cuellar, L., Vidiksis, R., Ferguson, C., Wolsky, M., & Andrews, J. (2023). Computational thinking with families: Studying an at-home media intervention to promote joint media engagement between preschoolers and their parents. *Early Childhood Research Quarterly*, 65, 102–114. <https://doi.org/10.1016/j.ecresq.2023.05.009>
- Levine, S. C., Suriyakham, L. W., Rowe, M. L., Huttenlocher, J., & Gunderson, E. A. (2010). What counts in the development of young children’s number knowledge? *Developmental Psychology*, 46(5), 1309–1319. <https://doi.org/10.1037/a0019671>
- Leyva, D., Weiland, C., Shapiro, A., Yeomans-Maldonado, G., & Febles, A. (2021). A strengths-based, culturally responsive family intervention improves Latino kindergarteners’ vocabulary and approaches to learning. *Child Development*, 93(2), 451–467.
- Mannell, K., Bloul, S., Sefton-Green, J., & Willcox, M. (2024). Digital media and technology use by families with infants, toddlers, and young children: A scoping review and call for forward momentum. *Journal of Children and Media*, 18(4), 605–628. <https://doi.org/10.1080/17482798.2024.2394939>
- Mermelshtine, R. (2017). Parent–child learning interactions: A review of the literature on scaffolding. *British Journal of Educational Psychology*, 87(2), 241–254. <https://doi.org/10.1111/bjep.12147>
- Moll, L. C., Amanti, C., Neff, D., & Gonzalez, N. (1992). Funds of Knowledge for Teaching: Using a Qualitative Approach to Connect Homes and Classrooms. *Theory into Practice*, 31(2), 132–141.
- Møller, A. K., & Kaup, C. F. (2023). Parents and children s learning when collaborating on inquiry-based mathematics and computational thinking tasks. *Journal of Pedagogical Research*, 2. <https://doi.org/10.33902/JPR.202319033>
- Neumann, M. M. (2018). Parent scaffolding of young children’s use of touch screen tablets. *Early Child Development and Care*, 188(12), 1654–1664. <https://doi.org/10.1080/03004430.2016.1278215>
- Nikken, P., & Jansz, J. (2006). Parental mediation of children’s videogame playing: A comparison of the reports by parents and children. *Learning, Media and Technology*, 31(2), 181–202. <https://doi.org/10.1080/17439880600756803>
- Ridge, K. E., Weisberg, D. S., Ilgaz, H., Hirsh-Pasek, K. A., & Golinkoff, R. M. (2015). Supermarket speak: Increasing talk among lowsocioeconomic status families. *Mind, Brain and Education*, 9, 127–135. <http://dx.doi.org/10.1111/mbe.12081>
- Rogoff, B. (2014). Learning by Observing and Pitching In to Family and Community Endeavors: An Orientation. *Human Development*, 57(2–3), 69–81.
- Rogoff, B., Mistry, J., Göncü, A., Mosier, C., Chavajay, P., Heath, S. B., & Goncu, A. (1993). Guided Participation in Cultural Activity by Toddlers and Caregivers. *Monographs of the Society for Research in Child Development*, 58(8), i. <https://doi.org/10.2307/1166109>
- Salazar, J., Seccia, I. T., Maldonado, J. V., Hernandez, L., Bermudez, V. N., Acevedo-Farag, L. M., Ahn, J., & Bustamante, A. S. (2025). Sustaining Latine Families’ Cultural Values

- Through Technology Mediation Practices. *Journal of Latinos and Education*, 1–12.
<https://doi.org/10.1080/15348431.2024.2444942>
- Sobel, D. M. (2023). Science, Technology, Engineering, and Mathematics (STEM) Engagement From Parent-Child Interaction in Informal Learning Environments. *Current Directions in Psychological Science*, 32(6), 454–461. <https://doi.org/10.1177/09637214231190632>
- Sobel, K., Bhattacharya, A., Hiniker, A., Lee, J. H., Kientz, J. A., & Yip, J. C. (2017). It wasn't really about the Pokémon: Parents' Perspectives on a Location-Based Mobile Game. *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems*, 1483–1496. <https://doi.org/10.1145/3025453.3025761>
- Swirbul, M., & Melzi, G. (2024). Family math engagement with young Latine children in the United States. *Child Development Perspectives*, 18(1), 3–9.
<https://doi.org/10.1111/cdep.12490>
- Takeuchi, L., & Stevens, R. (2011). The new coviewing: Designing for learning through joint media engagement. New York: The Joan Ganz Cooney Center at Sesame Workshop.
- Valkenburg, P. M., Krcmar, M., Peeters, A. L., & Marseille, N. M. (1999). Developing a scale to assess three styles of television mediation: “Instructive mediation,” “restrictive mediation,” and “social coviewing.” *Journal of Broadcasting & Electronic Media*, 43(1), 52–66.
<https://doi.org/10.1080/08838159909364474>
- Vélez-Ibáñez, C. G., & Greenberg, J. B. (1989). Formation and transformation of funds of knowledge among US Mexican households in the context of the borderlands. In *annual meeting of the American Anthropological Association, Washington, DC*.
- Verdine, B. N., Golinkoff, R. M., Hirsh-Pasek, K., Newcombe, N., & Bailey, D. H. (2017). *Links between spatial and mathematical skills across the preschool years*. Hoboken: Wiley.
- Vygotsky, L.S. (1978) *Mind in society: the development of higher psychological processes*. Harvard University Press.
- Weisberg, D. S., Hirsh-Pasek, K., & Golinkoff, R. M. (2013). Guided Play: Where Curricular Goals Meet a Playful Pedagogy. *Mind, Brain, and Education*, 7(2), 104–112.
<https://doi.org/10.1111/mbe.12015>
- Wood, D., Bruner, J. S., & Ross, G. (1976). THE ROLE OF TUTORING IN PROBLEM SOLVING*. *Journal of Child Psychology and Psychiatry*, 17(2), 89–100.
<https://doi.org/10.1111/j.1469-7610.1976.tb00381.x>
- Wood, E., Petkovski, M., De Pasquale, D., Gottardo, A., Evans, M. A., & Savage, R. S. (2016). Parent Scaffolding of Young Children When Engaged with Mobile Technology. *Frontiers in Psychology*, 7. <https://doi.org/10.3389/fpsyg.2016.00690>
- Yatmaz, Z.E., Demiral, S. (2022). Building from Scratch: Online Education Experiences of Early Childhood Education Teachers in Turkey. In: Papadakis, S., Kalogiannakis, M. (eds) *STEM, Robotics, Mobile Apps in Early Childhood and Primary Education*. Lecture Notes in Educational Technology. Springer, Singapore. https://doi.org/10.1007/978-981-19-0568-1_2
- Yu, J., DeVore, A., & Roque, R. (2021). Parental Mediation for Young Children's Use of Educational Media: A Case Study with Computational Toys and Kits. *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*, 1–12.
<https://doi.org/10.1145/3411764.3445427>

CHAPTER 4: Caregivers as Pedagogical Partners: Understanding Latine Caregivers' Pedagogical Sensemaking During Educational Technology Use

While schools are often positioned as the main sites of science, technology, engineering, and mathematics (STEM) learning, research shows that caregivers play an important role in supporting children's early engagement with STEM concepts (Salvatierra & Cabello, 2022; Sobel, 2023). Through everyday interactions and shared activities, caregivers are active learning partners who create opportunities for children to explore concepts, ask questions, and develop understandings of the world around them. These interactions often take place in informal environments such as homes, parks, museums, and community spaces (Sobel & Jipson, 2016). Within these contexts, caregivers support learning by guiding attention, asking questions, encouraging exploration, helping children make sense of new experiences, and responding to their developing understanding (Pattison et al., 2016).

Research on family STEM learning suggests that learning develops through shared participation, as caregivers and children explore ideas and solve problems together (Callanan et al., 2020; Murphy et al., 2014). In these interactions, caregivers serve as important learning partners who shape how children engage with STEM challenges and opportunities (Salvatierra & Cabello, 2022). Caregivers do this by scaffolding children's participation through questions, guidance, adapted support, and encouragement to explain their thinking (Callanan & Oakes, 1992; Murphy et al., 2014). As children respond to these supports, caregivers continue to interpret their children's understanding and adjust their interactions accordingly (Conner & Cross, 2003; Mermelshtine, 2017). These processes position caregivers as active participants who both scaffold and adapt approaches to support and make sense of children's learning during shared activities.

For Latine families, cultural values, family practices, and everyday experiences may shape collaborative interactions and support children's learning in ways that traditional educational settings often fail to recognize or leverage (González et al., 1995; Moll et al., 1992; Paradise & Rogoff, 2009). Asset-based perspectives highlight the rich knowledge, resources, and learning practices within Latine communities and emphasize the importance of understanding how families draw on these strengths during shared learning experiences (Moll et al., 1992; Yosso, 2005). Examining Latine caregivers' perspectives can therefore provide insight not only into how they scaffold children's learning, but also into how their knowledge and experiences shape their interpretations of children's understanding and their decisions about how to respond during collaborative technology use.

Although previous research has documented how caregivers support children's STEM learning through scaffolding and shared participation (Haden et al., 2023; Salvatierra & Cabello, 2022), research is needed to understand the reasoning that informs these practices, particularly among Latine caregivers. Because caregivers may adjust their support in response to children's participation and developing understanding (Murphy et al., 2014), understanding scaffolding also requires examining how caregivers interpret children's thinking and use those interpretations to decide when and how to respond. Examining this process can deepen understanding of caregivers as active learning partners who make pedagogical decisions during collaborative technology use.

The current study examines how Latine caregivers make sense of their scaffolding practices while co-engaging with their children using *Bizumia: World of Play*, a STEM-based learning application designed using culturally sustaining principles (Anderson-Coto et al., 2024). Through semi-structured interviews, I explore how caregivers describe their role in supporting

children's learning, how they interpret children's understanding and approaches to problem-solving, and how these interpretations inform their decisions about when and how to provide support. Prior research shows that caregivers hold beliefs about how children learn and develop and adjust their support based on children's demonstrated abilities and needs (Conner & Cross, 2003; Mermelshtine, 2017; Parmar et al., 2004). Building on this work, I use the term “*caregiver pedagogical sensemaking*” to describe how caregivers interpret children's developing understanding and use those interpretations to decide how to support learning during collaborative technology use. The study positions Latine caregivers as active learning partners whose knowledge and interpretations are central to understanding how scaffolding occurs and is adjusted during shared technology experiences.

Background

Sociocultural Perspectives on Family Learning

Drawing on sociocultural perspectives, learning is understood as a socially situated process that emerges through participation in shared activities (Rogoff, 1990; Vygotsky, 1978). Instead of being transmitted from one individual to another, knowledge develops through interaction, dialogue, and engagement with others (Bruner, 1983; Murphy et al., 2014; Vygotsky, 1978). From a sociocultural perspective, learning develops through participation in shared activities with others. As learners become more familiar and proficient within these activities, they can move from relying on the guidance of more experienced participants toward taking greater responsibility for their own participation (John-Steiner & Mahn, 1996; Lave & Wenger, 1991; Rogoff, 1990). From this perspective, learning is not only an individual process but a relational one that is shaped through interaction with others.

Within sociocultural theory, the Zone of Proximal Development and guided participation highlight interaction and mediation as central to learning. The Zone of Proximal Development describes the range of tasks a learner can accomplish with support from a more experienced other through scaffolding (Doolittle, 1995; Vygotsky, 1978), while guided participation emphasizes how learning occurs through structured engagement in shared activities (Rogoff et al., 1993). Through questioning, prompting, modeling, and feedback, caregivers support children's participation and help them develop new understandings (Mermelshtine, 2017; Vygotsky, 1978). Over time, responsibility for participation shifts, allowing children to engage more independently.

These sociocultural processes are particularly visible within family learning contexts. Family learning happens through shared participation in everyday activities, where caregivers and children contribute their own experiences, knowledge, and perspectives to make sense of the world around them (Haden, 2010; Rogoff, 1990). Through these family interactions, caregivers actively shape children's participation by adjusting support, responding to children's thinking, and creating opportunities for collaborative problem-solving and sense-making. Sociocultural perspectives position caregivers not just as supporters but as active participants who shape how learning unfolds through ongoing interaction.

Caregiver Scaffolding and Responsive Support

Within these family contexts, caregivers play a central role in shaping how learning unfolds. Supporting a child's learning involves more than just scaffolding, it requires caregivers to make sense of their child's understanding as the task progresses. As children engage in learning activities, their verbal responses, actions, problem-solving strategies, errors, and requests for assistance can cue caregivers to interpret children's developing understanding and

determine when additional support may be needed (Conner & Cross, 2003; Mermelshtine, 2017). Afterward, caregivers can mediate children's participation through scaffolding practices such as questioning, prompting, modeling, providing feedback, and adjusting support based on their children's needs (Mermelshtine, 2017; Murphy et al., 2014). Through these scaffolding interactions, caregivers can influence how their children approach challenges, develop problem-solving strategies, and adjust pedagogical approaches.

Scaffolding is not linear, instead, caregivers vary in how they guide, support, and respond to their children's participation based on their beliefs about learning, expectations for responses, and interpretations of their children's understanding. These differences shape whether learning interactions become more caregiver-directed, child-led, or collaboratively negotiated. While previous research has shown the importance of caregiver involvement in children's STEM learning (Salvatierra & Cabello, 2022), more research is needed on how caregivers describe their scaffolding practices during shared engagement with digital learning technologies, particularly among low-income, immigrant Latine families.

Caregiver Interpretation and Pedagogical Decision-Making

Supporting children's learning involves more than scaffolding participation. Caregivers must also interpret children's thinking and decide how to respond. During shared learning experiences, children's actions, verbal responses, problem-solving strategies, errors, and engagement signal their developing understanding (Haden et al., 2023; Rogoff, 1990). Caregivers interpret these cues in relation to their knowledge of their children's abilities, interests, prior experiences, and learning histories, as well as their beliefs and expectations about learning (Huang et al., 2005; Mermelshtine, 2017; Moorman & Pomerantz, 2010). Because

children's behaviors may not clearly indicate what they understand, caregivers must judge their meaning within the activity.

These interpretations inform pedagogical decisions, including when to provide support, encourage independence, or allow children to continue working through a problem (Mermelshtine, 2017; Zhang & Whitebread, 2017). Caregiver support can therefore be understood as a responsive process of noticing children's participation, interpreting their understanding, and deciding how to support their learning. Examining this process matters in family STEM learning because observable scaffolding practices alone may not reveal the reasoning behind caregivers' support, including during collaborative engagement with educational technologies.

Caregiver Mediation During Technology Co-Use

As digital technologies have become increasingly integrated into children's everyday lives (Mannell et al., 2024), caregiver mediation theory has been used to understand how adults guide, support, and regulate children's engagement with digital media (Clark, 2011; Valkenburg et al., 1999). Although this literature has traditionally focused on parents, this study uses the term *caregiver mediation* to recognize the diverse family members who may contribute to children's learning and technology experiences. Caregiver mediation is commonly described through three forms: *active mediation*, *restrictive mediation*, and *co-use* (Clark, 2011; Sobel et al., 2017; Valkenburg et al., 1999; Yu et al., 2021). *Active mediation* involves discussing or guiding children's engagement with digital content, *restrictive mediation* involves establishing rules or limits around technology use, and *co-use* occurs when caregivers and children engage with technology together.

Co-use is particularly relevant to educational technologies because it provides a context in which caregivers can participate alongside children as they engage with learning content (Griffith & Arnold, 2019). However, identifying an interaction as co-use does not fully explain how caregivers participate in children's learning or what informs their involvement. During shared technology use, caregivers may attend to children's interactions with the content, interpret their understanding, or determine whether and how support is needed. Examining these processes within co-use shifts attention from whether caregivers participate to how they make sense of children's learning and decide how to support them during shared engagement with educational technology.

Cultural and Asset-Based Perspectives on Caregiver Knowledge

Culturally sustaining and asset-based perspectives provide an important lens for understanding caregiver practices within Latine families. Culturally sustaining pedagogy emphasizes that educational environments should support and sustain learners' cultural and linguistic practices rather than replace them (Paris, 2012). From this perspective, learning is situated within cultural contexts, and families bring valuable experiences, knowledge, and ways of knowing that shape how they participate in and support learning activities.

Asset-based frameworks further highlight the strengths families contribute to learning. Funds of Knowledge (Moll et al., 1992) positions families as holders of historically accumulated bodies of knowledge developed through everyday experiences and practices. Similarly, Community Cultural Wealth (Yosso, 2005) challenges deficit perspectives by recognizing the multiple forms of knowledge, skills, and resources present within historically marginalized communities. Together, these frameworks suggest that Latine caregivers draw upon valuable

cultural resources as they scaffold children's learning, interpret children's thinking, and support participation in shared learning experiences.

These perspectives have informed efforts to design culturally sustaining learning environments and technologies that build upon families' existing strengths and practices (e.g., Anderson-Coto et al., 2024). However, educational technologies do not determine how learning occurs. Rather, caregivers and children actively shape how these tools are used within everyday family interactions. Understanding how Latine caregivers scaffold learning and make sense of children's understanding during shared technology use can provide important insight into how future family learning technologies might better support family STEM learning experiences.

Current Study

Through semi-structured interviews, this study explored how Latine caregivers described collaborative engagement with their children while using a STEM learning application designed using culturally sustaining principles. Specifically, how learning was co-constructed during shared activity and how caregivers interpreted and made sense of their child's learning throughout these interactions. The following research questions guided the current study:

1. How do Latine caregivers describe and make sense of the ways they scaffold their children's learning during co-use of a culturally sustaining STEM learning app?
2. How do Latine caregivers interpret their children's understanding and approaches to problem-solving during co-use of a culturally sustaining STEM learning app?

Examining how family STEM learning is collaboratively constructed and interpreted can provide insight into the relational processes through which Latine families engage with STEM learning. Such understanding may inform future efforts to design culturally sustaining technologies that support meaningful family learning experiences for Latine communities.

Methodology

Participants

Participants were recruited through our community partnership, the Santa Ana Early Learning Initiative (SAELI), a nonprofit organization focused on positive early childhood development in the southwestern United States. Through a long-standing relationship with the nonprofit, the director assisted with recruitment by contacting families who met the following criteria: identified as Latine, had a child between the ages of 4 and 10, and lived within the city the nonprofit serves.

For this study, twelve families agreed to participate (see Table 4). The twelve caregivers included ten women. The caregivers were, on average, 38 years old. 75% were Spanish speakers, with an average of 18 years living in their community. Four of the caregivers had less than a high school education, five had a high school diploma, two attended trade/vocational school, and one parent had a bachelor's degree. Regarding the children, 15 participated, aged 4 to 11 years, and 4 were female. Nine children preferred speaking in English, five preferred Spanish, and one felt equally comfortable with both languages.

Table 4
Families Demographics

Family ID	CAREGIVER SEX	CAREGIVER AGE	CHILD 1 SEX	CHILD 1 AGE	CHILD 2 SEX	CHILD 2 AGE
FAMILY 01	Female	35	Female	5	-	-
FAMILY 02	Female	34	Male	8	-	-
FAMILY 03	Female	37	Male	4	-	-
FAMILY 04	Female	42	Male	5	Male	9
FAMILY 05	Female	38	Female	7	-	-
FAMILY 06	Male	38	Male	8	-	-

FAMILY 07	Female	33	Male	8	-	-
FAMILY 08	Female	40	Male	8	-	-
FAMILY 09	Female	31	Male	4	Male	9
FAMILY 10	Female	44	Female	9	-	-
FAMILY 11	Female	40	Male	9	Female	11
FAMILY 12	Male	35	Male	8	-	-

Interviews

Caregivers were recruited in February 2026, provided informed consent in accordance with the University of California IRB protocol 2818, and obtained child assent. These sessions had two parts: observations and interviews.

In the first part of the session, caregivers and children spent 20 minutes exploring a STEM-based iPad app. The goal was for the caregiver-child dyads to complete a tutorial, explore the *Bizumia: World of Play* app, and play at least 2 mini-games. The app included four games: sharing how to pick the best produce with Queso, gathering ingredients to make a recipe with the Kien family, helping customers carry bags of produce by using the right number of Beez, and using Des' abacus to build underground tunnels. During this time, families were video recorded and wore microphones to capture physical and verbal interactions.

During the second part of the session, the caregiver and child's recording using the app was AirDropped to an iPad. The purpose was to replay three key moments that the researchers wanted to explore further. These moments are called “events” (Derry et al., 2010). An event was defined as an interactional episode involving problem-solving, caregiver scaffolding, or reciprocal caregiver–child conversation. Problem-solving involved working toward resolving a task or challenge for which an immediate solution was not apparent (Mayer, 1998). Scaffolding

involved caregiver support that facilitated the child's understanding, reasoning, or progress through a task (Wood et al., 1976). Reciprocal conversation involved a back-and-forth verbal exchange in which caregivers and children responded to one another across conversational turns (Romeo et al., 2018). The semi-structured interviews were designed to elicit caregivers' perspectives on how intergenerational learning unfolded during these events as they engaged with the STEM-based app. The goal was to gain insight into caregiver–child sensemaking by having caregivers watch a playback video of them using the app.

During the interview, the interviewer navigated to a specific timestamp in the video, replayed an event in which the caregiver and their child were interacting, and asked the caregiver to explain, in their own words, what was happening in that moment. Caregivers then described what was happening in those moments and what they were thinking, or inferred what their child was thinking. The researchers used probing questions to elicit more in-depth responses. Caregivers were also asked to compare these interactions to other at-home learning experiences, such as homework or school-related activities. This allowed examination of whether and how intergenerational learning dynamics during app use aligned with or differed from those in other learning contexts within the home. The semi-structured format allowed flexibility to probe caregivers' reflections, enabling deeper exploration of both observable interactional dynamics and caregivers' sense-making about their child's learning.

Data Analysis

The interviews were analyzed using a deductive qualitative coding approach guided by the study's research questions (Saldaña, 2021). Focusing on understanding how Latine caregivers described and made sense of their scaffolding practices during co-use of a STEM learning app and how they interpreted their children's understanding and approaches to problem-solving while

engaging with the app. A deductive approach was selected because the research questions provided an initial analytic lens for examining caregiver support and sensemaking during shared family engagement.

The analysis drew on a sociocultural perspective that conceptualizes learning as socially situated and mediated through interactions between caregivers and children (Rogoff, 2014). In addition, a strengths-based lens guided our attention to the family and cultural practices caregivers drew on to support their children's learning, rather than positioning families from a deficit perspective (Moll et al., 1992; Yosso, 2005).

Two researchers independently coded 25% of the interview transcripts to develop an initial codebook. During this phase, coders identified recurring patterns in caregivers' reflections and descriptions of parent-child interactions, with particular attention to how caregivers described their scaffolding practices, interpreted their children's understanding, and connected learning experiences to family practices and everyday life. After independently coding the transcript subset, coders met to discuss coding decisions, compare similarities and differences, and refine code definitions.

This iterative process resulted in an initial codebook organized around four analytic categories: caregiver-child interaction dynamics, caregiver scaffolding practices, caregiver interpretations of children's learning, and connections between learning and everyday life. After establishing the codebook, the remaining transcripts were divided equally between coders and analyzed in Dedoose, a qualitative data analysis software. Coders met weekly throughout the analysis process to discuss emerging patterns, clarify code definitions, and resolve discrepancies to ensure consistency across transcripts. Codes were then compared across interviews and grouped into broader patterns that informed the final themes presented in the findings.

All interviews were transcribed using Happy Scribe and subsequently proofread twice by five bilingual undergraduate researchers to ensure transcription accuracy.

Results

Thematic analysis identified two primary themes describing how Latine caregivers supported and interpreted their children's learning during co-use of *Bizumia: World of Play*. The first theme, *Scaffolding Learning Through Active Participation*, illustrates how caregivers described scaffolding their children's engagement through questioning, guidance, problem-solving, and joint participation. The second theme, *Caregivers as Sensemakers of Learning*, highlights how caregivers observed, interpreted, and evaluated their children's understanding and approaches to solving STEM-related activities. These findings suggest that caregivers actively shaped learning experiences by adapting support, attending to their children's thinking processes, and drawing on existing family practices during shared engagement with the app. Rather than positioning learning as an outcome of interacting with the technology alone, these findings show how caregiver involvement and the meaning caregivers made of their children's experiences mediated learning.

Scaffolding Learning Through Active Participation

Latine caregivers described family STEM learning as a collaborative process involving active participation with their children. Caregivers reported adjusting their support, addressing challenges, and encouraging children to contribute their own ideas and solutions. Caregivers facilitated STEM learning through ongoing interactions with children during co-engagement with app activities.

Responsive Scaffolding

Latine caregivers supported their children's participation by practicing responsive scaffolding, making real-time adjustments to their level of involvement. Caregivers frequently

monitored children's engagement and provided guidance when they determined support was necessary. Instead of immediately providing their child the answers, caregivers encouraged them to work through problems independently while remaining available to assist as needed. Family 07's caregiver explained how they balanced independence and support: "I kind of wanted him to like, choose himself and then guide him after if he needed help." She further described her response when her child struggled with a problem on the app: "When I felt he was stuck, I would ask him questions. So, he can get, like, a sense of guidance. To help him, like, figure out what he needed to do."

Family 10's caregiver also shared a similar idea by encouraging their child to independently reflect on mistakes they made: "...piénsale. Es que ahí sí le sumaste más o le pusiste un número demás y ella se queda viendo. Oh sí, sí, ya." ("...think about it. You added too much there or put an extra number, and she just stares at it. Oh yes, yes, now I see.") Through this approach, Family 10's caregiver prompted their child to reconsider the steps they had taken to answer the question.

Other caregivers used questioning to encourage deeper reflection. For example, Family 01's caregiver shared;

"¿Cómo se siente una fresa? Y me decía lo mismo que la zanahoria, como, porque me dijo duro. Y le dije: Tú comes, son tus frutas favoritas o sea, ¿Así se siente?. Sí, me dijo que sí. Y yo decía: No es tan dura. Pero ella decía que estaba dura pues. Y ya por eso lo poníamos ahí, porque era como la respuesta de ella. Pero era como que yo decía: No es eso pero."

English Translation

"How does a strawberry feel? And she told me the same thing as the carrot because she said it was hard. And I told her: You eat them, they're your favorite fruits, is that really how it feels? She said yes. And I would think: It's not that hard. But she said it was hard. So, we put it there because that was her answer. Even though I was thinking: That's not it."

Through Family 01's caregiver's example, we see how caregivers and their children negotiated problem-solving strategies by reflecting on the child's approaches. This approach still allowed the child autonomy to provide independent answers, even when those answers were incorrect.

In addition to prompting and questioning, Latine caregivers provided direct support as their children practiced specific skill sets. Family 03's caregiver described assisting her child with spelling during Queso's game where they had to share about how they pick the best produce using their senses: "We were spelling the word purple. So basically, I was helping him because he doesn't know how to, like, type the word or, like, you know, the word in general. He doesn't know it." Here, Family 03's caregiver adjusted their support to meet their child's needs while continuing to encourage participation and independent thinking.

Problem-Solving Together

Latine caregivers shared moments when learning felt like a negotiation, and they and their children sometimes approached tasks differently. They shared that some of these negotiations included discussions, clarifications, and problem-solving. Family 05's caregiver talked about an interaction where they felt confused because their child memorized Kien's ingredient list differently from them: "se las memorizó al revés, de abajo para arriba... y yo le di de arriba para abajo." ("...she memorized them backwards, from the bottom up... and I did it from the top down.") Family 05's caregiver continued, "Y ahí fue donde sí hubo confusiones, porque yo también me llegué a equivocar ahí cuando le estaba ayudando." ("And that's where there was confusion because I also got mixed up while I was helping her.") The differing approaches to memorization led to confusion about which portions were needed for each ingredient, resulting in an incorrect answer. They arrived at the correct answer by figuring out

where they went wrong. Family 05's caregiver encouraged their child not to use the help button but instead to figure it out together.

Other Latine caregivers encouraged their children to work through problems independently. Family 06's caregiver shared that when they were playing with Des' abacus game, they needed to count by fives, "Le dije: ¿Cuántos o que cuantos ocupaba? Ya dijo: Tres de cinco. Y así fue la manera que él también sumó rápido." ("I asked him: How many did he need? Then he said: Three of five. And that was how he was able to add them quickly.") In this example, Family 06's caregiver gave the child autonomy by asking a question that let the child respond freely and arrive at a solution on their own.

Latine caregivers would also recognize their child's skills in a task, such as reading, and support them in making those connections. Family 01's caregiver described how they were helping their child to develop literacy skills through the app: "como irla ayudando porque a veces como ya reconoce letras... pero todavía no las junta." ("Helping her along because sometimes she already recognizes letters... but she still doesn't put them together.") Instead of providing answers directly, Family 01's caregiver and other caregivers negotiated which approach to take in certain situations, such as when to help or when to allow exploration.

Latine caregivers also chose to redirect questions back to their children to think through. Like Family 01's caregiver explained, "...por eso me dijo: ¿Esta es grande o chiquita? Le dije: ¿Tú qué piensas?" ("...she asked me: Is this one big or small? And I told her: What do you think?") In this example, Family 01's caregiver demonstrated negotiation practices, dialogue, approaches, and collaborative problem-solving. This helped them support skill development while giving their children the freedom to generate their own answers.

Learning Together

Beyond scaffolding and problem-solving, Latine caregivers frequently described their engagement with the app as a shared experience in which both caregivers and children participated. Family 11's caregiver reflected on their own feelings about being included in using the app with their child;

“Pues en ese momento uh siempre le hago de que que es bueno que que le den el espacio a uno como adulto, ¿verdad? O sea se siente uno como motivado como de de seguir como con ellos hacia adelante, de decir oh que no se estén olvidando que están que estamos trabajando juntos. Por ejemplo, que a veces, por ejemplo que yo no estoy usando mis palabras, que ellos solitos uh inviten no solamente a su mamá, sino a otras personas...Se siente uno como integrado en el en el juego pues.”

English Translation

“At that moment, I always tell them that it's good to give adults space too, right? It makes you feel motivated to keep moving forward with them and to feel that they haven't forgotten that we're working together. For example, even when I'm not using my words, they invite not only their mom but other people too. It makes you feel included in the game.”

This example illustrates caregivers' positive feelings about being included and participating in a learning app with their child, as well as their appreciation when children are willing to include others.

Similar to Family 11's caregiver, Family 06's caregiver shared a similar feeling as they described learning alongside their child: “Pues, pues, más bien, que estábamos aprendiendo los dos. [se rie] Sí, yo aprendiendo de él también, porque pues él el lo veo que está... Sí, lo lo entendió rápido y lo estaba resolviendo rápido.” (“Well, really, we were both learning. [laughs] Yes, I was learning from him too because I could see that he understood it quickly and was solving it quickly.”) These reflections indicate that family STEM learning was experienced as a collaborative process in which caregivers and children contributed to and learned from one another, creating an inclusive environment for learners of all ages.

Caregivers as Sensemakers of Learning

Beyond interacting with the app's games, Latine caregivers described making sense of their children's learning while using the app. Latine caregivers observed their children's engagement, interpreted their understanding, and evaluated how learning occurred. These observations informed their responses to their children and shaped their assessment of the overall learning experience.

Ver (Observe)

Latine caregivers often described observing their children's behavior and engagement to look for cues that their children understand what is happening. They often attended to physical and emotional cues that signaled whether children understood the task or needed additional support. For example, Family 08's caregiver shared how they observed their child's physical reaction to gauge understanding cues: "As you saw. Like, he was swift. He knew what he was doing. And then there was a moment where, like, he didn't know, so he just paused." Similarly, other caregivers were also observant of their children's reactions to different games, like Family04's caregiver described noticing her child's excitement: "Porque en varias partes ahí dic- le mueve y dice que es recordó, hace seña que él recordó que esas porciones eran. Y como que estaba emocionado..." ("Because in several parts he would move it and say that he remembered, making gestures that showed he remembered what those portions were. And he seemed excited.") This showed that the caregiver knew that their child understood the task based on their level of excitement. Family 08's caregiver also shared their observation of their child, "If he doesn't understand something, he's hesitant. He'll try a couple of times and then..." Their child followed up by saying, "I'll ask for help."

These examples showcased how Latine caregivers used behavioral and emotional cues to assess their children's understanding and engagement, informing decisions about when to provide guidance.

Pensar (Interpret)

In addition to observing behaviors, Latine caregivers also interpreted children's reasoning and thought processes during interactions with the app's games. Rather than focusing on getting the correct answers, caregivers wanted to understand how children approached problems. Family 01's caregiver reflected on their child's thinking during Beez's game, where the child needed to add the correct number of Beez to carry a grocery bag full of produce: "Y empezó a ponerle nada más muchas [Beez] para que la alzada. Ella pensaba que con que ponerle demasiadas [Beez] la iba a alzar y se le iba a llevar." ("And she started putting a lot of [Beez] on it so it would lift. She thought that if she put enough [Beez] on it, it would lift and carry it away.") Here, Family 01's caregiver recognized that their child was attempting to complete the activity by trial and error rather than developing a strategy or plan to solve the problem.

Other Latine caregivers also expressed the importance of children reading and comprehending instructions to understand the problem at hand, in this case the app's STEM games. Family 09's caregiver emphasized the need for their children to pay attention to instructions prior to proceeding: "...siempre trato como que pongan ellos atención a lo que les están diciendo para que puedan entender..." (...I always try to get them to pay attention to what is being said to them, so that they can understand...) Family 09's caregiver further explained the importance of comprehension: "...una cosa es leer, pero no vas entendiendo porque tú no les estás poniendo atención a lo que vas haciendo. Y dice: Ah okay pero ya lo leí. [Yo le dije:] Sí, pero ¿qué le entendistes? ¿O qué dice?" ("If you read, that's one thing, but you're not understanding because you're not paying attention to what you're doing. And then they say,

"Okay, but I already read it." [I said,] Yes, but what did you understand? What does it say?")

Here, Family 09's caregiver shared that she was trying to encourage the child to better understand the tasks at hand and interpret the instructions, which would be essential for any of the app's activities.

Other Latine caregivers also shared about the importance of comprehension and independent problem-solving. Family 10's caregiver spoke about how they minimized interference to encourage their child's independent thinking: "Estando ahí junto a ella, no interfiriendo mucho, porque me gusta que piense. Como son juegos de matemáticas, de lectura o algo, me gusta más que piense..." ("Being there next to her, without interfering too much, because I like for her to think. Since they're math games, reading games, or something like that, I prefer that she think.") This shows that Latine caregivers' awareness of when to refrain from providing guidance, allowing children to attempt problem-solving independently.

These examples suggest that caregivers interpreted learning in terms of children's reasoning and reflection rather than just task completion. Latine caregivers gave children space to plan their approach to problems and encouraged them to understand and interpret the tasks presented.

Resolver (Resolve)

Latine caregivers also described learning as moments when children arrived at solutions and developed understanding through problem-solving techniques. Family 12's caregiver shared an instance in which their child realized, through trial and error, what was needed in the Beez's game: "Entonces ya después él se dio cuenta que tenía que poner una abeja grande y una pequeña a medida de cómo era la fruta." ("Then afterward he realized that he needed to place one large bee and one small bee according to the size of the fruit.") The caregiver observed that the child recognized the pattern required to progress in the game.

Other caregivers also observed their children having realizations that helped them resolve game challenges. Family 01's caregiver described how their child recognized the pattern needed to solve a problem: “Ella me dijo: Oh, grande. Porque ya miró el tamaño de la fruta, pero ya ella la escogió, ya se dio cuenta que era porque había fruta grande” (“She told me: Oh, big, because she saw the size of the fruit, but she chose it herself and realized it was because there was a large fruit.”) Similarly, Family 10's caregiver described encouraging independent problem-solving by allowing her child autonomy to reach conclusions: “...yo trato de de llevarla a que ella encuentre por sus propios palabras.” (“But I try to guide her so that she finds it in her own words.”)

Overall, the findings showed that caregivers viewed learning as a process in which children observed, interpreted, and resolved problems through their own reasoning and participation.

Discussion

This study explored how Latine caregivers described supporting and making sense of their children's learning while co-using a STEM-based learning app designed using a culturally sustaining framework. Specifically, (1) how caregivers scaffolded learning during shared technology use and (2) how they interpreted their children's understanding and problem-solving processes. Across interviews, caregivers described guiding children's engagement through questioning, encouragement, explanation, and responsive support, while also attending closely to how children reasoned through challenges. These findings suggest that caregivers are not simply facilitating access to technology but are actively shaping and interpreting learning as it unfolds during shared technology use.

Scaffolding Learning Through Shared Participation

Caregivers described learning as a collaborative process in which they adjusted support in response to children's needs rather than through direct instruction alone. They talked about asking questions, offering prompts, encouraging persistence, and gradually shifting the level of assistance as children worked through tasks. These practices align with sociocultural perspectives that frame learning as emerging through guided participation and shared activity instead of independent knowledge acquisition (Rogoff, 1990; Vygotsky, 1978).

Caregivers also described adapting their support throughout the interaction. This suggests that scaffolding functioned less as a set of teaching behaviors and more as an ongoing, relational process that evolved alongside children's participation. The findings extended prior work on caregiver-child interactions in informal STEM contexts by showing how caregivers actively negotiated support during technology-mediated learning (Griffith et al., 2022; Zimmerman et al., 2010).

At the same time, these findings are not intended to suggest that such practices are unique to this group of participants. The findings offer a strengths-based perspective that makes visible the pedagogical knowledge Latine caregivers already bring to shared learning experiences, consistent with scholarship that recognizes the knowledge and practices embedded within families' everyday lives as resources for learning (Moll et al., 1992; Vélez-Ibáñez & Greenberg, 1992). Latine caregivers' descriptions reflected instructional knowledge grounded in everyday experiences that supported their children and were situated within familial practices of guidance, encouragement, and shared participation (Rogoff et al., 1993).

Caregivers as Sensemakers of Children's Learning

In addition to describing how they supported learning, caregivers emphasized how they interpreted their children's understanding throughout the shared interaction. Instead of focusing on whether or not their child completed the activities correctly, Latine caregivers described attending to indicators such as children's reasoning, strategy use, and ability to explain their thinking. These descriptions suggest that caregivers considered multiple indicators of understanding focused on the learning process rather than the activity outcomes.

Attending to these indicators and behaviors positioned Latine caregivers as pedagogical sensemakers of children's learning. Their descriptions reflected an understanding of learning as gradual, iterative, and socially constructed, consistent with previous research (Rogoff, 2023; Zhang & Whitebread, 2017). Importantly, caregivers' interpretations offered insight into what they believed their children understood, where they might be struggling, and what they might need to keep participating in the activity.

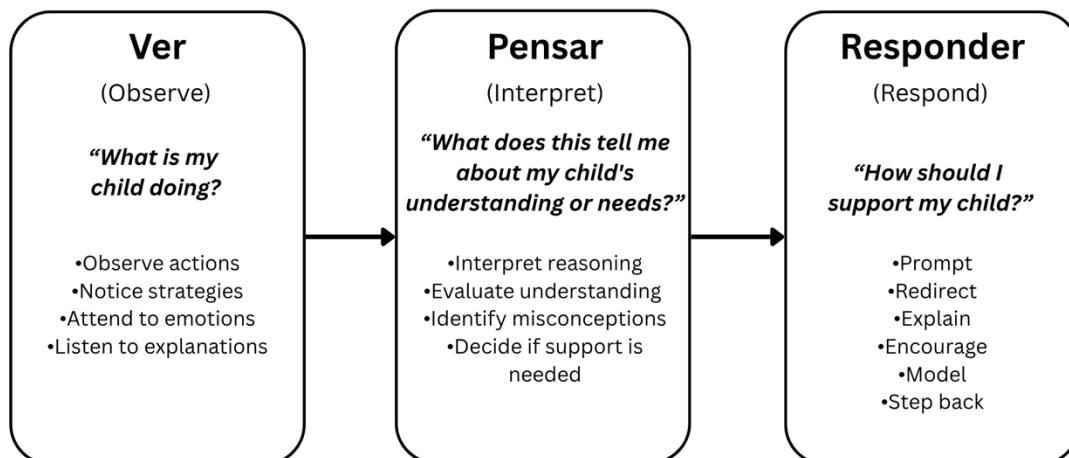
Caregivers' descriptions suggest that understanding family STEM learning requires attention not only to the scaffolding caregivers provide but also to how they make sense of children's learning when determining what support may be needed. Distinguishing between caregivers' observable scaffolding practices and the interpretations that inform those practices offers a way to examine the pedagogical reasoning that guides caregiver support during technology-mediated learning.

Ver–Pensar–Responder: A Framework for Caregiver Pedagogical Sensemaking

The interviews showed that shared participation and caregiver sensemaking suggest that scaffolding involves more than the supportive behaviors caregivers provide. Caregivers described attending to children's participation, interpreting what children's behaviors indicated

about their understanding, and using those interpretations to determine how to respond. I conceptualize this interpretive decision-making process as the Ver–Pensar–Responder Framework for Caregiver Pedagogical Sensemaking (see Figure 5). The framework consists of three interconnected components- observing, interpreting, and responding- that help explain how caregivers make pedagogical decisions while supporting children's learning. The Spanish terminology was analytically developed to represent recurring processes identified across Latine caregivers' descriptions of how they attended to, made sense of, and responded to their children's learning.

Figure 5
Ver–Pensar–Responder Framework for Caregiver Pedagogical Sensemaking



Ver (Observe) represents caregivers' attention to children's participation and asks, *what is my child doing?* Caregivers described observing children's actions, problem-solving strategies, verbal explanations, emotions, and moments of difficulty as cues to how learning was unfolding. Consistent with research on responsive scaffolding and guided participation (Conner & Cross, 2003; Mermelshtine, 2017; Rogoff et al., 1993), these observations gave Latine caregivers information they could use to assess children's participation and make sense of what might be happening during the learning activity.

Pensar (Interpret) represents the sensemaking that occurs as caregivers consider: *what does this tell me about my child's understandings or needs?* Instead of simply noticing children's behaviors, caregivers interpreted what those behaviors might indicate about their children's understanding. These interpretations could also be informed by caregivers' existing knowledge of their children, including their abilities, previous experiences, and approaches to learning (Puri et al., 2025). *Pensar* therefore serves as an important bridge between observing children's participation and deciding how to support them.

Responder (Respond) represents the pedagogical decision that follows caregivers' interpretations and asks, *how should I support my child?* Depending on what caregivers believed their children understood or needed, they described responding through prompting, redirecting, explaining, modeling, collaborating, encouraging, or allowing children to continue working independently. Choosing not to intervene also represented a pedagogical response when caregivers determined their child could continue independently. *Responder* therefore emphasizes that scaffolding is not defined by the amount of assistance caregivers provide, but by how they calibrate their support in relation to what they perceive their child needs.

The Ver–Pensar–Responder framework is not intended to represent a rigid or strictly linear process. A caregiver's response can lead to new actions, explanations, or challenges from the child, providing additional cues for the caregiver to observe and interpret. This allows caregivers to continually reassess their child's participation and recalibrate their support as learning unfolds. This interpretation aligns with sociocultural perspectives that characterize scaffolding and guided participation as responsive processes that change in relation to learners' developing needs (Rogoff et al., 1993; Van De Pol et al., 2010; Wood & Middleton, 1975). From this perspective, scaffolding can be understood not only through the support caregivers provide,

but also through the interpretive pedagogical process through which caregivers determine what support is appropriate.

The framework also extends how caregiver mediation can be conceptualized within technology-mediated learning. While caregiver mediation research has identified different ways caregivers guide, discuss, and participate in children's technology use (Nikken & Schols, 2015; Scott, 2022), these findings highlight the interpretive reasoning that can inform these practices. Caregivers' decisions to prompt, explain, collaborate, encourage, or allow children to continue independently were informed by what they noticed and how they interpreted their children's participation. Ver–Pensar–Responder therefore shifts attention from identifying mediation practices alone to considering the pedagogical decision-making process through which caregivers determine when and how to provide support. In doing so, the framework conceptualizes caregiver mediation as an interpretive, responsive process in which caregivers continually calibrate their support based on their understanding of children's learning.

The Role of Culturally Sustaining Technology

An important consideration is the role the application's culturally sustaining design may have played in shaping these interactions. Because the app was intentionally designed to reflect familiar cultural experiences and encourage collaboration (Anderson-Coto et al., 2024), it likely created conditions and opportunities that supported the kinds of interactions caregivers described. However, these findings should not be interpreted as suggesting that the technology itself produced caregivers' scaffolding practices. Instead, the current findings highlight the interaction between Latine caregivers' existing strengths and the design of the STEM-based learning app. The application's collaborative and culturally meaningful features appeared to invite conversation, questioning, and shared problem-solving, creating space for caregivers to

draw on knowledge and cultural practices they already use in everyday contexts. From this perspective, the app functions less as a replacement for caregiver involvement and more as a facilitator that creates opportunities for caregivers to draw upon their existing knowledge while participating in their children's learning.

Implications for Educational Technology Design

These findings highlight important implications for designing educational technologies intended for family use. Educational technologies are often designed around children's individual engagement with digital content, and not necessarily for caregiver participation and shared use (Ewin et al., 2021). In contrast, caregivers in this study described learning through dialogue, shared reasoning, and collaborative participation. Educational technologies designed for family use could intentionally support caregiver-child dialogue by incorporating open-ended discussion prompts that invite families to explain their reasoning, compare ideas, or reflect together after completing an activity. These features could create opportunities for caregivers and children to make their thinking visible to one another and engage in conversation around the learning process.

Educational technologies could also encourage collaborative participation by designing activities that require caregivers and children to work together rather than positioning the caregiver as an observer of the child's individual interaction. For example, multiplayer challenges or activities that require shared decision-making could give families opportunities to negotiate ideas, solve problems together, and contribute different perspectives toward a shared goal. Designing for this kind of participation recognizes that family learning can emerge through the interaction between caregivers and children.

Finally, adopting a strengths-based approach to educational technology design requires recognizing caregivers as knowledgeable learning partners whose cultural experiences and pedagogical practices can contribute to children's engagement. The Ver–Pensar–Responder framework suggests that caregivers can draw on what they observe and understand about their children to determine how to support their learning. Technologies could support this process by providing caregivers with conversation tips or prompts that encourage them to ask children to explain their thinking, while still allowing caregivers flexibility in how they respond. Activities with multiple solution paths could similarly create opportunities for caregivers to attend to children's reasoning and strategies rather than focusing only on whether they arrive at a predetermined answer. These design features are not intended to tell caregivers how to support their children, but to create opportunities for caregivers to draw on their existing knowledge of their children and make their own decisions about how to participate in the learning process.

Limitations and Future Directions

Several limitations should be considered when interpreting these findings. First, the study relies on caregiver interviews rather than direct observations of caregiver-child interactions. As a result, the findings reflect caregivers' interpretations of their experiences, which may not fully capture what occurred during the interactions themselves. Future research that combines interviews with observational or interactional data could provide a more detailed understanding of how scaffolding and sensemaking unfold in practice.

Second, participants engaged with a single culturally sustaining STEM application designed to encourage collaboration. These findings therefore should not be generalized to all educational technologies or to all Latine families. Future work comparing different types of applications could help clarify how specific design features shape caregiver involvement and

learning processes. Longitudinal research may also offer insight into how caregivers' practices and interpretations evolve over time as families continue to engage with educational technologies that were designed using a culturally sustaining framework.

Lastly, future research should further examine and develop the Ver–Pensar–Responder framework across different contexts and populations. The current study was conducted in a controlled setting, and future work could examine how the processes of observing, interpreting, and responding unfold in more naturalistic settings, such as families' homes and during interactions with other educational technologies. Examining the framework across different family and cultural contexts would also help determine the extent to which Ver–Pensar–Responder reflects caregiver pedagogical sensemaking beyond the families represented in the current study. These future directions could further refine the framework, identify how its components may vary across contexts, and establish its broader applicability for understanding caregiver support during technology-mediated learning.

Conclusion

This study contributes to the growing literature on family learning and educational technology by examining how Latine caregivers described both supporting and interpreting children's learning during co-engagement with a culturally sustaining designed STEM application. Across interviews, Latine caregivers framed learning as a collaborative process, adapting their support in response to their children's needs while also attending to how children reasoned through challenges and tasks. Caregivers drew on multiple indicators of understanding, such as persistence, strategy use, and explanation, to figure out how much scaffolding to provide. These findings position caregivers as pedagogical sensemakers whose roles go beyond facilitating technology use to shaping and making sense of children's learning experiences.

Current findings should not be interpreted as suggesting that the application alone produced these interactions or that these practices are unique to Latine families. Instead, the results suggest that culturally sustaining technologies can create conditions in which caregivers' existing strengths, cultural practices, and pedagogical knowledge become more visible during shared learning experiences. By highlighting these practices, this study offers a strengths-based perspective that recognizes the expertise families already bring to children's STEM learning.

As educational technologies continue to play an increasing role in children's everyday lives, these findings showcase the importance of designing tools that invite meaningful caregiver participation rather than positioning children as independent users and learners. Supporting opportunities for dialogue, shared problem solving, and multiple pathways for engagement may foster richer family STEM learning experiences. Attending not only to how caregivers support learning but also to how they interpret their children's thinking and learning can provide an important foundation for designing technologies that build on families' existing strengths while advancing culturally sustaining approaches to STEM learning.

References

- Anderson-Coto, M. J., Salazar, J., Lopez, J. L.-S., Sedas, R. M., Campos, F., Bustamante, A. S., & Ahn, J. (2024). Towards culturally sustaining design: Centering community's voices for learning through Participatory Design. *International Journal of Child-Computer Interaction*, 39, 100621. <https://doi.org/10.1016/j.ijcci.2023.100621>
- Bruner, J. S. (1983). *Children's talk: learning to use language*. New York: Norton.
- Callanan, M. A., Legare, C. H., Sobel, D. M., Jaeger, G. J., Letourneau, S., McHugh, S. R., Willard, A., Brinkman, A., Finiasz, Z., Rubio, E., Barnett, A., Gose, R., Martin, J. L., Meisner, R., & Watson, J. (2020). Exploration, Explanation, and Parent–Child Interaction in Museums. *Monographs of the Society for Research in Child Development*, 85(1), 7–137. <https://doi.org/10.1111/mono.12412>
- Callanan, M. A., & Oakes, L. M. (1992). Preschoolers' questions and parents' explanations: Causal thinking in everyday activity. *Cognitive Development*, 7(2), 213–233. [https://doi.org/10.1016/0885-2014\(92\)90012-G](https://doi.org/10.1016/0885-2014(92)90012-G)
- Clark, L. S. (2011). Parental Mediation Theory for the Digital Age. *Communication Theory*, 21(4), 323–343. <https://doi.org/10.1111/j.1468-2885.2011.01391.x>
- Conner, D. B., & Cross, D. R. (2003). Longitudinal analysis of the presence, efficacy and stability of maternal scaffolding during informal problem-solving interactions. *British Journal of Developmental Psychology*, 21(3), 315–334. <https://doi.org/10.1348/026151003322277720>
- Derry, S. J., Pea, R. D., Barron, B., Engle, R. A., Erickson, F., Goldman, R., Hall, R., Koschmann, T., Lemke, J. L., Sherin, M. G., & Sherin, B. L. (2010). Conducting Video Research in the Learning Sciences: Guidance on Selection, Analysis, Technology, and Ethics. *Journal of the Learning Sciences*, 19(1), 3–53. <https://doi.org/10.1080/10508400903452884>
- Doolittle, P. E. (1995). Understanding Cooperative Learning through Vygotsky's Zone of Proximal Development.
- Ewin, C. A., Reupert, A. E., McLean, L. A., & Ewin, C. J. (2021). The impact of joint media engagement on parent–child interactions: A systematic review. *Human Behavior and Emerging Technologies*, 3(2), 230–254. <https://doi.org/10.1002/hbe2.203>
- Gonzalez, N., Moll, L. C., Tenery, M. F., Rivera, A., Rendon, P., Gonzales, R., & Amanti, C. (1995). Funds of knowledge for teaching in Latino households. *Urban Education*, 29(4), 443–470.
- Griffith, S. F., & Arnold, D. H. (2019). Home learning in the new mobile age: Parent–child interactions during joint play with educational apps in the US. *Journal of Children and Media*, 13(1), 1–19. <https://doi.org/10.1080/17482798.2018.1489866>
- Griffith, S. F., Hart, K. C., Mavrakis, A. A., & Bagner, D. M. (2022). Making the best of app use: The impact of parent-child co-use of interactive media on children's learning in the U.S. *Journal of Children and Media*, 16(2), 271–287. <https://doi.org/10.1080/17482798.2021.1970599>
- Haden, C. A. (2010). Talking About Science in Museums. *Child Development Perspectives*, 4(1), 62–67. <https://doi.org/10.1111/j.1750-8606.2009.00119.x>
- Haden, C. A., Melzi, G., & Callanan, M. A. (2023). Science in stories: Implications for Latine children's science learning through home-based language practices. *Frontiers in Psychology*, 14, 1096833. <https://doi.org/10.3389/fpsyg.2023.1096833>

- Huang, K.-Y., O'Brien Caughy, M., Genevro, J. L., & Miller, T. L. (2005). Maternal knowledge of child development and quality of parenting among White, African-American and Hispanic mothers. *Journal of Applied Developmental Psychology*, 26(2), 149–170. <https://doi.org/10.1016/j.appdev.2004.12.001>
- John-Steiner, V., & Mahn, H. (1996). Sociocultural approaches to learning and development: A Vygotskian framework. *Educational Psychologist*, 31(3–4), 191–206. <https://doi.org/10.1080/00461520.1996.9653266>
- Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge university press.
- Mannell, K., Bloul, S., Sefton-Green, J., & Willcox, M. (2024). Digital media and technology use by families with infants, toddlers, and young children: A scoping review and call for forward momentum. *Journal of Children and Media*, 18(4), 605–628. <https://doi.org/10.1080/17482798.2024.2394939>
- Mayer, R. E. (1998). Cognitive, metacognitive, and motivational aspects of problem solving. *Instructional Science*, 26(1–2), 49–63
- Mermelshtine, R. (2017). Parent–child learning interactions: A review of the literature on scaffolding. *British Journal of Educational Psychology*, 87(2), 241–254. <https://doi.org/10.1111/bjep.12147>
- Moll, L. C., Amanti, C., Neff, D., & Gonzalez, N. (1992). Funds of Knowledge for Teaching: Using a Qualitative Approach to Connect Homes and Classrooms. *Theory into Practice*, 31(2), 132–141.
- Moorman, E. A., & Pomerantz, E. M. (2010). Ability mindsets influence the quality of mothers' involvement in children's learning: An experimental investigation. *Developmental Psychology*, 46(5), 1354–1362. <https://doi.org/10.1037/a0020376>
- Murphy, P. K., Rowe, M. L., Ramani, G., & Silverman, R. (2014). Promoting Critical-Analytic Thinking in Children and Adolescents at Home and in School. *Educational Psychology Review*, 26(4), 561–578. <https://doi.org/10.1007/s10648-014-9281-3>
- Nikken, P., & Schols, M. (2015). How and Why Parents Guide the Media Use of Young Children. *Journal of Child and Family Studies*, 24(11), 3423–3435. <https://doi.org/10.1007/s10826-015-0144-4>
- Paradise, R., & Rogoff, B. (2009). Side by Side: Learning by Observing and Pitching In. *Ethos*, 37(1), 102–138. <https://doi.org/10.1111/j.1548-1352.2009.01033.x>
- Paris, D. (2012). Culturally Sustaining Pedagogy: A Needed Change in Stance, Terminology, and Practice. *Educational Researcher*, 41(3), 93–97. <https://doi.org/10.3102/0013189X12441244>
- Parmar, P., Harkness, S., & Super, C. M. (2004). Asian and Euro-American parents' ethnotheories of play and learning: Effects on preschool children's home routines and school behaviour. *International Journal of Behavioral Development*, 28(2), 97–104. <https://doi.org/10.1080/01650250344000307>
- Pattison, S., Rubin, A., & Wright, T. (2016). Mathematics in informal learning environments: A summary of the literature. *Institute for Learning Innovation. Math in the Making Project*.
- Puri, A., Cavanagh-Welch, B., Henderson, A. M. E., Du, K., & Ruffman, T. (2025). The importance of relationship history on parents' scaffolding of children's mental states. *Developmental Psychology*, 61(7), 1251–1263. <https://doi.org/10.1037/dev0001923>
- Rogoff, B. (1990). *Apprenticeship in thinking: Cognitive development in social context*. New York, NY: Oxford University Press.

- Rogoff, B. (2014). Learning by Observing and Pitching In to Family and Community Endeavors: An Orientation. *Human Development*, 57(2–3), 69–81.
<https://doi.org/10.1159/000356757>
- Rogoff, B. (2023). Mutually Constituting, Fractal: Individual and Cultural Aspects of Holistic Process. *Review of Research in Education*, 47(1), 60–83.
<https://doi.org/10.3102/0091732X231224666>
- Rogoff, B., Mistry, J., Göncü, A., Mosier, C., Chavajay, P., Heath, S. B., & Goncu, A. (1993). Guided Participation in Cultural Activity by Toddlers and Caregivers. *Monographs of the Society for Research in Child Development*, 58(8), i. <https://doi.org/10.2307/1166109>
- Romeo, R. R., Leonard, J. A., Robinson, S. T., West, M. R., Mackey, A. P., Rowe, M. L., & Gabrieli, J. D. E. (2018). Beyond the 30-Million-Word Gap: Children’s Conversational Exposure Is Associated With Language-Related Brain Function. *Psychological Science*, 29(5), 700–710. <https://doi.org/10.1177/0956797617742725>
- Saldaña, J. (2021). *Coding techniques for quantitative and mixed data* (Vol. 151, pp. 9780203729434-14). Abingdon: The Routledge reviewer’s guide to mixed methods analysis.
- Salvatierra, L., & Cabello, V. (2022). Starting at Home: What Does the Literature Indicate about Parental Involvement in Early Childhood STEM Education? *Education Sciences*, 12(3), 218. <https://doi.org/10.3390/educsci12030218>
- Scott, F. L. (2022). Family mediation of preschool children’s digital media practices at home. *Learning, Media and Technology*, 47(2), 235–250.
<https://doi.org/10.1080/17439884.2021.1960859>
- Sobel, D. M. (2023). Science, Technology, Engineering, and Mathematics (STEM) Engagement from Parent-Child Interaction in Informal Learning Environments. *Current Directions in Psychological Science*, 32(6), 454–461. <https://doi.org/10.1177/09637214231190632>
- Sobel, K., Bhattacharya, A., Hiniker, A., Lee, J. H., Kientz, J. A., & Yip, J. C. (2017). It wasn’t really about the Pokémon: Parents’ Perspectives on a Location-Based Mobile Game. *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems*, 1483–1496. <https://doi.org/10.1145/3025453.3025761>
- Sobel, D. M., & Jipson, J. L. (Eds.). (2016). *Cognitive development in museum settings: Relating research and practice*. Psychology Press.
- Valkenburg, P. M., Krcmar, M., Peeters, A. L., & Marseille, N. M. (1999). Developing a scale to assess three styles of television mediation: “Instructive mediation,” “restrictive mediation,” and “social coviewing.” *Journal of Broadcasting & Electronic Media*, 43(1), 52–66. <https://doi.org/10.1080/08838159909364474>
- Van De Pol, J., Volman, M., & Beishuizen, J. (2010). Scaffolding in Teacher–Student Interaction: A Decade of Research. *Educational Psychology Review*, 22(3), 271–296.
<https://doi.org/10.1007/s10648-010-9127-6>
- Vélez-Ibáñez, C. G., & Greenberg, J. B. (1989). Formation and transformation of funds of knowledge among US Mexican households in the context of the borderlands. In *annual meeting of the American Anthropological Association, Washington, DC*.
- Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.
- Wood, D., Bruner, J. S., & Ross, G. (1976). The role of tutoring in problem solving. *Journal of Child Psychology and Psychiatry*, 17 (2), 89–100.

- Wood, D., & Middleton, D. (1975). A study of assisted problem-solving. *British Journal of Psychology*, 66(2), 181–191. <https://doi.org/10.1111/j.2044-8295.1975.tb01454.x>
- Yosso, T. J. (2005). Whose culture has capital? A critical race theory discussion of community cultural wealth. *Race Ethnicity and Education*, 8(1), 69–91. <https://doi.org/10.1080/1361332052000341006>
- Yu, J., DeVore, A., & Roque, R. (2021). Parental Mediation for Young Children’s Use of Educational Media: A Case Study with Computational Toys and Kits. *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*, 1–12. <https://doi.org/10.1145/3411764.3445427>
- Zhang, H., & Whitebread, D. (2017). Linking parental scaffolding with self-regulated learning in Chinese kindergarten children. *Learning and Instruction*, 49, 121–130. <https://doi.org/10.1016/j.learninstruc.2017.01.001>
- Zimmerman, H. T., Reeve, S., & Bell, P. (2010). Family sense-making practices in science center conversations. *Science Education*, 94(3), 478–505. <https://doi.org/10.1002/sce.20374>

CHAPTER 5: Conclusion

Educational technologies are often created without fully considering the cultural values, family routines, relationships, and shared experiences that shape learning across communities. Although culturally sustaining design has emphasized incorporating community voices, histories, and cultural practices into the design process (Anderson-Coto et al., 2024; Bermudez et al., 2023), questions remain about what happens when these commitments are carried into families' actual interactions with educational technology. Prior research has shown that Latine caregivers bring important cultural values and practices to how they guide children's technology use (Ochoa & Reich, 2020; Salazar et al., 2025). Now, research needs to consider how educational technologies can intentionally build on these strengths to support caregiver-child learning and how caregivers themselves make sense of their role in this process.

This dissertation addressed these questions by examining culturally sustaining educational technology across three interconnected stages: design, interaction, and interpretation. *Study 1* examined the values and priorities Latine caregivers envisioned for educational technology; *Study 2* examined how caregivers and children interacted with an educational technology designed around families' cultural strengths and everyday experiences; and *Study 3* examined how caregivers interpreted children's learning and decided how to support them during shared technology use. Across these studies, the findings show that centering Latine families in educational technology makes learning visible as a culturally situated, relational process in which caregivers' cultural knowledge, everyday experiences, and pedagogical expertise serve as important resources. The findings make three broader contributions: educational technology can be designed from families' cultural strengths, technology can intentionally support family learning, and caregivers should be recognized as pedagogical partners.

Designing from Families' Cultural Strengths

The first contribution of this dissertation is demonstrating how families' cultural strengths can serve as resources for both the design and use of educational technology. Culturally sustaining approaches argue that communities' values, practices, and knowledge should be centered in learning and design (Anderson-Coto et al., 2024; Paris, 2012; Paris & Alim, 2014). This dissertation builds on this work by showing that culture not only shapes what families want represented in technology but also how families imagine technology should support relationships, participation, and learning.

Study 1 showed that Latine caregivers wanted educational technologies to reflect priorities such as collective learning, *bien educado*, and digital safety. Caregivers described educational technology as extending beyond the academic content children should encounter. They also considered how technology could bring family members together, encourage children to behave respectfully toward others and in shared spaces, protect children's privacy, and connect learning to experiences meaningful within their families and communities. These findings align with prior work showing that Latine caregivers' approaches to children's technology use can be informed by values such as *familismo*, *educación*, and resilience (Salazar et al., 2025). Importantly, *Study 1* shows that these values can inform not only how caregivers mediate existing technologies but also what families believe educational technologies should support. Thus, culturally sustaining design involves more than incorporating culturally familiar characters, settings, or content. It also requires considering how cultural values shape families' expectations for learning and participation.

These priorities informed the design and implementation of *Bizumia: World of Play*, which situated STEM learning within familiar experiences such as grocery shopping, cooking,

choosing produce, and navigating neighborhood environments. *Study 2* demonstrated what could happen when these everyday practices become part of technology-mediated learning. Caregivers drew connections between the activities in the application and family routines, including cooking, sharing food, measuring ingredients, and everyday problem-solving, to help children make sense of STEM concepts. Instead of relying on the app's academic content, caregivers brought their own experiences and knowledge into the interaction.

Study 3 further showed how caregivers drew on these resources to support children's learning. Caregivers described asking questions, encouraging children, interpreting their thinking, and connecting activities within the application to previous family experiences. Through the technology's activities, caregivers had opportunities to contribute their own knowledge, experiences, and ways of supporting learning.

The findings extend Funds of Knowledge (Moll et al., 1992), Culturally Sustaining Pedagogy (Paris, 2012), Caregiver Mediation Theory (Clark, 2011), and culturally sustaining design approaches by showing how families' cultural and everyday knowledge can serve as resources during technology-mediated STEM learning. Data from Latine families show that funds of knowledge are not only resources researchers and designers can identify and incorporate into learning content. They can also become interactional resources that caregivers themselves draw upon to explain concepts, make connections, and support children's reasoning during technology use. Educational technologies can create opportunities for home and community knowledge to become meaningful resources for STEM learning.

Designing for Family Learning

The second contribution of this dissertation is to demonstrate that family learning does not happen simply because caregivers and children use technology at the same time. Instead,

technologies can be intentionally designed to create opportunities for conversation, collaboration, and shared participation. While previous research has shown the importance of caregiver-child interaction for learning (Sheehan et al., 2019), educational technologies are often designed primarily around children's individual engagement with digital content (Naranjo-Bock & Ito, 2017). Across the three studies, this dissertation demonstrates how family relationships and interactions can instead become central resources within technology-mediated learning.

Study 1 showed that Latine caregivers envisioned technology as a way to bring families together to learn. Caregivers described experiences in which family members could talk, participate, take turns, solve problems, and learn together. Their priorities suggest that collaborative participation was not simply an instructional preference but was also connected to family values around *familismo* and collaborative experiences. For these caregivers, designing for family learning meant considering not only what an individual child could learn from technology but also what families could do and learn together through technology.

Study 2 provided evidence of how these opportunities for participation unfolded during caregiver-child co-use. As caregivers and children interacted with *Bizumia: World of Play*, they discussed STEM concepts, connected activities to everyday experiences, worked through problems, and made sense of challenges together. Open-ended activities and familiar contexts gave caregivers opportunities to contribute to the interaction. These findings show that meaningful family learning can emerge when educational technologies leave space for dialogue, explanation, negotiation, and joint problem solving.

Study 3 further revealed that caregivers actively shaped these shared learning experiences. Caregivers described adjusting their support according to what they believed their

children needed, asking questions to encourage deeper thinking, supporting children through moments of difficulty, and building understanding together.

The three studies demonstrate a progression from what caregivers envisioned to what families did and how caregivers understood those interactions: *Study 1* identified families' priorities for shared learning, *Study 2* documented collaborative learning as it occurred during technology use, and *Study 3* made visible the reasoning caregivers brought to those interactions.

These findings contribute to sociocultural theories of learning and guided participation (Rogoff, 1990; Vygotsky, 1978) by illustrating how technology-mediated learning can be co-constructed through family interaction. The experiences of the Latine families in this dissertation further demonstrate that this social interaction is culturally situated. Latine caregivers did not enter the learning experience as culturally neutral pedagogical partners. They brought their own experiences, knowledge, and established ways of interacting with their children into the learning process. Findings suggest that designing for family learning requires attention not only to opportunities for interaction but also to the cultural and relational resources families bring to those interactions. This way, culturally sustaining educational technology can support family learning by creating space for families' existing relationships and ways of participating together to become part of the learning experience.

Recognizing Caregivers as Pedagogical Partners

The third contribution of this dissertation is repositioning caregivers as pedagogical partners rather than managers or supervisors of children's technology use. Caregiver mediation research has often examined how caregivers monitor, restrict, discuss, or otherwise manage children's engagement with digital media (Livingstone & Helsper, 2008; Nikken & Schols, 2015). Although this work has provided important insight into how families navigate technology,

focusing primarily on mediating technology use can undermine the pedagogical practices caregivers use when learning with technology.

Studies 2 and 3 demonstrated that caregivers did more than help children operate the technology or reach the correct answer. During observations, caregivers directed children's attention, redirected their thinking, asked questions, and connected activities to previous experiences. In interviews, caregivers explained that they watched what their children were doing, considered whether they understood the activity, and decided whether and how to intervene. These practices show that Latine caregivers actively made instructional decisions as learning unfolded.

Study 3 makes this interpretive process visible through the Ver–Pensar–Responder framework. *Ver* (Observe) represents caregivers noticing what their children are doing, including their strategies, actions, emotions, and explanations. *Pensar* (Interpret) captures how caregivers make sense of these observations and consider what they reveal about their children's understanding or needs. *Responder* (Respond) represents the decision about whether and how to provide support, such as asking a question, offering encouragement, redirecting attention, explaining an idea, or allowing the child to continue independently. Rather than conceptualizing scaffolding as a collection of observable caregiver behaviors, the framework highlights the interpretive reasoning that can inform those behaviors.

Centering Latine caregivers in this analysis matters because it makes visible pedagogical knowledge that can be overlooked when caregivers are primarily positioned as technology managers or when families from historically marginalized communities are approached through deficit perspectives. The caregivers in these studies demonstrated thoughtful instructional decision-making grounded in their knowledge of their children, their everyday experiences, and

broader family practices of guidance, encouragement, and shared participation. These findings should not be interpreted as suggesting that these practices are exclusive to Latine families. Instead, they provide a strengths-based account of the expertise these Latine caregivers already brought to technology-mediated learning.

The findings also extend caregiver mediation perspectives by distinguishing between mediating children's relationship with technology and mediating children's learning through technology. Caregivers interpret children's thinking, adjust their support, and help children connect STEM concepts to everyday life. In this sense, caregiver mediation during the use of educational technology can also function as a form of pedagogical mediation.

The Ver–Pensar–Responder framework contributes to sociocultural perspectives and guided participation by making more explicit the decision-making process through which caregivers organize and adjust children's participation in learning. Guided participation emphasizes how children learn through participation in culturally organized activities with others (Rogoff, 1990). The present data show that caregivers' guidance within these interactions involves an ongoing process of observing, interpreting, and responding to children's participation. Educational technologies designed for family learning should therefore recognize and strengthen the pedagogical expertise caregivers already possess by creating features that support them.

Implications for Educational Technology Design and Research

This dissertation's findings have several implications for designing educational technologies intended for family use. First, educational technologies should be designed not only for children but also for the relationships through which children learn. Technologies can intentionally create opportunities for caregiver-child dialogue through open-ended discussion

questions, prompts that encourage explanation and prediction, and reflection opportunities following activities. Collaborative challenges, shared decision-making, and activities with multiple possible solution paths can further encourage caregivers and children to participate as learning partners, rather than positioning one person as the user and the other as an observer.

Second, technologies should recognize caregivers as knowledgeable learning partners. Instead of recommending that caregivers provide only instructions for supervising children's use, educational technologies can offer flexible resources caregivers can draw on based on their children's needs. For example, caregiver conversation tips, optional prompts, and multiple pathways to support an activity could complement caregivers' own knowledge of their children. Designing this way acknowledges that caregivers already possess strategies for questioning, explaining, and making connections and that technology can create opportunities for caregivers to use those strategies.

Findings also have implications for researchers and designers working with Latine families. Culturally sustaining design should move beyond asking how Latine culture can be represented within educational technologies and toward asking how families' values, relationships, knowledge, and everyday practices can shape the learning experiences technologies make possible. This requires approaching Latine caregivers not as populations whose perceived needs or deficits must be addressed, but as partners whose expertise can inform both design and learning. Participatory and co-design approaches can provide opportunities for families to articulate not only what they want represented in technology, but also how they want children and caregivers to learn together. At the same time, researchers should be attentive to the variety within Latine communities and avoid treating the practices identified in this dissertation

as representative of all Latine families. Instead, this work shows the value of beginning with families' own experiences and priorities and letting those perspectives inform design decisions.

Finally, the Ver–Pensar–Responder framework provides several directions for future research. Because the present studies were conducted within a controlled research setting and with a particular group of Latine families, subsequent studies should examine caregiver decision-making in more naturalistic environments, including families' homes and other everyday learning settings. Research should also examine whether and how Ver–Pensar–Responder appears across different Latine communities, cultural groups, family structures, age groups, educational contexts, and types of educational technology. Such research can help determine which aspects of the framework are shared across contexts and which may be culturally or contextually specific.

Future work should also move beyond using Ver–Pensar–Responder only as an analytic framework and investigate its potential as a resource for educational technology design. Technologies could be intentionally designed to create opportunities for caregivers to observe children's strategies, interpret their understanding, and select from different ways of responding without prescribing a single "correct" form of caregiver support. Examining how families engage with technologies designed around these principles would provide an opportunity to further develop and evaluate the framework while also investigating how technology can support caregivers' existing pedagogical expertise.

Final Thoughts

In summary, this dissertation argues that culturally sustaining educational technology requires more than representing culture within digital content. Across three studies with Latine caregivers and children, the findings show that families' cultural values can shape what

educational technology is designed to support, everyday family knowledge can become a resource for STEM learning, and caregivers can act as pedagogical partners who interpret and engage with children's learning. Examining design, interaction, and caregiver interpretation together provides a more complete account of what culturally sustaining educational technology can look like across the learning experience.

More broadly, this dissertation calls for a change in how researchers and designers conceptualize educational technology for families. Rather than focusing only on how technology can teach children more effectively, educational technologies can be designed to create opportunities for families to bring their own relationships, knowledge, cultural practices, and ways of supporting learning into the experience. This shifts technology from the primary source of instruction to a resource around which families can talk, reason, and learn together.

Lastly, culturally sustaining educational technology should not only ask whether families can see their culture represented on a screen, but whether they can use the knowledge, values, and practices that already exist within their families as meaningful resources for learning. When technologies are designed from families' strengths instead of perceived deficits, culture becomes more than something represented in educational content, it becomes something enacted and sustained through participation. Educational technology can become a space where caregivers and children build knowledge together while drawing upon the cultural and familial strengths they already possess.

References

- Anderson-Coto, M. J., Salazar, J., Lopez, J. L.-S., Sedas, R. M., Campos, F., Bustamante, A. S., & Ahn, J. (2024). Towards culturally sustaining design: Centering community's voices for learning through Participatory Design. *International Journal of Child-Computer Interaction*, 39, 100621. <https://doi.org/10.1016/j.ijcci.2023.100621>
- Bermudez, V. N., Salazar, J., Garcia, L., Ochoa, K. D., Pesch, A., Roldan, W., Soto-Lara, S., Gomez, W., Rodriguez, R., Hirsh-Pasek, K., Ahn, J., & Bustamante, A. S. (2023). Designing culturally situated playful environments for early STEM learning with a Latine community. *Early Childhood Research Quarterly*, 65, 205–216. <https://doi.org/10.1016/j.ecresq.2023.06.003>
- Clark, L. S. (2011). Parental Mediation Theory for the Digital Age. *Communication Theory*, 21(4), 323–343. <https://doi.org/10.1111/j.1468-2885.2011.01391.x>
- Livingstone, S., & Helsper, E. J. (2008). Parental Mediation of Children's Internet Use. *Journal of Broadcasting & Electronic Media*, 52(4), 581–599. <https://doi.org/10.1080/08838150802437396>
- Moll, L. C., Amanti, C., Neff, D., & Gonzalez, N. (1992). Funds of Knowledge for Teaching: Using a Qualitative Approach to Connect Homes and Classrooms. *Theory into Practice*, 31(2), 132–141.
- Naranjo-Bock, C., & Ito, J. (2017). Playing Together: The Importance of Joint Engagement in the Design of Technology for Children. *Proceedings of the 2017 Conference on Interaction Design and Children*, 749–752. <https://doi.org/10.1145/3078072.3081310>
- Nikken, P., & Schols, M. (2015). How and Why Parents Guide the Media Use of Young Children. *Journal of Child and Family Studies*, 24(11), 3423–3435. <https://doi.org/10.1007/s10826-015-0144-4>
- Ochoa, W., & Reich, S. M. (2020). Parents' Beliefs About the Benefits and Detriments of Mobile Screen Technologies for Their Young Children's Learning: A Focus on Diverse Latine Mothers and Fathers. *Frontiers in Psychology*, 11, 570712. <https://doi.org/10.3389/fpsyg.2020.570712>
- Paris, D. (2012). Culturally Sustaining Pedagogy: A Needed Change in Stance, Terminology, and Practice. *Educational Researcher*, 41(3), 93–97. <https://doi.org/10.3102/0013189X12441244>
- Paris, D., & Alim, H. S. (2014). What Are We Seeking to Sustain Through Culturally Sustaining Pedagogy? A Loving Critique Forward. *Harvard Educational Review*, 84(1), 85–100. <https://doi.org/10.17763/haer.84.1.9821873k2ht16m77>
- Rogoff, B. (1990). *Apprenticeship in Thinking: Cognitive Development in Social Context*.
- Salazar, J., Seccia, I. T., Maldonado, J. V., Hernandez, L., Bermudez, V. N., Acevedo-Farag, L. M., Ahn, J., & Bustamante, A. S. (2025). Sustaining Latine Families' Cultural Values Through Technology Mediation Practices. *Journal of Latinos and Education*, 1–12. <https://doi.org/10.1080/15348431.2024.2444942>
- Sheehan, K. J., Pila, S., Lauricella, A. R., & Wartella, E. A. (2019). Parent-child interaction and children's learning from a coding application. *Computers & Education*, 140, 103601. <https://doi.org/10.1016/j.compedu.2019.103601>
- Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.