

The Role of Funds of Knowledge in Online Search and Brokering

Wendy Roldan, Paola Vanegas, Laura Pina, Carmen Gonzalez, and Jason Yip
wr4@uw.edu, pvd@uw.edu, lpina@uw.edu, cmgonzal@uw.edu, jyip@uw.edu
University of Washington

Abstract: Lower-socioeconomic status, immigrant parents who are English language learners often work collaboratively with their children to search the internet. Family members rely on each other's language and digital literacy skills in this collaborative information problem solving process known as online search and brokering (OSB). While previous work has identified the ecological factors that impact OSB, research has not yet distilled the specific learning processes behind such collaborations. From a case study analysis of three families, this work explores the funds of knowledge that children and parents rely on as they engage in collaborative learning experiences through OSB. We demonstrate how in-home computer supported collaborative processes are often informal, collaborative, social, and highly relevant to solving real-life information challenges. Our work shows how parents and children draw on their funds of knowledge when they search collaboratively, with and for their family members, to build their collective knowledge of technology and problem-solving.

Introduction

Approximately 8 million U.S. children have at least one immigrant parent who is an English language learner (Zong, Batalova, & Hallock, 2018). Lower-socioeconomic status immigrant parents often rely on their children's language and digital literacy skills to address family needs (Eksner & Orellana, 2012). In these families, adults and children work with each other to search the internet, in a collaborative information problem-solving process we call *online search and brokering* (OSB) (Pina et al., 2018; Yip, Gonzalez, & Katz, 2016). For these families, children's responsibilities extend beyond traditional chores to holding the role as the family's primary problem-solver for critical family needs through online information searches (Pina et al., 2018). While previous work has identified online search and brokering practices (Yip et al., 2016) and the ecological factors that influence online search and brokering (Pina et al., 2018), research has not yet distilled the specific learning processes behind such family collaborations. While online information problem-solving models (Brand-Gruwel, Wopereis, & Walraven, 2009) contribute to our understanding of digital learning and information processing, they do not fully explain the sociocultural, collaborative learning processes that occur as families engage in online search and brokering.

Our research focuses on Latin American families, the fastest growing population in the U.S. (Pew Research Center, 2018). Latino children are projected to make up about a third of the K-12 enrollment by 2023 and with more than half of them living in immigrant families (Foxen & Mather, 2016), many of them are searching for critical information online for their English language learning family members. Education researchers engaged in sociocultural historical approaches with children from non-dominant backgrounds explain that learning is an ongoing process that is not divided into separate characteristics of individuals and contexts (Gutiérrez & Rogoff, 2003). Therefore, we believe it is important to understand the learning that occurs in intergenerational, bilingual, information problem-solving family collaborations. Previous research with families whose households have been traditionally viewed as low-resourced, applies a funds of knowledge framework to understand and nurture the strategic knowledge and skills that are often overlooked (Moll, Amanti, Neff, & Gonzalez, 1992). Using a funds of knowledge framework (Moll et al., 1992) this work explores the learning processes that occur in Latino families, when family members collaboratively search for information online. We examine a case study of three focal Latin American, lower-socioeconomic status, English language learner families as they engaged in collaborative, computer supported, online search and brokering. Our research questions are: **RQ1**. What funds of knowledge do bilingual children and their English language learner parents rely on when attempting to solve information problems using the Internet?; and **RQ2**. What are the collaborative learning processes around online information searches in English language learner families as they work together?

Background

This work builds on literature in individual and collaborative search processes, the phenomenon of search and brokering, joint media engagement, and sociocultural historical theory on learning as a cultural, ongoing activity. We draw on research that investigates how individuals search for information online to make sense of the learning that happens within individual search processes. However, in applying individual problem-solving models for online search we find gaps with respect to understanding how learning occurs in intergenerational and bilingual collaborative searches. Thus, we turn to the literature on language brokering that focuses on intergenerational and

bilingual problem-solving between youth and their parents to help us fill the gaps. To strengthen our literature review on online search and brokering with families, we find that joint media engagement is a particularly useful framework to examine the learning that is happening as families use media together and in the home.

Individual and collaborative search processes

A rich body of work explores how individuals search for information online. Models like *Information Problem-Solving for the Internet* offer insights into the set of skills individuals need to search for information online. These skills include: defining, searching, scanning, processing, and organizing information (Brand-Gruwel et al., 2009). While we know much about the learning that happens within individual search processes, less is known about the process of how people collaborate together to solve information problems and the learning processes behind it (Stahl, Koschmann, & Suthers, 2006). Research on online searching as a collaborative process between individuals (Morris, 2013), shows the opportunity to reinforce and learn search skills from exposure to others' strategies (Foss et al., 2012). But much of this work has focused on skilled peer adults searching remotely together using online tools (Morris, 2013). Further, research with families engaged in informal collaborative relationships with technology suggests that participation in these activities can nurture knowledge of managing information and promoting self-direction of one's learning (Jenkins, 2006). This strand of research provides insights into the relationship between collaboration and learning but focuses on collaborative engagement in technologically mediated activities that are not information problems. From our literature review, we conclude that research on intergenerational, bilingual, collaborative search processes and learning is limited thus we turn to the communications literature that explores language brokering with youth in the home.

Online search and brokering (OSB)

Recent literature explores how parents and children work collaboratively to address family information needs using digital resources, in a process known as online search and brokering (Pina et al., 2018). Research on immigrant youth shows how language brokering is part of everyday life as children and parents work together to address family needs (Orellana, Dorner, & Pulido, 2003). Bilingual youth work as translators and interpreters for their immigrant parents, which opens the families' access to resources and information on education, health, and finances. As families collaborate to address family needs in everyday language-brokering events, different levels of skills and expertise are leveraged, and knowledge becomes co-constructed (Eksner & Orellana, 2012). As the digital divide narrows, scholars have also explored how children become *technology brokers* to introduce and teach their parents new technologies (Nelissen & Van den Bulck, 2018). There are significant differences in how children help their parents with technology across families from different socio-economic status (Brown, Bakken, Nguyen, & Von Bank, 2007). In high-socioeconomic status families, children drive the adoption of mobile applications, technology for entertainment, and educational purposes. On the other hand, in families from a lower-socioeconomic status, children help connect their adult family members to critical information needs (e.g., finances, health, well-being) (Nelissen & Van den Bulck, 2018). Collaborative family engagement with technology also differs significantly across families. To further contextualize our work as parents and children use technology together, we draw on literature from joint media engagement.

Joint media engagement (JME)

The nuanced interactions that occur as parents and children engage in online search and brokering is a form of joint media engagement that has not been previously studied (Pina et al., 2018). The phenomenon of joint media engagement helps us understand the experiences of people using media together as they view, play, contribute, search, and create with both traditional and digital media (Sobel et al., 2017; Takeuchi & Stevens, 2011). Previous research with families defines joint media engagement as the process of learning between children and parents as they co-create meaningful connections among interests, experiences, and representations using all forms of media and technologies that are present in children's lives (Takeuchi & Stevens, 2011). However, much of the research on joint media engagement emphasizes learning together through gaming, entertainment, and education (Gee, Takeuchi, & Wartella, 2018). Our work builds on prior research with families and technology by identifying the funds of knowledge that children and their parents draw on to problem-solve and co-create meaningful connections that extend beyond play and family fun to solve critical family needs.

Theoretical framework – funds of knowledge

We apply a funds of knowledge framework to examine the collaborative, intergenerational, bilingual, information problem-solving learning processes that occur during online search and brokering with an asset-based perspective. A funds of knowledge framework allows us to understand the historically accumulated and culturally developed bodies of knowledge that are essential for household and individual well-being (Moll et al., 1992). We posit that a funds of knowledge approach allows us to capture the tacit knowledge parents and children draw on when

engaging in online search and brokering, knowledge that is not necessarily taught but critical to family well-being. This framework allows us to push the conversation away from deficit models of learning for non-dominant students towards honoring the learning that occurs in the household and everyday activities of Latino youth and adults as they search and broker for information online collaboratively. Previous research with families whose households have been traditionally viewed as low-resourced uses funds of knowledge to refer to the strategic knowledge and skills that exist within these families (Moll et al., 1992). A person's funds of knowledge can be described as their accumulated life experiences, the skills and knowledge they use to navigate everyday life, and their cultural-historical academic and personal background knowledge. Our work builds on prior funds of knowledge research in learning and education, by identifying the knowledge and skills found in households that members use to solve information problems as a computer supported collaborative learning process.

As parents and children engage in everyday online search and brokering, we explore the learning processes that occur through a sociocultural lens by applying a funds of knowledge framework. Sociocultural scholars propose that the educational movement toward equity will occur, "as we create learning environments that connect in deep ways to the life experiences of all students" (Nasir, Rosebery, Warren, & Lee, 2006). A sociocultural lens provides new insights on issues of race, culture, and learning (Nasir et al., 2006). Learning, as a cultural process of engagement in repertoires of practices, is a process in which individual development is understood in cultural and historical contexts (Gutiérrez & Rogoff, 2003). Building on this body of work, we recognize understanding learning requires a focus on how individuals engage and participate in particular everyday activities and how they draw on artifacts, tools, and others to solve problems (Nasir & Hand, 2006).

Methods

For this study, we adhered to the standards and practices of a case study examination (Merriam & Tisdell, 2015). We focused on three Latin American lower-socioeconomic status, English language learner families in the Pacific Northwest and their collaborative learning experiences through engagement in online search and brokering.

This exploratory, qualitative study with three focal families is a part of a larger qualitative study. Between July 2016 and June 2017, we visited 23 families in an urban area of the Pacific Northwest, U.S., within a 32-kilometer radius of our research institution. Our participants included parents, grandparents, and children aged 10-17. Most of the adults that were a part of our study were born in Mexico, did not have a college-degree, worked in service industries, and represented a lower-socioeconomic population. At the time of this study, a tense political climate existed for Latino families therefore we relied on community center networks, local cultural events, and a paid community liaison as a part of our recruitment strategies. We conducted two separate in-home family visits per family. In-home visits allowed participants to feel comfortable in their usual search and brokering environment and allowed researchers to observe search practices within the home's digital infrastructure. In our first in-home visit (V1), we conducted separate adult and youth retrospective interviews to contextualize where and how they search. In V1 we gathered family members' perspective on their practices, strategies, and challenges when searching for information online. The interview protocol was adapted from previous work on in-home media studies (Katz & Gonzalez, 2016). Each interview (45-60 mins) was audio recorded and transcribed. Parent interviews were in Spanish and youth interviews in English. For our second in-home visit (V2), we focused on directed internet search tasks between adult-youth dyads. Visit 2 was audio recorded and screen interactions were video recorded. In V2, participants engaged in a set of imposed search tasks prompted by researchers and historical tasks of prior online searches. We take a deep dive into three specific families from this larger data set (Table 1).

Table 1: Demographics of the families

ID	Relationship (Age)	Occupation	Adult birthplace	Grade completed by adult
2	Mother (39), Daughter (10)	Hospitality	Mexico	Primary, 4 th grade
17	Grandfather (62), Grandson (12)	Food Industry	Mexico	Secondary, 7 th grade
22	Mother (42), Daughter (15)	Housekeeping	Mexico	Secondary, 10 th grade

Our selection criteria for these three families are the following. (1) Each family offered insights into different household structures that influence the online search and brokering process. One family was a mother-daughter dyad within a single-parent home, another was a grandparent-grandson dyad within a seven-person home, and the third was a mother-daughter dyad within a four-person family home. (2) In a comparative analysis each family allowed us to see how despite the differences across family structures, we observed themes in the funds of knowledge used and the learning processes occurring during online search and brokering. (3) Each family offers insights into different types of devices used in the home to search for information.

For this paper, we analyzed data from V1 and V2 with three families to explore our research questions. To analyze the data, two researchers used open coding with constant comparative analysis (Merriam & Tisdell, 2015). This iterative open-coding was done for both parent and child interviews and for an analysis of V2 video

data. Two researchers open-coded the data independently for themes such as technology and language brokering, information problem-solving, relationships, perceptions of learning, and strategies and challenges to searching. We coded and compared the themes to develop further categories for analysis and then systematically compared and contrasted the themes between researchers. Following open-coding, we used axial coding to make connections between funds of knowledge categories and subcategories. We performed a constant sorting and comparative analysis until theoretical saturation was reached and no new codes were generated. Finally, we looked at these themes and interpreted them using a funds of knowledge analytical lens. Data on search tasks from our second visit allowed us to triangulate interview data from our first visit to provide a rich analysis of our data.

Findings

For each family, we provide a case description for context and describe a search task in-depth. We then discuss each case using a funds of knowledge analytical lens (Moll et al., 1992) to help us document the learning and knowledge in practice that is a part of online search and brokering as a daily household routine (Gutiérrez, Morales, & Martinez, 2009). We highlight the funds of knowledge that each family member brings into the collaborative information problem search process from their home and community lives (Moll et al., 1992). Each family engages in online search and brokering differently with devices, set-ups, and strategies. All quotes are translated from Spanish. We use [] to indicate typing on digital devices. All names used in the cases are pseudonyms, with Name^A for adult, and Name^C for child.

Family 2. Norma^A and Mia^C

Case Description. Mia^C is Norma^A's 10-year-old youngest daughter who helps her mom with searches on a more regular basis compared to her older sisters. Mia^C is a developing yet savvy searcher, often struggling with spelling search words but consistently recognizing the need for descriptive terms to narrow her search. At the time of the study, Norma^A indicated she did not feel confident with technology but was aware of technology resources through her local community networks. In V1, we learned Norma^A and Mia^C engaged in collaborative online search and brokering when Norma^A discovered someone had taken money out of her bank account fraudulently. The woman from the bank taught Mia^C how to access Norma^A's online banking information for her. During V2, we saw this financial search information problem revisited. For one of the tasks, Norma^A wanted to find the closest bank near her home. Mia^C clicked the search bar (Figure 1, left), and began to type using the tablet screen keyboard and her two index fingers, [*the cosest bank*]. Mia^C paused as the search engine suggestions came up for *the closest bank of america* and *the closest bank of america to me*. Mia^C continued to type into her search [*the cosest bank of america*] and pressed the search button to generate results. Mia^C scanned the results and clicked on the Google visual map (Figure 2, right). Mia^C hovered her finger over the options and explained to her mom what the results meant. Mia^C noted Option A is the closest because it appeared first.

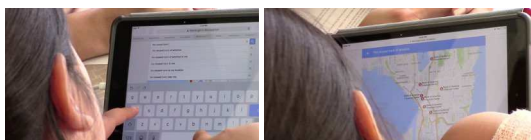


Figure 1. Norma and Mia searching for the closest bank using Google Maps.

Case analysis. Knowledge of linguistic translational practices

In this case, we notice how Norma^A and Mia^C use their funds of knowledge about each other's assets to complete their financial information search task of finding the bank nearest to them. Mia^C built on her cultural repertoires of linguistic practice as she (a) translated her mom's inquiry about finding the closest bank from Spanish to English; (b) searched using key descriptive terms in English that would narrow her search for banks nearest her; (c) scanned the information presented in English; (d) relied on visuals and maps to find answers; and (e) translated the results back to Norma^A. After the search was completed, Mia^C explained she did not understand maps, but Norma^A used her knowledge of spatial geography and relied on her lived experiences of navigating this area to understand where the bank was. Norma^A and Mia^C helped each other process, translate, and increase their collective understanding of finding and reading a map. We see knowledge of linguistic translational practices used in their intergenerational, bilingual, online search and brokering practices. In this example, we see Mia^C engaging in a range of practices that challenge deficit notions of students' repertoires developed across non-school settings (Gutiérrez et al., 2009). As Mia^C collaborative searches with and for her mom, she uses linguistic knowledge, problem-solving and search knowledge, and translation knowledge. Each of these funds of knowledge Mia^C uses to search could become future resources for her learning across settings and practices, inside and outside the classroom (Gutiérrez et al., 2009).

Family 17. Carmelo^A and Mateo^C

Case Description. Mateo^C is Carmelo^A's 12-year-old youngest grandson who helps Carmelo^A with most of his searches. Carmelo^A owns a restaurant and is a lifelong learner who desires to learn more about technology. Mateo^C is a visual and audio searcher who feels comfortable with technology and uses google voice to search for information. Similar to Mia^C, Mateo^C struggles with spelling and instead prefers to say rather than type a word. In V1, Carmelo^A told us that he searches the internet to buy things for his restaurant and preferred images to make sense of information online. In V2, we observed Carmelo^A and Mateo^C search together for new industrial stoves knobs for Carmelo^A's restaurant. Carmelo^A wanted to buy goods on Amazon for his restaurant. Mateo^C clicked on the Amazon app on a smartphone and clicked on the search bar (Figure 2, left). He moved his fingers from the search bar to the keyboard. Mateo^C showed Carmelo^A how to go to the search bar. Carmelo took the smartphone and typed [*buttons for*] in Spanish. Mateo^C interrupted and asked if this was for clothing, but Carmelo^A explained this was for stoves. When Carmelo finished typing, the Amazon app returned images of what Carmelo was looking for. As the discussion continued, there was a disconnect between what Mateo^C thought they were looking for. Mateo^C typed word [*butten*] into the Amazon search bar (Figure 2, center). Mateo^C said the search was not giving him what he wanted. Carmelo^A took back the phone, left the Amazon app, clicked the Google app, and typed [*how do you spell buttons in English*]. Carmelo^A said, "There it is! This is how I do it. But it takes me a long time." At this point Carmelo^A asked Mateo^C to teach him how to search using voice to be more agile. Mateo^C clicked on the voice icon on Google search (Figure 2, right) and told him to just talk. Carmelo^A took the phone up to close to his mouth and said, "I want to look for buttons for the stove," but the search did not work. Mateo^C explained, "You have to push this button and then go. You push it and go." Carmelo^A used the voice assistant again, "I want to look for buttons for the stove." Carmelo^A looked and smiled at the search result images of the knobs he was looking for, having learned a new technology skill (Figure 2, right).

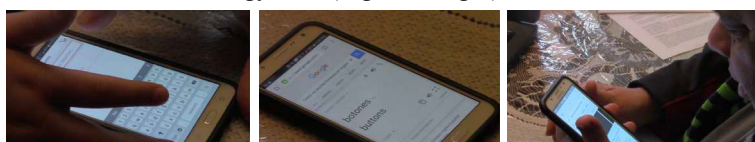


Figure 2. Carmelo and Mateo searching for stove knobs using the Amazon app and Google voice assistant.

Case analysis. Knowledge of problem-solving strategies

In this case, we believe Carmelo^A and Mateo^C rely on each other's funds of knowledge to explore different search strategies when they face the challenge of not knowing the translation between buttons and knobs in Spanish. Carmelo relies on his lived experiences running the restaurant to explain to Mateo^C what he was looking for. Mateo^C sets the search up for Carmelo^A by (a) previously configuring the Amazon app settings to Spanish; (b) showing him where to enter his search terms; and (c) clarifying what it is they are looking for to make sure the language translation is correct. When they get stuck, Carmelo^A uses his previous knowledge related to persistence to show Mateo^C how he uses the Internet to problem-solve translational challenges. Further, this example shows how each other's funds of knowledge are taken up as they explore alternative search strategies moving from the Amazon app, to Google search, to Google search voice assistant. Carmelo^A observes Mateo^C using the Google voice assistant and learns how to do it himself through Mateo^C's scaffolds. The two help each other conceptualize the problem, explore different internet resources to push away from challenges, and learn new language and technology skills. We see knowledge of alternative strategy exploration being taken up by Carmelo^A and Mateo^C as they expand their knowledge of technology to uncover the shared meaning of knobs/buttons in their multisensory (auditory and visual), intergenerational, bilingual, and online search and brokering practices.

Family 22. Romelia^A and Amy^C

Case Description. Amy^C is Romelia^A's 15-year-old daughter. Romelia^A is a stay-at-home mom and relies on Amy^C to search for information related to the needs of others in the home. Romelia^A watches videos on YouTube to learn how to do things like braid hair or find new recipes. Amy^C is a searcher who uses multiple strategies in action as she searches for her mom using her knowledge about viruses, advertisements, and web browsing. When the two engage in collaborative online search and brokering together they often sit side-by-side, co-viewing on the family desktop computer. During our first visit, we learned Romelia^A wished she knew how to help her husband search for construction jobs. In V2, we observed how Amy^C and Romelia^A search for construction jobs for the father. Amy^C asked, "What jobs do you want to help find for papa?" (Figure 3, left). Romelia^A responded, "Like companies, like companies that have jobs." Amy^C typed, [*construction companies hiring near me*] and clicked on the second search result, Monster.com. Romelia^A noted, "Make sure the search results are local." Amy^C narrowed the search by selecting the U.S. state and typed [*construction*] in the Monster.com search box. The search results come up and Amy^C translated the job descriptions from English to Spanish for her mom. As Amy^C

simultaneously interpreted, translated, and scanned the results, she also explained why she was not clicking on job postings that require a technical or engineering degree. However, Amy^C noted she was stuck. Romelia^A suggested adding the word *siding* and Amy typed in [*constructing citing* (sic)], which did not result in what they needed. Amy^C asked, “*citing*, right?” They stepped away from the computer and look for other resources to refine their search terms. Romelia^A pointed to the father’s contracting certification that showed how to spell *siding* the correct way (Figure 3, right). Amy typed, [*construction companies hiring siding installers in (U.S. state)*]. She translated the information to her mom. Romelia^A asked, “How much do those jobs pay?” Amy noted it was about \$20 an hour. Amy^C asked, “Do you want jobs for him or for his company?” Romelia^A stated, “I want to look for jobs for a contractor, not jobs that hire by the hour, I want to look for big jobs because he has his company.”



Figure 3. Romelia and Amy searching for construction siding jobs using online and physical resources.

Case analysis. Knowledge of search resources

Romelia^A and Amy^C discuss, contribute, and move from online resources to resources in the home to move past challenges. When Amy^C began the search, Romelia^A used her geospatial knowledge and lived experiences of finding a job to ask Amy to narrow the search for local jobs. Amy^C used her knowledge to (a) click on a job search engine; (b) scan the job postings; (c) translate linguistically the search results; and (d) explain her interpretation of the job descriptions. When the two got stuck, Romelia^A offered new search terms (*siding*) while Amy^C continued to scan and interpret website search results. Using knowledge of alternative resources available to them beyond the Internet they collectively (a) step away from the computer; (b) find the father’s contracting license; and (c) correct their spelling of their search terms. They build on each other’s funds of knowledge to conceptualize the problem, find alternative resources to spell the search term, and explain what type of job they are looking for based on the father’s qualifications. We argue knowledge of search resources moves fluidly between the two as they translate across language, across physical and online, and across technical linguistic practices.

Discussion

Funds of Knowledge in Online Search and Brokering. In this study, we found that each individual family member contributes their own knowledge to collectively build household knowledge resources. Each child is a part of a larger social structure within the home where they rely and share their knowledge with siblings, parents, and grandparents. Across all families, we observed how Mia^C, Mateo^C, and Amy^C’s role as the primary searcher in their home carried “the trace of prior social relations,” building on their prior actions while co-creating new knowledge with adults (Bakhtin, 1981; Vossoughi, Jackson, Chen, & Roldan, Under Review; Vygotsky, 1978). The adults usually have knowledge for the search conceptualization such as geospatial understanding, spelling clarifications, or knowledge of family resources. The children usually have critical technology proficiency and linguistic translational knowledge to search, scan, process, gather, and translate online information. During collaborative searches, each family member continually builds on the knowledge of each other’s assets. This knowledge informs the ways in which children and adults set up future learning opportunities for each other within online search and brokering practices.

Further, we highlight how family members developed resilience, as they faced structural and systemic challenges to searching for information (language, access to social resources, schooling). Resilience was reinforced through funds of knowledge and resource sharing as family members relied on each other’s knowledge, strategies, and skills when met with a challenge during their search process (Berkes & Ross, 2013). Across all families, we observed resilience at the level of the individual and the household as interrelated, with family members actively developing their shared resilience through capacity building and collaborative learning while engaged in online search and brokering (Berkes & Ross, 2013). The families persisted and relied on their funds of knowledge (translational practices, problem-solving, search resources) collaboratively to solve their information problems when they got stuck or tried to problem-solve through the unknown. For the majority of the adults in this study, the United States is not their home country. With this information, we can see the funds of knowledge related to resilience, problem-solving through new situations, and strategies to move beyond challenging situations while engaging in online search and brokering in our data. Building on sociocultural theories of learning, we offer this analysis as a way to help us construct classrooms that draw on the funds of knowledge that students bring from their home and everyday experiences to promote holistic and equitable development and learning (Gutiérrez & Rogoff, 2003).

Collaborative Learning Processes in Online Search and Brokering. In contrast to highly individualized

instructional systems (e.g., formal school), we demonstrate learning processes in-the-home are often informal, collaborative, highly social, and highly relevant to solving real-life information access challenges. Through our thematic analysis of the funds of knowledge that adults and children draw on while they engage in collaborative online search and brokering with their families, we offer a nuanced understanding of computer supported collaborative learning processes happening within the home. We contribute to studies of joint media engagement (Takeuchi & Stevens, 2011) by identifying the funds of knowledge Latino families draw on to problem-solve and co-create solutions that extend beyond play to solve critical family needs. Joint media engagement is not just about learning together through gaming, entertainment, or educational technologies. Instead, we highlight the ways that family members work together as a group to solve information problems using online connected technologies. Work within CSCL notes that group cognition forms as a result of collaborative knowledge building in which meaning is created across the utterances of different people (Stahl, 2006). In our cases, all of the adults and youth act in a joint activity to problem-solve for their family needs. The shared construction of meaning occurs as both adult and child engage through intersubjectivity of language, technological interactions, information problem-solving, and family funds of knowledge. For many of these families, the group remains at the synchronous level, in which adult and child work together around an interactive device (e.g., desktop, tablet, laptop, smartphone) to collaboratively solve their family information needs. We believe our research in this area contributes to CSCL as there is a need to identify how technology and online information problem-solving for family needs supports how people learn, and uncovering what challenges lie ahead.

Implications for Educators. As online search and brokering plays a major part of family practices, our work highlights the funds of knowledge that are evident as parents and children search together, which educators can utilize in the classroom to design instructional materials that are relevant to students' family responsibilities. Overall, while our findings focus on a specific group of Latin American families with English language learner parents from a lower-socioeconomic status, family information search and collaboration happen across all contexts and ages. For example, other immigrant English language learner families might search for health information for elderly family members together. Individuals must use similar processes of finding information together, making sense of that information, and translating that information by closely drawing on their funds of knowledge at each step of the information problem-solving model. By examining a) the funds of knowledge families use in online search and brokering and b) the computer supported collaborative learning processes in online information search, we are better able to provide instructional design implications to help schools, libraries, and community centers attend to culture in understanding students' learning. Our work opens up new opportunities to bridge home and school through the computer supported collaborative learning process that are embedded in children's every day practices. Our findings can help educators consider family roles when designing curricula. Future work could examine the unique challenges of English language learning students and how their search practices might fluctuate across formal and informal contexts.

Conclusion

We argue that an intergenerational online search and brokering process is different compared to collaborative online information problem-solving that happens between classroom peers or between co-workers. Our research shows how both parents and children draw on their funds of knowledge when they search collaboratively, with and for their family members, to build their collective knowledge of technology and problem-solving. Through the metaphor of a jigsaw puzzle, we can begin to understand how collaborative problem-solving takes first, the identification of knowledge and skills and secondly, the learning processes behind figuring out how to can arrange, turn, and shift the puzzle pieces, in this case the funds of knowledge, to solve the information problem at hand. The CSCL community can benefit from an understanding of how online search and brokering is a form of collaborative learning around technologies, given it is the daily reality for millions of bilingual children.

References

- Bakhtin, M. M. (1981). *The dialogic imagination: Four essays by mm bakhtin* (m. holquist, ed.; c. emerson & m. holquist, trans.). Austin: University of Texas Press.
- Berkes, F., & Ross, H. (2013). Community Resilience: Toward an Integrated Approach. *Society & Natural Resources*, 26(1), 5–20. <https://doi.org/10.1080/08941920.2012.736605>
- Brand-Gruwel, S., Wopereis, I., & Walraven, A. (2009). A descriptive model of information problem solving while using internet. *Computers & Education*, 53(4), 1207–1217.
- Brown, B. B., Bakken, J. P., Nguyen, J., & Von Bank, H. G. (2007). Sharing information about peer relations: Parent and adolescent opinions and behaviors in Hmong and African American families. *New Directions for Child and Adolescent Development*, 2007(116), 67–82.
- Eksner, H. J., & Orellana, M. F. (2012). Shifting in the zone: Latina/o child language brokers and the co-

- construction of knowledge. *Ethos*, 40(2), 196–220.
- Foss, E., Druin, A., Brewer, R., Lo, P., Sanchez, L., Golub, E., & Hutchinson, H. (2012). Children's search roles at home: Implications for designers, researchers, educators, and parents. *Journal of the American Society for Information Science and Technology*, 63(3), 558–573.
- Foxen, P., & Mather, M. (2016). Toward A More Equitable Future: The Trends and Challenges Facing America's Latino Children. Retrieved from <http://publications.nclr.org/handle/123456789/1627>
- Gee, E., Takeuchi, L., & Wartella, E. (Eds.). (2018). *Children and families in the digital age: learning together in a media saturated culture*. New York: Routledge, Taylor & Francis Group.
- Gutiérrez, K. D., Morales, P. Z., & Martinez, D. C. (2009). Re-mediating literacy: Culture, difference, and learning for students from nondominant communities. *Review of Research in Education*, 33, 212–245.
- Gutiérrez, K. D., & Rogoff, B. (2003). Cultural ways of learning: Individual traits or repertoires of practice. *Educational Researcher*, 32(5), 19–25.
- Jenkins, H. (2006). Confronting the challenges of participatory culture: Media education for the 21st century. An occasional paper on digital media and learning. John D. and Catherine T. MacArthur Foundation.
- Katz, V. S., & Gonzalez, C. (2016). Toward meaningful connectivity: Using multilevel communication research to reframe digital inequality. *Journal of Communication*, 66(2), 236–249.
- Merriam, S. B., & Tisdell, E. J. (2015). *Qualitative research: A guide to design and implementation*. John Wiley & Sons.
- 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.
- Morris, M. R. (2013). Collaborative search revisited. *Proceedings of the conference on computer supported cooperative work*. ACM, 2013.
- Nasir, N. S., & Hand, V. M. (2006). Exploring Sociocultural Perspectives on Race, Culture, and Learning. *Review of Educational Research*, 76(4), 449–475.
- Nasir, N. S., Rosebery, A. S., Warren, B., & Lee, C. D. (2006). Learning as a Cultural Process: Achieving Equity Through Diversity. In *The Cambridge handbook of: The learning sciences*. (pp. 489–504). New York, NY, US: Cambridge University Press.
- Nelissen, S., & Van den Bulck, J. (2018). When digital natives instruct digital immigrants: Active guidance of parental media use by children and conflict in the family. *Information, Communication & Society*, 21(3), 375–387.
- Orellana, M. F., Dorner, L., & Pulido, L. (2003). Accessing assets: Immigrant youth's work as family translators or para-phrasers. *Social Problems*, 50(4), 505–524.
- Pew Research Center. (2018). *Hispanic/Latino Demographics*. Retrieved from <http://www.pewresearch.org/topics/hispaniclatino-demography/>
- Pina, L. R., Gonzalez, C., Nieto, C., Roldan, W., Onofre, E., & Yip, J. C. (2018). How Latino Children in the US Engage in Collaborative Online Information Problem Solving with their Families. *Proceedings of the ACM on Human-Computer Interaction*, 2(CSCW), 140.
- 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 (pp. 1483–1496). ACM Press.
- Stahl, G. (2006). *Group cognition: Computer support for building collaborative knowledge*. Cambridge, Mass: MIT Press.
- Stahl, G., Koschmann, T. D., & Suthers, D. D. (2006). Computer-supported collaborative learning.
- Takeuchi, L., & Stevens, R. (2011). The new coviewing: Designing for learning through joint media engagement. Presented at the New York, NY: The Joan Ganz Cooney Center at Sesame Workshop.
- Vossoughi, S., Jackson, A., Chen, S., & Roldan, W. (Under Review). Embodied pathways and ethical trails: Studying learning in and through the choreography of social relations.
- Vygotsky, L. (1978). Interaction between learning and development. *Readings on the Development of Children*, 23(3), 34–41.
- Yip, J.C., Gonzalez, C., & Katz, V. (2016). The learning experiences of youth online information brokers. In C. K. Looi, J.L. Polman, U. Cress, & P. Reimann, P. (Eds.). *Transforming Learning, Empowering Learners: The International Conference of the Learning Sciences (ICLS)* (Vol. 1, pp. 362 – 369).
- Zong, J., Batalova, J., & Hallock, J. (2018). *Frequently Requested Statistics on Immigrants and Immigration in the United States*. Migration Policy Institute.

Acknowledgments

We thank the families that allowed us into their homes and the individuals that contributed to this research.