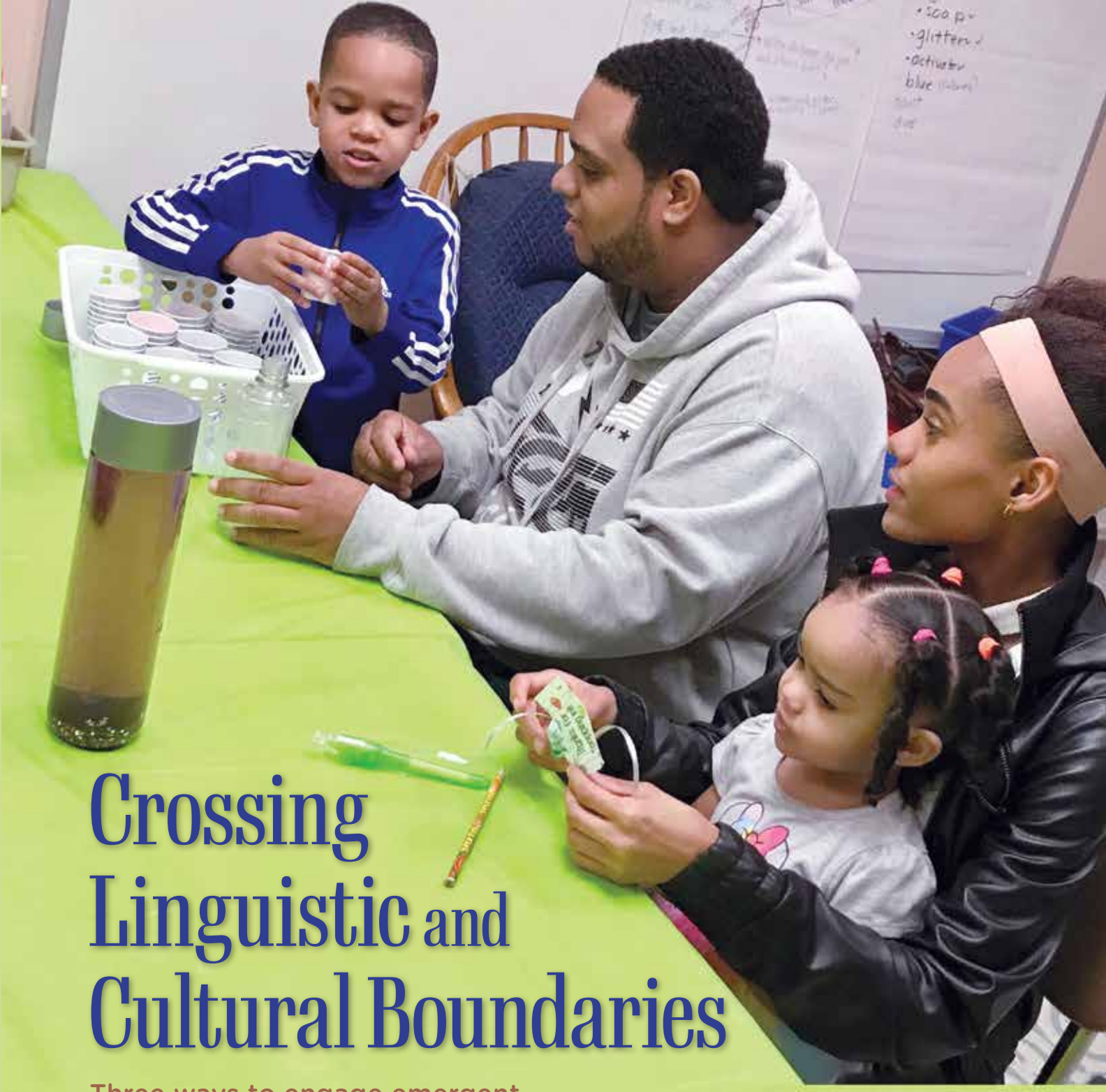

Crossing Linguistic and Cultural Boundaries

Three ways to engage emergent bilingual families through science

By Lori Zimmerman and Michelle Brown

It is a Wednesday morning in Ms. Zimmerman's second-grade virtual classroom. Our computer screens show the familiar grid of boisterous students taking out their science journals, plastic cups, and soap samples. We invite students' families to join this part of the lesson. Older brothers, mothers, and other family members sit with the students as we predict whether different soaps sink or float as part of a longer investigation about soap properties. One student's older brother asks a question, which we write down to test next week. Another student's mother demonstrates how to observe the soap using smell, touch, and sight. A student's mother speaks to her child in Spanish. The child describes the soap as "soft." When we ask the student if she knows how to say "soft" in Spanish, she looks to her mother, who teaches her the word *suave*. We briefly discuss how learning to read

in one's home language builds strong literacy skills in English. This is what family-school connection through science looks like in Ms. Zimmerman's class during the pandemic.

We know that teachers are the critical component of students' success in the classroom (NRC 2001), but families are the critical component of student success at home. When families and teachers develop strong relationships and build trust with each other, students benefit (Henderson and Mapp 2002). This is especially true in communities where home culture is significantly different from school culture, such as Lori's new immigrant, largely Spanish-speaking classroom community. Over the course of the past three years, as coteachers we have been building connections with families through science sensemaking. We have found science to be an effective way to connect with families across linguistic and cultural differences. This article shares examples and suggestions for how to engage more meaningfully with families during in-person interactions, as well as our more nascent explorations of family engagement during the pandemic. Although everything, including engaging with families, may feel more challenging during virtual learning, we share how we have leveraged the affordances of remote and asynchronous learning to invite families into our virtual learning spaces.

Successful Family Engagement

We have found that the most important consideration in engaging effectively with families, particularly those from different cultures, is to explore who we think the families are, the values they have, and our own goals for engaging with them. Similar to building personal relationships, engaging with families requires mutual trust and respect. Remote learning creates a space where teachers and families can see and hear each other—sometimes more than we would like. Although this can make both parties feel vulnerable, it also can break down barriers between home and school, opening up possibilities for routine communication. However, barriers are only broken down if we are open-minded when home and school cultures clash. We often implicitly assign meaning to the actions we "see" from families. When students show up late, do not have their homework, or are working in places that seem distracting, we may think families don't care about their children's education. When we take into consideration how different families are experiencing the pandemic in very different ways, with some being able to work from home and support their children's online learning, while others are working 10 to 12 hour days, we can better interrupt our instinct to judge them. When we approach families with an assumption that they *do* care, but that we might have different cultural understandings about what care looks like or do not fully understand their reality, we can have more productive interactions. For example, when a student in Lori's remote class does not have their materials, she resists the impulse to make assumptions and construct a deficit narrative about their family and instead focuses on the problem and tries to find a solution. Seeing students' families as resources rather than obstacles means holding an asset perspective. An asset perspective shifts our goals for family engagement. Interactions where families attend events, bring in items, or volunteer have less impact on student achievement than those where families and teachers continually and actively communicate with the shared goal of supporting students.

Science as a Powerful Engagement Tool

Science is an instrumental way to engage with families across linguistic and cultural boundaries. We know that young children are naturally curious about the world around them. Science phenomena provide students with engaging experiences to talk and write about, and the use of realia creates a more equal playing field for students without assuming specific background knowledge. These engaging anchoring activities can help families and teachers come together. During the pandemic, families from Lori's class routinely pick up science materials that allow them to explore realia at home. This allows families to join in the discussions, sharing their own experiences and questions across languages and cultures. Science phenomenon can also level hierarchies between families and teachers. If teachers are not "science experts," engaging in science activities together can make all groups: teachers, students, and their families, equal learners. When families share connections between the science phenomenon and their own lived experiences, teachers can better make connections between lessons and students' funds of knowledge. Funds of knowledge, a term coined by Luis Moll and his colleagues (1992), refer to the often-underutilized resources students bring to school from their home and community experiences. Science explorations provide an engaging space for teachers to build bridges between home and school.

Three Ways to Engage Families Through Science

There is no one right way to engage with families, and engagement is valuable on large and small scales. Here we present three different ways we have engaged with families before and during the pandemic: individual collaboration, classroomwide interactions, and schoolwide or community engagements.

Engaging Individual Caretakers: Weekly Collaboration

Valuable collaboration around science can occur in small, continuous ways. For example, before the pandemic we sent home science activities we had done in the classroom to allow students to share their experiences with families and return with stories of how science happens in their homes.

This entails providing all necessary materials for the activity, directions (ideally written by students themselves), and an invitation for families to share their experiences at home. Families report enjoying these take-home science activities because it allows them to explore science with their children, often in very different ways from their own school science experiences. Activities do not need to impress but instead can be a variation of something that was done in class. Teachers can consider implementing storylines such as those found on the NextGenStoryline website (*www.nextgenstorylines.org/elementary*) or find resources from STEM Teaching Tools (*http://stemteachingtools.org*). Storylines from our collaboration will also be available on the Science 20/20 website (*www.science2020k-5.com*).

Another way we engaged with caretakers on an individual level was to invite them to explore phenomena with us in the classroom. We reached out to families who expressed interest in collaborating during our open house, using their preferred contact method and language. An important aspect of this collaboration was our intention: our goal in inviting caretakers into the classroom was not to fulfill a specific need of ours but rather to build a relationship and collaborate with them around student learning. For example, one student's mother was able to investigate Oobleck with her son and other students, deciding whether it was a liquid or solid. Spanish-speaking students were able to explain their learning in their home language to the mother, and her presence amplified the message that all languages and cultures are welcome in the classroom. In return, the mother was able to see that the majority of the students in the class can communicate in Spanish. This realization seems to relieve anxiety for caretakers who have felt intimidated about being part of the classroom when they are not fluent in English. As we engage with individual caretakers routinely, we are able to better understand cultural disconnects and work together to build meaningful bridges between home and school. For example, the initial partnership with the mother described here has led to an ongoing relationship that allows us to understand one family's experiences during the pandemic. In addition, as caretakers gain comfort and trust with us, they can begin to share their own questions and needs. It is important to recognize that cultural connections are local and contextualized—understanding the culture of one family does not equate to understanding the values of a larger group of students from the same background.

This type of engagement is beneficial because it allows the teacher and an individual caretaker to build a meaningful partnership, particularly when one-on-one time to collaborate and reflect is possible. These partnerships are especially powerful when they cross cultural and linguistic boundaries, in that they allow the teacher to better leverage students' lived experiences at home. Also, they provide a space for caretakers to have agency and share their own values and vision.

Individual Collaborations During the Pandemic

We have continued to engage with families during the pandemic through asynchronous science lessons and listening to families' stories about supporting their children during remote and hybrid learning. Providing families with materials to conduct science investigations at home allows families to stay involved in their student's learning. For example, when begin-

Exploring "settling jars."

A mother joins in to explore Oobleck.

PHOTOS COURTESY OF THE AUTHORS

Strategies for Engaging Families in a Science Event

Scheduling the event. Consider families' schedules for the event. You may want to survey families ahead of time to see when best times are for them to attend. If possible, consider having multiple times for them to attend. When surveying families, consider language and literacy needs—having translations in home languages along with pictures to indicate as much information as possible, and consider reaching out in different ways: through a phone call, text, email, and paper invitation.

The invitation: Kids write their own invitation. Research shows that when students write their own invitations rather than sending a generic one, families are more likely to notice and attend the event. Consider including pictures of students with the activity to spark a discussion between the student and family. Also, make sure the invitation clearly indicates what, who, where, and when, and is written in the home language(s) (or both in English and the home languages), and provide pictures to accommodate literacy needs. Make sure to send the invitation home with enough advance notice for a family member to make plans to attend. Explicitly invite ALL family—this way younger children, and aunts, uncles, and other family members know they are welcome. You may want to also mention if you will have food, drinks, and child care services. Consider sending out a video that communicates details of the event as well, both in home and English languages. When advertising the activity, use language that is not threatening. For example, we mentioned doing a "fun activity" rather than "science investigation" to reduce the potential for intimidation.

Reach out multiple times. Some families may have negative experiences with school in the past, or feel unwelcome in the school or community due to cultural and language barriers. Research shows that it often requires multiple invitations before a family member may attend an event. Consider multiple attempts to invite families (e.g., sending out a video, invitation, voice mail), and even verbally during parent pickup and drop-off or outside events.

Make it meaningful for families AND students to attend. When students really want to attend an event, their families are more likely to go. For example, we handed out t-shirts that students had decorated at one event, and let them take home their settling jars at another event. Families often are motivated by their student's enthusiasm to attend.

Make something! Center your event around a making activity that ties to students' learning and that is fun and engaging (and not intimidating). See the settling jar activity description. When students have already explored the concepts behind the activity, they can act as teachers and teach their families how to do the activity. This not only allows families to see what their children have been learning, but positions students as knowers.

Make families feel welcome from the moment they enter the school or join an online event. Consider the small ways you can make families feel welcome both for the event and throughout the year. Do you have a welcome sign in the front office? Is it in languages of the families who attend the school? Smile when families enter the school, classroom, or online space. Consider learning how to say welcome or hello in families' home languages. Ensure there is a family liaison or translator who can help translate across languages.

Consider a mix of schoolwide and classroom family engagement events. When school engagement events include both schoolwide and classroom events, families can feel more comfortable with the whole school, in addition to your classroom. Consider hosting larger events where families can meet multiple teachers across grade levels and see what learning is occurring. This also allows families to meet potential future teachers, and connect with a wider range of families. Also, it can allow families to have a better understanding of the wider school community. This can encourage PTA membership and other networks and resources for families. But don't forget meaningful, individual or small-group interactions that allow you to work more collaboratively with families.

ning an investigation about the properties of matter (2-PS1-1), we tasked students and their families to explore what happens when you microwave Ivory Soap. We explicitly asked students to explore the phenomenon and discuss their observations with a family member throughout the investigation and provided instructions in languages spoken at home. We also provided space for families to share what they would like us to know about their child. Given the constraints many families have during the pandemic, we provided a seven-day window of time for families to do this investigation. We also provided videos of the investigation for students who could not do this with family, or who did not have access to a microwave. As we continued to explore the properties of soap, we sent home materials and invited families to participate in explorations.

We also interviewed families about their experiences during the pandemic to better understand their lived realities of supporting their children's learning remotely. Hearing stories about the challenges they face allows us to better respond to their needs. Families have shared stories about the struggles of keeping their students focused, what communication methods work best, and the sacrifices they have made to best support their children. From our conversations, we have understood that some families may need support in creating effective routines and systems so that their children can successfully navigate their online learning independently. We also have understood the great sacrifices and difficulties families are enduring, including working long hours and depending on multiple childcare sources, which helps us teach with compassion. We continually try to interrupt our tendency to generalize family experiences, recognizing that those families whom we could not speak with may have very different stories. Although taking time to connect with families individually takes time, it helps us better understand the realities families are facing and builds stronger connections between school and home.

A family liaison translates during a schoolwide event.

Classroomwide Engagement: Science at the Open House

In the fall before the pandemic, Lori Zimmerman hosted an open house that was quite different from the typical experience of coming to the room, looking, and leaving. Even before families arrived, it was clear that this would be a different event. Students wrote invitations to their families that made it clear that all were welcome and showed a photo of the activity they would do together. Snacks and treats to take home were placed near the classroom door, and there was an area for younger children to play with Legos or color. Long tables had been moved together to create space for an activity where families could sit, stay, and talk while engaging in science. When families entered the classroom, they were greeted by the teacher and the family liaison. Students led their families on a scavenger hunt, highlighting important places in their classroom and sharing work they were proud of. Families then moved to the large table where there were supplies to make Settling Jars (see Supplemental Resources): bottles filled with warm water, clear Elmer's glue, and glitter. The ratio of glue and water determines whether the glitter settles slowly or quickly. Students had been learning about liquids through noticing and wondering about settling jars, had experimented with what goes into a jar, and had made their own; they were settling jar experts, able to teach their families.

As families gathered around the table, it felt less like a formal open house, and more like a family dinner. People were laughing, talking, and sharing stories in English and Spanish around the table. Families got to know each other better, and Lori was able to have conversations with caretakers, including discussing literacy strategies and making sure a family understood how to access reading resources from home. We also invited families to come into the classroom to participate in future science lessons. This type of engagement was beneficial because it allowed families and teachers to get to know each other and build trust.

Classroomwide Engagement During the Pandemic

One way we can encourage community building between families and the teacher during the pandemic is to host afterschool virtual events. For example, a colleague hosts monthly game-nights where families are provided with game boards, dice, and timers to practice math and reading skills. A family liaison is present to help translate between Spanish and English, and after the teacher explains the activity, families play games together in a virtual space. Laughter, chatting, and informal conversations emerge, families connect, and the teacher is able to get to know families informally, similar to our in-person open house event. We are also planning to host a virtual family science night where families will be provided with materials to make Settling Jars. These informal virtual spaces provide an opportunity for us to better listen and understand

the needs of families who can participate, and to share suggestions for how to support student learning, as understood through past interviews with families.

Engaging the Community: A Schoolwide Family Science Night

Another way to engage the community is through a schoolwide family science night. Before the pandemic, we hosted successful schoolwide events where all families and community members were invited to celebrate and engage in science investigations the students had done. Various K–2 teachers set up stations along the perimeter of the cafeteria highlighting student investigations, samples of their science writing, and demonstrations of the investigations. For example, families could read books second-grade students had written about the water cycle and explore stations about evaporation and condensation. The event had food, drinks, giveaways, a place for younger children to play and color, and many science investigations to explore. All families were provided with a goody bag full of science investigations they could try at home, with directions in Spanish and English. The science activities were economical (totaling around $2 per bag) and fun, including materials to make "magic" bubbles, Kool-Aid Playdough, towers out of marshmallows and toothpicks, slime, optical illusions, and more. This type of engagement is beneficial because it allows teachers, families, and community members to see science learning across a continuum, and to meet potential future teachers and families. It also allows families to build a wider community with each other, and provides opportunities for outside community members to build relationships with families and the school.

Communitywide Engagement During the Pandemic

Although communitywide events are no longer safe during the pandemic, we can still engage community members by inviting them to join our remote learning space. Community members include those who live and work in the local neighborhood, as well as other networks of community, such as friends and family, or across disciplines. For example, we plan on inviting professionals related to our storyline to share stories about their careers, and to highlight how aspects of their work align with their own characteristics and preferences. Michelle's collaboration with a first-grade teacher around an Earth and Sun storyline includes an opportunity for students to welcome family and friends from other parts of the world to class to provide evidence about where the Sun is in their location. Making sure that the professionals and families invited to join our remote space represent a diversity of genders, races, ethnicities, languages spoken, and other qualities, we can help disrupt stereotypes about who belongs in which careers.

Conclusion

Building partnerships with families is hard—it takes time, self-reflection, and patience, but it is vital to the success of children, particularly for those whose cultures and languages are often excluded from such alliances. Although the pandemic has created many challenges and obstacles, it has also created new ways for us to invite families and community members to join us as we engage in learning with their children. Science provides a productive starting point to engage families and communities in meaningful ways, from community-wide connections, to one-on-one interactions. ●

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SUPPLEMENTAL RESOURCES

Instructions for making a settling jar, and send-home cards for exploring bubbles and play dough (in English and Spanish) are available at *https://bit.ly/3bD4l1v*.

Lori Zimmerman (*Zimmermanl@hasdk12.org*) is a second-grade teacher at Arthur Street Elementary School in Hazleton, Pennsylvania. **Michelle Brown** (*mnb17@psu.edu*) is a PhD candidate at Penn State University in State College, Pennsylvania.