"COMPLICANDO ALGO TAN SENCILLO": BRIDGING MATHEMATICAL UNDERSTANDING OF LATINO IMMIGRANT PARENTS

Kiyomi Sánchez-Suzuki Colegrove
Texas State University
kiyomi@txstate.edu

Gladys Krause
The University of Texas at Austin
gladyshrueda@utexas.edu

The purpose of this paper is to demonstrate the mathematical understanding of Latino immigrant parents in curricular and pedagogical practices in elementary school. The paper seeks to counter widely spread deficit discourses about the parental involvement of Latinos in education. Using data from the Agency and Young Children project, a video-cued ethnographic study (Tobin, Wu, & Davidson, 1989; Tobin, Hsueh, Karasawa, 2009; Tobin, Arzubiaga, & Adair, 2013), we highlight aspects from home that schools can use as resources to build a bridge that supports children's mathematical understanding.

Keywords: Curriculum, Elementary School Education, Equity and Diversity, Mathematical Knowledge for Teaching

Introduction

According to Suárez-Orozco (2001), immigrant children lie "in the margins of two cultures" (p.92). As the children, so too their parents find themselves in this borderline situation. This paper presents data collected from 14 focus groups in two different states. We showed parents a video of a typical day in a first grade classroom to stimulate conversation about their thoughts, ideas, and recollections from their own and their children's academic experiences in schools in the United States and in their country of origin. Although they share a variety of topics and experiences, we focus our analysis for this paper on their experiences related to mathematics instruction.

In this paper we argue that there is a real need of bridging communication between school and parents, particularly in mathematics instruction. We share the view that "parents are underused resources as partners in mathematics learning" (Aguirre, Mayfield-Ingram, & Martin, 2013, p.87). More common, unfortunately, is the deficit view that characterizes parents as lacking interest and involvement in their children's academic experience. Therefore, there is a need to strengthen the relationship between parents and schools to counter these debilitating characterizations. Adding to these already worrisome views, a common misconception arises regarding mathematics instruction: that mathematics is a universal language because it is a language of symbols, therefore culture-independent, and hence the ideal subject for ELL students because matters of language should not substantially affect understanding of the content conveyed (Moschkovich, 2007).

This work presents data that challenges deficit views regarding parent interest and involvement in their children's academic preparation. Latino immigrant parents interviewed for this project are attentive to and aware of their children's academic experiences during mathematics instruction. Parents are willing to support their children's mathematical learning at home, and they understand that teachers and schools do not always recognize their efforts. Parents are conscious of the dissonance between the two cultures and how it interferes in the ways in which they can support their children's learning at home. According to parents in this study, mathematics was the subject area in which parents can see the most concrete differences in methodology and symbology between the country of origin and new country.

The data presented will show not only the cultural differences in the mathematics classroom, but also the importance of communication between teacher and parents in order to improve the academic achievement of students. On this basis, we can start to build a bridge that facilitates the exchange of ideas, concerns, and support between the school and home. We propose that the construction of this

Wood, M. B., Turner, E. E., Civil, M., & Eli, J. A. (Eds.). (2016). *Proceedings of the 38th annual meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education*. Tucson, AZ: The University of Arizona.

bridge start at the school with teachers prepared to recognize and incorporate the cultural variety present in their classrooms.

Our present work answers the following research questions: How could teachers better support and communicate with Latino immigrant parents when teaching mathematics to their children? How can teachers' understanding of immigrant families' mathematical knowledge potentially improve their practice? How can teachers bridge mathematical understanding and academic support at home?

Literature Review and Theoretical Framework

There is an extensive body of research that examines what a teacher needs to know for teaching mathematics in the elementary school. Many of these studies illustrate how mathematical knowledge does not necessarily translate into mathematical instruction designed for students to develop a deep conceptual understanding of mathematics as envisioned in current reform documents by the National Council of Teachers of Mathematics (2000). NCTM (2000) emphasizes contexts for engaging students in learning mathematics, such as problem solving, reasoning and proof, representations, communication, and connections. The underlying idea is that by engaging students in the practice of mathematics, they should develop conceptual understanding and the ability to reason.

Two research-based theories, Constructivism and Sociocultural Theory, illustrate how students learn. The constructivist approach asserts that students come to the classroom with previous knowledge. Students acquire this knowledge outside the classroom based on experiences with the surrounding world. Students "construct" their own learning. The sociocultural approach suggests that the student can also "construct" knowledge, but typically with the assistance of others who are more "knowledgeable" (Vygotsky, 1978, 1986). Still, both approaches see the student as an active agent in the learning process.

These theories hold important implications for immigrant students' opportunities to use in the classroom environment their previous knowledge from outside the classroom, and for what types of support they receive from more knowledgeable peers. Zevenbergen (2000) has documented how the preferences, behaviors, and attitudes of dominant groups rarely fit with those of the marginalized groups. Her work illustrates a disconnection between theory and practice particularly in the contexts of classrooms where different cultures mix. According to Zevenbergen (2000), cultural and social differences strongly influence how individual students construct their identities when learning mathematics. Civil (2005) explains that some difficulties in learning mathematics may derive from a student's particular social or cultural group and how others perceive their mathematical practices, or from the relationships marginalized groups have to dominant groups.

Extending the constructivist and sociocultural approaches for teaching mathematics, our work stresses the need to provide immigrant students with opportunities to bring their culture into the mathematics classroom. Along with Civil (2005) we highlight the importance of immigrant parents as intellectual resources in their children's education. Moreover, we reject the deficit model that frequently points to the home as the root of academic failure (Civil, 2005). In particular: *"In our view, meaningful inclusion and interaction with students necessitate knowledge of their personal, family, and community backgrounds as well as their social realities"* (Aguirre, et al., 2013, p. 9). But given that teachers and parents are aware of these differences, the task remains of creating a productive mode of communication between school and home.

In the context of the United States, immigrant parents are often stereotyped as uncaring and unengaged in their children's education when they do not participate in the traditional activities that traditionally defined appropriate parental involvement, such as volunteering for school, chaperoning for field trips, and PTA membership (Chavkin, 1993; Riojas-Cortez & Flores, 2009). Latino immigrant parents particularly face individual and institutional barriers when trying to participate in their children's educational experiences: for example, individual characteristics such as socioeconomic status, limited English proficiency, and lack of understanding of cultural norms

Wood, M. B., Turner, E. E., Civil, M., & Eli, J. A. (Eds.). (2016). *Proceedings of the 38th annual meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education*. Tucson, AZ: The University of Arizona.

(Arias & Morillo-Campbell, 2008; Lareau, 1987; Nieto, 1985; Rueda, Monzó, & Arzubiaga, 2003). Also parents face institutional barriers that include schools' deficit views of immigrant parents, the under-preparation of teachers to serve culturally and linguistically diverse families, and the different expectations that minority parents and schools hold for children (Arzubiaga, Noguerón & Sullivan, 2009; Graue, 2005; Graue & Brown, 2003; Riojas-Cortez & Flores, 2009; Baum & Swick, 2008; Whitehouse & Colvin, 2001). Individual and institutional challenges interfere in how parents communicate and participate in their children's schooling. Often deficit discourses in school describe immigrant parents not only as unengaged in their involvement at school, but also as incompetent in helping their children with schoolwork at home. However, there is empirical work that highlights the great value Latino immigrant parents place in their children's education (Valdes, 1996; Epstein, 1995). Lopez (2001) suggest the need for schools to broaden their idea of parental involvement and recognize Latino immigrant parents' culture as important resources at school.

The general need to broaden the borders of involvement for Latino immigrant parents in schools naturally includes specific application in mathematics instruction. It is commonplace to hear non-immigrant parents complaining about the "new" ways for teaching mathematics that widely differ from the "old" ways (the way they learned). One can imagine how such dissonance might be magnified for those parents who grew up in different countries and try to make sense of their children's mathematics homework in the effort to help them. Researchers such as Perkins & Flores (2002) and Moschkovich (2007) have documented the differences in symbols, algorithms and methodologies across different countries. In addition to these differences, there is also a cultural difference. As Civil (2005) documented in her study, immigrant parents traditionally have a great sense of respect for the teacher and tend not to "interfere" in what the teacher has established.

In this paper, we use a Funds of Knowledge (Gonzalez, Moll, & Amanti, 2005) framework. Latino immigrant families bring with them knowledge and experiences, or funds of knowledge, that are not always appreciated and therefore not always conducive to helping them understand the U.S. schooling system. However, the work of Gonzalez and colleagues (2005) views the linguistic and cultural practices of minority communities as capital, particularly when teachers recognize those "funds" and are able to bring them into the classroom. In this study, parents are recognized as knowledgeable of their children's education and their funds of knowledge valued as they share their opinions about, expertise in, and concerns regarding the education their children receive in the U.S.

Methodology

Participants

Participants selected were Latino immigrant parents with children enrolled in U.S. schools from Pre-K through 3rd grade. For the study, fourteen focus groups were conducted in Texas and California with 55 Latino immigrant parents from Mexico, Peru, Guatemala, Chile, Venezuela and Honduras. The sites in Texas included 10 focus groups in two urban and one rural area and 4 focus groups in two urban areas in California. We interviewed 50 mothers and 5 fathers, with levels of formal education that ranged from 5th grade to a Master's degree.

Data Collection

The focus groups were conducted in rural and urban cities for purposes of comparison. Focus groups in Texas were conducted on school grounds during and after school hours in central and southern cities and border towns. The California focus groups were conducted in the Bay and East Bay areas in the homes of participants who agreed to host a focus group with friends and acquaintances who met the above criteria.

Focus groups began with a short explanation of the project and a film. The film represents a typical day in a first grade ESL classroom with a large number of Latino immigrant children. The 20-

Wood, M. B., Turner, E. E., Civil, M., & Eli, J. A. (Eds.). (2016). *Proceedings of the 38th annual meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education*. Tucson, AZ: The University of Arizona.

minute film captures a variety of scenes throughout a school day, with math, reading, writing, small and large group work, centers and recess, to provide parents with a glimpse of what a school day looks like in a first grade public school classroom in Central Texas. Each focus group watched the same film. Focus groups were audio and video recorded for transcription and translation purposes. Parents viewed the film and discussed what they saw. A member of the research team facilitated each conversation guided by a series of pre-established questions. These questions were used with all focus groups and included aspects of pedagogy, curriculum and parental involvement.

Method

The research team transcribed all focus group interactions. We then coded the transcriptions and used content analysis to identify patterns in the codes. We used debriefing (Merriam, 1998) to think deeply about our initial codes and how to categorize them into more defined themes. Throughout this entire qualitative process, we continually reflected on the data collection and analysis (Creswell, 2003; Merriam, 1998; Stake, 1995; Yin, 2003).

Findings

The data we present in this section focus on two major categories that highlight parents' concerns and ideas about mathematics instruction and curriculum, and the support they provide for their children. These findings are further explored below.

Latino Immigrant Parents' Support

During the focus group interviews, we asked the parents about the school and home responsibilities when it comes to learning. Parents expressed as part of their responsibility the need to help and support their teachers' work at home. In the Bay Area, Perla shared how important it is for her that school and home work as a team.

> *Perla:* [Communication is important] at all times, either because of behavior or academics, and to work as a team, that way we can learn about what they do in the classroom and how we can help at home. And to always keep that communication open. [About] things that are important at home and especially during the summer, because it is mostly when... like that commercial, that makes me laugh, where the kid kind of shakes his head and the letters come out of his ear. It seems terrible to me, but at the same time it is so graphic, it is so… very, very well depicted if I can say that. It is all about keeping a routine as much as we can. I mean, you are not going to be sitting with a notebook doing math every day, but we can play with numbers and find games and make them practice some things, and keep reading. To me that is crucial.

It is important to note in this mother's response that she places high value on open communication and teamwork between the school and home. For her it is also important to know not only about her children's behavior but also about their academic progress and needs. The parent also stresses finding out how she can help at home providing learning opportunities that reinforce what her children are learning at school, especially during the summer months.

In El Naranjo Elementary School in a rural border town in Texas, the focus group discussed ways parents support their children's schoolwork at home. Parents frequently mentioned helping their children with homework. In the following transcript they shared some of the strategies they used while helping their children with math work.

> *Kiyomi*: I have a question, because one of the things that teachers generally ask parents is, "How do you help your child at home with the homework assignments?" Have they asked you this question: "How do you help your child?" I don't know, so I'll ask, how you help your child at home with the homework. Do you help with the homework?
>
> *Marcela*: I help him with the homework.

Wood, M. B., Turner, E. E., Civil, M., & Eli, J. A. (Eds.). (2016). *Proceedings of the 38th annual meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education*. Tucson, AZ: The University of Arizona.

Kiyomi: With the homework too.

Jazmin: I explain to them, like when doing mathematics and let's assume they are adding, maybe adding 9 plus 3, I tell them make little dots, 9, and then make 3 and then count them all together. That way he is learning, or I show him how to use his fingers... I teach them too.

Marcela: That's how I teach them, with the fingers.

Kiyomi: We all teach that way.

Marcela: But it's that it is different because my mathematics is really different from hers. I actually taught her mathematics, in fact. When she started 2nd grade, I taught her how to divide, because... it is not that I want to brag, but she turned out to be very intelligent. I taught her to divide; then she learned how to multiply. Now, at the Valparaíso High School, forget it ma' [referring to her daughter], I have no idea, that didn't come up in my time.

This transcript shows how parents use a variety of pedagogical methods to teach their children mathematics. Jazmin uses drawings and her fingers as tools to support her children's understanding of addition and subtraction. Marcela shares her story about how her child first learned how to divide and then how to multiply. Traditionally in schools, students first learn how to multiply before they are exposed to division problems. However, research on children's mathematical thinking (Empson & Levi, 2011) has shown that children in grades as early as Kindergarten can solve division problems without having any formal instruction in multiplication facts.

Mathematics, Instruction and Curriculum

During the focus group interviews we asked parents if they noticed any aspects of teaching that were different when compared to their own learning at school. In Las Rosas Elementary School while referring to the video, parents shared some aspects of teaching mathematics that were very different compared to their own learning. In the film first graders were asked to pair and represent the number 10 in different ways by combining number cards and then write the number combinations on a piece of paper.

Ricardo: The way they teach mathematics, I mean, it seems… it seems they are making complicated something so simple.

Liliana: Yes.

Olivia: Yes, I was going to say the same thing (laughs).

Kiyomi: Let me understand, explain it to me: what? how? Give me an example.

Ricardo: That for example, for what they were doing in the video, to add 10, how many options do we have?

Parents at Las Rosas have strong ideas about how mathematics should be taught at school. In this particular case parents disagree with what the teacher is asking children to do. This is a good example of how communication between school and home is important so parents can understand how children are learning and the rationale for the learning experiences at school. The idea behind the task is to develop the student understanding of base-10 concepts. Once students see the different ways in which they can construct the number 10 they can extend this idea to other numbers and develop an understanding of arithmetic operations. In mathematics instruction children are encouraged to explore with numbers. Decomposing numbers in such a way is a fundamental activity for their own mathematical understanding (Carpenter, Fenemma, Franke, Levi, & Empson, 2015).

In Las Rosas, parents continued to discuss mathematical instruction and the following transcript shows the difference in mathematical procedures between Olivia and her first grader Javier while helping him to complete his mathematics assignment.

Olivia: You haven't seen the ones with 6 and 7 that Javier gives me, a bunch of numbers. And I'll tell him, "Kiddo, it was only a division problem," because I know, I help him... nothing but a

Wood, M. B., Turner, E. E., Civil, M., & Eli, J. A. (Eds.). (2016). *Proceedings of the 38th annual meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education*. Tucson, AZ: The University of Arizona.

> division problem: 72 fits in there and that's it, these… . "No, kiddo, it looks like I have to do everything. Enough! Do it yourself!"… because really, when it's like that, I don't know how to do it that way.
>
> *Kiyomi*: Then, the way they are taught mathematics is different.
>
> *Olivia*: It turns out more complicated, when really it should be much easier.

In this transcript Javier is completing his homework and his mother is helping him. However Olivia expressed frustration as Javier is expected to solve the problem while documenting the process. She does not understand why he needs to add that step, as it complicates the assignment but does not change the outcome. Parents are willing and able to help their children with schoolwork, but have trouble when their own academic experiences do not match school expectations. It would be helpful if they had a better understanding of the rationale for the assignments their children are required to complete.

Discussion and Conclusions

Mathematics is widely thought of as a universal language. Data from the focus group interviews reveal that, while mathematics is the same across contexts of instruction in various countries, the pedagogical methods can differ in important ways. Parents expressed the willingness and desire to help their children with schoolwork and to provide support whenever possible, but they also expressed a lack of understanding of, and frustration with, the rationale behind the schoolwork. Parents' own school experiences do not necessarily match their children's, causing them to feel helpless in supporting their children academically. This counters deficit discourses that usually portray Latino immigrant parents as uncaring and unengaged. Both teachers and school need to improve support of and communication with families by explaining the curriculum or how to access related information. We argue that this communication needs to be open, such that teachers reach out to families to share and explain the pedagogical practices and methods they implement. Teachers must understand that there are cultural and methodological differences whose acknowledgement and inclusion can potentially enrich their teaching of mathematics. These can broaden the cultural understanding of the teacher and the class. Parents, if invited to the schools, can provide that knowledge, so that teachers can learn and better understand the cultural richness and mathematical thinking that parents and their children bring with them.

References

Aguirre, J.M., Mayfield-Ingram, K., & Martin, D.B. (2013). *The Impact of Identity in K-8 Mathematics: Rethinking Equity-based Practices*. Reston, VA: National Council of Teachers of Mathematics.

Arias, M.B., & Morillo-Campbell, M. (2008). *Promoting ELL parental involvement: Challenges in contested times.* The Great Lakes center for education research and practice. Online Submission, Retrieved from ERIC database.

Arzubiaga, A.E., Noguerón, S.C., & Sullivan, A.L. (2009). The education of children of im/migrants families. *Review of Research of Education*, *33*, 246-271.

Baum, A. C., & Swick, K. J. (2008). Dispositions toward families and family involvement: Supporting preservice teacher development. *Early Childhood Education Journal*, *35*, 579-584.

Carpenter, T., Fennema, E., Franke, M., Levi, L., & Empson, S. (2015). *Children's mathematics: Cognitively guided instruction*. Portsmouth, NH. Heinemann.

Chavkin, N. F. (1993). *Families and schools in a pluralistic society*. Albany, NY: State University of New York Press.

Civil, M., Planas, N., & Quintos, B. (2005). Immigrant parents' perspectives on their children's mathematics education. *ZDM–The International Journal on Mathematics Education, 37*(2), 81-89.

Creswell, J. W. (2003). *Research design: Qualitative, quantitative, and mixed methods approaches*. Thousand Oaks, CA: Sage Publications.

Empson, S., & Levi, L. (2011). *Extending children's mathematics: Fractions and decimals.* Portsmount, NH: Heinemann.

Wood, M. B., Turner, E. E., Civil, M., & Eli, J. A. (Eds.). (2016). *Proceedings of the 38th annual meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education*. Tucson, AZ: The University of Arizona.

Epstein, J. L. (1995). School, family and community partnerships: Caring for the children we share. *Phi Delta Kappa 76*, 701-712.

Gonzalez. N., Moll, L.C., & Amanti, C. (2005). *Funds of knowledge theorizing practices in households, communities and classrooms*. New York, NY: Routledge.

Graue, E. (2005). Theorizing and describing preservice teachers' images of families and schooling. *Teachers College Records*, *107*(1), 157-185.

Graue, E. & Brown, C. (2003). Preservice teachers' notions of families and schooling. *Teaching and Teacher Education*, *19*, 719-735.

Lareau, A. (1987). Social class differences in family-school relationships: The importance of cultural capital. *Sociology of Education*, *60*(2), 73-85.

Lopez, G.R. (2001). The value of hard work: Lessons on parent involvement from an (im)migrant household. *Harvard Educational Review*, *71*(3), 416-437.

Merriam, S. B. (1998). Qualitative Research and Case Study Application in Education. San Francisco: Jossey-Bass.

Moschkovish, J. (2007). Using two languages when learning mathematics. *Educational Studies in Mathematics*, *64*(2) 121-144.

National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics*. Reston, VA.

Nieto, S. (1985). Who's afraid of bilingual parents? *Bilingual Review*, *12*(3), 179-189.

Perkins, I., & Flores, A. (2002). Mathematical notations and procedures of recent immigrant students. *Mathematics Teaching in the Middle School*, *7*(6), 346-351. Russell Sage Foundation.

Suárez-Orozco, C. & Suárez-Orozco, M. (2001). *Children of immigration*. Cambridge, MA: Harvard University Press.

Riojas-Cortez, M., & Flores, B.B. (2009). Sin olvidar a los padres: Families collaborating within school and university partnerships. *Journal of Latinos and Education*, *8*(3), 231-239.

Rueda, R., Monzó, L.D., & Arzubiaga, A. (2003). Academic instrumental knowledge: Deconstructing cultural capital theory for strategic intervention approaches. *Current issues in education*, *6*(14).

Stake, R. E. (1995). *The Art of Case Study Research*. Thousand Oaks, CA: Sage Publications.

Tobin, J., Arzubiaga, A. E., & Adair, J. K. (2013). *Children crossing borders*. NY: Russell Sage Foundation.

Tobin, J. J., Hsueh, Y., & Karasawa, M. (2009). *Preschool in three cultures revisited: China, Japan, and the United States*. Chicago: The University of Chicago Press.

Tobin, J. J., Wu, D. Y. H., & Davidson, D. H. (1989). *Preschool in three cultures: Japan, China, and the United States*. New Haven: Yale University Press.

Valdes, G. (1996). *Con respeto: Bridging the differences between culturally diverse families and school.* New York: Teachers College Press.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes* (M. Cole, V. John-Steiner, S. Scribner, & E. Souberman, Eds.). Cambridge, MA: Harvard University Press.

Vygotsky, L. (1986). *Thought and language*. Cambridge, MA: The MIT Press.

Yin, R. K. (2003). *Case study research: Design and methods* (4th ed.). Thousand Oaks, CA: Sage Publications.

Zevenbergen, R. (2000): "Cracking the code" of mathematics classrooms: school success as a function of linguistic, social and cultural background. In: J. Boaler (Ed.), *Multiple perspectives on mathematics teaching and learning.* Westport, CA: Ablex, p. 201-224.