

## MATHEMATICS EDUCATION AND ENGLISH LEARNERS

Zandra de Araujo  
University of Missouri  
dearaujoz@missouri.edu

Marta Civil  
University of Arizona  
civil@math.arizona.edu

Anthony Fernandes  
Univ. of North Carolina-Charlotte  
Anthony.Fernandes@uncc.edu

Judit Moschkovich  
Univ. of California-Santa Cruz  
jmoschko@ucsc.edu

Sarah Roberts  
Univ. of California-Santa Barbara  
sroberts@education.ucsb.edu

Craig Willey  
Indiana University, IUPUI  
cjwilley@iupui.edu

William Zahner  
San Diego State University  
bzahner@mail.sdsu.edu

*This Working Group will continue the work of last year's Working Group in considering multiple aspects of research and practice related to mathematics learning and teaching with English Learners. Our goals include: (1) developing further the collaborative endeavors that began during the 2015 meeting and (2) fostering new collaborations and supporting further connections among researchers and research projects in the future. In Session 1, the organizers will present brief reports on the work that resulted from the 2015 Working Group and preview the schedule for this year's Working Group. During Sessions 2 and 3 we will provide the smaller groups time to collaborate and continue their work. We will close Session 3 with time to review group progress and discuss next steps and products of our work.*

Keywords: Equity and Diversity, Teacher Education-Pre-service, Teacher Education-Inservice/Professional Development, Research Methods

### Brief History

The facilitators of this Working Group initially came to work together through the NSF-funded Center for the Mathematics Education of Latinas/os (CEMELA). CEMELA brought together researchers from across the country to collaborate on research focused specifically on critical issues related to Latinos/as in mathematics. Prior to CEMELA, researchers interested in such a focus worked mostly in isolation. The overarching framework for CEMELA included an examination of language, culture, and mathematics. In considering issues related to Latinos/as in US schools, the issues of language and English Learners (ELs) are closely related. While not all Latinos/as are English Learners, and not all ELs are Latinos/as, these two groups have significant overlap. For example, about 80% of ELs speak Spanish as a first language, and Spanish-speaking ELs appear to struggle on measures of academic achievement (Goldenberg, 2008).

CEMELA expanded the field's knowledge of ELs in mathematics by conducting studies in interdisciplinary teams. CEMELA focused on research in teacher education, research with parents, and research on student learning, resulting in well over 50 publications and presentations. Several of these studies involved the investigation of questions related to the interplay of language, culture, and mathematics education.

Following the conclusion of CEMELA's funding, Zandra de Araujo, Sarah Roberts, Craig Willey, and Bill Zahner continued to meet regularly. These meetings focused on examining intersections among these early career scholars' work related to the mathematics education of ELs. To date these meetings have resulted in a number of national presentations at the annual meetings of the National Council of Teachers of Mathematics, the American Educational Research Association, and PME-NA. Currently, this group is working on several manuscripts and follow-up studies related to the preparation of teachers to work with ELs.

The Mathematics Education and ELs Working Group met for the first time at PME-NA 2015 (de Araujo et al., 2015). At that meeting, we brought together a diverse group of about 20 researchers who started collaborating on several projects related to the mathematics education of ELs (see descriptions of these projects in the section titled *Prior Work*). Our aim for the 2016 Working Group is to provide a space for these scholars to continue their work and to bring new scholars into the fold.

### Focal Issues

ELs are the fastest growing group of U.S. students (Verplaeste & Migliacci, 2008). In fact, U.S. schools have seen an increase of 152% in EL students over the past 20 years (National Clearinghouse for English Language Acquisition, 2008). The growing number of ELs across the country induces the need for teachers from all states to be prepared to attend to the needs of ELs in their mathematics classrooms. Considerations of how to support ELs in mathematics is no longer a concern for only states, like Arizona, Texas and California, with traditionally high numbers of EL students. Instead, with all but ten states across the country seeing increases in their EL populations between 2002-03 and 2011-12 (National Center for Educational Statistics (NCES), 2014), there is increasing pressure for support in addressing the needs of these students.

Despite the rise in the number and proportion of ELs, teacher preparation has not kept up with this trend. In 2002, the NCES reported that out of the 41% of teachers who worked with ELs in their classrooms, only 13% received EL-specific professional development. In 2008, Ballantyne, Sanderman, and Levy found that it was “likely that a majority of teachers have at least one English language learner in their classroom,” although “only 29.5% of teachers with ELs in their classes have the training to do so effectively” (p. 9). This misalignment of the realities of today’s classrooms and teacher preparation necessitates research into effective means for supporting current teachers and for preparing prospective teachers to meet the needs of linguistically diverse learners.

The implementation of the Common Core State Standards for Mathematics (National Governors Association Center for Best Practices (NGA Center) and the Council of Chief State School Officers (CCSSO), 2010) is putting additional pressure on teachers of students who are still gaining proficiency in English. Teaching aligned with the CCSSM’s content standards and the standards of mathematical practice will increase the language demands required to engage in mathematical discourse, which is typically in English (Moschkovich, 2012). Providing ELs with quality educational experiences is no longer relegated to only language specialists; it is a “mainstream” issue for which all mathematics teachers must be prepared (Bunch, 2013).

Many ELs or their families have literal experience crossing international borders. Issues related to educating ELs are also connected to metaphorical borders. This year, our Working Group aims to examine critically the borders with(in) mathematics education that hinder quality educational experience for bilingual and emergent bilingual students in mathematics. In particular, we will examine the artificial borders between research and practice, linguistic and mathematical resources, teacher preparation and practice, research with monolingual and bilingual learners, and research in mathematics education at large and research on the mathematics learning of ELs. To do this work, we will bring together researchers from diverse contexts to examine current and past research on ELs in mathematics education while also supporting burgeoning collaborations to establish future, imperative research directions.

### Previous Work of the Group

The 2015 Working Group (de Araujo et al., 2015) began with whole group discussions aimed at examining a number of aspects related to the mathematics education of ELs including: a) Student Learning; b) Preservice & Inservice Teacher Education; c) Family and Community Resources; d) Curriculum; and e) Language Perspectives. In the following sections we briefly summarize our discussions of these areas.

### **Student Learning**

Building upon situated and sociocultural perspectives (Moschkovich, 2002), we started from the premise that ELs, like all students, learn mathematics through participating in and appropriating discourse practices, tool use, and perspectives of mathematics. There exists a need to understand better how research in mathematics education at large is connected with research on the learning of ELs; much of the content-focused work in mathematics education is isolated from research on how ELs develop specific mathematical understandings. This has resulted in a gap in the literature and so we need to develop more linkages between mathematics education research on student learning of specific topics, and the mathematics education research on student learning of ELs. We also need to develop more connections among research with monolingual, bilingual, and multilingual mathematics learners or settings. Some results may apply across learners and settings, while other results may be specific to one population or setting. Researchers need to explore both these intersections and differences. Members of this group were involved in research that critically examines issues at the borders of learning mathematics and learning language.

### **Teacher Education**

Despite findings that suggest ELs develop academic language in the content areas over a period of about 5-7 years, many ELs are mainstreamed within two years. Thus, it is essential that teachers support ELs in learning content in mainstream mathematics classes while also providing support to develop their academic language. Most inservice teachers have had few, if any, professional learning experiences around working with ELs in mathematics classrooms (Ballantyne et al., 2008). In fact, many mathematics teachers struggle to understand their role in supporting ELs' mathematics language development (Willey, 2013).

Preservice teachers typically have few opportunities to think specifically about how they will work with ELs in their mathematics classrooms. Preparation programs often include coursework on teaching ELs that is not specific to the content areas in which preservice teachers will work. Meanwhile, the content courses for preservice teacher often focus solely on content, devoid of exploring how to support ELs in mathematics classrooms. There is a need for much more content specific support for mathematics teachers of ELs. Recently researchers have shared strategies for engaging preservice teachers in working with ELs in mathematics classrooms. For example, Fernandes (2012) suggested a series of mathematics task-based interviews to engage preservice teachers in the process of noticing the linguistic challenges that ELs face and the resources these students bring to their mathematical communication. Additionally, the TEACH MATH (Drake et al., 2010) research team is using tasks in their content courses to support preservice teachers in drawing on students' funds of knowledge (Turner, Drake, Roth McDuffie, Aguirre, Bartell & Foote, 2012).

Much of the prior work on teacher education related to ELs has focused on more general strategies (e.g., sheltered instruction, as in Echevarria & Graves, 1998), such as using visuals, modifying texts or assignments, and using slower speech. At our previous meeting, we explored ways to support teachers, both preservice and inservice, in learning to better address the needs of ELs in the mathematics classroom.

### **Family and Community Resources**

Families and communities can serve as resources for ELs in their mathematics learning in myriad ways. Families can advocate for their children and provide and support learning experiences both in and out of the classroom. Communities can also provide a wealth of support mechanisms and learning possibilities. Moll and colleagues (1992) described how students studied candy making and selling within their neighborhood to explore mathematics within this context, such as discussing and analyzing production and consumption. In doing so, the teachers and students acknowledged the value of these community experiences. Additionally, Civil and Bernier (2006) explored the

challenges and possibilities of involving parents in facilitating workshops for other parents around key mathematical topics. These studies and others like them illustrate the promising impact of family and community resources in fostering ELs' mathematics learning. At our prior meeting, we discussed the implications of different language policies on parental engagement and how teacher educators can draw on family and cultural resources in support of ELs.

### **Curriculum**

Curriculum plays a key role in the teaching and learning of mathematics and teachers play a pivotal role in selecting and enacting curriculum materials for students. The choice of curriculum materials impacts students' opportunities for learning in the mathematics classroom (Kloosterman & Walcott, 2010). Early work on curriculum and English learners focused specifically on the challenges ELs encounter when completing or interpreting word problems (Télez, Moschkovich, & Civil, 2011). More recent work that centers on both ELs and curriculum has focused on culturally relevant curricula. A subset of mathematics education, called ethnomathematics, focuses on this area (e.g., D'Ambrosio, 2006). Other studies have focused on the development of curriculum materials for ELs (e.g., Freeman & Crawford, 2008) or the evaluation of a curriculum's appropriateness for ELs (e.g., Khisty & Radosavljevic, 2010; Lipka et al., 2005). More recently, work related to ELs and curriculum has begun to look at teachers' use of curriculum (e.g., de Araujo, 2012). At our prior meeting, we investigated the intersection of teachers, curriculum, and ELs in discussing how curricula addresses (or not) the needs of ELs.

### **Language Perspectives**

Teachers' and researchers' conceptions of language, second language acquisition, and bilingualism impact teaching and learning mathematics for ELs. At our prior meeting, we considered how perspectives of language, second language acquisition, and bilingualism appear in both theory and practice. We also contemplated, in particular, how work focused on ELs can draw on current work on language and communication in mathematics classrooms, classroom discourse, and linguistics. Looking for these intersections and connections was crucial because it ensures that work in mathematics education is both theoretically and empirically grounded in relevant research, and it will prevent researchers from reinventing wheels, and it can inform crucial research-based guidelines for curriculum, instruction, and assessment.

### **Aims for the 2016 Working Group**

Following the Working Group's discussions of student learning, teacher education, family and community resources, curriculum, and language perspectives, three smaller groups formed to explore subsets of these ideas in depth. Since the conclusion of the 2015 Working Group, these smaller subgroups have continued the work they started in the Working Group. The aim of the 2016 Working Group is to provide updates on the work of these subgroups and continue to move the groups' research agendas forward. In the following section we provide an overview of each of these subgroups and the goals for the groups moving forward.

### **Group 1 (Curriculum)**

In 2015, the curriculum subgroup focused on the role of textbooks, specifically teachers' guides and student work pages, in demonstrating how one might approach supporting ELs in building mathematical understanding and developing mathematics language. We inquired about the process publishers undergo to incorporate and offer support to teachers. What assumptions do they make? Who do they consult? What motivates them to invest in serving ELs better? What is/are their end goal(s)? The group decided to conduct an analysis of various middle grades curriculum to ascertain what supports and guidance are offered to teachers. It was suggested that we might build on the work

of Pitvorec, Willey, and Khisty (2011), who explored the features of Finding Out/Descubrimiento (FO/D) that proved to be successful with bilingual children of migrant families in the 1980's (see Neves, 1997) and partially contributed to the development of complex instruction (Cohen, Lotan, Scarloss, & Arellano, 1999).

For the 2016 meeting, this group will continue to examine textbooks to understand better the supports they provide for ELs. The subgroup will also consider language issues in mathematics texts for ELs, especially as related to word problems and assessment items. We will first share a short literature review of relevant research on linguistic complexity and vocabulary for mathematics word problems. Based on that research, we will summarize recommendations for addressing language complexity and vocabulary in designing word problems for instruction, curriculum, or assessment. We will then use examples of released sample Smarter Balanced Assessment Consortium items to illustrate how to apply those recommendations to designing word problems and to designing supports for ELs to work with word problems.

The subgroup will consider how to provide instructional support at three different levels for mathematical texts in terms of a) language issues: Light Support, Medium Support, and Strong Support, and b) the mathematical content. These three levels address the differing needs of students at differing English proficiency levels, but rather than working with a static student label, which is not consistent, dependable, or useful across settings, these labels refer to the level of support as the focus of instruction. For example, students who are newcomers may need strong support for language but differing support for mathematical content, and those need to be assessed separately but addressed concurrently. Students who are at an intermediate level of Academic English may need Medium Support for language and differing support for the math content. Students who are not immigrants, are native English speakers who belong to bilingual communities, or who speak an on-standard variety of English, or are labeled "long term ELs," may need strong support for reading comprehension in their first language (English) and differing support for mathematical content depending on their mathematics course taking experiences.

We will consider, in particular, how this subgroup can draw on current work on scaffolding in English Language Arts (ELA) to develop supports for comprehension of what ELA experts call "complex text." The following questions will guide the group's work related to this theme:

- What do we know from research regarding the linguistic complexity of mathematics texts, especially word problems and assessment items?
- How can instruction address these issues with mathematics texts?
- What are research based recommendations for designing word problems, revising text, and designing glossaries?

## **Group 2 (Student Learning)**

During the 2015 working group meeting, the student learning sub group discussed multiple ongoing research projects that examine the intersection(s) of research on student learning of mathematics and research on learning language(s). Moschkovich shared examples from her past work that has illustrated the mediation of language and Discourses in students' mathematics learning (2007, 2008, 2015). For example, in one study Moschkovich traced the evolution of the phrase "went by" in reference to the intervals and scales on graphs. Zahner also shared results from an analysis of how assessment pressures shaped whole class discourse practices and opportunities for student learning in one ninth grade algebra classroom (Zahner, 2015). Zahner also shared a preliminary analysis of how teachers and students use formal and informal language about rates of change during classroom discussions (this work will be presented formally at ICME). The working group also discussed ideas for future analyses that build on and extend the prior work in this area.

The collaborations started at the PME working group in 2015 have directly influenced work on two projects by Zahner that he will share at the working group. Zahner has also invited his collaborators on these projects to join the working group in 2016. In one study led by Phil Vahey at SRI International and Tracy Nobel at TERC, working group member Zahner is contributing to developing a coding scheme that captures EL's participation in the CCSSM Practice Standard "Reason Abstractly and Quantitatively." This coding scheme is being developed specifically to focus on interactions among trios of ELs solving problems about rates of change. The coding scheme builds on and extends prior work by members of the working group who have examined how ELs and their teachers use words, symbols, gestures, and discourse practices to engage in mathematical reasoning (Shein, 2012; Turner, Domínguez, Maldonado, & Empson, 2013; Zahner & Willey, 2014). The work with the team from SRI also includes developing dynamic representational technology for fostering abstract and quantitative reasoning among ELs in mathematics classrooms. Members of this project team will come to the working group in 2016 to share an update on progress and to present preliminary analyses of abstract and quantitative reasoning among ELs.

In a distinct study, Zahner is initiating a new project that has the goal of developing specialized learning trajectories that combine development students' mathematical reasoning and development of students' use of academic language related to specific mathematical topics. This development is occurring in collaboration with a working with a group of three high school teachers in in a Southwest high school, along with a research team including graduate and undergraduate students. The final goal is to design and develop curriculum materials related to linear and exponential growth that account for the special needs of ELs in secondary mathematics classrooms. At the working group Zahner and team members will share preliminary data and updates on this project. The working group will also function as a site where participants can offer feedback and build collaborations around these key ideas.

### **Group 3 (Teacher Education)**

The teacher education subgroup focused on the primary issues that arise in the preparation of teachers to teach ELs at the various institutions. As a group we recognized that there were few attempts to include the teaching and learning of mathematics to ELs beyond the states where there was a high population of ELs. Given that some of the group members were meeting for the first time, a significant portion of the allotted time was spent sharing the details of our research we did and our interest in being part of this particular subgroup. One of the members shared a survey about examining preservice teachers conceptions about teaching mathematics to ELs and the other members agreed to administer the survey at their locations. Together, the responses will provide us with some insight about possible teacher conceptions that need to change and the steps we can take to make that happen. The group decided to stay in touch online and continue the discussions about potential collaborations. This subgroup aims to continue this line of work at the 2016 meeting. In particular, they seek to develop a multi-institution study that will investigate the issues raised at the 2015 meeting.

### **Plan for the Working Group**

During the three sessions, participants will continue the work of the subgroups and bring new members up to date on the group's prior activities. In participating in the three sessions, participants will work to: a) clarify research questions, b) refine research tools, methods, and analyses, c) explore connections among different projects and studies, and d) discuss further collaborations and research on learning and teaching mathematics in classroom with ELs.

In Session 1, the organizers will present brief reports on the work that resulted from the 2015 Working Group and preview the schedule for this year's Working Group. During Sessions 2 and 3 we will provide the smaller groups time to collaborate and continue their work. We will close

Session 3 with time to review group progress and discuss next steps for our work as shown in Table 1. Meeting notes, work, and documents will continue to be shared and distributed via our Google Community (<https://plus.google.com/communities/104376842129206334879>) and corresponding Google Drive folder (<https://goo.gl/EXhUVm>). The use of Google Community allows members to create an institutional memory of activities during the Working Group that we have continued to use and add to following the 2015 Working Group. In addition to the Google Community and Drive resources, anticipated follow-up activities include planning for a continuation of the Working Group at PME-NA in 2017 and organizing collaborative writing projects on this topic.

**Table 1: Overview of Proposed Working Group Sessions**

<b>SESSION 1</b>	<b>INTRODUCTIONS, UPDATES, &amp; CLARIFYING AIMS</b>	
	<b>ACTIVITIES</b>	<b>GUIDING QUESTIONS</b>
	<ol style="list-style-type: none"> <li>1. Introduction and overview of the Working Group including introduction to the Google Community.</li> <li>2. Brief presentations by panel members from each of the subgroups providing overviews of research projects with specific examples of how researchers have designed the studies. The purpose is to provide an overview and update of scholarly activities that were initiated at the 2015 Working Group.</li> <li>3. Following the presentations, participants will discuss specific questions posed by the subgroups and aims for the subgroups' work at the 2016 meeting.</li> </ol>	<ol style="list-style-type: none"> <li>1. What research is being done in relation to each of the subgroups?</li> <li>2. Which aspects of studies focusing on English learners do you find most puzzling? Most useful? Most misunderstood?</li> <li>3. What goals do participants have for the 2016 conference?</li> </ol>
<b>SESSION 2</b>	<b>SUBGROUP WORK TIME</b>	
	<b>ACTIVITIES</b>	<b>GUIDING QUESTIONS</b>
	<ol style="list-style-type: none"> <li>1. Subgroups will work to establish goals and work toward those goals.</li> <li>2. The second session will close with an allotment of time for subgroups to give brief updates on their work and pose questions for the whole group.</li> </ol>	<ol style="list-style-type: none"> <li>1. What theories and theoretical frameworks have informed the design of your research project(s)?</li> <li>2. How might your work inform theory in mathematics learning and teaching? How can work on this student population expand our theoretical lenses?</li> <li>3. What issues and challenges have you faced in designing studies?</li> </ol>
<b>SESSION 3</b>	<b>SUBGROUP WORK TIME &amp; NEXT STEPS</b>	
	<b>ACTIVITIES</b>	<b>GUIDING QUESTIONS</b>
	<ol style="list-style-type: none"> <li>1. Work time for the subgroups to discuss directions for continued collaboration. Subgroups will also develop next steps as they plan for continued work.</li> <li>2. Whole group discussion in which subgroups share goals and next steps developed by the subgroups.</li> <li>3. Establish next steps for continued collaboration, including the Google Community.</li> </ol>	<ol style="list-style-type: none"> <li>1. How might other researchers pursue research projects on this topic and what can they learn from the work done so far?</li> <li>2. What are the next steps in continuing this work?</li> <li>3. How will your subgroups' work be disseminated?</li> </ol>

### Follow-up Activities

We anticipate that this Working Group will attract other researchers interested in issues related to the mathematics education of ELs. Therefore, an important component of this second meeting of the Working Group will be to continue to establish connections with other interested researchers and to build opportunities for future collaborations. We will provide space for new researchers to contribute to our work, to suggest new directions, and to add to the growing body of research on mathematics and ELs. At the first session of our Working Group, we will share our ongoing online Google Community, which uses Google applications (Plus, Hangout, Groups, Drive, etc.). Google's applications are freely available and allow for a number of collaborative opportunities, including video conferencing, group messaging, collaborative document development, and shared web and social media space. Through this collaborative Google Community, we have organized follow up meetings both virtually and at conferences such as TODOS and the NCTM Research Conference. These meetings, both face-to-face and virtual, allow us to set concrete goals in preparation for the creation of a Working Group proposal for PME-NA 2017 to continue our work.

In addition to these short-term goals, we have several longer-term goals for this Working Group. First, we would like to seek funding for a conference where we can share the results of our work with other researchers and practitioners. A number of the facilitators will attend and present at the TODOS: Mathematics for All Conference in Summer 2016. The TODOS conference brings together practitioners and researchers and provides a venue for the dissemination and discussion of ideas and issues related to the mathematics education of diverse groups of learners. A related conference specifically focused on ELs, which we would organize, would be of great benefit to a multitude of stakeholders as we continue to examine how to best support ELs. In addition to the conference, we will also propose a special edition of a journal focused on issues related to mathematics education and ELs. This would allow the broader mathematics educational research audience access to current work being done in this area.

### References

- Ballantyne, K. G., Sanderman, A. R., & Levy, J. (2008). *Educating English Language Learners: Building Teacher Capacity. Roundtable Report*. Washington, DC: National Clearinghouse for English Language Acquisition & Language Instruction Educational Programs.
- Bunch, G. C. (2013). Pedagogical language knowledge preparing mainstream teachers for English learners in the new standards era. *Review of Research in Education*, 37(1), 298-341.
- Civil, M., & Bernier, E. (2006). Exploring images of parental participation in mathematics education: Challenges and possibilities. *Mathematical Thinking and Learning*, 8(3), 309-330.
- Cohen, E. G., Lotan, R. A., Scarloss, B. A., & Arellano, A. R. (1999). Complex instruction: Equity in cooperative learning classrooms. *Theory into practice*, 38(2), 80-86.
- de Araujo, Z. (2012). Transferring demand: Secondary teachers' selection and enactment of mathematics tasks for English language learners (Unpublished doctoral dissertation). University of Georgia, Athens, GA.
- de Araujo, Z., Roberts, S. A., Anhalt, C., Civil, M., Fernandes, A., Moschkovich, J., Willey, C., & Zahner, W. (2015, November). Mathematics education and English learners. In T. G. Bartell, K. N. Bieda, R. T. Putnam, K. Bradfield, & H. Dominguez (Eds.), *Proceedings of the 37th annual meeting for the North American Chapter for the Psychology of Mathematics Education* (pp. 1384-1393), East Lansing, MI.
- D'Ambrosio, U. (2006). *Ethnomathematics: Link between traditions and modernity*. Rotterdam, the Netherlands: Sense Publishing.
- Drake, C., Turner, E., Aguirre, J., Bartell, T. G., Roth McDuffie, A., & Foote, M. (2010). Teachers Empowered to Advance Change in Mathematics (TEACH MATH): Preparing Pre K-8 Teachers to Connect Children's Mathematical Thinking and Community-Based Funds of Knowledge. National Science Foundation.
- Echevarria, J. & Graves, A. (1998). Sheltered content instruction: Teaching English- language learners with diverse abilities. Needham Heights, MA: Allyn & Bacon.
- Fernandes, A. (2012). Mathematics preservice teachers learning about English language learners through task-based interviews and noticing. *Mathematics Teacher Educator*, 1(1), 10-22.

- Freeman, B., & Crawford, L. (2008). Creating a middle school mathematics curriculum for English-language learners. *Remedial and Special Education, 29*(1), 9-19.
- Goldenberg, C. (2008). Teaching English language learners: What the research does and does not say. *American Educator, 32*, 8-44.
- Khisty, L. L., & Radosavljevic, A. (2010). *A descriptive analysis of Math Pathways and Pitfalls in a Latina/bilingual classroom*. Retrieved from <http://www.wested.org/mpp2/docs/mpp-ies-khisty.pdf>
- Kloosterman, P., & Walcott, C. (2010). What we teach is what students learn: Evidence from national assessment. In B. Reys, R. E. Reys, & R. Rubenstein (Eds.), *Mathematics curriculum: Issues, trends, and future directions* (pp. 89-102). Reston, VA: National Council of Teachers of Mathematics.
- Moll, L. C., Amanti, C., Neff, D., & Gonzalez, N. (1992). Funds of knowledge for teaching: Using a qualitative approach to connect homes and schools. *Theory into Practice, 31*(2), 132-141.
- Moschkovich, J. N. (2002). A situated and sociocultural perspective on bilingual mathematics learners. *Mathematical Thinking and Learning, 4*, 189–212. [http://doi.org/dx.doi.org/10.1207/S15327833MTL04023\\_5](http://doi.org/dx.doi.org/10.1207/S15327833MTL04023_5)
- Moschkovich, J. N. (2007). Examining mathematical Discourse practices. *For the Learning of Mathematics, 27*, 24–30.
- Moschkovich, J. N. (2008). “I Went by twos, he went by one:” Multiple interpretations of inscriptions as resources for mathematical discussions. *Journal of the Learning Sciences, 17*, 551–587.
- Moschkovich, J. N. (2012). An Introduction to Examining Everyday and Academic Mathematical Practices, *11*(2002), 1–11. Retrieved from files/808/ch1- Everyday and Academic Mathematics in the Classroom.pdf
- Moschkovich, J. N. (2015). Academic literacy in mathematics for English Learners. *The Journal of Mathematical Behavior*. <http://doi.org/10.1016/j.jmathb.2015.01.005>
- National Center for Education Statistics (2002). 1999-2000 School and staffing survey: Overview of the data for public, private, public charter and Bureau of Indian Affairs elementary and secondary schools. Washington, DC: U.S. Department of Education, Office of Educational Research and Improvement.
- National Center for Educational Statistics. (2014, May). *English language learners*. Retrieved from: [http://nces.ed.gov/programs/coe/pdf/coe\\_cgf.pdf](http://nces.ed.gov/programs/coe/pdf/coe_cgf.pdf)
- National Clearinghouse for English Language Acquisition. (2008). How has the limited English proficient student population changed in recent years? Washington, DC: NCELA. Retrieved May 22, 2013, from: [http://www.ncela.gwu.edu/files/rcd/BE021773/How\\_Has\\_The\\_Limited\\_English.pdf](http://www.ncela.gwu.edu/files/rcd/BE021773/How_Has_The_Limited_English.pdf)
- National Governors Association Center for Best Practices & Council of Chief State School Officers. (2010). *Common Core State Standards for Mathematics*. Washington, DC: Authors.
- Neves, H. A. (1997). The relationship of talk and status to second language acquisition of young children. *Working for equity in heterogeneous classrooms: Sociological theory in practice*, 181-192.
- Pitvorec, K., Willey, C., & Khisty, L. L. (2010). Toward a framework of principles for ensuring effective mathematics instruction for bilingual learners through curricula. In *Mapping equity and quality in mathematics education*(pp. 407-422). Springer Netherlands.
- Shein, P. P. (2012). Seeing with two eyes: A teacher’s use of gestures in questioning and revoicing to engage English language learners. *Journal for Research in Mathematics Education, 43*, 182–222. <http://doi.org/10.5951/jresmetheduc.43.2.0182>
- Télliez, K., Moschkovich, J., & Civil, M. (2011). *Latinos/as and mathematics education: Research on learning and teaching in classrooms and communities*. Charlotte, NC: Information Age Publishing.
- Turner, E., Dominguez, H., Maldonado, L., & Empson, S. (2013). English Learners’ Participation in Mathematical Discussion: Shifting Positionings and Dynamic Identities. *Journal for Research in Mathematics Education, 44*(1), 199–234. <http://doi.org/10.5951/jresmetheduc.44.1.0199>
- Turner, E. E., Drake, C., McDuffie, A. R., Aguirre, J., Bartell, T. G., & Foote, M. Q. (2012). Promoting equity in mathematics teacher preparation: A framework for advancing teacher learning of children’s multiple mathematics knowledge bases. *Journal of Mathematics Teacher Education, 15*(1), 67-82.
- Verplaetse, L. S. & Migliacci, N. (eds) (2008). *Inclusive pedagogy for English language learners*. New York: Lawrence Erlbaum Associates.
- Willey, C. J. (2013). A case study of two teachers attempting to create active mathematics discourse communities with Latinos (Unpublished doctoral dissertation). University of Illinois at Chicago.
- Zahner, W., & Willey, C. (2014). Integrating communication in Common Core mathematics for English learners. In M. Civil & E. Turner (Eds.), *Common Core State Standards in mathematics for English language learners* (pp. 51–66). Alexandria, VA: TESOL Press.
- Zahner, W. (2015). The rise and run of a computational understanding of slope in a conceptually focused bilingual algebra class. *Educational Studies in Mathematics, 88*(1), 19–41. <http://doi.org/10.1007/s10649-014-9575-x>