NOTICIAS de TODOS

TODOS Newsletter: Mathematics for ALL

Spring 2019, Volume 14 Number 1

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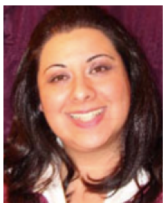
English Language Learners, English Learners, Emergent Bilinguals…

By Eugenia Vomvoridi-Ivanovic and Laura McLeman

Historically, a variety of terms/phrases have been used to identify students who are not English monolinguals, including *Limited English Proficient, English as a Second Language, English as an Additional Language, Language-Minority Students, English Language Learners*, *English Learners,* and *Bilinguals*. All of these terms exist, and keep changing, because we are constantly searching for ways to describe students as individuals - individuals who, as Diana Ceja describes in "From the President", have "language, culture, thoughts, and a voice," recognizing that the language we use is important to "the identity of many children." However, people are are not perfect, whether they be teachers and/or researchers. Although there is much information regarding the facilitation and creation of mathematics learning environments that are inclusive, meaningful, and draw upon the strengths of our students, many of us find ourselves modeling practice and using language that isn't necessarily in the best interests of our students. Diana shares about this very issue when she writes about her struggle to use the phrase *Emergent Bilingual.* She also shares resources through the TODOS community that help support her as she grapples with this issue and pushes her own thinking forward.

Another resource we think you will find useful is the article featured in this issue of *NOTICIAS,* "Teaching and Learning Mathematics with English Learners: What Can We Learn from Research?," written by Zandra de Araujo and Craig Willey. In this article, Zandra and Craig share a summary of the findings from a review of the research literature on *English Learners* and mathematics (for more information, see de Araujo, Roberts, Willey, & Zahner, 2018), highlighting lessons learned from the research that are particularly applicable to mathematics educators who work with students from a variety of linguistic backgrounds.

Finally, we encourage you to check out an article "Making Imaginary Roots Real" by Dr. N. Murray which was published in Mathematics Teacher. To provide equitable access for Spanish-speaking students and educators, this article has been translated into Spanish and can be accessed at https://tinyurl.com/RaicesImaginarias. We hope that you find this and the other resources in this newsletter helpful as you grapple with the changing landscape of education.



From the President

By Diana Ceja

I find myself struggling to train myself to use the term Emergent Bilingual. As an English learner myself, I prefer the term emergent bilingual as it holds much promise. As an emergent bilingual it is recognized that I am an individual who has language, a culture, thoughts, and a voice. As such I am primed for learning of new languages, cultures, and thoughts in order to create a more profound voice. In many ways it is liberating for me as a learner and as a teacher. Yet the pressures of policy, and time cause a dissonance and I default to a deficit-based practice. But I continue to work on this as it is important to the identity of many children. I am supported in this struggle through the TODOS community. I would like to highlight some resources that I have found very useful.

The TODOS/NCSM position paper https://www.todos-math.org/assets/docs2016/2016Enews/3.pospaper16_wtodos_8pp.pdf builds a strong foundation in understanding a social justice stance in the mathematics education discussing deficit-views. Wonderful and powerful discussions through social media, which you may follow using #mathequity and #TMfSJ. Given our students who are emergent bilinguals are diverse, the TODOS blog post Mathematics and Diversity: Why? What do you think? ***From the President, continued on page 2***

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TODOS Mission Statement

The mission of *TODOS: Mathematics for ALL* is to advocate for equity and high quality mathematics education for all students—in particular, Latina/o students.

"Teaching and Learning Mathematics with English Learners: What Can We Learn from Research?"

By Zandra de Araujo,
University of Missouri
& Craig Willey, Indiana
University – Purdue University Indianapolis


In this paper we share a summary of our findings from a research article in which we reviewed the literature on English Learners (ELs) and mathematics. In that research article we reviewed 75 research studies related to the teaching and learning of mathematics with ELs (de Araujo, Roberts, Willey, & Zahner, 2018). The studies we examined were conducted in different contexts, in different countries, and with students whose first language (L1) differed. However, across all of those studies the common thread was that they were studies of students whose L1 was not English and who were in a K-12 school in which English was the language of instruction. We organized our article around the focus of the studies. For example, some studies focused on the students and their learning and others focused on the teaching of the students. In the following sections, we summarize some of the findings from each of these studies.

What do we know about how ELs learn mathematics?

English learners' proficiency in each of their languages relates to their mathematical proficiency. Language and mathematics are intertwined. We communicate and develop our mathematical understandings with ourselves and others through language. Therefore, it may not be surprising that a number of studies (e.g., Clarkson, 2007) report that students' language proficiency, in both their L1 and their L2, is related to their mathematical proficiency. This underscores the importance of fostering language proficiency alongside mathematics proficiency, even if you are a mathematics teacher.

We also found evidence that more complex mathematical solutions require more use of language (e.g., Bailey, Blackstock-Bernstein, & Heritage, 2015). For example, if you are trying to explain how you multiplied 17 and 12, saying that you added 12 plus 12 plus 12 and so on 17 times requires less sophisticated language than a strategy that would utilize distributive thinking such as taking ten groups of 17 to get 170 and then 2 more groups of 17 to get 34 and then adding those to get 204. It is also the case that tasks that are high in cognitive demand tend to carry higher linguistic demands as students must try to explain and justify their thinking or make sense of problems in a particular context. This, again, suggests that if teachers are to provide access to rigorous mathematics, they cannot remove language; rather they must intentionally support language development.

Multimodal communication is important in the mathematics classroom. When we think of communication, many people focus on written and spoken language. However, for students who are still working toward proficiency in L2, the use of nonverbal communication (e.g., gestures, pictures) is vital. For example, although a student may not yet be able to provide a written explanation of how they divided 96 by 12, the student may be able to draw a diagram or use base-ten blocks to evidence their thinking. In situations where teachers struggle to garner a complete understanding of ELs' mathematical understanding, nonverbal communication can be used alongside speech (Dominguez, 2005). Moreover, curricular materials intentionally designed to incorporate and promote multimodal communication have shown to support ELs' success as measured by standardized assessments (e.g., Miller & Warren, 2014). The studies focused on multimodal communication highlight an important pedagogical approach that broadens the ways in which we might elicit ELs' mathematical knowledge and think about assessment in general.

Students' use of their dominant language in the classroom is necessary and important to their learning of mathematics. Students naturally draw on their L1 and L2 as they participate in mathematics. This process of going between languages is largely fluid and unplanned (Clarkson, 2007). For example, students might explain that the sum of five and three is eight because cinco, seis, siete, ocho (as they count on from five using their fingers). Because students naturally use L1 (both internally and externally), teachers should foster the use of both languages in the classroom. ***de Araujo & Wiley, continued on page 3***

From the President, continued from page 1

https://www.todos-math.org/index.php?option=com_content&view=article&id=398:practiceblog&catid=19:site-content explores the question "what to do with diversity." TODOS Live! has showcased several webinars that support the teaching of the diverse population of emergent bilinguals by using an asset-view approach. The TEEM journal has many papers on the topic of emergent bilinguals. Currently TODOS is working on the next issue of TEEM. I am looking forward to one article in particular that gives us a peek into a bilingual classroom and how the systems in the classroom leverage and strengthen students' competencies in mathematics and language.

Thank you to all those that came out to the NCSM and NCTM Annual meetings. I hope you enjoyed the TODOS Strand featuring several of our TODOS members. I look forward to seeing you next summer at the TODOS 2020 conference! Look for a call for speaker proposals in the upcoming months.

de Araujo & Wiley, continued from p. 2

However, in classrooms and contexts in which English is the language of instruction, many teachers and students perceive the use of languages other than English as a deficit or irrelevant. As a result, students may choose not to use their linguistic resources in L1 so as not to be "othered" or seen as less than those who use only English (Barwell, 2014; Setati, 2008). In other cases, students may choose to use L1 in order to counter the supremacy of English and retain their authority (e.g., Zavala, 2014). These instances showcase the politics of language and, again, underscore the need to think deeply about language in the mathematics classroom.

Students' cultural resources help them connect with and make sense of mathematics. When students are provided tasks that connect with their cultural resources, they are able to use those resources to support their mathematical meaning-making. Dominguez (2011) found that when students were given mathematics tasks with familiar contexts, the students were able to draw on their cultural and linguistic resources to make sense of the problems by mathematizing the situation rather than simply relying on procedures. The benefits afforded to students when they are encouraged to draw on their cultural funds of knowledge have been written about for decades (e.g., Moll et al., 1992), and the more recent studies we examined underscore this importance by evidencing the richness of students' mathematical meaning-making as they do so.

What do we know about teaching mathematics with English learners?

Teachers' practices should promote ELs' access to mathematics. Teachers should work to ensure that language is not a barrier to mathematics. For example, teachers can use visual strategies such as pictures and gestures to help communicate contextual features of tasks to students so that the context supports rather than detract the mathematics (e.g., Pray & Ilieva, 2011). If there is a problem about a ski slope, teachers can play a video to contextualize it and then use gestures to illustrate the angle of the slope. While familiar contexts are helpful for ELs, teachers do not need to limit themselves to only contexts that might be familiar to ELs. In fact, supporting ELs to understand unfamiliar contexts is an important dimension of language development. Regardless of the strategy, it is important that teachers maintain the mathematical purpose of tasks so that the practices teachers enact promote access without diminishing opportunities for mathematical thinking.

Teachers' practices should support ELs' participation in mathematics discourse. Teachers may think sheltering ELs from mathematical discussions is helpful, however, as we discussed previously, it is vital to nurture students' mathematical *and* linguistic proficiency. Instead of avoiding terms that may seem difficult, teachers should introduce such terms as students are referring to the concepts with their everyday language. This allows students to expand and use academic language. Classrooms should be spaces rich in communication (both verbal and nonverbal) as students explore and discuss their thinking. Rather than shy away from language, teachers should embrace and encourage discussion with ELs in mathematics classrooms. Doing so will benefit all students.

There are several practices teachers can use to support mathematical discourse with ELs. Teachers can elicit and encourage discourse in both whole-class and small-group formats (Hansen-Thomas, 2009). When teachers ask students to share their ideas, they are able to learn about and draw on students' many cultural and linguistic resources in meaningful ways. Throughout this process, teachers should be open to, and encourage, students sharing their ideas in ways they find natural. This might include students' use of both L1 and L2, as well as the use of visuals and gestures (e.g., Salehmohamed & Rowland, 2014). Teachers can also model the use of discourse with their students (Khisty & Chval, 2002). For example, a teacher might talk through their thinking in front of the class to show students how they would communicate their thinking. Relatedly, teachers might revoice student contributions to help position students' ideas as valuable to the class and to help make sure they understand the students' thinking (Enyedy et al., 2008). Together, these practices help create a discourse-rich classroom in which students' contributions are acknowledged, their language development is explicitly supported, and they are positioned as competent and brilliant generators of mathematical knowledge.

What did we learn from this study?

Across all of the studies we reviewed, we took away two key lessons. First is the notion that ELs can be successful in school mathematics. Many stories in popular media report on the achievement gap among ELs and native English speakers, or on remediation for ELs. We found it heartening to read about the ways in which encouraging the use of ELs' linguistic and cultural resources help them make sense of mathematics. Once teachers embrace a view of language beyond spoken and written English, many opportunities arise for ELs as they engage in mathematical thinking and practices. Second, we found that teachers must acknowledge the need for both linguistic *and* mathematical support. Many teachers continue to think of mathematics and language as separate, but, in reality, every mathematics teacher is a language teacher! ***de Araujo & Wiley, continued on page 4***

de Araujo & Wiley, continued from p. 3

Together, mathematics and language form a complex web through which meaning is made and conveyed. Moving forward, we must learn to view mathematics and language as interrelated, entangled, and supporting one another. As we do so, we can work to create rich, caring, and transformative classroom environments for everyone, especially ELs.

Acknowledgements

We acknowledge our co-authors of the article on which this summary is based, Sarah A. Roberts and William Zahner.

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TODOS
Mathematics for ALL

Congratulations to the newly elected board members, who will begin their terms this Spring!

President-Elect: Linda M. Fulmore (Arizona)

Directors: Gloria Brown Brooks and María del Rosario Zavala (California)

TODOS Live Sessions

Make sure to take advantage of the Recorded TODOS Live Sessions where you can find sessions like, Weaving Indigenous Perspectives & Mathematics: Landscape of Success for ALL Learners presented by Florence Glanfield or the session Essential Understanding of Geometry for English Language Learners Presented by José Francisco Sala García.

Link to TODOS Live Sessions - https://toma.memberclicks.net/todoslive

TODOS Blog

"*The Mathematics of Voting and its Consequences: Ideas for Mathematics Lessons*" by Silvia Llamas-Flores, Carlos LópezLeiva, & Kyndall Brown

The blog starts by focusing on the historic link between democracy and voting and challenges that have emerged over time. The second section of the blog provides resources around a number of current issues related to policies that tend to restrict voting rights, such as: Inequitable voting requirements across states and people's status, closure of voting polls, felony disenfranchisement, and gerrymandering. The third section of the blog is dedicated to mathematics lessons on voting. There are some examples with links to previous mathematics lessons on voting. The use of modeling in a lesson as a mathematical practice is presented as a link between issues of voting and the Common Core State Standards for Mathematics.

For more, follow the link, https://www.todos-math.org/election-blog

Main Blog Page: https://www.todos-math.org/blogmain

Student Awards

California Mathematics Council – South (CMC-S) Conference
Palm Springs, California (November 2018)

Guillermo C., 7th Grade student at Bobby Duke Middle School, Coachella Valley USD
Nominating Teacher: Ms. Cynthia Lopez
Natalie A., 8th Grade student at Bobby Duke Middle School, Coachella Valley USD
Nominating Teacher: Mr. Edwin Detoya
Aleynah G., 8th Grade student at Bobby Duke Middle School, Coachella Valley USD
Nominating Teacher: Mr. Glenn Gendron
Julio S., 8th Grade student at Bobby Duke Middle School, Coachella Valley USD
Nominating Teacher: Mr. Glenn Gendron
Angel L., 9th Grade student at Rancho Mirage High School, Palm Springs USD
Nominating Teacher: Ms. Sue Drummond
Kenia R., 9th Grade student at Rancho Mirage High School, Palm Springs USD
Nominating Teacher: Ms. Sue Drummond

Ohio Council of Teachers of Mathematics (OCTM) Conference
Akron, Ohio (October 2018)

Lucas E., 9th Grade student at NIHF STEM High School, Akron Public Schools
Nominating Teacher: Mr. Benjamin Graber
Martin H., 10th Grade student at NIHF STEM High School, Akron Public Schools
Nominating Teacher: Mr. Benjamin Graber
Cristina F., 11th Grade student at North High School, Akron Public Schools
Nominating Teacher: Ms. Eileen Everett
Carolina M., 12th Grade student at North High School, Akron Public Schools
Nominating Teacher: Mrs. Jaimee Merrell

Seated from left to right: Cristina F., Martin H., Lucas E.
Not pictured: Carolina M.

Standing from left to right: Brian Dunnicliffe (TI Representative), Angel L., Guillermo C., Julio S., Donald Tunstall (TI Representative)
Seated from left to right: Natalie A., Kenia R., Aleynah G.

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