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**THE QUESTION**

# What are the best approaches for teaching mathematics to newcomers to the U.S. who are English learners?

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Our focus in this brief is on students who are new arrivals to the United States and are emergent English speakers, known as “newcomers.” The term “newcomers” encompasses a diverse group of students. Within this group we distinguish two very different subgroups: students who had regular access to formal schooling prior to their arrival in the U.S., and students who did not have regular access to a formal school system or whose education was interrupted by war, famine, and other traumatizing events prior to their arrival to the U.S. As the consensus study report by the National Academy of Sciences, Engineering, and Medicine (NAS) (2018) points out, there is limited research specific to newcomers. Thus, many of the recommendations in this brief draw on the evidence-based literature on teaching mathematics to English Learners as a broad group. Moreover, this brief is grounded on an asset-view of newcomers (e.g., attending to the resources students bring rather than what they lack), and the principle that “newcomers can interact with children who speak English and participate and contribute in authentic STEM learning contexts” (NAS, 2018, p. 31).

With this frame and focus, we have organized evidence for teaching newcomers in mathematics into three sections: course placement, ideas for instruction, and collective responsibility.



## THE EVIDENCE

### Placement

When newcomers first arrive, it is important to understand what they already know about mathematical concepts and procedures. However, traditional pencil-and-paper assessments are not likely to work in these situations, as mathematical notation, syntax, and vocabulary vary dramatically among countries' school systems. Ideally someone who is familiar with the students' community and speaks their language should conduct a diagnostic interview to assess students' knowledge and understanding of mathematics. This assessment process is crucial to appropriately serve newcomers because single-framework assessments have historically resulted in the disproportionate *overidentification* in learning disabilities of these students, while recent studies have illustrated *underrepresentation* of newcomer students in programs for students with learning disabilities and speech impairments. The mixed results from single-framework research suggest that multiple modes of assessment (e.g., diagnostic interview, informal conversation, observations from multiple teachers, and input from parents and guardians) may be best to accurately identify newcomers for special education services.

Additionally, if newcomers attend schools with tracked mathematics classes, including leveled mathematics programs in elementary schools, it is important that newcomers are placed at the appropriate level of mathematics based on their understanding of the subject and not on their level of English proficiency. We emphasize across all of these suggestions that students' mathematical education should not be placed on hold as they acquire English proficiency or acclimate to living in the U.S. However, once more acclimated with the school culture and routines, student placements need to be flexible and they may need to be reassessed frequently. Properly placing students and ensuring they have access to needed courses is essential to future success in school as well as for making a living in the United States.

### Instruction

Effective instruction for newcomers is not the sole responsibility of the classroom teacher. Rather, teachers should collaborate with other professionals (e.g., paraprofessionals, language teachers) in designing instruction (NAS, 2018). There is a growing body of literature examining effective mathematical instructional practices for English learners. Looking across this work, we provide the following principles for teaching mathematics with English Learners.

#### **English Learners should work on challenging mathematical tasks**

and be provided with support to access the tasks. Prior studies have found that in attempting to support English Learners, teachers may rely upon problems that are procedural and devoid of context. Teachers must provide students access to mathematical tasks that support students in reasoning, sense-making and mathematical modeling.

#### **English Learners need opportunities to communicate about mathematics**

using multiple modalities and resources (orally, writing, drawings, gestures, manipulatives and tools, home languages). Though it seems intuitive to lessen language demand for English learners, it is with and through language that students learn and communicate mathematics. Teachers must broaden their notion of language, beyond vocabulary to include non-verbal and non-written communication alongside students' home languages.

#### **English Learners need scaffolding strategies**

that help them engage in and make sense of mathematical tasks while developing their learning of English. In order to access challenging tasks and engage in mathematical discourse, teachers must utilize scaffolding strategies that avoid lessening the mathematical rigor. Such scaffolding should be individualized and implemented as the need arises.

#### **English Learners bring cultural, linguistic, and mathematical resources to the classroom.**

Teachers should draw on and connect to these resources as they consider learning opportunities for students. Sharing these connections with all students will help build a stronger and more empathetic classroom community and strengthen students' mathematical understanding.

### Building Community

Newcomers arrive at school with diverse funds of knowledge and experiences and, drawing on these resources, they

become language and culture brokers to adapt to their new world and also help the new world understand who they are. This fluidity that newcomers bring is an asset and it is important for schools to collectively nurture, learn from, and draw on for mathematical learning in school.

To nurture and learn from newcomer families and communities, multiple approaches are necessary. One such approach is home visits where the teachers and other school personnel go in as learners as well as advocates for the children's learning. Another is to involve newcomer families through existing school and community structures (e.g., parent-teacher unions, places of worship, community centers, after-school programs, local businesses) and develop programs for families to engage in mathematical learning. These interactions and collaborations promote cultural contact zones that help us adapt, understand, and develop versatile ways of seeing, doing and being. Working with newcomers asks for a bidirectional learning and sharing process in order to practice an inclusive pedagogy. Therefore, educational leaders need to embrace the mathematics education of newcomers as a two-way process: *teaching and learning from students and their families*.



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## CONCLUSION

Overall, the question of how to support the mathematics learning of newcomers in the U.S. sits within a bigger conversation of what is and is not working in mathematics education, as we strive towards equity. New movements help us rethink course sequences and learning objectives in school mathematics. Thus, our recommendations also include elements of awareness, action, and accountability towards this more just system, in which newcomers from historically marginalized or oppressed communities stand to lose the most if we do not address these larger inequities. For our recommendations will ultimately fall short if teachers, principals, and superintendents are constrained by rigid policies that limit their abilities to do what is best for newcomer families: to first greet them in light of their humanity, assess students' mathematical understanding, advocate for and re-evaluate placements as necessary, be in community with and help families navigate our complex schooling system as inequitable as it currently is, and ultimately build towards the policy changes we wish to see.

## References

National Academies of Sciences, Engineering, and Medicine (2018). *English learners in STEM subjects: Transforming classroom, schools, and lives*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/25182>.

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