



Supporting culturally responsive teaching practices through math curricula

Authors: Barbara Harris, Walter Herring, and Riley Stone

As elementary and secondary classrooms in the United States become more ethnically, linguistically, and culturally diverse, math teaching should be more responsive to students' identities and experiences.¹ Culturally responsive math teaching incorporates students' identities and lived experiences into classroom instruction to enhance students' engagement and learning. Because the content covered and pedagogical approach that teachers in math instruction use are heavily influenced by the curriculum,² curriculum developers should consider the extent to which their curricula support culturally responsive teaching practices. ***We describe nine aspects of culturally responsive practices that publishers can integrate into their math curricula to meet both teachers' and students' needs.***

Culturally responsive instructional practices incorporate students' identities and lived experiences. Using such practices not only improves students' engagement and learning in the math classroom but also makes math instruction more joyful for both students and teachers.³

As the need for teachers to implement culturally responsive practices grows, so too will the demand for curricula that support and encourage such practices. For example, in a nationally representative 2022 survey, 75 percent of K-12 teachers reported wanting math curricula that would help to activate students' diverse cultural background knowledge.⁴ This may be due to the lack of attention to these issues in current curricula: a recent analysis shows that existing math curricula provide limited guidance to teachers on how to implement these practices.⁵

Because of the importance of culturally responsive teaching, curriculum developers and publishers

have a timely opportunity to incorporate more aspects of culturally responsive teaching in their materials to better meet students' and teachers' needs.

As they revise and develop new math curricula, publishers can meet the growing demand for culturally responsive materials and simultaneously support student learning. Just as curricula guide teachers' approaches and support differentiated instruction, curriculum materials can also support teachers' need to implement culturally responsive instruction while delivering rigorous math content to students.

To help developers incorporate guidance on culturally responsive practices into their materials, we describe below nine aspects of the approach. We also provide examples of activities or supports that can help publishers see how to guide teachers in their use of culturally responsive practices in mathematics instruction.

Culturally responsive math curricula should



Build on students' cultural and community funds of knowledge. Cultural and community funds of knowledge are the everyday knowledge and activities in students' homes and communities that they understand and relate to.⁶ Culturally responsive teaching sees these as resources students bring to the classroom. Students bring ways of thinking about, reasoning with, and understanding math based on their backgrounds and the extent to which they engage in different mathematical activities. For example, students may know how to calculate fares when riding the bus or have experience measuring ingredients when cooking. Math curricula can tap into students' cultural and community funds of knowledge by encouraging teachers to practice the following:

- Inquire about students' backgrounds and experiences and draw on those during math lessons.
- Ask students to reflect on instances where they might have seen a math concept at work in their own life and adapt it into a problem for the class.
- Reference students' community and home knowledge, culture, or experiences to make math instruction more relatable and meaningful to them.



Promote rehumanization. Rehumanizing is a direct effort to honor diverse cultures. Rehumanizing makes clear that all students can be good at math by showing them that strong mathematicians are found in cultures around the world.⁷ Rehumanizing acknowledges that math is a human activity that involves both thinking and feeling: math is not just an abstract set of rules and procedures. Curricula can rehumanize math by prompting teachers within the curriculum materials to implement the following practices:

- Affirm positive math identities for all races, genders, and ethnicities by using math problems that honor students' cultures.
- Expand students' views of mathematics by highlighting that math is more than abstract memorization. Math involves problem solving and reasoning that draw upon students' empathy, senses, and feelings.
- Represent the diversity of mathematicians by introducing Black, Indigenous, Latinx, and other mathematicians to students by referencing their literature as examples in textbooks and by referencing websites such as www.lathisms.org or www.mathematicallygiftedandblack.com.



Promote and value diverse student thinking and ideas. Research suggests that students attain deeper levels of conceptual understanding in math when they discuss their reasoning and compare different approaches to solving problems.^{8,9} In culturally responsive math teaching, attending to student thinking is even more important, given their diverse backgrounds and variety of ways they might approach problems. Math curricula can promote student thinking by reminding teachers to do the following:

- Prompt students to share their reasoning, ask questions of one another, discuss each other's ideas, and build shared understanding.
- Explicitly encourage students to use multiple forms of communication, including hand gestures, pictures or drawings, and diverse verbal responses.



Include math tasks that require high levels of cognitive demand. Cognitive demand refers to the type of thinking a lesson requires of students to complete math tasks.¹⁰ Engaging in challenging content is important for every student—and particularly for historically marginalized students who have not had equal access to demanding content in the past. Research shows that some teachers have lower expectations for historically marginalized students. This could set up those students to have lower achievement.¹¹ Curricula can support teachers to engage all students in cognitively demanding problems:

- Include tasks designed to allow all students to use complex, non-algorithmic thinking.
- Provide tips for teachers to give all students opportunities to engage in intellectually and conceptually challenging math tasks that emphasize underlying concepts, patterns, and properties.



Maintain rigor and high standards for all students. Scaffolding is a common instructional practice to support students' access to the content when they may be struggling to understand it. Although scaffolding is a good instructional practice, sometimes it can result in lowering the rigor of math tasks for some students.¹² The goal is to advance students into rigorous math, not lower the expectations for some students and never give them the opportunity to succeed with challenging content. Curricula can help all students access rigorous content with the following:

- Include a variety of scaffolding techniques designed to help students achieve success with the math tasks in each lesson that have higher levels of cognitive demand.
- Provide suggestions for teachers to scaffold students into formal mathematics by accessing their everyday knowledge and personal experiences. For example, children's understanding of how to share snacks with friends can be a scaffold for solving equal sharing problems.



Affirm multilingualism. To attain deep understanding of math, students must engage in rigorous content and discuss their thinking with other students. Multilingual learners across the English-learning spectrum need meaningful opportunities to engage in mathematical reasoning such as describing patterns, using representations, and making generalizations.¹³ Curricula can address the needs of multilingual learners by prompting teachers to do the following:

- Allow students to develop their mathematics skills while working in their home language.
- Immerse multilingual children in language-rich mathematics while using strategies to develop academic language, such as reframing everyday language explanations with math terms.
- Encourage students to use multiple forms of communication to show their thinking, including graphic organizers, manipulatives, equations, drawings, labels, and other writing.



Distribute intellectual authority. Teaching approaches that center on students pave the way for them to actively engage in meaningful math conversations and deeper math understanding.¹⁴ Students can draw on their own experiences and knowledge to make sense of and connect with the math concepts they are learning. Using student-centered approaches helps students see that teachers are not the only source of knowledge and honors the various forms of knowledge students bring to the classroom.¹⁵ Curricula can support distributed authority in two ways:

- Provide teachers with suggestions to promote students as mathematical authorities and use students' ideas to drive mathematical conversations. For example, when students ask questions to confirm their thinking, prompt teachers to direct the question to the rest of the class to consider.
- Provide frequent opportunities for students to engage in group or paired activities that support them teaching each other.



Disrupt status and power. Curricula can help overcome typical power imbalances in the classroom to ensure all students are empowered participants, regardless of their backgrounds.

This is particularly important when creating opportunities for students to work together and share intellectual authority. Popular or outgoing students may speak most often, or the top performers in class may get more attention from the teacher.¹⁶ Therefore, curricula should support teachers to intentionally attend to students' unique mathematical, cultural, and linguistic strengths.¹⁷ Curricula can ensure all students participate in meaningful ways:

- Include strategies teachers can use to address status imbalances, such as confronting stereotypes or using inclusive talk that builds up students and encourages multiple approaches to math.
- Remind teachers to build up students as mathematical authorities to each other and encourage teachers to lift up important mathematical thinking from students whose peers do not yet see them as math resources.



Analyze and act. Students learn math in the context of meaningful problems from their lives and communities.¹⁸ As such, curricula can support students' understanding by including math tasks that are related to an issue that students will strongly connect with. Curricula can provide opportunities for students to address and act on a problem:

- Include current or historical issues of injustice or social justice that may resonate within students' communities.
- Prompt teachers to tailor problems around issues in the local community. For example, a textbook problem could ask students to discuss different ways to distribute donations among families at a local food bank.

These nine features do not necessarily cover every important aspect of culturally responsive instruction, nor must every lesson attend to all nine. Rather, these features represent a starting point for how publishers can better support teachers in implementing culturally responsive instructional practices through their curricula.

Background. These nine aspects of culturally responsive math instruction are based on a tool developed by Maria del Rosario Zavala and Julia Maria Aguirre. They use the tool, called the CRMT2, to support professional learning for teachers.¹⁹ Their research has shown these nine aspects to be important practices used during classroom instruction for effective implementation of culturally responsive math teaching. As part of an evaluation Mathematica conducted, Mathematica researchers adapted Zavala's and Aguirre's tool to examine six different middle school curricula. We found that curricula paid little attention to the aspects of culturally responsive instruction described in this document.²⁰▲

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