

# CULTURALLY RESPONSIVE MATHEMATICS TEACHING IN THE ELEMENTARY SETTING

Hannah Boucher | Master's in Teaching | Elementary Education



## Inquiry Questions:

- How does culturally responsive math teaching impact elementary students?
- How can teachers implement culturally responsive mathematics teaching in the elementary classroom?

**TPEP Criterion 3:** Recognizing Individual Student Learning Needs and Developing Strategies to Address Those Needs

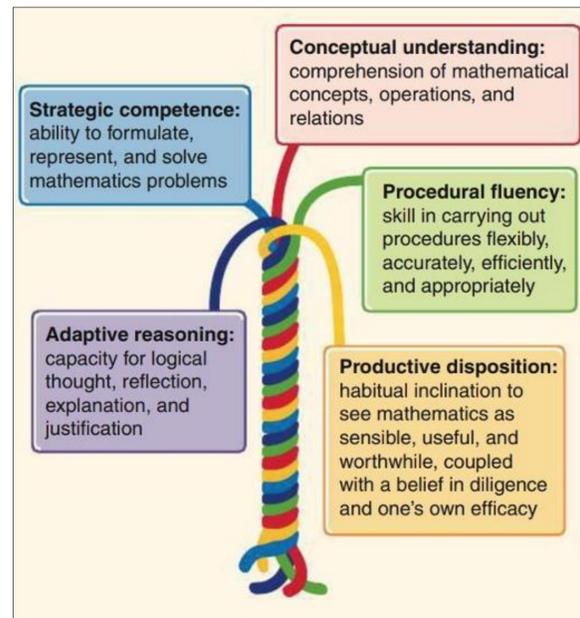
## DEFINING CULTURALLY RESPONSIVE MATHEMATICS TEACHING

Culturally responsive mathematics teaching is defined by Harding-DeKam as “recognizing individual student learning needs and developing strategies to address those needs.” Rather than holding a deficit mindset, educators practicing culturally responsive mathematics teaching consider the students’ experiences and the influences they have on their learning. The teacher understands how the specific cultural and personal knowledge play a role in each student’s math learning.

To achieve this level of cultural responsiveness in the elementary mathematics setting, teachers must plan and develop authentic math tasks and assessments. This method of instruction is intended to target the cultural inequities in education spaces. Minority student populations such as students of color, students from lower socio-economic backgrounds, students with disabilities, and multi-lingual learners develop identities as independent learners as they begin to connect with their personal experiences to the concepts they are exploring in the classroom (Hammond. 2015 p. 35). However, at its core, culturally responsive teaching benefits all students. To practice culturally responsive mathematic teaching in any subject, an educator must understand that all students are unique individuals with their own cultural identities.

## SUPPORTING THE DEVELOPMENT OF INDEPENDENT LEARNING

In 2001, the National Research Council identified five strands of mathematical proficiency, which all weave together to support a student in solving math problems. The five strands are as follows:



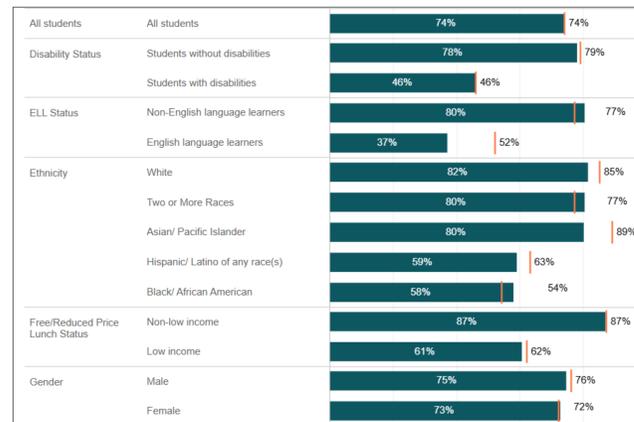
Source from Van De Wall

One way to support the strengthening of all five of these components of mathematical proficiency is to incorporate more authentic math tasks and assessments that connect to students’ personal knowledge.

## TRADITIONAL TEACHING AND THE ACHIEVEMENT GAP

Traditionally, students are expected to learn mathematical procedures through examples, definitions, and other isolated practices (Matthews. 2022 p. 3). This traditional approach to teaching may lead to the development of math anxiety, which creates a learning barrier for students. Rather than focusing on exploring new concepts and ideas to encourage their learning, students feel pressure to perform perfectly because their main objective is to produce “correct answers” and replicate the teacher’s procedures (Finlayson, M. 2014). Students are left wondering: *What is the point? Why am I learning this?* Many students find this traditional way of teaching to be so disconnected from their actual lives, so they do not feel as though they can access these math skills and knowledge (Turner. 2009 p. 137). This style of teaching, as Hammond says, perpetuates the dependent learner identity for many students, especially students with diverse cultural and linguistic backgrounds (2015 p. 31, 32). To prevent these achievement gaps in elementary mathematics, educators can adopt culturally responsive pedagogy in their mathematics teaching.

In Washington state, fourth graders in the 2021-22 academic year participated in the National Assessment of Education Progress for mathematics. When considering the assessment results that are available on the OSPI website, it was found that out of the 74% of students who passed, 59% and 58% of Hispanic and Black students respectively passed the exam. Compared to the 82% of white students who passed the exam, this shows that even now, there is a disparity between student achievement based on ethnicity. In addition, there are achievement gaps between multilingual learners and non-multilingual learners, students with and without disabilities, and students from different socioeconomic backgrounds. The impacts of 20<sup>th</sup> century education on student achievement are still prevalent in today’s education system, however, over the past few decades, various studies have been conducted to share the impact culturally responsive teaching has on closing these achievement gaps in mathematics.



Source from OSPI

Scan the QR Code to Access References



## REFLECTING ON THE PRACTICE

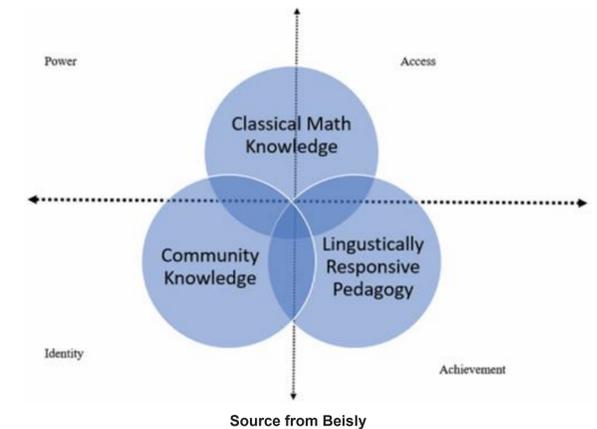
An important aspect of engaging in culturally responsive math teaching is self-reflection. This includes considering student-teacher interactions, expectations for learners, and personal feelings (Wong, B. 2020 p.49). By recognizing their thoughts and feelings, educators may begin to unpack their practices and beliefs and understand how they impact their students. A teacher may realize that their commitment to teaching curriculum materials with fidelity does not acknowledge the diverse needs of their learners.

| Knowledge & Identities   | Rigor & Support  | Power & Participation   |
|--|--|---|
| <b>Centering Cultural and Community Funds of Knowledge</b><br>Helping students connect mathematics with relevant/ authentic issues or situations in their lives                              | <b>Sustaining High Cognitive Demand</b><br>Enable all my students to closely explore and analyze math concept(s), procedure(s), and problem solving/reasoning strategies | <b>Distributing Intellectual Authority</b><br>Distributing mathematics authority and make space for multiple forms of knowledge and communication                   |
| <b>(Re) Humanizing Mathematics</b><br>Supporting creativity and broadening what counts as mathematical knowledge, and affirming positive math identities for all students.                   | <b>Scaffolding Up</b><br>Maintaining high rigor with high support for all students.  | <b>Disrupting Status and Power</b><br>Disrupt status differences, entrenched stereotypes, and inequitable power relationships present in all mathematics classrooms |
| <b>Honoring Student Thinking and Ideas</b><br>Making opportunities to elicit, express, and build on student mathematical thinking in multiple ways (e.g. gestures, pictures, words, symbols) | <b>Affirming Multilingualism</b><br>Making space for multilingual learners (MLL) to be central participants in mathematics activities                                    | <b>Analyzing and Taking Action</b><br>Supporting student use of mathematics to analyze, critique, and address power relationships and injustice in their lives      |

Source from Zavala

## THE IMPACTS OF CULTURALLY RESPONSIVE TEACHING PRACTICES IN ELEMENTARY MATH

In a recent study, a group of teachers modeled different culturally responsive teaching practices in their classrooms and reflected on how these practices impacted the inclusiveness of math lessons. They defined nine specific practices, which all fell under three main categories, or “strands”: “Knowledge and Identities”, “Rigor and Support”, and Power and Participation”. It was reported that 17 out of 19 teachers, or 89%, found that honoring student thinking and ideas supported the resistance of marginalization in mathematics classrooms (Turner. 2024). Honoring student thinking ideas, which falls under “Knowledge and Identities”, can be accomplished through number talks, collaborative projects, discussions, or by allowing students to choose how they present their solutions. Students have more freedom and can truly develop their own math identity. This also encourages students to engage in independent learning. When considering the impact of teachers implementing practices that encouraged “Rigor and Support”, those practices were not found to be as successful, however, “teachers found that the openness of MM activities, and the ways that they encouraged risk-taking enhanced their opportunities to recognize student strengths (ST) and affirm positive mathematical identities (RH).” (Turner. 2024) Students began to have opportunities to showcase what they knew, rather than replicating what they were expected to. Teachers also found that when implementing “Power and Participation” practices, while there was some success, it was determined that these practices “may marginalize some students, including emerging bilingual learners, unless sufficient instructional supports are in place.” (Turner. 2024) At its core, culturally responsive teaching is intended to support *all* learners, so it can be inferred that these practices would be beneficial to multilingual learners in mathematics. However, this would require the teacher to dig deeper and consider how they can honor a student’s linguistic background in their math learning. The language used in mathematics does not have as much overlap with the other subjects in the general education classroom. Students who identify as multilingual learners found more success in their math learning when teachers implemented more rigorous tasks with adaptations made to honor their linguistic background (Beisly. 2023 p. 878).



Source from Beisly

## APPLICATIONS IN THE CLASSROOM

It’s easy for someone to identify what culturally responsive math teaching in theory, but to truly make an impact in the classroom, teachers need to apply these practices. Find where the concepts, language, and community culture overlap to embrace students on their math journey. Every student, class, and school community is unique, but here are some ideas to get started!

- Hold a math club for students to engage with informal math tasks
  - Students can take ownership of the club
  - What do they want to explore?*
- Ask students to brainstorm a list of problems they’d like to engage with and use this as context for math lessons
  - Project-Based Learning
  - Consider their hobbies, what’s going on at the school, or something else relevant to the students*
- Plan a math night for students and families with activities and games that are connected to the community
  - Game Night
  - There are many manipulatives and math games that are included with curriculum materials, as well as other games or activities out there that could be sent with families afterwards to continue the fun*
- Collaborate with other teachers to plan school events that integrate mathematics
  - Nutrition Night
  - Collaborate with the health and P.E. teacher and find a way to incorporate fractions and percentages with nutrition using more accessible foods*
- Adapt curriculum material (story problems, worksheets, etc.) to be more relevant to your class
  - Changing the context of story problems
  - Remember to avoid the deficit mindset and instead celebrate what your students DO know...conduct interest surveys throughout the year to get a good starting point*
- Develop routines that integrate conversations to encourage the collaboration and exposure of student ideas
  - Number Talks
  - Partner Assignments (Rotating or Static)
  - Having students pair up with other classmates to collaborate in solving a math task*



An example of student work from a math project-based learning activity where students in a 5<sup>th</sup> grade class at Kamiak Elementary School reviewed, modified, and drew a model of a new addition to the KES school garden when learning how to multiply fractions by fractions.