Powerful Learning is Relevant Learning

Virtual T³IC
September 30, 2023

Dr. Paul Gray, NCSM President

Ancestral lands of the Wampanoag Nation Nauset Nation

Source: https://native-land.ca/
NCSM is the premiere mathematics education leadership organization!

Annual conference full of sessions for people who lead math teachers

Focused on equity for all teachers and students to experience high-quality math teaching and learning

Professional learning network

2,200 members strong

Source for resources so I can do my job as a math leader better.
What is culturally relevant instruction?

How do we make our tasks more culturally relevant?

Reflections and Implications

Stages of Math Tasks
Words of Wisdom to Set the Table

In some places, buzzwords like “culture” and “culturally relevant” are trigger words that cause a particular reaction.

In this presentation, the focus is how we might make science and mathematics more relevant to the humans in our mathematics classrooms.

References to “culturally relevant” or “culturally responsive” instruction are used in an academic sense. There is no political motive or intention.
Parents across groups feel that their own child would be more likely to excel in math class if it felt more relevant and engaging.

Making math education more relevant and engaging will make it more likely that my child succeeds in math:

- **Parents**
  - Strongly agree: 60
  - Somewhat agree: 36
  - Disagree: 3
  - Total Agree: 96

- **White Parents**
  - Strongly agree: 61
  - Somewhat agree: 35
  - Disagree: 4
  - Total Agree: 96

- **Black Parents**
  - Strongly agree: 54
  - Somewhat agree: 44
  - Disagree: 3
  - Total Agree: 98

- **Latino Parents**
  - Strongly agree: 63
  - Somewhat agree: 36
  - Disagree: 3
  - Total Agree: 99

- **AAPI Parents**
  - Strongly agree: 63
  - Somewhat agree: 36
  - Disagree: 3
  - Total Agree: 99

Source: Global Strategy Group, May 2023
Large majorities are inclined to believe that making math education more personally relevant and relatable for students of different backgrounds will make it more likely that they succeed in math class.

Making math more relevant and relatable for students of all backgrounds will make them more interested in what they are learning and therefore more likely to do well in math. If students are able to connect to and see themselves in what they are learning in math class, they are more likely to succeed.

There is a place for instruction that incorporates diverse backgrounds and experiences in other school classes, but at its core, math is about numbers. Efforts to bring culture into math classrooms will distract from teaching the fundamentals and making sure students can pass exams.

<table>
<thead>
<tr>
<th></th>
<th>Overall</th>
<th>White</th>
<th>Black</th>
<th>Latino</th>
<th>AAPI</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. Adults</td>
<td>71</td>
<td>29</td>
<td>31</td>
<td>24</td>
<td>29</td>
</tr>
<tr>
<td>Parents</td>
<td>69</td>
<td>31</td>
<td>38</td>
<td>38</td>
<td>38</td>
</tr>
<tr>
<td>Teachers</td>
<td>76</td>
<td>24</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Net Relevant Instruction</td>
<td>+42</td>
<td>+38</td>
<td>+38</td>
<td>+44</td>
<td></td>
</tr>
</tbody>
</table>

Source: Global Strategy Group, May 2023
What is Culturally relevant instruction?
“I think we’ve been asking some of the same old questions, and they haven’t been yielding very much. We’ve been asking what’s wrong with these kids, what’s wrong with their parents, what’s wrong with their culture…I think those are not the right questions. I think we have to begin to ask questions about how might school be very different?”

–Dr. Gloria Ladson-Billings
What is culturally relevant teaching?

“...a pedagogy that empowers students intellectually, socially, emotionally, and politically by using cultural referents to impart knowledge, skills, and attitudes. These cultural referents are not merely vehicles for bridging or explaining the dominant culture; they are aspects of the curriculum in their own right.”

Academic Excellence
Attention must be paid to academic content development as to avoid a “feel good” curriculum that leaves students without the necessary content knowledge.
Cultural Competence
Students must learn how to appreciate and affirm their own culture while developing fluency in at least one other culture.
Cultural Competence and Identity
Critical Consciousness
Students must develop an ability to identify, analyze, and solve real-world problems, particularly problems resulting from societal inequities.
Multiple perspectives of how culture strengthens learning

Culturally Relevant Pedagogy

Culturally Responsive Pedagogy

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Culturally Responsive Pedagogy

“...using the cultural knowledge, prior experiences, frames of reference, and performance styles of ethnically diverse students to make learning encounters more relevant and effective for them. It teaches to and through the strengths of these students It is culturally validating and affirming”

Culturally Responsive Pedagogy

“…routine because it does for Native American, Latino, Asian American, African American, and low-income students what traditional instructional ideologies and actions do for middle-class European Americans. That is, it filters curriculum content and teaching strategies through their cultural frames of reference to make the content more personally meaningful and easier to master. …

radical because it makes explicit the previously implicit role of culture in teaching and learning, and it insists that educational institutions accept the legitimacy and viability of ethnic-group cultures in improving learning outcomes”

Culturally Responsive Pedagogy

Hammond extends this definition as “an educator’s ability to recognize students’ cultural displays of learning and meaning making and respond positively and constructively with teaching moves that use cultural knowledge as a scaffold to connect what the student knows to new concepts and content in order to promote effective information processing.”

Mirrors and Windows

Rudine Sims Bishop, 1990
Rochelle Gutiérrez, 2012

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Why is culturally relevant teaching important?

- Our teaching faculty is 79% white and our student body is only 48% white (2017-18 school year, NCES)
- Multicultural classrooms are ripe for windows, mirrors, and sliding glass doors (Rochelle Gutierrez, Rudine Sims Bishop)
- Asset-based view honoring the cultural funds of knowledge (Marta Civil) that students bring with them from home to the classroom
How do we make math tasks culturally relevant?
Continuum of Culturally Relevant Tasks

Stage 1
Start with good standards-based math and science tasks.

Stage 2
Replace names with ones that are meaningful to your students.

Stage 3
Replace context with one that is engaging to your students.

Stage 4
Empower your students to be agents of change.
Stage 1 Task

Start with a good standards-aligned task

- Achieve the Core
- Illustrative Mathematics
- Nrich
- Youcubed
Stage 2 Task

Replace names with ones that are meaningful to your students.

The robotics club at your school is hosting a fundraiser and plans to sell a slice of pizza with a cup of water for $1.10. If a slice of pizza costs $1 more than the cup of water, how much should each item cost separately.

The robotics club at Westpoint Middle School is hosting a fundraiser. Syretha plans to sell a slice of pizza with a cup of water for $1.10. If a slice of pizza costs $1 more than the cup of water, how much should Syretha charge for each item separately?
Stage 3 Task

There were many women who took part in the movement for civil rights for African Americans. While most people are familiar with how Rosa Parks refused to give up her seat on a bus in Montgomery, Alabama, on December 1, 1955, very few people know that a fifteen-year-old African American girl named Claudette Colvin refused to give up her seat nine months earlier. Because of their treatment on the buses, the African American residents of Montgomery organized a boycott, meaning they refused to ride the buses, until they could sit wherever they wanted to. Therefore, they had to find other methods of transportation to and from work. This provided an opportunity for African American taxi drivers to transport boycotters as an alternative to the buses.

Margot Adler and Phillip Hoose (2013)
Juan Williams (2013)
Stage 3 Task

There were 56 birdhouses at school. Today, 4 classes made more birdhouses. Each class made 8 birdhouses. How many total birdhouses are there now?

Let's say during the boycott, the taxi driver charged 8 cents per passenger. The first hour the driver worked, he made 56 cents. For the second hour, the taxi driver transported 4 people. How much total money did the taxi driver make in the first two hours of work?

Photo by Lubomirkin on Unsplash

Source: Seda & Brown (2021)
Empower your students to be agents of change

- What similar contexts might there be in your school community?
  - Pollinating plants for local bees and butterflies?
  - Grocery store or health care deserts?
  - Resource allocation in the school - bookstore, cafeteria, etc.?

There were 56 birdhouses at school. Today, 4 classes made more birdhouses. Each class made 8 birdhouses. How many total birdhouses are there now?
Stage 4 Task

Empower your students to be agents of change
How do we create tasks that our students can see themselves (and their peers) in?
Tools for Professional Learning Communities
### Culturally Relevant/Cognitively Demanding Rubric

<table>
<thead>
<tr>
<th>Task Level</th>
<th>Description of Mathematical Task Level</th>
</tr>
</thead>
</table>
| Emerging   | Requires considerable cognitive effort in mathematics  
              - Task is mathematically rich and cognitively demanding  
              - The task requires considerable efforts using multiple representations and strategies to develop deep understanding of mathematics  
              - Task content draws from connections to other relevant subjects, disciplines, and concepts. |
| Developing | Requires considerable cognitive effort AND is embedded in cultural/self/community inquiry and activity  
              - The task is centered in real-world situations requiring students to inquire deeply about themselves, their communities, and the world about them  
              - Requires students to draw from, use, and embrace community and cultural knowledge directly in developing strategy and solution process  
              - Task content seeks to add to this knowledge through mathematical activity. |
| Exemplary  | Requires considerable cognitive embedded in cultural inquiry and activity AND targets cultural/self/community empowerment and social justice  
              - The task requires students to examine structure and assumptions of self, community, the world, and its relations in considerations of solutions and strategy limits  
              - Task requires students to examine conditions of opportunity, justice, suffering, and inequity that arise in their communities, schools, and the world around them  
              - Task utilizes mathematical sense-making and the solution processes to help students to develop informed perspectives and take action on real-world issues. |

Source: Adapted from Matthews, Jones, and Parker (2013).

Figure 1.13: The Revised CRCD Mathematics Task Framework

Visit [http://mathedleadership.org/EArsources](http://mathedleadership.org/EArsources) to download a free reproducible version of this figure.
Where does this task fall on the CRCD Rubric?

Two hikers begin hiking the North Dome trail in Yosemite National Park, which is 5¾ miles to the summit. The hikers cover 2⅛ miles before taking a break. They then hike another 1½ miles before taking a second break. How many more miles do the hikers have to go before reaching the summit?

Where does this task fall on the CRCD Rubric?

A water pipe has an outside diameter of 1\(\frac{1}{4}\) inches and a wall thickness of 5/16 inch. What is the inside diameter of the pipe?

Mathematics Task Modification

Stage 4 Task: Empower your students to be agents of change

Sources for Social Justice Contexts
- Engaging in Culturally Relevant Math Tasks: Fostering Hope in the Elementary Classroom
- Mathematics Teachers' Use of the Culturally Relevant Cognitively Demanding Mathematics Task Framework and Rubric in the Classroom
- Rethinking Mathematics: Teaching Social Justice by the Numbers
- Radical Math

Mirrors, Windows, and Sliding Glass Doors

1. This task may act as a mirror for which group of students?
2. This task may act as a window for which group of students?
Peer Feedback

Partner up or make a triad. In this pair or triad…

- When you were modifying your task, what questions emerged that you’d like to get some insights on? Ask your colleagues those questions.
- Review one another’s modifications. What suggestions do you have?
<table>
<thead>
<tr>
<th>Student Action</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interpreting the problem and the underlying social</td>
<td>● Discuss broad social justice issues.</td>
</tr>
<tr>
<td>justice issue</td>
<td>● Consider the cause to the social justice issue.</td>
</tr>
<tr>
<td>Proposing approaches to addressing the social justice</td>
<td>● Identify vital aspects of the context to reach goal.</td>
</tr>
<tr>
<td>problem</td>
<td>● Choose context-based methods for a potential solution.</td>
</tr>
<tr>
<td></td>
<td>● Search for more information.</td>
</tr>
<tr>
<td>Mathematizing the situation and working mathematically</td>
<td>● Use background knowledge and assumptions to mathematically interpret the situation.</td>
</tr>
<tr>
<td></td>
<td>● Write and speak about mathematical representations of the context.</td>
</tr>
<tr>
<td>Validating the solution against contextual constraints</td>
<td>● Verify mathematical results against constraints.</td>
</tr>
<tr>
<td></td>
<td>● Think about realistic implications of their choices.</td>
</tr>
<tr>
<td>Applying the solution to a social justice context</td>
<td>● Report out the mathematical solution with regard to the social justice context.</td>
</tr>
<tr>
<td></td>
<td>● Justify mathematical choices using assumptions about the context.</td>
</tr>
</tbody>
</table>

Source: Hyunyi Jung and Sarah Brand, 2021
Reflections and Implications
We know that the instructional tasks a teacher selects are critically important for the mathematics and science students will learn and the science and mathematical experiences they will have.

Instructional tasks should provide windows, mirrors, and sliding glass doors for students from a variety of cultural backgrounds.

“Culturally relevant” tasks are not found in textbooks, Pinterest, or TPT.

Professional learning is essential.
NCSM Resources
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- October 28-31, 2023 in Washington, DC
- NCSM 2023 Conference will be after NCTM’s Annual Meeting!

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2023 Series: We’re ALL Math People!

- Hosted by Dr. Katey Arrington and Dr. Brian Buckhalter
- New episode on the 11th of each month
- More info: https://www.mathedleadership.org/podcast/
Positioning Multilingual Learners for Success in Mathematics

A joint position statement from NCSM: Leadership in Mathematics in Education and TODOS: Mathematics for ALL (Fall, 2021)

Our Position

NCSM: Leadership in Mathematics Education and TODOS: Mathematics for ALL (TODOS) prioritize policies and practices that position multilingual learners (i.e., children learning mathematics in languages that differ from their students’ first language) so that they can access, engage, and thrive in mathematics education. Accomplishing this will require a systemic approach and investments that influence policies and practices. These include professional development, infrastructure, curriculum, family/community engagement, language development, and mathematics teaching, learning and assessment.

We acknowledge that:

- The use of students’ first language is a human right (Skutnabb-Kangas, 2000) and should be promoted in the mathematics classroom;
- Mathematics is a human activity;
- Race, class, culture, language, and their intersections play key roles in the teaching and learning of mathematics (see The Move)ment to Prioritize Anti-racist Mathematics: Planning for This and Every School Year);
- Multilingual learners should be viewed as students who possess knowledge, strengths, and resources (i.e., asset-based rather than deficit-based lens);
- Every mathematics teacher is a language teacher — particularly the academic language used to formulate and communicate mathematics learning (Lager, 2006); and
- Leaders and teachers from mathematics and second-language acquisition should work collaboratively to accomplish this work, in cooperation with families.
Questions and Comments
Culturally Relevant Tasks

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