



What is Ethnomathematics, and How Can it Help Solve a Math Problem?

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by Tracy Drinkwater

Synopsis: Brazilian mathematician Ubiratan D'Ambrosio coined the term "Ethnomathematics" in 1987. Decades later, we often still see math as separate from culture. How can D'Ambrosio's approach help us change how we teach students who have felt no connection between their lives and the subject of math?

I have loved math since I was a young child. I've always been drawn to puzzles, games and LEGO® sets. I took for granted that these activities were inherently mathematical, and that much of my fluency with math was due to my experiences within my own home and family culture. For most of my life, and especially as a math educator, I have been fascinated by other cultures and how they value and teach mathematics. In my work I have collected stories, videos, and articles about math from around the world and through the centuries. I've been fascinated by how mathematics has been developed throughout history.

Math is often considered a universal language and acultural. However, this can be misleading, as math has been created and discovered to serve the needs of communities. Various cultures throughout history and all over the world have developed methods of counting and measuring. Each method was unique until more and more cultures came into contact with one another through trade, migration, travel and conquest. Communication then necessitated that communities use a common vocabulary and methods. Some ideas were shared, while others were practically stolen – and false credit was given to those who first published the theorems, rather than to



their original source. From the necessity for universal vocabulary to communicate cross-culturally, mathematics came to be viewed as the foundation and universal language for science, engineering and technology. In the process, it came to be viewed as separate from the humanities and culture.

As a Seattle University Instructor teaching *Math Methods* for graduate students in the Master in Teaching program, I discovered the article “What is ethnomathematics, and how can it help children in schools?” by Ubiratan D'Ambrosio¹. I used this article to stimulate discussion in our Culturally and Linguistically Responsive Teaching (CLRT) unit. D'Ambrosio, a Brazil mathematician, explains:

The term ethnomathematics is used to express the relationship between culture and mathematics. The term requires a dynamic interpretation because it describes concepts that are themselves neither rigid nor singular—namely, ethno and mathematics (D'Ambrosio 1987). The term ethno describes "all of the ingredients that make up the cultural identity of a group: language, codes, values, jargon, beliefs, food and dress, habits, and physical traits." Mathematics expresses a "broad view of mathematics which includes ciphering, arithmetic, classifying, ordering, inferring, and modeling" (pp. 2-3). Many educators may be unfamiliar with the term, yet a basic understanding of it allows teachers to expand their mathematical perceptions and more effectively instruct their students.

And so it seems, by having separated math from culture, our American educational system has implemented a procedural and acultural approach to teaching math. And we have failed to reach and teach many of our students, especially those of color. Below is a graph from the Seattle Times representing data for Washington State public school students from before (2019) and during (2021) the COVID-19 pandemic. The data tells the tragic story of how few students in the majority of categories are meeting or exceeding standards in mathematics.²

¹ D'Ambrosio, Ubiratan. “What is ethnomathematics, and how can it help children in schools?” *Teaching Children Mathematics*; Reston; Feb 2001.

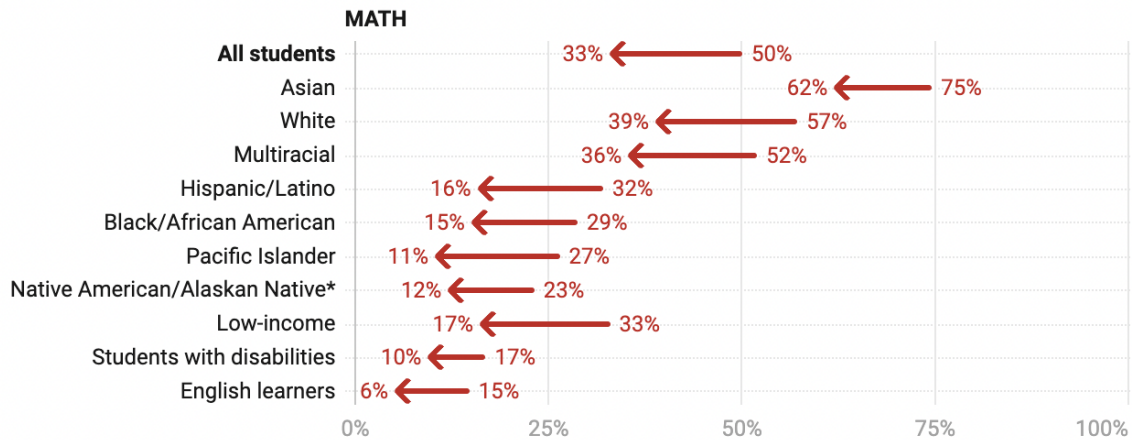
https://www.researchgate.net/publication/284702127_What_is_ethnomathematics_and_how_can_it_help_children_in_schools

² Bazzaz, Dahlia. “Washington Students' Test Scores Drop Significantly in First Exams since Pandemic Began.” *The Seattle Times*, The Seattle Times Company, 18 Jan. 2022.

<https://www.seattletimes.com/education-lab/in-first-assessment-since-the-pandemic-began-washington-student-test-scores-drop-significantly/>



We can see from the results of the most recent test scores in Washington State that we have much work to do with all students, especially BIPOC (Black and Indigenous People of Color) students or whose families are considered low income. Inequities were already present pre-pandemic, and unfortunately the pandemic has exacerbated the challenges of students in all categories.



**Native American/Alaskan Native children saw a particularly steep drop in participation (11 percentage points) between 2019 and 2021.*

Chart: Lauren Flannery / The Seattle Times • Source: Washington Office of Superintendent of Public Instruction

Why are so many of these students needs' not being met? We must work harder in our society to inspire all children to learn math, and be willing to reconsider the methods that our traditional education system uses do not work for so many of our students. Students need to connect math to their daily lives, and to experience math hands-on and in 3D. This typically requires in-person support that has been lacking throughout the pandemic.

I know, as a former teacher in our public schools, it can seem like there is little time for creative approaches like project based learning, and there are no available resources for math related field trips. Teachers are pressured by standardized testing to teach children to repeat specific procedures to get correct answers. Teaching for testing leaves little room to encourage students to use other means to demonstrate an understanding of mathematical concepts – methods such as discussing and arguing why one answer is correct and another is not quite right, or using math to create art and music or writing an essay to prove their mathematical knowledge. Standardized test scores are useful to compare and track achievement, but are they the best way to assess a child's true learning? Or to motivate them to do better?



To engage students, embrace their cultural assets, and inspire them to learn about math, let's examine D'Ambrosio's call to action:

Mathematics is a compilation of progressive discoveries and inventions from cultures around the world during the course of history. Its history and ethnography form a wonderful mosaic of cultural contributions. Today, we too are playing a part in the evolution of the discipline of mathematics. It is time for educators to improve their understanding of the role that culture has played and continues to play in shaping mathematical development. It is time for educators to empower their students with this vital knowledge.³

What can we do to solve this challenging math problem? We can provide more culturally responsive ways for students to approach and learn math. To do this we must start with the belief that all children can learn math, and that positive emotional experiences with math are a key to a student's motivation to learn.

At Seattle Universal Math Museum (SUMM) we aim to provide play-based math, demonstrating the fun and creative nature of the subject, while giving students a hands-on learning experience and access to the historical aspects of mathematics that relate to their ancestries. With this knowledge and experience, students will be more motivated to engage with math. Teachers and parents need to rise to the challenge and be open to a broader approach in teaching, learning and the appreciation of the diversity of the subject of mathematics.

For more information about SUMM, and how we plan to spark each and every person to love math, please visit our website at www.seattlemathmuseum.org.

³ D'Ambrosio, Ubiratan. "What is ethnomathematics, and how can it help children in schools?" *Teaching Children Mathematics*; Reston; Feb 2001.
https://www.researchgate.net/publication/284702127_What_is_ethnomathematics_and_how_can_it_help_children_in_schools