

Rethinking the Standards for Mathematical Practice

by California Mathematics Council, Equity and Social Transformation Committee
Chair Brande Otis: botis@g.ucla.edu

This article calls for the continued evolution of the Standards for Mathematical Practice (SMP), a transformation that reflects the present and heightened need for meaningful mathematics education for all learners.

Content standards, such as the NCTM standards of 1989, focused on the *what* of mathematics, the content to be taught and learned. The Standards for Mathematical Practice focus on the activity of doing mathematics, the *how* of mathematics. The SMP encourage the development of mathematical understanding through productive habits of mathematical engagement and dispositions to problem solving.

We, the California Mathematics Council (CMC) Equity and Social Transformation (EST) Committee, call for a reframing of the Standards for Mathematical Practice to include consideration of the *who* of mathematics. Mathematics is a human activity that shapes people's lives and is shaped by the contexts, experiences, and interests brought to the mathematics by the people involved. The SMP should reflect this.

The Common Core Content Standards and the Standards for Mathematical Practice were built with equity in mind. Educators should teach mathematics that matters in ways that are comprehensible and empowering for students. However, a focus on content and particular mathematical practices limits and ignores the needs, interests, and strengths of students, particularly students from communities that have been historically disenfranchised from a mathematics education that should embrace and enable all students.

The standards for mathematics teaching practice should encourage teachers to make students' lived experience, curiosity, and strengths central to the mathematical activity in their classrooms. We believe that all students should be encouraged to do mathematics that reveals its beauty and depth in ways that reflect who they are and where they come from—their communities and cultures.

Teachers should work from a set of mathematical standards that do not regard students as interchangeable, alike in their manner and their way of learning and doing mathematics.

Standards for Mathematical Practice (SMP)

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable argument and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Teachers should work from mathematical practices that encourage them to see the differences in how students think, see, and work.

Conceptual Framework

To provide a common perspective, enhance collaboration on this project, and support critical analysis of the Standards for Mathematical Practice, we, the members of the California Mathematics Council (CMC) Equity and Social Transformation (EST) committee, chose Culturally Relevant Pedagogy (CRP) (Ladson-Billings 1995) as a common language and set of principles to understand, expand, and critique the existing SMP. Additionally, the work of this committee is well aligned with CRP's focus on upholding the cultural identity of all students while supporting their academic success and providing a pedagogy that not only educates but also empowers.

CRP is supported by three criteria that describe the mindsets and practices of teachers who have been successful at increasing the achievement of African-American students: "... (a) students must experience academic success; (b) students must develop and/or maintain cultural competence; and (c) students must develop a critical consciousness through which they challenge the status quo of the current social order" (Ladson-Billings 1995, p. 160).

The first step in the analysis process was to determine how well the Standards for Mathematical Practice align with each of the criteria

of CRP and identifying points of alignment and misalignment between the CRP and the SMP. We performed this analysis using a matrix combining the three criteria of CRP with the eight SMP.

In cases where we found a misalignment or disconnect between a specific SMP and elements of the CRP theory, we formulated suggestions about how classroom teachers can adapt the respective SMP to make it more culturally congruent and equitable for all students. These suggestions will be presented in a future article in the *ComMuniCator*.

Academic Success

The first criterion of Culturally Relevant Pedagogy, "... all students need literacy, numeracy, technological, social, and political skills to be active participants in a democracy" (Ladson-Billings 1995, p. 160), appears to be the element of CRP most closely aligned with the SMP. Specifically, SMP 1 and SMP 3 can provide opportunities for students from all backgrounds to engage in the types of productive struggle that can lead to a robust and personalized understanding of mathematics content. Explicit attention to mathematical discourse could provide a forum in which students work things out in a democratic fashion while maintaining their cultural identity and leveraging their cultural funds of knowledge. However, it is important to ensure that students who have often been disenfranchised and had fewer opportunities to engage in mathematical discourse are provided equitable access to the appropriate tools (SMP 5) needed to participate fully. We must recognize that the playing field is not always equal and work to ameliorate these disparities.

Cultural Competence

We find more misalignment between Culturally Relevant Pedagogy and the Standards for Mathematical Practice in the areas of cultural competence and critical consciousness. We believe that teachers need to not only include, but also bring to the forefront, the cultural, social, and linguistic tools (SMP 5) that students bring to the classroom and leverage these tools as funds of knowledge for enriching curricula and creating more inclusive classroom practices (SMP 3, 5, and 7). Ladson encourages teachers to "utilize students' culture as a vehicle for learning" (Ladson-Billings 1995). She cites a classroom in which students studied poetry through their familiarity with rap music. She also shared that a teacher invited stu-

dents' parents to teach the class a relevant craft or skill and connected their lessons to mathematics and other curriculum content.

Additionally, educators should recognize that there is no culturally superior or right way of doing and discussing mathematics (SMP 2, 3, 4, 5, 6, 7, and 8) and should work towards understanding and integrating students' frames of reference throughout their application of the SMP.

Critical Consciousness

Finally, students must be able to see mathematics as a tool for liberation and how it has been used as a tool for oppression. For generations, through harmful ideas, policies, and laws, many have used mathematics as a gatekeeper to filter economic access, higher education, and full participation in society to justify oppression, segregation, dehumanization and exploitation of indigenous peoples and communities of color. Teachers may need to go beyond their comfort zones and find meaningful and relevant ways to engage students (SMP 1, 2, 3, 4, and 5) in applying mathematics as a tool for critiquing and challenging the status quo. Students can learn to use mathematics to develop a broader sociopolitical consciousness that allows them to critique the cultural norms, values, mores, and institutions that produce and maintain social inequities.

Ladson's Culturally Relevant Pedagogy provides a useful frame for a reconsideration of the Standards for Mathematical Practice. CRP insists that what students bring to their learning, from their lived experiences, their cultures, and their communities, matters to their learning. SMP that brings the students into that pedagogy, the *who* of the mathematics teaching and learning, should work towards academic success for all, develop cultural competence, and lead to critical consciousness.

There currently appears to be a significant misalignment between CRP and the SMP. In our follow-up article, the CMC EST committee will provide classroom teachers with grade-level specific examples and vignettes illustrating how the SMP can be applied more equitably and aligned with the criteria of CRP and other existing frameworks related to supporting students in culturally diverse classrooms.

Reference

Ladson-Billings, G. 1995. "But That's Just Good Teaching! The Case for Culturally Relevant Pedagogy." *Theory into Practice* 34 (3). https://nationalequityproject.files.wordpress.com/2012/03/ladson-billings_1995.pdf