

Mathematics Education Through the Lens of Social Justice: Acknowledgment, Actions, and Accountability

*A joint position statement from the
National Council of Supervisors of Mathematics and
TODOS: Mathematics for ALL*

Our Position

The National Council of Supervisors of Mathematics (NCSM) and TODOS: Mathematics for ALL (TODOS) ratify social justice as a key priority in the access to, engagement with, and advancement in mathematics education for our country's youth. A social justice stance requires a systemic approach that includes fair and equitable teaching practices, high expectations for all students, access to rich, rigorous, and relevant mathematics, and strong family/community relationships to promote positive mathematics learning and achievement. Equally important, a social justice stance interrogates and challenges the roles power, privilege, and oppression play in the current unjust system of mathematics education—and in society as a whole.

NCSM and TODOS understand that moving forward with social justice demands change in institutional structures, teaching and learning environments, community engagement practices, and individual actions. Incremental approaches to address urgent calls for action have made little difference in how many children experience mathematics in our nation's schools. This is repeatedly documented by the disparities in learning opportunities and outcomes in mathematics education based on race, class, culture, language, and gender. Immediate and transformative change is necessary. These changes must occur in multiple settings and at multiple levels including classrooms, district offices, school boards, universities, legislatures, and communities.

Three components are needed for a just, equitable, and sustainable system of mathematics education for all children. There must be acknowledgment of the unjust system of mathematics education, its legacy in segregation and other forms of institutional systems of oppression, and the hard work needed to change it. The actions taken must be driven by commitments to re-frame, re-conceptualize, intervene, and transform mathematics education policies and practices that do not serve to promote fair and equitable mathematics teaching and learning. And there must be professional accountability to ensure these changes are made and sustained. This is the challenge and work of social justice in mathematics education to do right by our children and move forward together.

What Is Social Justice in Mathematics Education?

Eliminating deficit views of mathematics learning:

Deficit views of historically marginalized children, their families, and communities because of race, class, language, and culture persist in educational conversations and research (Valencia, 2010). In mathematics education this deficit

thinking happens in at least two ways. First, is the continuous labeling of children's readiness to learn mathematics via standardized tests and other institutional tools that position and sanction specific forms of mathematics knowledge. As early as pre-school and kindergarten, research and policy documents use deficit-oriented labels such as "maladaptive" and "immature" strategies to describe black, Latina/o, and poor children's mathematical learning and position them as

already behind their white and middle class peers (Clements & Sarama, 2007; National Research Council, 2000). In practice, the ubiquitous and dehumanizing labels such as “slow kids,” “low kids,” “high kids,” and “bubble kids” persist. The hyper focus on performance and perceived readiness leads to these learning labels fueling teacher and institutional expectations that affect what type of school sanctioned mathematics instruction children receive (Flores, 2007; Gutiérrez, 2008; Gutiérrez & Dixon-Román, 2011). The labels bestow privilege and marginalization leading to a differentiated and unjust mathematics education. A social justice priority in mathematics education is to openly challenge deficit thinking and the institutional tools and practices that perpetuate static views about children and their mathematics competencies. Eliminating the deficit discourse by focusing on learning rather than labels is a key step toward a more just and equitable mathematics education.

Second, deficit thinking implies that students “lack” knowledge and experiences expected by the dominant group. Deficit thinking ignores, dismisses, or casts as barriers mathematical knowledge and experiences children engage with outside of school every day. A social justice approach to mathematics education assumes students bring knowledge and experiences from their homes and communities that can be leveraged as resources for mathematics teaching and learning (Civil, 2007; Gonzalez et al., 2005; Leonard & Martin, 2013; Turner et al., 2012). It also means broadening participation and engagement of children in light of the varied cultural, linguistic, and mathematical competencies they bring to the classroom. And it means to imbue mathematical experiences with opportunities to learn multiple histories of mathematics, analyze issues of fairness, and promote civic responsibility in their own communities and beyond.

Eradicating mathematics as gatekeeper: Mathematics achievement, often measured by standardized tests, has been used as a gatekeeping tool to sort and rank students by race, class, and gender starting in elementary school (Davis & Martin, 2008; Ellis, 2008; Spielhagen, 2011). Historically, mathematics and the perceived ability to learn mathematics have been used to educate children into different societal roles such as leadership/ruling class and labor/working class leading to segregation and separation (Berry, Ellis, & Hughes, 2014; Davis & Martin, 2008; Martin et al., 2010; Stanic, 1987; Tate, 1994; Woodson, 1933/2000). Algebra, in particular, plays a significant and historical role as gatekeeper to more advanced study in mathematics and post-secondary education because of its institutionally sanctioned reputation as the more sophisticated and “abstract” domain

of mathematics (distinct from arithmetic, and foundational to calculus) that only some can or should be able to study (Aguirre, 2009; Spielhagen, 2011). Thirty years of research on curricular tracking and course taking patterns continue to show unequal distributions of resources, course taking opportunities, access to high cognitive demand tasks; and mathematics learning outcomes based on race, class, language, and culture (Boaler, 2002; Cogan, Schmidt, & Wiley, 2001; Flores, 2007; Oakes, 1985/2005; Schmidt, 2004). Research documents that tracking institutionalizes a fixed mindset about students and their capacities to learn mathematics (Boaler, 2015). The detrimental effects of tracking start early in elementary school with readiness labels and ability grouping structures that provide vastly different mathematical experiences. In practice, children placed in “low” groups experience mathematics as an isolating act consisting of fact-driven low cognitive demand tasks and an absence of mathematics discourse opportunities. This is because of a pervasive misguided belief that students must “master the basics” (e.g., know the times tables or “basic facts”) prior to engaging with complex problems solving. In addition, analysis of the findings from the Third International Mathematics and Science Study confirmed that tracking in the United States is unique in its early formal introduction in middle school and splintering of the curriculum leaving students placed in lower tracks with less access to rigorous curriculum and detrimental impacts on student achievement and affect (Schmidt, Cogan, & McKnight, 2011). A consistent finding about tracking is that mathematical rigor, engagement, and dispositions are seriously compromised with long-standing negative effects on educational, work, and income trajectories (Boaler, 2002, 2011; Mosqueda, 2010; Oakes, 2005).

Efforts to de-track mathematics education in schools and districts hold some promise. High expectations, high-quality content, and strong relationships with students and families lead to substantive increases in learning opportunities and outcomes for students (Burriss et al., 2008; Spielhagen, 2011). Yet, many well-documented efforts yielding outstanding results have not been sustained and, in some cases, explicitly dismantled by systemic forces (e.g., the derailing of Railside High School, see Nasir et al., 2014). In addition, there has been some progress made toward equity, especially for girls in mathematics. This improvement is documented by increases in standardized test scores, rigorous course-taking patterns, and undergraduate majors in mathematics (Hyde et al., 2008; National Science Foundation, 2014). Yet, progress for other historically marginalized groups such as poor and non-white racial, ethnic, and cultural groups remain stagnant.

A social justice approach works to transform mathematics from a gatekeeper to a gateway, democratizing participation and maximizing education advancement that equitably benefits all children rather than a select few.

The students historically marginalized in mathematics education and exposed to less rigorous and meaningful mathematics are now the new norm. Currently, over 51% of children attending our nation's public schools live in working class and poor communities (Southern Education Foundation, 2015). Many schools are seeing significant increases in immigrant and multilingual student populations (NCES, 2015). Census enrollment data show that non-white children are now the majority in elementary and secondary public schools (NCES, 2014). In contrast, the demographic profile of mathematics teaching, and by extension its leadership, is predominantly white and middle class. This widening difference raises questions about how a system can change if the workforce charged with the transformation does not reflect the communities it serves, or is unaware of the academic and social needs and resources of all students. The gatekeeping role of mathematics contributes to the lack of diversity in the mathematics education workforce. A social justice approach to mathematics education recognizes this linkage and advocates for the vital inclusion of diverse instructional voices, knowledge, and skills needed to transform mathematics education systems into a more holistic, just and equitable experience for our nation's youth.

Engaging the sociopolitical turn of mathematics education: A social justice commitment to mathematics education highlights mathematics as a dynamic, political, historical, relational, and cultural subject (Gutiérrez, 2013a). Identity and power play central roles in this engagement. Identity as a mathematics learner is dynamic, negotiated, and complex (Martin, 2000). It is constructed from one's beliefs about themselves, as well as, how one is positioned as a mathematics learner by others. Institutional, historical, and cultural forces play a part in the development of a child's mathematics identity over time. One's own agency and voice are also vital to identity construction. The sociopolitical turn in mathematics education interrogates dominant discourses about mathematics, learning, and teaching and attends to the ways that students, parents, teachers, and leaders create counter narratives to deficit-orientations as acts of resistance, identity work, and self-protection. For example, if students are disengaged, a sociopolitical turn questions the current instructional practices and interrelations as possible sources of alienation and seeks out the perspectives of disaffected

students and their families to change the mathematics learning environments and reengage the students.

A sociopolitical turn frames mathematics as both a mirror and a lens to understand the world around us. A sociopolitical turn reflects an explicit openness to multiple meanings of mathematics and mathematical practices that students may bring to the classroom. By valuing and building upon these contributions students see themselves in the mathematics and see mathematics as a more dynamic humanistic and just endeavor (Gutiérrez, 2013a). Furthermore, engaging the sociopolitical turn in mathematics education situates mathematics as an analytical tool to understand, critique, and transform the world (Gutstein, 2006). Mathematics can be used to problem-solve and model real-world phenomena, sociopolitical situations, community issues, and power relationships. Conversely, new mathematics can be learned when facing novel experiences that demand creative quantitative analysis, and culturally based solutions. Thus, facilitating student mathematical proficiencies that transcend textbooks and promote quantitative literacy, civic engagement, as well as individual and collective agency, is a social justice act of mathematics education.

Elevating the professional learning of mathematics teachers and leaders with a dual focus on mathematics and social justice: A social justice approach in mathematics education seeks to actively encourage teachers and leaders of mathematics to deepen their professional knowledge base and instructional practice with mathematics and social justice as a dual focus. An increased understanding of mathematical content knowledge is vital, yet insufficient for 21st century mathematics teaching. Equally important, teachers and leaders need on-going research-based professional learning that focuses on the sociopolitical turn of mathematics education (Gutiérrez, 2010) and mathematical pedagogies that are equitable and culturally responsive (Aguirre, Mayfield Ingram, & Martin, 2013; Aguirre & Zavala, 2013; Gay, 2000; Greer et al, 2009; Moschkovich, 2013). Studies continue to show that equitable practices combined with high expectations, high-quality content, and strong family/community relationships have a positive effect on mathematics learning and achievement (Oakes, 2005; Kitchen et al., 2007). Furthermore, recent research in mathematics teacher education reflects an explicit anti-deficit discourse approach with pre-service and in-service teachers. These studies demonstrate that teachers across the professional spectrum can connect mathematics, children's mathematical thinking, and family/community-based funds of knowledge in their instruction given explicit and strategic

support in professional learning communities (Aguirre et al., 2012; Aguirre & Zavala, 2013; Aguirre, Zavala, & Kantanyoutanant, 2012; Bartell, 2013; Battey & Franke, 2015; Foote, 2010; Leonard et al., 2009; Roth McDuffie et al., 2014; Turner et al., 2012; Wager, 2012). The studies also show how hard this work can be to transform deficit thinking that is institutionally sanctioned and often unquestioned.

Therefore, mathematics teachers and leaders must also be reflective practitioners that critically examine their agency in perpetuating and dismantling institutional structures, policies, and practices that promote systemic inequities in mathematics education. This development of political knowledge must be cultivated as part of social justice in mathematics education (Gutiérrez, 2013a, 2013b).

Three Steps to Implement Our Position Statement: *Acknowledgment, Action, Accountability*

1. ACKNOWLEDGMENT: Mathematics teachers and leaders must acknowledge that the current mathematics education system is unjust and grounded in a legacy of institutional discrimination based on race, ethnicity, class, and gender. Beyond awareness, acknowledgment of the present injustices sets the stage for systemic and teaching innovation that will transform the mathematics education experienced in schools. We must also acknowledge that a commitment to social justice in mathematics education is complex and challenging work. This is due, in part, because some benefit by the current system and the differentiated status associated with it. Giving up privilege is difficult, even if it is the right thing to do. To transform the learning environment, instructional practices and the systemic forces that shape the mathematics experience of our children requires a team effort. Mathematics teachers and leaders must self-reflect on privileges and obstacles in their own mathematics histories, build and exchange ideas, and expand the pool of knowledge resources by partnering with families and communities to make change. Thus, working together is essential to gain intimate, multifaceted knowledge needed to replace the systems of oppression in mathematics education with new systems of equity that promote rich, rigorous, and relevant mathematical experiences for our nation's children.

2. ACTION: Mathematics teachers and leaders must take multiple actions to create and sustain institutional structures, policies, and practices that lead to just and equitable learning opportunities, experiences, and outcomes for children. These actions must be part of a systemic plan for professional learning that strives to democratize mathematics education—an education that is just and equitable for all children.

Below are some actionable items mathematics teachers and leaders can do.

Belief Systems and Structures

- Interrogate individual and societal beliefs underlying the deficit views about mathematics learning and children with specific attention to race/ethnicity, class, gender, culture, and language.
- Refrain from using deficit discourse in professional learning communities and instructional decision making (e.g., placement decision, course offerings, intervention strategies).
- Eliminate tracking systems that sort children based on perceived ability and demographic profile.
- Show evidence that course taking patterns are changing, remedial/intervention courses reduced, and advanced mathematics offerings are more robust and plentiful.
- Increase recruitment and retention of mathematics teachers and leaders from historically marginalized groups.
- Create fair and holistic assessment systems for students and teachers of mathematics that provide productive and timely information on learning, and are free from high stakes pressure, static labeling of students and schools, and arbitrary sanctions.
- Require professional development opportunities that focus on social, cultural, linguistic, contextual, and cognitive facets of mathematics and mathematics learning.
- Create a mathematics vision with accountability mechanisms for the classroom, school, and district that uplifts students to learn rigorous and relevant mathematics.

Curriculum and Instruction

- Cultivate and sustain a positive mathematics identity and affect in students as doers of mathematics (Aguirre, Mayfield Ingram, & Martin, 2013).
- Focus on mathematical strengths and areas of growth with targeted meaningful feedback that promotes learning, not labeling.
- Analyze curriculum for access to high cognitive demand tasks that are meaningful and connected to children’s lived experiences.
- Adapt instruction that routinely connects children’s mathematical thinking and students’ mathematical, cultural, linguistic, and community-based funds of knowledge (Aguirre et al., 2012; Bright et al., 2015; Celedón-Pattichis & Ramirez, 2012; Civil & Turner, 2014; Drake et al., 2015; Turner et al., 2012; Wager, 2012;).
- Include tasks that demand quantitative analysis of fairness and civic engagement issues (Gutstein & Peterson, 2013; Lesser, 2007; Turner & Strawhun, 2007; Turner et al., 2009; Simic Muller et al., 2009).
- Increase use of complex instruction and other participation structures that maximizes mathematical discourse and student contributions while minimizing status issues in the classroom (Featherstone et al., 2011; Horn, 2012; Turner & Celedón-Pattichis, 2011).

Partnering with Families and Communities as Resources for Mathematics Learning

- Go on a community mathematics walk and/or home visit to learn about mathematics knowledge,

practices, and experiences that can customize mathematics lessons.

- Create respectful bi-directional feedback pathways with families to holistically understand how and what their children are learning in mathematics.
- Provide mathematics-specific resources in multiple languages to families through newsletters, parent-teacher conferences, mathematics fairs, parent education events, and internet.
- Strengthen partnerships with faith-based and community organizations that provide additional academic and socio-emotional supports for children in the communities.

3. ACCOUNTABILITY: Actions are hollow unless there is accountability. As professional organizations in mathematics education, NCSM and TODOS commit to supporting and incentivizing mathematics teachers and leaders to create professional learning opportunities and accountability systems that monitor progress of the implementation of actionable items. Multiple venues for this work will increase at the annual professional conferences, webinars, and other professional spaces organized by NCSM and TODOS. Boards will conduct annual audits on implementation progress of social justice actions items and make informed adjustments to professional offerings and resources for its current and future membership and affiliated partners. Advocacy outreach to inform legislatures, funding agencies, and other stakeholders will also increase to maximize resources needed for this work. We must hold the profession and our organizations accountable to making a just and equitable mathematics education a sustainable reality.



*TODOS: Mathematics for ALL
Excellence and Equity in Mathematics*

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