NCTM | NATIONAL COUNCIL OF TEACHERS OF MATHEMATICS

Disrupting "High," "Medium," and "Low" in Mathematics Education

Question: Why is labeling students "high," "medium," and "low" problematic?

Do you, your school, or your district attempt to ensure that all students have access to mathematics learning opportunities that are rigorous, challenging, and affirming of their identities as learners and human beings? At the same time, do you, your school, or your district use terms such as "high," "advanced," "gifted," "below basic," "far below basic," "remedial," and "low" to characterize students' mathematical abilities? These practices are fundamentally incompatible. If our society is to ever make high-quality mathematics teaching and learning for each and every student a reality, the practice of ability labeling must end.

Ability labels are widely used in education and especially in mathematics education. They are connected to cultural beliefs that frame mathematical ability as innate and fixed, positioning some people as "good at math" and others as "bad" at the subject (Boaler, 2016). Furthermore, mathematical abilities are frequently associated with a narrow range of qualities, particularly speed and accuracy in computation (Boaler & Staples, 2008) as well as whiteness, Asianness, and maleness (Martin, 2009). The following declarations highlight problems with these ways of thinking and acting and assert the need for change at many levels of policy and practice.

Ability labels are false.

The development of mathematical understanding over the course of human history and for students in classrooms today relies on diverse and multidimensional ways of thinking, learning, and knowing (Boaler & Staples, 2008; Joseph, 2011). Ability labels obscure and distort this fact, compressing mathematical ability into a single linear scale. For example, a student may be fast and accurate with arithmetic computations but struggle to explain their reasoning. Teachers may label such a student "high" or "advanced" because the predominant culture privileges quick computation as an indicator of mathematical ability. But this label omits many important facets of the student's current strengths and learning needs. Moreover, mathematical thinking, learning, and knowing vary across time and context. For example, students may display fluency with mathematical skills and understandings that are not evident in their classroom participation in out-of-school settings (e.g., Nasir & Hand, 2008; Saxe, 1988). Ability labels obstruct our capacity to notice and build on the varied forms of knowledge that students bring to school and the varied ways they may need support. Rather than accept ability labels at face value then, we must consciously work to challenge the idea that abilities can be summed up with a few words or numbers. We must consciously work to develop more multifaceted, and hence more accurate, understandings of children, their current abilities, and their vast potential.

Ability labels are oppressive.

The history of classifying people by intelligence and ability is inextricably intertwined with the eugenics movement and anti-egalitarian ideas, structures, and practices (Oakes et al., 1997). Given these roots, it should not be surprising that ability labels continue to be applied in ways that reflect and reproduce social hierarchies based on race, gender, dis/ability, language, and class (Martin 2009). For example, research consistently finds that irrespective of mathematics achievement, African American and Latinx students are disproportionately assigned to lower-track classes and special education, while White and Asian students are disproportionately assigned to higher tracks and gifted programs (Mickelson, 2005). Low-tracked students are persistently denied access to ambitious teaching and learning, further exacerbating inequalities within schools (Gamoran, 1992; Oakes, 2005; Mayer et al., 2018) as well as in college admissions and graduation rates (Mickelson, 2015; National Center for Education Statistics, 2017). This matters at the level of broad social organization (e.g., representation in STEM fields) and at the scale of individual students and their access to opportunities, resources, and identities as learners and doers of mathematics as valuable and valued members of our society.

Ability labels are incompatible with current purposes for mathematics education.

NCTM has championed three essential purposes for learning mathematics: developing deep mathematical understanding; learning to understand, question, and critique the world, including its injustices, through mathematics; and experiencing the wonder, joy, and beauty of mathematics (Huinker et al., 2020, p. 11). Ability labels do not support work toward these purposes. Rather, they obstruct it. They imply that students perceived as "high" are more capable than those perceived as "low" of experiencing deep understanding and mathematical joy, and that "high" students are more suited to rich learning opportunities. Indeed, students who are labeled "low" are frequently subjected to rote memorization and drills, while students deemed "high" are more likely to have opportunities for creative, open-ended problem solving (Anyon,; Louie, 2020). At the same time, learning to understand, question, and critique the world and social injustice with mathematics is often framed as unnecessary for students perceived as "high." These students experience few opportunities to engage in such learning, instead, they are accelerated through standardized, decontextualized content. Additionally, by positioning some students with power and voice and others as inferior, ability labels choke the kinds of collaboration that are required for understanding the world and acting on our understanding.

Personal, structural, and systemic changes are all important and necessary.

Undoing the harms of ability labeling is not just an issue of changing our language or implementing a standardized set of "best practices" or policies. It requires sustained action and ongoing learning at every level of our educational system, from individual classrooms to schools, school districts, universities, regions, states/provinces, and the nation. Many curricula, assessments, and instructional practices reproduce stratification—labeling students, their problem-solving strategies, and the learning opportunities they should receive on a scale from "remedial" to "sophisticated" (e.g., test score categories, systems for grouping students based on perceived ability, and strategies for sequencing student work for mathematical discussions). Combating this stratification will require creating corresponding asset-based systems and many

principled actions that cannot be prescribed in advance because they must be responsive to the ever-shifting landscapes of specific schools, classrooms, and communities. Many resources exist to support educators in shifting their thinking and their practice (e.g., Jilk, 2016; Featherstone, 2014; Featherstone et al., 2011; Bush et al., 2020; NCTM, 2018; Huinker et al., 2020; NCSM, 2020; NCSM and TODOS). These resources contain valuable recommendations, such as deliberately looking for strengths, especially in students whose strengths don't seem to align with those that have typically been valued in schools; creating opportunities for students to show their strengths by supporting all students' access to rich content and open-ended problem solving; and keeping support groups flexible and focused on information about students' understanding of specific topics rather than general assessments of ability. However, it is critical that these recommendations not be taken as a checklist or reduced to a set of tasks for individual teachers to complete in isolation. Research has shown how easily well-intentioned reforms may end up perpetuating the same systems they are supposed to disrupt (Louie, 2017, 2020; Rubel, 2017). Meaningful change then, is not about following steps by rote but about building collective capacity—as educators in partnership with students and families—for navigating the ongoing challenges of disrupting ability labels and building on students' strengths.

Making sense of the problems with ability labeling and with more inclusive ways of thinking, acting, designing, and structuring education is not easy. Hierarchical and exclusionary ways of understanding mathematics and mathematical ability are deeply ingrained in the cultural assumptions and systems that dominate our society. Rejecting ability labels is a necessary part of dismantling these harmful assumptions and systems. To create in their place a world in which each and every student thrives in and through their mathematics education, and in which mathematics is a more powerful tool for supporting flourishing life on our planet, we invite educators, youth, policymakers, researchers, and families to imagine such a world and what it would mean to them, and to ask together, "What can we do to make our imagined worlds real?" By building on the full range of knowledge, questions, and goals that people have in all our diversity, we can create new possibilities for ourselves and for future generations.

References

Boaler, J. (2016). *Mathematical mindsets.* Jossey-Bass.

Boaler, J., & Staples, M. (2008). Creating Mathematical Futures through an Equitable Teaching Approach: The Case of Railside School. *Teachers College Record, 110*(3), 608-645.

Bush, Roy, G. J., & Jackson, C. (2020). *Catalyzing change in middle school mathematics: Initiating critical conversations.* The National Council of Teachers of Mathematics, Inc.

Featherstone, H., Crespo, S., Jilk, L. M., Oslund, J. A., Parks, A. N., & Wood, M. (2011). *Smarter Together!: Collaboration and Equity in Elementary Math Classroom*. National Council of Teachers of Mathematics.

Huinker, D., Yeh, C., & Marshall, A. M. (2020). *Catalyzing change in early childhood and elementary mathematics: Initiating critical conversations.* The National Council of Teachers of Mathematics, Inc.

Jilk, L. M. (2016, March 2016). Supporting teacher noticing of students' mathematical strengths. *Mathematics Teacher Educator, 4*(2), 188-199.

Joseph, G. G. (2011). *The crest of the peacock: Non-European roots of mathematics* (3rd ed.). Princeton University Press.

Louie, N. (2017). The culture of exclusion in mathematics education and its persistence in equity-oriented teaching. *Journal for Research in Mathematics Education, 28*(5), 488–519.

Louie, N. (2020). Agency discourse and the reproduction of hierarchy in mathematics instruction. *Cognition and Instruction, 38*(1), 1–26.

Martin, D. B. (2009). Researching race in mathematics education. *Teachers College Record, 111*(2), 295–338.

Nasir, N. S., & Hand, V. (2008). From the court to the classroom: Opportunities for engagement, learning, and identity in basketball and classroom mathematics. *Journal of the Learning Sciences, 17*(2), 143–179.

National Council of Supervisors of Mathematics, & TODOS: Mathematics for All. (2016). *Mathematics education through the lens of social justice ... - todos: Math*. Mathematics education through the lens of social justice: Acknowledgment, actions, and accountability. https://www.todos-math.org/assets/docs2016/2016Enews/3.pospaper16_wtodos_8pp.pdf

National Council of Supervisors of Mathematics. (2020, Spring). *Closing the opportunity gap: A call for detracking mathematics - NCSM*. Closing the Opportunity Gap: A Call for Detracking Mathematics. https://www.mathedleadership.org/docs/resources/positionpapers/NCSMPositionPaper19.pdf

National Council of Teachers of Mathematics. (2018). *Catalyzing change in high school mathematics: Initiating critical conversations. Catalyzing Change Series.* National Council of Teachers of Mathematics.

Oakes, J., Wells, A. S., Jones, M., & Datnow, A. (1997). Detracking: The social construction of ability, cultural politics, and resistance to reform. *Teachers College Record, 98*(3), 482–510.

Rubel, L. (2017). Equity-directed instructional practices: Beyond the dominant perspective. *Journal of Urban Mathematics Education, 10*(2), 66–105.

Saxe, G. B. (1988). Candy selling and math learning. *Educational Researcher, 17,* 14–21.