Asset-Based Perspectives in Mathematics Teaching and Learning

A Joint Position Statement Between the Association of State Supervisors of Mathematics (ASSM) and the Association of Mathematics Teacher Educators (AMTE)

ASSM and AMTE Position

The Association of State Supervisors of Mathematics (ASSM) and the Association of Mathematics Teacher Educators (AMTE) are bringing forth this statement to highlight the need for educators to adopt asset-based practices and perspectives toward mathematics teaching and learning. Asset-based perspectives are essential to fostering positive mathematical identities and students' mathematics learning. To realize this goal, it is critical that teacher educators and state supervisors of mathematics better understand asset-based perspectives to support shifts toward more student-centered teaching and help all students be successful in mathematics.

Introduction

For too long, mathematics education has placed more emphasis on answer-getting than on student reasoning and sense-making (Schoenfeld, 2022). The focus tends to be on distinguishing right answers from wrong, with more time spent on fixing mistakes and what (we think) students do not know. We must explicitly support all those involved with mathematics education to cultivate asset-based perspectives to change this perpetual cycle. Asset-based perspectives start with recognizing that all students bring knowledge, experiences, strengths, talents, and resources to the learning process and can contribute meaningfully. Student thinking is valued, and the teacher facilitates discussions that build on what students know. Asset-based perspectives cultivate an inclusive classroom environment where students see themselves and others as capable learners and doers of mathematics. This is important for all students, but especially students who have historically been marginalized in mathematics education.

Through our aligned efforts across AMTE and ASSM, we recognize that now is the time to highlight the following:

- Asset-based perspectives are essential for mathematics teaching and learning.
- Asset-based perspectives are essential in mathematics curriculum, instruction, and assessment.
- Asset-based perspectives are essential when supporting mathematics teachers and mathematics teacher educators in examining and shifting their practice.

Asset-Based Perspectives Are Essential for Mathematics Teaching and Learning

An asset-based perspective recognizes that all students bring strengths, talents, and resources to the learning process and that building on students' diverse abilities, experiences, and cultural backgrounds is important. This idea of recognizing students' strengths and lived experiences has connections to many frameworks, including culturally sustaining pedagogy (Paris, 2012), funds of knowledge (Moll, 1992), and growth mindset (Dweck & Yeager, 2019). These frames share a common recognition that all students bring important resources to their mathematics learning and are capable of learning important mathematical ideas with time, effort, and appropriate supports. An asset-based perspective builds on and extends those frames by inviting teachers to explicitly identify student assets and take pedagogical actions that deliberately build on those assets in the service of new mathematical learning.

An asset-based approach to mathematics learning is essential for several reasons. Building on students' strengths and talents allows them to take ownership of their learning and feel capable (Jilk, 2016; Kobett & Karp, 2020). By honoring the cultural background and traditions of students we can promote inclusive practices and classroom environments. By recognizing that students have unique needs, we can prioritize personalized approaches to instruction, making learning more meaningful to students. Promoting a positive mindset among students can foster a sense of self-efficacy and resilience (Sun, 2018). Within a collaborative learning environment, students can share their talents and knowledge and support each other as they build a skill set for learning that can be used beyond the math classroom. By embracing an asset-based perspective educators can create learning environments that promote academic success and social-emotional development.

Asset-Based Perspectives Are Essential in Mathematics Curriculum, Instruction, and Assessment

Many current mathematics curriculum, instruction, and assessment practices are founded on deficit perspectives. Decontextualized, one-size-fits-all curriculum, inflexible pacing guides, and high-stakes testing disregard students' cultural and familial funds of knowledge and leave little space or time for students to see themselves as doers of mathematics. Instead, we must move away from a focus on hierarchical, decontextualized skills toward open problems that provide all students access to rich mathematics and allow them to experience success. These curricular shifts must be coupled with instructional practices such as culturally relevant pedagogy (Ladson-Billings, 1995) and intentionally designed group work (Cohen & Lotan, 2014) that encourage students to draw on their prior experiences and community-based knowledge and emphasize collaboration. To enact these practices, teachers should be provided with guidance, support, and opportunities to collaborate. Instructional leaders must not only ensure teachers have professional learning opportunities to rehumanize and contextualize mathematics, they must also examine state and district policies to determine the extent to which they support these practices. More importantly, as instructional leaders across our systems, we must advocate for continuous

learning for policymakers and change agents who can enact policies that support asset-based approaches.

Due to the high-stakes nature of standardized assessments, educators and leaders must advocate for assessments that highlight student thinking and strategies. An asset-based approach to assessment requires that educators and leaders understand the purpose of the assessments being given, as well as how to view the evidence through the lens of "What do the students know and understand? Does the assessment evidence highlight students' mathematical understandings or does it merely reveal areas where students' performance was inaccurate or below grade level?" Formative assessment practices allow educators to collect evidence of student learning that can inform their instruction in the moment, while summative assessment provides a snapshot of what students know at one particular moment in time. Educators and leaders need to advocate for using formative assessment in the classroom and for quality summative assessments that highlight students' understanding. Supporting the proper use of summative assessment data (i.e. improving instructional programs for the upcoming year by providing a benchmark of student learning) will help shift educators' mindsets to a more asset-based approach.

Asset-Based Perspectives are Essential When Supporting Mathematics Teachers and Mathematics Teacher Educators in Examining and Shifting their Practice

Supporting teachers in moving toward more asset-based perspectives in the classroom is most effective when the school, district, and state culture includes ongoing discussions and shifts at all levels. Mathematics teacher educators and leaders work in partnership with classroom teachers to make and sustain these changes.

At the classroom level, mathematics educators must recognize that language matters and is an important component of teachers' daily work that fosters asset-based perspectives. Deficit-based language can be persistent, and educators must recognize and avoid broad labels for groups of students (NCTM, 2023). These labels are harmful to students and their mathematical identities (Muhammad, 2020). Mathematics teacher educators should integrate attention to language into teacher preparation and professional development contexts. Teachers, educators, and leaders make an impact when they are prepared with tools and language that productively disrupts deficit language when it arises in these contexts. Local, state and national leaders should provide teachers, schools, and districts with briefs that discuss asset-based language.

Mathematics teacher educators and supervisors of mathematics should model and support teachers and preservice teachers in leveraging students' mathematics language assets as compared to a rigid insistence on the exclusive use of mathematics terminology. Moving between informal and formal mathematical language honors the assets students bring to the classroom and supports the content's conceptual and procedural development. They should also explicitly support pedagogical practices that leverage student assets. The effective mathematics

teaching practices described by NCTM (Boston et al., 2017; Huinker & Bill, 2017; NCTM, 2014; Smith, Steele, & Raith, 2017) are good examples of instructional routines that are student-centered and support asset-based perspectives. Planning frameworks like the *5 Practices for Orchestrating Productive Mathematical Discussions* (Smith, Steele, & Sherin, 2020) can also be useful in helping teachers plan instruction that is culturally relevant, collaborative, and centers students' mathematical ideas.

Moving beyond the classroom, schools, districts, and communities must also embrace asset-based perspectives in teaching mathematics. In particular, mathematics teacher educators and leaders must support educators in developing outreach to counter deficit-based narratives that are popular in communities (e.g., it is ok to be "bad at math"), as well as showcasing the practices teachers are using in math class to solicit and build on student assets. Further, connecting to family and community mathematical assets and advocating for positive mathematical messages to the broader community can be effective ways to develop asset-based systems (e.g., Adams 2021; Civil & Quintos 2022).

Actionable Recommendations

We encourage state supervisors of mathematics to:

- Message the importance of asset-based perspectives to all those involved in mathematics teaching and learning
    a. Support educational leaders in using the assets of teachers to support them in recognizing and using student strengths and learning styles to prioritize personalized approaches to instruction.
    b. Provide resources and professional learning opportunities that cultivate asset-based learning environments that promote academic success and social-emotional development.
    c. Develop standards and practices that enhance student ownership and increase students' mathematical identity.
- Embed explicit attention to asset-based approaches in policy and practice related to curriculum, instruction, and assessment
- Develop and deploy teacher learning opportunities that support asset-based shifts in mathematics teaching and learning

We encourage mathematics teacher educators to:

- Attend to teacher strengths/assets in teacher preparation and professional development, so that teachers can in turn recognize and leverage the assets/strengths that students bring to the classroom.

- Support teachers in reflecting on current practices with respect to asset-based perspectives and identify aspects of curriculum, instruction, and assessment that do and do not reflect asset-based perspectives.
- Design, provide, and disseminate professional learning to support shifts toward asset-based practices.

We encourage mathematics teachers to:

- Examine and/or create their Core Values and beliefs about student assets and ensure their values align with their instruction and assessment practices.
- Incorporate principles of "wise feedback" (Yeager et al., 2014) that includes building trust & expressing belief that students are capable of meeting high standards.
- Acknowledge and value students' developing understandings in the course of instruction.
- Provide opportunities for students to engage in grade-level content and rigorous problem solving (Aguirre, Mayfield-Ingram, & Martin, 2024).
- Connect with colleagues in districts, universities, and other education service providers to develop and share classroom practices that support asset-based perspectives.

References

Adams, M. (2021). *When we relate: Towards a people-centered methodology for classroom-B\based research*. The Ohio State University.

Aguirre, J., Mayfield-Ingram, K., & Martin, D. B. (2014). *Impact of identity in K–12 mathematics: Rethinking equity-based practices* (expanded edition). National Council of Teachers of Mathematics.

Boston, M. D., Dillon, F., Smith, M. S., & Miller, S. (2017). *Taking action: Implementing effective mathematics teaching practices in grades 9-12*. National Council of Teachers of Mathematics.

Civil, M., & Quintos, B. (2022). Mothers and children doing mathematics together: Implications for teacher learning. *Teachers College Record, 124*(5), 13-29. https://doi.org/10.1177/01614681221105008

Cohen, E. G., & Lotan, R. A. (2014). *Designing groupwork: strategies for the heterogeneous classroom third edition*. Teachers College Press.

Dweck, C. S., & Yeager, D. S. (2019). Mindsets: A view from two eras. Perspectives on Psychological Science, 14(3), 481–496. https://doi.org/10.1177/1745691618804166

Huinker, D. & Bill, V. (2017). *Taking action: Implementing effective mathematics teaching practices in grades K-5*. National Council of Teachers of Mathematics.

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

Kobett, B.M. & Karp, K.S. (2020) *Strengths-Based Teaching and Learning in Mathematics: Five Teaching Turnarounds for Grades K-6.* Corwin.

Ladson-Billings, G. (1995). Toward a Theory of Culturally Relevant Pedagogy. *American Educational Research Journal, 32*(3), 465-491.

Moll, L. C. (1992). Bilingual classroom studies and community analysis: Some recent trends. *Educational Researcher, 21*(2), 20-24.

Muhammad, G. (2020). *Cultivating genius: An equity framework for culturally and historically responsive literacy*. Scholastic.

National Council of Teachers of Mathematics (2014). *Principles to actions: Ensuring mathematical success for all.*

NCTM (2023). Ability Labels: Disrupting “High,” “Medium,” and “Low” in Mathematics Education. https://www.nctm.org/Standards-and-Positions/Position-Statements/Ability-Labels_-Disrupting-%E2%80%9CHigh,%E2%80%9D-%E2%80%9CMedium,%E2%80%9D-and-%E2%80%9CLow%E2%80%9D-in-Mathematics-Education/

Paris, D. (2012). Culturally sustaining pedagogy: A needed change in stance, terminology, and practice. *Educational Researcher, 41*(3), 93-97.

Schoenfeld, A. H. (2022). Why are learning and teaching mathematics so difficult?. In *Handbook of cognitive mathematics* (pp. 1-35). Cham: Springer International Publishing.

Smith, M. S., Steele, M. D., & Raith, M. L. (2017). *Taking action: Implementing effective mathematics teaching practices in grades 6-8*. National Council of Teachers of Mathematics.

Smith, M. S., Steele, M. D., & Sherin, M. G. (2020). *The five practices in practice: Successfully orchestrating mathematics discussions in your high school classroom*. Corwin.

Sun, K. L. (2018). Brief report: The role of mathematics teaching in fostering student growth mindset. *Journal for Research in Mathematics Education, 49*(3), 330-335.

Yeager, D. S., Purdie-Vaughns, V., Garcia, J., Apfel, N., Brzustoski, P., Master, A., ... & Cohen, G. L. (2014). Breaking the cycle of mistrust: Wise interventions to provide critical feedback across the racial divide. *Journal of Experimental Psychology: General, 143*(2), 804.

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