

High Expectations in Mathematics Education

A Position of the National Council of Teachers of Mathematics

Question: What does it mean to teach mathematics with high expectations?

NCTM Position

To teach mathematics with high expectations means that teachers (1) recognize that each and every student, from prekindergarten through college, is able to solve challenging mathematical tasks successfully; (2) build in each student a positive mathematical identity and a sense of agency; (3) design instruction that builds on students' prior knowledge and experiences; (4) teach in ways that ensure that each and every student is reasoning and making sense of mathematics on a daily basis; and (5) reflect on ways that tasks and teaching can be improved to provide greater access, challenge, and support for every learner.

Students bring to the classroom a diversity of mathematical understanding and backgrounds that can be tapped to enhance learning for each and every student (Donovan & Bransford, 2005). Different students exhibit strengths on different types of mathematical problems and in different topics in mathematics. These individual student strengths should be used to support students' learning and their identity development as accomplished learners of mathematics. Classroom experiences that build mathematical communities to solve problems, communicate reasoning, and make sense of mathematics are key to teaching mathematics with high expectations.

As students engage in challenging tasks, meeting high expectations requires effort on their part (Willingham, 2009; Bransford, Brown, & Cocking, 2000). Challenging tasks are at the core of lessons focused on mathematical reasoning, problem solving, and sense making, and these tasks help motivate students to learn more (Stein, Remillard, & Smith, 2007; Silver & Stein, 1996; Stein, Grover, & Henningsen, 1996). From an early age, students must have opportunities to engage in challenging tasks. Such tasks should be used to launch and sustain learning throughout an instructional unit rather than being postponed until the end of the unit. Engaging students in the practices addressed in the Common Core Standards for Mathematical Practice throughout lessons can support them in approaching the challenging tasks and engaging in the reasoning and sense making that are necessary to be successful with these tasks (NCTM, 2014).

Teachers must challenge students to persevere in order to give them the experience of success in meeting high expectations. Thoughtful and purposeful planning is key (e.g., anticipating misconceptions, considering different strategies, generating questions that students might ask) in supporting student perseverance and success (NCTM, 2014). Providing feedback to students during the learning process supports their productive struggle (NCTM, 2014) in meeting the high expectations of a coherent curriculum.

Teaching with high expectations means giving each and every student access not only to challenging tasks but also to challenging courses and curricula (Stiff, Johnson, & Akos, 2011; Tate, 2005). This does not necessarily mean that courses are difficult or accelerated but does mean that they consistently make reasoning and problem solving the focus for each student. Teaching mathematics with high expectations for all students in mathematical reasoning, sense making, and problem solving invites students to learn to identify assumptions, develop arguments, and make connections within mathematical topics and to other contexts and disciplines.

References

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