

Research-Informed Answers for Mathematics Education Leaders

Improving Student Achievement in Mathematics for Students with Special Needs

Improving educational results for children with disabilities requires a continued focus on the full implementation of IDEA to ensure that each student's educational placement and services are determined on an individual basis, according to the unique needs of each child, and are provided in the least restrictive environment. The focus must be on teaching and learning that use individualized approaches to accessing the general education curriculum and that support learning and high achievement for all.

Individuals with Disabilities in Education Act (IDEA), 2000

Our Position

It is the position of the National Council of Supervisors of Mathematics that in order to improve the achievement of students with special needs, educators must truly believe that all students can learn rigorous mathematics. When this foundational belief is in place, educators can embrace the learning issues of students with special needs in order to provide effective instruction and develop productive lessons. Sustained and frequent collaboration between classroom teachers and special educators must occur in order to create the conditions leading to success in mathematics for all students. This position can be accomplished when all mathematics teachers and leaders:

- Believe students with special needs can learn rigorous mathematics and deserve a *chance to learn* high quality and higher order mathematics.
- Research and deepen their understanding of the learning issues inherent to students with special needs.

- Create a nurturing classroom environment that supports and responds to learning issues students with disabilities confront on a daily basis.
- Use strategic customization of instructional practices in order to help students access knowledge in their preferred learning style and at their readiness level.
- Provide district and school-wide structures that promote collaboration between regular education and special education teachers in order to obtain the necessary support and success for students with disabilities.
- Provide multiple opportunities for students to practice and acquire fundamental skills and understandings.

Research that Supports our Position

"...all students must have access to the highest-quality mathematics instructional programs."
(NCTM, 2000, p. 5).

The NCSM Improving Student Achievement Series is a set of position papers designed to provide research-based practices for school and district mathematics education leaders.

The National Research Council describes current assumptions that some teachers have about special

education students. “It has long been assumed that children with moderate, mild, and borderline mental retardation or learning disabilities are not capable of meaningful or conceptual mathematical learning and, thus, unlike other children, have to be taught by rote.” (Kilpatrick, et al. 2001).

Accordingly, teachers need to better understand the nature of the students’ mathematical disabilities and reevaluate their perceptions or beliefs about the learning capabilities of these students. Leaders in mathematics education must confront the inappropriate use of labels that have been used to describe students with special needs and replace the casual labeling of students as “lazy, dumb, special needs, ADD and not capable” that result in lower expectations and less engagement, with more diagnostic language describing the learning requirements of the students. Diagnostic language such as “a student has a visual spatial learning issues and struggles to interpret graphs,” or “a student has conceptual issues and can identify a pattern, but is not able to generalize it” helps define the learning needs of individual students and necessary next steps. Students who are labeled often become dependent on teachers, refuse to engage in a problem until help is available, and thus demonstrate a *learned helplessness*. Teachers consequently view students as passive and often continue to lower the expectations for these students (Parmar & Cawley, 1991). This is a vicious cycle that is difficult to disrupt.

Research also points to three important needs that must be met in order for struggling learners to achieve success in the K-12 mathematics curriculum: 1) teachers who are committed to ensuring that they learn mathematics; 2) teachers who have a conceptual framework for why struggling learners have difficulties learning mathematics; and 3) teachers who use instruction that addresses student learning needs, thereby allowing them to understand mathematics (Allsopp, et al, 2008).

Research studies also demonstrate that students with disabilities who are placed in general education

classrooms benefit both academically and socially (Baker, 1994; Rea et al, 2002). Collaboration between the mathematics teacher and the special education teacher is a critical component to the success of an inclusion program. Research studies have shown that co-teaching can be an effective model for students with and without special needs (Cole, 1992; Coombs-Richardson et al, 2000; Henderson, 2002). Moreover, Mutch-Jones (2004) found that collaboration between general education teachers and special education teachers fostered:

- A broader and deeper understanding of mathematics content;
- Development of better questions about mathematical thinking and mathematics curriculum to ask students because of the collaboration;
- Expanded ways of thinking about student abilities and needs.

The acknowledgement of learner differences and the willingness of teachers to further examine the complexities of the learners’ engagement with the mathematics help teachers create safe and productive learning environments. Two important instructional strategies working in combination that can facilitate a supportive learning environment are: 1) scaffolding the learning experience by moving from concrete stages of understanding to more abstract comprehension and 2) incorporating both receptive and expressive response formats when asking students to demonstrate mathematical understandings (Allsopp, et al, 2008).

With the wide range of learners appearing in today’s classrooms, instructional practices need to engage students in the learning of mathematics. To accomplish this, instruction must be aligned with the strengths of the learners. Teaching, therefore, calls for an extended repertoire of instructional practices that are well known and used by general education and special education teachers throughout the school year. Relevant instruction that permits compensatory strategies can help students reach higher levels

of mathematical understanding (Berch, 2007). A “... goal for all students is that they develop and a relational understanding of mathematics ideas. This type of understanding is best developed by instruction that engages students in the processes of doing mathematics (using mathematical understandings in meaningful ways to develop deeper, more connected mathematical knowledge) in contrast to instruction that emphasizes the learning of isolated mathematical concepts and skills.” (Allsopp et al, 2008).

Strategic customization of instructional practices and effective use of accommodations are important in meeting the needs of a wide range of students, particularly students with special needs. “The purpose of accommodations is to allow students with disabilities to demonstrate their knowledge on assessments without interference from their disabilities, as their nondisabled peers are able to do, while not giving students with disabilities an unfair advantage over their peers.” (Edgemon, et al, 2006). This customization may include an adjustment to the pace of a lesson or unit, or the allowance for built-in scaffolds or supports as part of the regular mathematics learning experience. “Typical accommodations include changes in time or schedule of the assessment; test directions; presentation of questions; student response to questions; and test setting.” (The Center for Innovations in Special Education, 1998). Additionally, strategic use of instructional materials, such as manipulatives, graphic organizers specific to mathematics, visuals, and models are necessary for supporting conceptual understanding of the mathematics and providing students with a solid foundation for the continuous learning of mathematics.

How NCSM Members can Implement our Position

NCSM members must act to create and sustain the conditions and structures that will enable students with special needs to successfully participate in and learn rigorous mathematics throughout the

schooling years. To create successful learning opportunities for students with special needs, teachers of mathematics and special education teachers must join forces within a learning community and face this situation collaboratively. More specifically, NCSM members should:

1. *Cross the aisle* to collaborate closely and frequently with school leaders in special education in order to:
 - jointly provide high quality professional development for all teachers and teacher teams.
 - create an essential professional learning community in which teachers of mathematics and special education focus on understanding the learning issues for students with special needs, deepen the math content knowledge of teachers, and examine in-depth district-wide mathematics standards, for curriculum, instruction and assessment.
 - use effective accommodations to instructional materials that maintain the integrity of the mathematics while making the mathematics more accessible to a wide range of students.
2. Use teacher teams to develop and implement an expanded range of instructional practices including assessments that facilitate student learning of rigorous mathematics aligned to student’s strengths, such as:
 - more student centered learning, including effective group work and interactive tasks particularly when working on problem solving tasks.
 - use of visual representations to uncover underlying mathematical concepts.
 - use of technology that allows students to interact with the mathematical concepts.
 - opportunities for students to practice fundamental and essential skills.

3. All teachers and teacher teams commit to a diagnostic approach of students' learning issues, and use strategies that align with the students' strengths while addressing difficulties when learning mathematics, such as:

- understanding misconceptions and barriers that occur for students with learning difficulties.
- providing scaffolds that support access to the math concepts and skills that are aligned to students' learning barriers in specific concepts or lessons.
- employing strategies that address issues of language in mathematics.
- modeling approaches to understanding concepts and skills, including verbalization when solving problems.
- using visuals and regularly refer to them during instruction and learning activities.

Ultimately, it is the responsibility of the school mathematics leader to mobilize with every mathematics teacher to understand and prepare for the issues of social justice inherent to denying students with special needs the access and opportunity to learn mathematics at a high level. It should be the desire and pursuit of every high performing mathematics program to ensure gains in the mathematics achievement of all special needs students through the systemic and sustained effort to provide a differentiated instructional and assessment plan as needed.

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National Council of Supervisors of Mathematics

Mission Statement

The National Council of Supervisors of Mathematics (NCSM) is a mathematics leadership organization for educational leaders that provides professional learning opportunities necessary to support and sustain improved student achievement.

Vision Statement

NCSM envisions a professional and diverse learning community of educational leaders that ensures every student in every classroom has access to effective mathematics teachers, relevant curricula, culturally responsive pedagogy, and current technology.

To achieve our NCSM vision, we will:

- N: Network and collaborate with stakeholders in education, business, and government communities to ensure the growth and development of mathematics education leaders
- C: Communicate to mathematics leaders current and relevant research, and provide up-to-date information on issues, trends, programs, policies, best practices and technology in mathematics education
- S: Support and sustain improved student achievement through the development of leadership skills and relationships among current and future mathematics leaders
- M: Motivate mathematics leaders to maintain a life-long commitment to provide equity and access for all learners

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