

Connecticut State Board of Education
Hartford

Position Statement on Mathematics Education

Adopted May 6, 2009

The Connecticut State Board of Education believes that a high-quality, comprehensive prekindergarten-Grade 12 mathematics education is essential for students to become mathematically literate. To be mathematically literate, one must understand major mathematics concepts, possess computational facility and have the ability to apply these understandings to situations in daily life. Making connections between mathematics and other disciplines is a key to the appropriate application of mathematics skills and concepts to solve problems. The ability to read and write within the discipline of mathematics is an integral skill that supports mathematical understanding, reasoning and communication. Mathematically literate persons are able to make informed decisions about the world around them and have the interest and confidence to meet an increasingly quantitative, data-rich global society's needs and challenges.

By the end of high school, students must be prepared to think critically, compute, reason, communicate and solve problems to ensure success in life. In addition, greater numbers of students need to be prepared to pursue careers in science, technology, engineering and mathematics (STEM) to help support the competitiveness and economic viability of their state and nation.

The Board believes that a quality mathematics education must be part of the core curriculum for all Connecticut students to become mathematically literate. The core curriculum must be rigorous and focused on developing key mathematical concepts and skills as described in the state mathematics standards and curriculum documents. Highly qualified professionals must deliver the mathematics curriculum to the classroom's diverse learners through effective instruction. Further, students need to be engaged in the mathematics curriculum and, as a result, view mathematics as a language that helps them to understand and organize their world.

To accomplish these goals, the Board supports a balanced approach to mathematics education, which places equal importance on conceptual understanding, computational and procedural fluency and problem solving through a variety of strategies, tools and technologies. Adequate time and appropriate resources must be provided for this specialized instruction. To use time and resources effectively, administrators, teachers and other staff members must have opportunities to participate in ongoing, job-embedded professional development to support instruction and student engagement.

Meaningful partnerships among families, school districts, community organizations, businesses, industries and universities strengthen mathematics education. Each of these stakeholders is necessary to fulfill the Board's vision of mathematics education as preparation for life, advanced studies and careers for all students. To sustain this collaborative effort, the Board developed "Guidelines for Policymakers," a set of recommendations describing the roles and responsibilities for a high-quality, comprehensive prekindergarten-Grade 12 mathematics education program. These guidelines are outlined in a corresponding document.

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Components of a High-Quality Mathematics Education System: Guidelines for Policymakers

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The Connecticut State Board of Education, in its 2009 Position Statement on Mathematics Education, calls for a systematic approach to ensure every Connecticut student receives a high-quality, comprehensive, prekindergarten-Grade 12 mathematics education. The Board provides the following guidelines to support this work and the collaboration among the state's various stakeholders.

Department of Education Responsibilities:

1. Provide a vision for prekindergarten-Grade 12 mathematics instruction aligned with national standards and the requirements for entry into postsecondary study and careers.
2. Establish prekindergarten-Grade 12 mathematics curriculum framework; standards; curriculum models; instructional strategies; sample lesson plans; and formative and summative assessments, which clearly identify an aligned, coherent developmental progression of key mathematical concepts and skills for all Connecticut's public school students.
3. Develop state assessments that are aligned with the learning expectations described in the mathematics curriculum framework.
4. Provide focused mathematics professional development opportunities for all Connecticut educators.
5. Recognize and disseminate research and best practices related to mathematics education.
6. Establish standards that ensure all Connecticut mathematics teachers are highly qualified.
7. Partner with the community, higher education institutions, businesses and industries to develop programs that support student interest and mathematics learning in and beyond our schools.
8. Support families as partners to develop mathematical literacy.

School District Responsibilities:

1. Implement high-quality, comprehensive district prekindergarten–Grade 12 mathematics curriculum, instruction and assessments aligned with state expectations.
2. Provide all students with the adequate time and support to learn mathematics.
3. Examine data to determine gaps in mathematics achievement and establish practices to eliminate these gaps in achievement.
4. Provide all teachers and all students with high-quality instructional resources, including manipulatives, tools and technology.
5. Provide students technological access to mathematics coursework through online programs.
6. Ensure the integration of mathematics content within students' learning experiences across content areas.
7. Provide administrators, teachers and staff members with ongoing, job-embedded mathematics professional development opportunities focused on content, pedagogy and cross-content connections.
8. Employ highly qualified mathematics teachers and make appropriate use of teachers who have specialized mathematics training.

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9. Provide mathematics teachers time to collaborate and develop high-quality mathematics lessons and formative and summative assessments.
10. Provide all teachers opportunities to meet, evaluate student work and analyze data to inform instruction and improve student achievement.
11. Partner with the community, higher education institutions, businesses and industries to develop programs that support student interest and learning of mathematics in and beyond our schools.
12. Support families as partners to develop mathematical literacy.

Early Childhood

1. Provide a high-quality, comprehensive program to support a solid mathematical literacy foundation for all learners.
2. Provide personnel affiliated with early childhood programs opportunities to participate in high-quality, job-embedded professional development.
3. Provide administrators, teachers and staff members opportunities to use scientifically based methods to gather and use information about developing children's understanding of mathematics.
4. Provide a learning environment rich in resources and materials that support the development of mathematics concepts and skills according to students' learning needs.
5. Ensure the integration of mathematics content within students' learning experiences.
6. Support families as partners to develop mathematical literacy.

Elementary

1. Ensure adequate daily instructional time for mathematics.
2. Provide a learning environment and experiences rich in resources and materials that support development of mathematical literacy.
3. Maintain class sizes to support instructional excellence.
4. Provide students developmentally appropriate opportunities to question, explore, observe, synthesize and draw conclusions based on their mathematics understanding.
5. Provide students opportunities to develop literacy skills and read varied, culturally responsive fiction and nonfiction texts in the mathematics classroom.
6. Ensure the integration of numeracy instruction within the context of students' learning experiences in other disciplines.
7. Provide administrators, teachers and staff members opportunities to use scientifically based methods to gather and use information about developing students' understanding of mathematics.
8. Provide supplemental and intensive mathematics intervention and enrichment based on individual students' learning needs.
9. Engage students in mathematics competitions and enrichment activities.
10. Support families and the community as partners to develop mathematical literacy.

Secondary

1. Provide adequate time and a positive environment to support student learning.
2. Maintain class sizes to support instructional excellence.
3. Ensure all students have access to a variety of advanced mathematics courses and opportunities to experience college-level curriculum.

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4. Provide students opportunities to develop literacy skills and read varied, culturally responsive fiction and nonfiction texts in the mathematics classroom.
5. Provide students opportunities to explore science, technology, engineering and mathematics (STEM) careers (e.g., software analyst, actuary, biostatistician, engineer, investment banker).
6. Ensure the integration of mathematics content within the context of students' learning experiences in other disciplines.
7. Provide administrators, teachers and staff members opportunities to use scientifically based methods to gather and use information about developing students' understanding of advanced mathematics.
8. Provide supplemental and intensive mathematics intervention and enrichment based on individual students' learning needs.
9. Engage students in mathematics competitions and enrichment activities.
10. Support families and the community as partners to develop mathematical literacy.

Administrators' Responsibilities Prekindergarten–Grade 12:

1. Provide safe, effective learning environments at all levels.
2. Provide varied instructional materials and supporting technology at all levels.
3. Provide students technological access to mathematics instruction through online programs.
4. Remain current in mathematics content, pedagogy and cross-content connections.
5. Provide teachers and staff members opportunities for ongoing, job-embedded mathematics professional development focused on content, pedagogy and cross-content connections.
6. Implement a system of support for all students that includes supplemental and intensive mathematics intervention and enrichment.
7. Appropriately assign highly qualified mathematics teachers who are knowledgeable about content and pedagogy.
8. Recruit and train mathematics teacher leaders to coordinate and support mathematics instruction at all grade levels.
9. Provide mathematics teachers time to collaborate and develop high-quality mathematics lessons and formative and summative assessments.
10. Provide all teachers opportunities to meet, evaluate student work and analyze data to inform instruction and improve student achievement.
11. Create and maintain partnerships with families, higher education, businesses and industries.
12. Encourage student interest and achievement in mathematics and other STEM-related careers.

Teachers' Responsibilities:

1. Understand and use the mathematics curriculum, current research in mathematics instruction and the applications of mathematics.
2. Create supportive classrooms that enable students to meet rigorous standards and develop mathematical literacy.
3. Plan units and lessons to accommodate students with diverse needs, abilities and interests.
4. Use effective teaching strategies and appropriate materials, tools and technologies to engage students in learning mathematics.
5. Challenge students to think critically, communicate their understanding and problem solve.
6. Provide opportunities for students to explain their thinking verbally and in writing, examine the reasoning of others and give specific feedback.
7. Use formative and summative assessments to monitor student achievement and adjust instruction.

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8. Collaborate with peers to improve mathematics education for all students.
9. Encourage students' interest in mathematics and the investigation of STEM-related careers.
10. Support families as partners to develop mathematical literacy.

Students' Responsibilities (as developmentally appropriate):

1. View mathematics as a language that helps them to organize and understand their world.
2. Build upon personal experiences and prior learning to understand mathematical concepts and apply them to real life.
3. Participate actively, think critically and communicate effectively about mathematical reasoning and solutions.
4. Use technology, literature and connections to other disciplines to better understand mathematics and support mathematical literacy.
5. Seek extra help, extracurricular activities and other assistance to ensure success in mathematics.
6. Pursue a course of study that includes high-level mathematics.
7. Explore career options in STEM-related fields.

Higher Education Responsibilities:

1. Design programs that yield mathematically literate graduates.
2. Promote instructional practices supported by high-quality research when available, and by accomplished instructors' best professional judgment and experience.
3. Attract and retain students in the pursuit of STEM-related careers, including mathematics teaching.
4. Prepare educators with the content and pedagogy necessary to teach key concepts and skills to all learners.
5. Provide programs for mathematics specialists that focus on advancing their content knowledge, pedagogy and the leadership skills to work with and support adult learners.
6. Ensure that educators learn assessment and statistical skills to measure, monitor and report student progress.
7. Provide future elementary and secondary teachers varied opportunities to work in schools and learn from veteran mathematics teachers before earning certification.
8. Produce rigorous scientific research focused on mathematics instruction, learning, resources and assessment.

Family and Community Responsibilities:

1. Encourage students to talk about the mathematics they are learning at school and how it relates to daily life.
2. Engage children in mathematical activities related to daily routines such as counting, measurement, observing patterns and dealing with money.
3. Provide for students opportunities to apply mathematics concepts and skills and participate in activities that foster the growth of productive and mathematically literate members of society.
4. Encourage students to participate in high-level mathematics courses.
5. Work with teachers and schools as partners to develop mathematical literacy.

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Business and Industry Responsibilities:

1. Develop ongoing, systematic partnerships with schools to support and enhance mathematics programs.
2. Establish programs, activities and incentives to attract students in STEM-related careers.
3. Provide teachers and students mentoring and internships.
4. Provide information about the importance of mathematical literacy to sustain the state's economy.
5. Provide students, families and schools opportunities to participate in activities that foster the growth of productive and mathematically literate members of society.

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