

Ohio Mathematics and Science Coalition

Systemic Improvement Recommendations

Finding the Solution (2001)

1. Implement Learning Standards

- Continue to develop a uniform, statewide set of age-appropriate, research-based and professionally recommended learning standards that have been benchmarked against national and international standards.
- Continue to educate stakeholders about the new standards and how they apply to each component of the mathematics and science education system.
- Monitor how the standards are being applied to ensure they are reflected in curricula, instruction and assessment.

2. Implement Research-based Curricula and Assessments

- Use curricula, instructional methods and assessment tools that reflect current scientific research in mathematics and science learning and that have been developed and tested by recognized experts.
- Ensure that mathematics and science curricula and instruction are carefully aligned with standards and assessments.
- Ensure that curricula and instruction reflect mathematics and science as inquiry-based disciplines; focus in greater depth on fewer core topics; are supported with appropriate resources; and are fair, genuine and useful to all students.
- Use research-based, professionally recommended assessments that specify, measure and report whether students meet specific content learning standards.
- Provide timely feedback from assessments so that schools and teachers can use the information to improve student learning in mathematics and science.
- Participate regularly (as a state) in national and international assessments to learn how Ohio's students are doing in comparison to students in other states and nations.

3. Empower Qualified Teachers

- Require school districts to use qualified mathematics and science teachers for all mathematics and science instruction.
- Develop a teacher licensure and training system that ensures all teachers who teach mathematics and science have adequate knowledge of (a) mathematics and science content; (b) scientific research on how students learn mathematics and science; and (c) instructional methods and appropriate, meaningful and effective materials for teaching the subjects at all grades specified on their license.
- Ensure that mathematics and science content and methods courses in colleges and universities are consistent with, and model, research-based content and instruction.
- Provide professional development learning opportunities in different forms, such as courses, coaching, mentoring, peer support groups and attendance at professional conferences.

- Set aside significant daily work time for teachers to devote to professional development activities (time away from regular teaching duties).
- Support development of school cultures that support professional collaboration among teachers, administrators and professional mathematicians and scientists, and that overcome professional isolation.
- Require school and district administrators to play an active role in collaboration with teachers and in designing and implementing in-service opportunities based on sound scientific practice for professional development.
- Provide resources to support long-term, sustained professional development.
- Offer statewide leadership, support, and requirements to help school districts implement continuous professional development programs at all grade levels.
- Provide compensation to mathematics and science teachers at a level that encourages them to remain in the classroom.

4. Commit to Shared Accountability and Responsibility

- Implement a comprehensive, coordinated statewide mathematics and science education system that guides and connects the following components: learning standards, curricula and instruction, assessment, teacher licensure, university programs for teacher education, teacher professional development and education funding.
- Implement a mechanism for regularly monitoring and analyzing the functioning of mathematics and science education goals, including their implementation and results at the state, district, school and classroom levels.
- Conduct a public review of all components of the statewide mathematics and science education systems by experts every five years.
- Encourage all stakeholders to commit to the shared vision for mathematics and science education in Ohio.
- Educate all stakeholders about the benefits of implementing scientifically sound, professionally recommended practices in mathematics and science education.
- Put aside differences based on specific stakeholder interests to work together to promote improved teaching and learning in mathematics and science.
- Encourage all high school students to take mathematics and science courses beyond state minimums.

5. Align the System

- Develop a unified, coherent vision that guides all aspects of mathematics and science education in Ohio.
- Support cooperating mechanisms at the state level to assure that mathematics and science programs and policies are research-based and led by experts in mathematics and science education, and that standards, curricula, instructional strategies and assessments are aligned.
- Secure a commitment from all stakeholders to design, implement, support and share responsibility for an accountability system for mathematics and science education that:
 - ▶ Provides supportive learning environments in which *all* students learn challenging, applicable, and suitable mathematics and science material;

- ▶ Makes mathematics and science more interesting and relevant to **all** students by providing real-world applications and exploring how mathematics and science can help them make sense of their world;
 - ▶ Develops in **all** students a deep and genuine understanding of mathematics and science concepts, emphasizing depth and application of understanding rather than breadth of coverage; and
 - ▶ Provides **all** students with learning experiences that allow them to express their own ideas, compare them with other ideas, make reasoned choices between them, and exercise personal judgment.
- Formulate and implement a multi-year, integrated improvement plan that addresses all elements of Ohio's Pre-K-16 mathematics and science education system.