THE COUNCIL OF CHIEF STATE SCHOOL OFFICERS

The Council of Chief State School Officers (CCSSO) is a nonpartisan, nationwide, nonprofit organization of public officials who head departments of elementary and secondary education in the states, the District of Columbia, the Department of Defense Education Activity, and five U.S. extra-state jurisdictions. CCSSO provides leadership, advocacy, and technical assistance on major educational issues. The Council seeks member consensus on major educational issues and expresses their views to civic and professional organizations, federal agencies, Congress, and the public.

MATHEMATICS AND SCIENCE EDUCATION TASK FORCE

LEADERSHIP, ADVOCACY, SERVICE

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Policy Statement Executive Summary

November 2006

Executive Summary

The CCSSO Mathematics and Science Education Task Force convened to address a common set of concerns regarding the condition of mathematics and science education in the United States. The performance level of U.S. students on international assessments is substantially below that of students in many other nations. One-third of our high school graduates are not prepared to enter postsecondary education or the workforce. The number of U.S. students graduating from advanced degree programs in mathematics and science continues to decline, and the majority of our graduate students in these subjects come from countries outside of the United States. Directly related to student performance is teacher quality. While it is often the case that circumstances compel school administrators to assign inadequately prepared teachers to teach mathematics or science, it is also true that many teacher training programs—particularly elementary education programs—do not require prospective teachers to take challenging coursework in mathematics and science content and pedagogy or coursework commensurate with the level of instruction to be taught.

As P–12 leaders, the chiefs . . . can effect the changes needed to improve mathematics and science education in the United States.

Chief state school officers are uniquely positioned to build state capacity to deliver challenging mathematics and science education programs and impact licensure requirements. Recognizing the diversity of operations for chiefs in the states, territories, District of Columbia, and Department of Defense Education Activity, the methods of implementation will likely vary. Yet, within their respective state contexts, chiefs can provide guidance and technical assistance, establish urgency, enact or influence regulations and policies, and work with other states and stakeholder partners to increase mathematics and science achievement. Thus, the task force recommendations are primarily directed to state chiefs and their agencies.

The task force recommendations, a representative sample of which follow, are organized by four themes which seek to underscore the fact that the teacher is the most critical element to improving mathematics and science learning. While the role of technology is not explicit in these recommendations, the task force concluded that state education agencies must play a leadership role in the appropriate use of technology in the teaching, learning, and assessment of mathematics and science. As P–12 leaders, the chiefs—individually in their own states and collectively through the work of CCSSO—can effect the changes needed to improve mathematics and science education in the United States.

Vision and Leadership:

- Bring together educators and community members to develop and gain consensus on a clear, single statewide vision that would address what needs to happen to support mathematics and science education to prepare students for entry into postsecondary education and the 21st century workforce.

- Build a process and delivery mechanism for the state education agency to continuously gather and make available to school districts new information and resources related to improving learning in the areas of mathematics and science education.

- Establish a process for ensuring that state content standards and grade-level expectations are consistent with proven, up-to-date content knowledge in the disciplines of mathematics and science, as well as aligned with college and workplace expectations.

Curriculum, Instruction, and Assessment:

- Provide and encourage the use of multiple assessment measures within mathematics and science that are appropriate for the intended purposes and that measure the content in appropriate ways. Ensure that assessments are of suitable rigor and are aligned to the scope and depth of the intended standards and curriculum. Policy and standards revisions will have greater impact if mathematics and science assessments reinforce the state policy agenda.

- Modify, clarify, organize, and place instructional priorities on state standards, indicators, and benchmarks in mathematics and science education to achieve focus and coherence. Standards should have a global perspective to ensure depth of teaching and learning as students progress through grades P–8 and into high school, postsecondary education, and the 21st century workplace.

- Collaborate with other states and engage with the publishing and instructional materials

industry and informal education institutions to improve the quality of mathematics and science curricula.

Teacher Development and Support:

- Build or reinforce professional development policies and structures that equip mathematics and science teachers with the knowledge and skills to address students with diverse needs, including those from other cultures, English language learners, students in urban settings, and students with special needs.

- Require prospective teachers, as part of the licensure process, to take coursework that reflects current and emerging research in mathematics and science education. Work with institutions of higher education to ensure available courses in mathematics and science that will prepare teachers to effectively teach the state standards for their endorsement or level of assignment (i.e., school mathematics and science). Furthermore, because success in higher-level mathematics and science achievement requires an early start, develop credentials and provide support and incentives for mathematics and science specialists in grades P–8.

- Use research to improve the practice of mathematics and science teaching and professional development. Student, teacher, school, state, and national data should be used to make decisions regarding the focus and structure of professional development programs, beginning with student data that identifies where students are not achieving.

Sustainability and Scalability:

- Pilot innovative ideas and initiatives in mathematics and science, evaluate the results, and use the resulting data to support proposals for additional funding to scale up to statewide implementation and sustainability.

- Use information technology appropriately to efficiently and effectively bring proven models and promising practices in mathematics and science education to scale.

- Cultivate grassroots support among all stakeholders for the mathematics and science vision, agenda, and strategy. As much as possible, tie in with existing organizations such as state and national science and mathematics organizations and education policy groups and use appropriate resources when crafting messages for particular audiences.

Conclusion

It is evident that mathematics and science education must be reexamined for more rigor and alignment to national and international standards so that our students will be competitive in a 21st century global society. In order to make meaningful improvement possible for our students, a number of steps at various levels need to be taken. Collaborating with other education organizations, the private sector, and local community organizations is the most effective and promising way to accomplish the shared vision for improving mathematics and science achievement. Curriculum and instruction need to be informed, firmly based on research, and aligned to standards that in turn reinforce a high level of rigor. Chiefs are urged to utilize their position to examine and clarify policies, advocate for necessary resources, and create networks for their state education agencies to assist in the recruiting, training, and ongoing development of mathematics and science instructors.

Along with the recommendations to chiefs and their agencies, the task force further recommends the following steps for CCSSO to aid the effort to elevate mathematics and science achievement in our nation as a whole

Collaborate with other national organizations to examine mathematics and science curricula at the middle and high school levels.

Synthesize ongoing national discussions and research findings with respect to science, technology, engineering, and mathematics (STEM) to provide feedback to chiefs and alert them to emerging priorities. Convene discussions on STEM with national organizations on behalf of chief state school officers.

Curriculum and instruction need to be informed, firmly based on research, and aligned to standards that in turn reinforce a high level of rigor.

Call for a five-year plan to achieve continuous growth in P–12 mathematics and science education that brings U.S. curriculum up to international standards. This initiative should include building strategies for communication, parental involvement and understanding, and the support of the business community and private sector.

Education leaders must be willing to advocate and provide the infrastructure for the changes necessary to prepare our students for postsecondary education, work, and citizenship in the 21st century and beyond.

The executive summary and report were made possible by the contributions of the CCSSO Mathematics and Science Education Task Force:

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