FOCUSING ON ASSESSMENT OF LEARNING:
PROCEEDINGS AND TRANSCRIPTS FROM TWO MATHEMATICS AND SCIENCE PARTNERSHIPS WORKSHOPS
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Committee on Mathematics and Science Partnerships: Helping Partners Understand and Implement Improvements to STEM Education Programs Based on Research and Best Practices

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Committee on Mathematics and Science Partnerships: Helping Partners Understand and Implement Improvements to STEM Education Programs Based on Research and Best Practices

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Preface

The Mathematics and Science Partnership (MSP) initiative has a very important role to play in improving STEM education in the United States. Through a series of targeted and comprehensive grants, the National Science Foundation is supporting a series of experiments to allow formal partnerships between institutions of higher education and K-12 schools and districts to work together to improve mathematics and science learning for all children through reinvigorated and challenging courses and pedagogy and strengthened preparation and professional development of teachers of mathematics and science. The MSP initiative has high expectations for evidence that these partnerships are achieving their goals. Additional information about the MSP initiative funded by NSF is available at https://www.ehr.nsf.gov/msp/.

The National Research Council (NRC) developed a project, part of the Research, Evaluation, and Technical Assistance (RETA) component of the MSP initiative, to provide a series of workshops over three years for both teams and individual representatives from Mathematics and Science Partnerships. The workshops were designed to assist people who are involved with MSP projects and those who seek to become involved with this initiative succeed in this significant and complex undertaking. Tools that will help them succeed include a clear understanding of the recent and emerging research about ways to improve learning and teaching in the nation’s schools and to measure learning and teaching effectiveness in meaningful ways. Much of this research has been analyzed and synthesized through studies, workshops, and other convening activities conducted by the NRC.

The members of the Steering Committee who have guided this effort have broad and varied expertise in STEM education and the research related to it in both K-12 and higher education. Together with the superb staff – Jay Labov, Janet Garton, and Terry Holmer – who have worked with us, the committee has developed a series of workshops on various topics central to the work and themes of NSF’s Mathematics and Science Partnerships initiative. Our workshops have been offered and are being planned to assist MSP grantees and future applicants better understand the research literature and the implications and applications of that evidence in the areas of learning, assessment of learning, teacher education for effective teaching and learning, and the development of challenging courses in mathematics and science.

The NRC and steering committee have viewed the improvement of student learning and achievement as the underlying theme for every workshop. This Proceedings reports on activities that were parts of two workshops that focused on the research literature about effective assessments of student learning. It emphasized the research evidence that has been synthesized in the NRC report Knowing What Students Know: The Science and Design of Educational Assessment (NRC, 2001) and also provided opportunities for
participants to engage in the important concepts about learning and teaching that are embodied in this report and in a second seminal NRC report *How People Learn: Mind, Brain, Experience and School* NRC, 2000). The workshops include a series of “hands-on” experiences with a specific set of assessment materials, plenary sessions, and several smaller breakout sessions. Speakers who undertook some of the research described in these and other NRC reports and several members of the study committees that produced it gave presentations and answered questions both about the research on assessment and its implications for improving learning in science and mathematics classrooms. Since our concern is always about the transition from research to practice, we have included sessions led by people who are using the information from *Knowing What Students Know* report and related NRC reports in the educational activities of their MSPs.

At least four workshops will be offered on the improvement of student learning; this proceedings provides readers with information and resources from two workshops that were held in February and May, 2004 that focused on the Assessment of Learning. Two workshops each on *Educating Teachers for Effective Teaching and Learning* and on *Challenging Courses and Curricula* will be offered in 2005. A special workshop focusing on the higher education part of MSP partnerships will also be offered in December 2004.

This report and future proceedings from this MSP-RETA initiative are designed to provide readers with accurate representations of the presentations and discussions at these workshops. We present them in the hope that they will assist both the Mathematics and Science Partnerships community and others who are trying to undertake similar work to accomplish the important tasks that the nation needs done.

The agenda in this CD-ROM contains hyperlinks to the PowerPoint presentations, background readings, references, breakout sessions, and verbatim transcripts of presentations and discussions during the workshops. The transcripts are based on audio recordings of the workshops. Although every attempt was made to have presenters and participants speak into microphones so that their comments could be recorded accurately, there are some lapses in those recordings and in the printed transcripts. Please also note that, because breakout sessions were highly interactive and therefore more difficult to capture in transcripts, only plenary sessions were audiotaped; the agendas indicate where written transcripts are not available.

For the two workshops that are included in these proceedings, in addition to presenters, facilitators, committee members, and National Academies staff, 64 people registered for the February workshop and 44 people registered for the May workshop. Participants were primarily from K-12 and higher education institutions that are involved with NSF-funded Mathematics and Science Partnerships projects, but individuals from a variety of other types of institutions attended as well. These other participants included people from state departments of education, staff from the National Science Foundation and U.S. Department of Education, education research organizations, private foundations, and K-12 science and mathematics teachers spending a year in Washington as Einstein Fellows [to view the complete list of registered participants for the February workshop, click here. For the list of registered participants for the May workshop, click here.]
The NRC will issue a series of proceedings for all workshop topics as those workshops are completed. **The information presented and the views expressed by presenters and participants are their own and are not necessarily those of the National Research Council.**

I want to express deep gratitude to all members of the Steering Committee for volunteering their help when needed to make the workshops more effective and useful. I would also like to express my thanks to Patti Bourexis, our external evaluator, who steadfastly has provided us with reliable feedback and suggestions, based upon direct conversations with workshop participants, that strengthened the format and content of the workshops. Finally, I express my appreciation on behalf of the Steering Committee and the staff to all of the presenters, discussants, facilitators, and participants in this workshop for their hard work and dedication to finding new ways to improve science and mathematics education in this nation that are based on and guided by research and evidence.

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Acknowledgments

This proceedings and transcriptions have been reviewed in draft form by individuals chosen for their diverse perspectives and technical expertise, in accordance with procedures approved by the Report Review Committee of the National Research Council. The purpose of this independent review is to provide candid and critical comments that will assist the institution in making its published report as sound as possible and to ensure that the report meets institutional standards for objectivity, evidence, and responsiveness to the charge. The review comments and draft manuscript remain confidential to protect the integrity of the process. We thank the following individuals for their review of this report: Robert E. Cannon, Department of Biology, University of North Carolina at Greensboro; Laurie Fathe, Center for Teaching Excellence, George Mason University; Brent A. Ford, Research Department, Horizon Research, Inc., Chapel Hill, NC; Tim Weston, Academic Affairs, University of Colorado, Boulder.

Although the reviewers listed above provided many constructive comments and suggestions, they were not asked to endorse the content of the report nor did they see the final draft of the report before its release. The review of this report was overseen by Kendall N. Starkweather, Executive Director/CEO, International Technology Education Association, Reston, VA. Appointed by the National Research Council, he was responsible for making certain that an independent examination of this report was carried out in accordance with institutional procedures and that all review comments were carefully considered. Responsibility for the final content of this report rests entirely with the author(s) and the institution.