SEEFORUMS

Scientific Evidence in Education Forums

Forum Summary—May 12, 2009

Elementary School Mathematics Curricula

The growth of scientific and technology-related jobs and the increase in computerized aspects of once purely service or manual jobs have underscored the importance of mathematics skills in the 21st century economy. However, as the most recent National Assessment of Educational Progress shows, at all of the grades tested (4th, 8th, and 12th), many U.S. students fail to meet the level of "proficient" and roughly one-fifth of students fall in the "below basic" level. Additionally, by the fourth grade, there are significant differences in performance among students from different racial/ethnic and socio-economic backgrounds, demonstrating a critical need for effective mathematics instruction in the early grades. At the same time, however, little rigorous research has been available on the instructional materials being used to teach mathematics.

With this in mind, on May 12, 2009, the American Institutes for Research (AIR) (www.air.org) convened the fifth of its Scientific Evidence in Education (SEE) Forums on "Building a Foundation for the Future: A Discussion on the Latest Research on Elementary School Mathematics Curricula." The resulting rich discussion identified several issues as being central to further exploration of the challenges in providing high quality mathematics curricula and instruction to young students:

- What can high-quality research, particularly the study upon which the forum focused, tell us about the relative weight of a good curriculum versus a good teacher?
- In the study of focus, why and how did the teachers of one of the four curriculum studied manage to devote additional instructional time to mathematics? and
- Related, what role might that time factor have played in the results in mathematics and possible unintended results in other subjects?

The SEE Forums (www.seeforums.org) is an initiative aimed at linking the education policymaking community with rigorous research that can facilitate increased evidence-based decisionmaking and practice. The forum was held at the Charles Sumner School and featured presentations on recent high-quality research as a springboard to generate discussion. More than 65 representatives of key policy and research organizations, educators and administrators from the Washington, DC, area attended the event. The SEE Forums are convened by AIR, with support from a grant from the U.S. Department of Education's Institute of Education Sciences (IES) (http://ies.ed.gov).

To open the session, **Roberto Agodini**, senior economist at Mathematica Policy Research, described newly released results from the first large-scale evaluation of mathematics curricula to use a highly rigorous research design. The study, sponsored by IES, used an experimental design to test the relative effects of four commonly used mathematics curricula on student achievement in disadvantaged schools: Investigations in Number, Data, and Space; Math Expressions; Saxon Math; and Scott Foresman-Addison Wesley Mathematics. The study was conducted with first-graders in 39 schools and showed relatively greater effects for Math Expressions and Saxon Math. Dr. Agodini provided an overview on how the study was conducted and how the curricula were received and implemented in the study schools, as well as results from the study's first year. He also called attention to two future reports from

the study, which will assess the second and third years of the study and provide data on additional schools and grades participating in these later years.

Mary Lindquist, professor emeritus at Columbus College (Columbus, Georgia), served as a panelist, providing her perspective from a long career in mathematics teacher education, assessment development and curriculum review and development. Dr. Lindquist lauded the study for its careful and thoughtful approach and its contribution to the knowledge base. She also noted, however, that "a good study raises lots of questions" and posed several that had occurred to her, which she hoped future study reports would address. For example: Given the sometimes questionable reliability of teacher reports and complexity of curricula being studied, what can we make of data showing a strong degree of curriculum coverage? What are the possible effects of different amounts of teacher coaching? All the teachers in the study supplemented the curricula with additional materials (as do teachers nationally); what are the effects and implications of such supplementation? Mainly, Dr. Lindquist emphasized that, so far, this is a study in one grade, in 1 year of implementation, and using one instrument—users must keep these "ones" in mind in interpreting these important, but preliminary results. She hoped that funding for this and similar studies would be continued to provide more complete answers to the questions that this study has raised and started to answer.

Kati Haycock, president of the Education Trust, also served as a panelist, providing her perspective based on a history of advocating in education policy for the development and support of a quality teaching force. She also found the IES study very useful and, in her comments, raised additional questions and pointed out some interesting findings that should be further explored in future reports. Commenting specifically on the potential policy relevance of the findings, she thought that this study should reinforce the ideas that curriculum matters and that we need to rethink how we approach the selection, training for, and implementation of curricula in U.S. classrooms. She also pointed out that the study data showed relatively greater differences among the curricula for more experienced teachers, suggesting that even a "good" teacher can benefit from a relatively better curriculum and that a "good" curriculum may not compensate for a less qualified teacher. She urged further careful research on the effects of curricula and, particularly, on what types of supports teachers need in implementing them. She also highlighted the importance of creating vehicles to get that information into the hands of the States, districts, and schools responsible for curriculum-selection decisions.

Rebecca Herman, SEE Forums project director and managing research analyst at AIR, served as moderator of the forum.

The presentations and comments generated a rich question-and-answer session, with numerous participants asking questions of Dr. Agodini and the panelists. In addition to the issues mentioned earlier, participants were interested in whether a correlation existed between teacher satisfaction with the curricula they were using and effects on student achievement; whether study mobility was an issue; and whether students were tested upon returning to school the next fall, to capture any skill or knowledge loss. Future reports from the study, as early as spring of 2010, may provide additional insight on some of these questions.

Additional information about the forum, including audio recordings of the presentations and discussion, the accompanying *ResearchLink* newsletter, and additional resources, can be found online at http://www.seeforums.org/MathCurricula.html.

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The forum on elementary school mathematics curricula was the fifth of six forums planned over the 2008–09 period. The next forum will be held in September 2009. To learn about or register for the next SEE Forum, join the mailing list, or submit general comments or questions, please see our website (www.seeforums.org) or contact info@seeforums.org.