

## **Memorandum for the Evaluation of Mathematics Curricula**

This memo provides background for the Evaluation of Mathematics Curricula ("the Study") and describes the roles and responsibilities of Mathematica Policy Research, Inc. (MPR) and Hardin County School District ("the District") during the implementation of the study.

**Background for the study.** The goal of Title I is to improve academic achievement of disadvantaged students, and under the No Child Left Behind Act (NCLB), public schools must make adequate yearly progress—a federally approved, state-specific standard that requires public schools to continuously and substantially improve student achievement in reading and math. Title I, Part E, Section 1501 mandates a national assessment of the implementation and impact of Title I, and NCLB repeatedly emphasizes the importance of adopting scientifically proven educational practices with funding under Title I.

Given the need to help schools find ways to make adequate yearly progress and the fact that only a small fraction of this country's elementary school students are judged as proficient in mathematics, the U.S. Department of Education (ED) decided to conduct an evaluation of mathematics curricula as part of the Title I evaluation plan. Little research evidence exists on the effectiveness of math curricula and therefore a study of this kind could help educators choose math curricula that help to improve student achievement. Early in 2005, ED worked with MPR to convene a panel of experts in mathematics, mathematics instruction, and evaluation design to discuss issues that confront a study of the effectiveness of mathematics curricula and to recommend how the study could address those issues. The early elementary grades were recommended as the target level for the study because evidence indicates that high-poverty students have lower basic math competencies than low-poverty students, even before entering elementary school. Examining mathematics curricula based on different approaches for developing students' math skills was also identified as an important element of the study.

In October 2005, ED contracted with MPR to conduct a study that selects, implements, and evaluates the relative effectiveness of several early elementary math curricula (contract ED-04-CO-0112/0003), named the Evaluation of Mathematics Curricula ("the study"). MPR is the prime contractor for the study and is solely responsible for its conduct. MPR is being supported on the study by a subcontractor—SRI International (SRI). In this memo, "MPR" and "the study team" refer to Mathematica Policy Research, Inc. and its subcontractor. The study team may also include from time to time consultants on the study and ED program officers.



**Study Design.** A competitive process was used to select the curricula included in the study. The study issued a Request for Proposals that invited developers and publishers of early elementary school math curricula to submit a proposal to include their curricula in the evaluation. A technical working group (TWG) convened by the study team reviewed the submissions and recommended to ED curricula suitable for the study. After reviewing the information, ED selected four curricula to be included in the study. Subsequently, MPR identified school districts to participate in the study by implementing the four curricula. The curricula selected for the study are listed in the table below.

#### MATH CURRICULA INCLUDED IN THE STUDY

Curriculum	Publisher
Investigations in Number Data, & Space	Pearson Scott Foresman
Math Expressions	Houghton Mifflin
Saxon Math	Harcourt Achieve
Scott Foresman-Addison Wesley Math	Pearson Scott Foresman

As part of the study, the District will implement all four of the study's curricula during the 2007-08 school year. The study will occur during the 2007-08 school year and will conclude after one year of curricula implementation and data collection. The study includes an option ED can exercise that would extend implementation into the 2008-09 school year. If ED exercises this optional year, MPR will discuss with the District their interest in participating during the 2008-09 school year.

The study has been designed to satisfy standards for scientifically-based research as stated in NCLB. The study will use a school-level random assignment design to answer the question of effectiveness of math curricula. This design calls for randomly assigning schools in each participating district to the selected curricula and comparing math achievement of students in those schools. Consider, for example, a district that has eight elementary schools willing to participate in the study. The study team will randomly select two schools to implement curriculum A, two schools to implement curriculum B, etc., so that two schools implement each of the four study curricula. In each school, teachers at the target grade level(s) will use only the curriculum assigned to their school. The study will include approximately 15 districts and 100 schools throughout the country.

Relative effects of the curricula will be estimated by comparing average math achievement of students in the target grade levels in schools that implemented the various curricula. For example, the relative effectiveness of curriculum A versus curriculum B will be estimated as the difference in average achievement between students in the schools assigned to curriculum A and those in the schools assigned to curriculum B. The



study will use a pre-existing assessment to measure student math achievement and the assessments will be administered by MPR.

MPR also will examine the relationship between teacher content/pedagogical knowledge and curricular effectiveness, by administering an assessment entitled "Learning Mathematics for Teaching" developed by researchers at the University of Michigan. The assessment will be administered to teachers during the initial curriculum training sessions that typically will occur towards the end of the summer before the school year begins.

The study will include first and second grade classrooms in the 2007-08 school year. If ED exercises the option to extend the study into the 2008-09 school year and the district decides to continue participating in the study, the study will move up to the third grade.

**Study Activities.** MPR acknowledges that the District's mission is the provision of education, the District has obligations in meeting its mission that are separate and independent of this study, and the District has full control over all matters of instruction. The District acknowledges it is committed to assisting MPR in achieving an objective research product, and MPR has full control and responsibility over all matters of research methodology and data collection related to the study.

The key activities and respective roles of the study team and the District's staff in implementing the evaluation are as follows:

- a. *Identification of Schools.* The District worked with MPR to identify schools suitable for participating in the study. This includes schools willing to be randomly assigned to the study's math curricula and that have at least one teacher in the first and second grade providing instruction in math. The schools identified for the study are:
  1. Howe Valley Elementary School
  2. Lincoln Trail Elementary School
  3. Rineyville Elementary School
  4. Woodland Elementary School
- b. *Random Assignment of Schools.* MPR will randomly assign the study's four curricula to the participating schools for implementation during the 2007-08 school year and also the 2008-09 school year, if the option to include the 2008-09 school year is exercised. Schools will be notified of their curriculum assignments soon after the assignments have been conducted.
- c. *Curricula Acquisition.* During the summer before the 2007-08 school year begins, the study team will arrange the District's acquisition of the study's curriculum materials for all participating first and second grade classrooms free of



charge. District staff will work with the publishers to determine the timing and location of the delivery. If the study is extended into the 2008-09 school year, all third grade materials will be provided to the District's participating schools free of charge. All curriculum materials provided to participating schools as part of the study may be kept by the schools upon completion of the study.

- d. *Teacher Consent to Attend Training and for Data Collection.* The study team will obtain teacher consent from all participating teachers. Teachers will be asked to attend training conducted by the curricula publishers, complete the assessment of math content/pedagogical knowledge during the initial training, and respond to two short surveys during the school year. In addition, teachers will be asked to permit the study to observe their classroom once during each school year. The teacher consent form will notify teachers that all data collected by the study will be kept confidential to the full extent allowed by law.
- e. *Initial Teacher Training on the Curricula.* The study team will coordinate the training of teachers who will use the study's curricula for their math instruction during the 2007-08 school year (and possibly the 2008-09 school year). First and second grade teachers will receive initial training from the publishers during summer 2007 free of charge. If the study continues into the 2008-09 school year, all third grade teachers will be trained during summer 2008 free of charge. MPR will pay for any travel expenses teachers incurred to attend the training and will pay teachers a stipend in the amount of \$250 per day, if training occurs outside of the school day. The study team will work with the publishers to provide training to those teachers who cannot make the scheduled training dates.
- f. *Ongoing Curriculum Support and Follow-Up Training.* The publishers will provide curriculum support as they typically provide for their products as specified in their conventional licensing agreements. Customary support on the curricula will be provided to the District's participating schools free of charge during the course of the study. During the school year, MPR will reimburse the District for the cost of substitute teachers, as determined by the District, if such teachers are needed for follow-up training. If follow-up training occurs outside of the school day, MPR will pay teachers a stipend in the amount of \$31.25 per hour.
- g. *Teacher Assessment.* During the initial summer 2007 training sessions, teachers will be asked to take an assessment of their math content/pedagogical knowledge. The study team will administer an assessment entitled "Learning Mathematics for Teaching" developed by researchers at the University of Michigan. The assessment takes approximately 40 minutes to complete, and teachers will be compensated for completing the assessment. The assessment also will be administered to new study teachers during the summer 2008 training sessions, if the optional 2008-09 school year is exercised.
- h. *Parent Consent for Student Data Collection.* Teachers will be asked to hand out the parent consent packets to all students in the study and to collect the consent or



refusal forms at the beginning of the school year. MPR will provide the District with parent consent packets that will contain a letter informing parents about the nature of the study and its data collection activities, an active consent form, and an informational brochure. The parent consent letter will explain to parents that all data collected by the study will be kept confidential to the full extent allowed by law. Alternatively, if the District prefers, MPR can mail parent consent packets directly to parents and include a pre-paid return envelope for parents to return the consent forms to MPR.

- i. *Class Rosters.* MPR will request class rosters from principals or teachers for all students in the study at three points in time: around the beginning of the school year, a month or two after the beginning of the school year, and near the end of the school year. The first and third roster collections will be used to identify students who are eligible for pre- and post-testing. The second roster collection (a month or two after the beginning of the school year) will be used to assess whether any changes in class composition occurred after pre-testing. The roster information requested will include date of birth, gender, race/ethnicity, and IEP or LEP status for each student. The parent consent letter and form will notify parents that MPR will collect these pieces of information on their children. The study will collect rosters during the 2007-08 school year and during the 2008-09 school year, if the optional year of implementation is exercised.
- j. *Student Assessments.* MPR will assess student math achievement using the math assessment from the Early Childhood Longitudinal Study (ECLS), which is an individually-administered test and will require about 30 minutes for each student to complete. MPR will administer the test by pulling students one-by-one out of study classrooms during time periods agreed upon with the District and schools. In the 2007-08 school year, MPR will administer the test to about 30 first and second graders in each participating school and classroom at the start of the school year and at the end of the school year. If the study continues in the 2008-09 school year, MPR will administer the test at the end of the school year to about 30 third graders in each school.
- k. *Teacher Surveys.* In fall 2007, the study will administer a questionnaire to study teachers. The 30-minute fall questionnaire will gather background information about the teachers and their experience with the summer curricula training and any follow-up training that has occurred during the fall. In spring 2008, the study will administer a follow-up questionnaire to all study teachers. The 20-minute follow-up questionnaire will gather information on experiences with the curricula during the school year. The study team will mail both surveys directly to the teachers and ask them to complete the surveys and return them to MPR in a self-addressed, pre-paid envelope. Teachers will receive \$25 for completing each survey—a total of \$50 for completing the two surveys. If the study continues into the 2008-09 school year, all third-grade teachers will be asked to complete both the fall and spring surveys.



- l. *Observations of Classrooms.* MPR will observe each classroom participating in the study once during the 2007-08 school year. District staff will assist the study team in scheduling the visits. MPR will comply with the District's policies regarding visiting and working on school sites. No classroom observations will be conducted during the 2008-09 school, if that year of implementation is added.
- m. *Data Provided to the District.* The study team will report to the district average test score gains by curricula (i.e., average score gains for the group of students using curriculum A, the group using curriculum B, and so on). Differences in the average score gains between, for example, curriculum A and curriculum B can be interpreted as an estimate of the achievement effect of curriculum A relative to curriculum B.

**Compensation for Study Burden.** Recognizing the burden on the District and participating schools for their efforts in assisting the study, MPR will pay a total of \$5,600 during the 2007-08 school year for supporting the data collected by the study. This total payment is based on a \$1,200 payment for the district and \$1,100 per school. The payment during the school year will be provided to the District and participating schools. The District and participating school payments will be based on the achievement of milestones on the following schedule:

- a. Year 1 - January 2008 Milestone: Completion of student pre-tests and scheduling of classroom observations.  
Payment amount: \$600 to the District  
\$550 to each participating school
- b. Year 1 - June 2008 Milestone: Completion of student post-tests and classroom observations.  
Payment amount: \$600 to the District  
\$550 to each participating school

If the 2008-09 school year of implementation is exercised, MPR will pay a total of \$2,800 to the District for their efforts in assisting the study—the burden on the District and participating schools is about half of the previous school year. The District and participating school payments will be based on the achievement of one milestone on the following schedule:

- c. Year 2 (if exercised by ED) - June 2009 Milestone: Completion of third-grade student post-tests.  
Payment amount: \$600 to the District  
\$550 to each participating school



**Confidentiality.** The data collected for the study from districts, schools, teachers, and students will be used for research purposes only and treated as confidential to the full extent allowed by law. The study's results will be reported only for groups of students, such as "70 percent of first graders achieved mastery of rudimentary mathematics."

**Cancellation of Participation.** The District's participation may be cancelled by either the District or the Study, and the understanding is that the canceling party will provide advance written notice of at least thirty (30) days to the other party. Cancellation of participation by the District or individual schools may lead to the removal of curricula materials provided for purposes of the study, if the District or individual schools withdraw from the study within the first few months of the school year. Cancellation of participation or withdrawal of individual schools by the Study or District may also result in an adjustment to the amount of study burden paid to the District and participating schools.

**Points of Contact.** The study requires timely communication and responsiveness to ensure successful implementation. To that end, the District names Jimmie Dee Kelley (270-769-8804; [Jimmie.Kelley@hardin.kyschools.us](mailto:Jimmie.Kelley@hardin.kyschools.us)) as the central point of contact for issues related to the study. MPR names Patricia Del Grosso (609-275-2252; [pdelgrosso@mathematica-mpr.com](mailto:pdelgrosso@mathematica-mpr.com)) as the central point of contact for issues related to the study.

We are pleased to have Hardin County School District participating in the Evaluation of Mathematics Curricula. If you have any questions about this memo, please call me at (609) 936-2712. You can also reach me via email at [ragodini@mathematica-mpr.com](mailto:ragodini@mathematica-mpr.com). We look forward to working with you on this important study.

Sincerely,

Roberto Agodini  
Study Director