

The primary purpose of this study is to estimate a link between NAEP mathematics and TIMSS mathematics, and between NAEP science and TIMSS science, at the national level. Subsequently this link may be used in conjunction with individual state 2011 NAEP mathematics and science performance, to provide each of the states with an estimated score distribution on the TIMSS mathematics and science scales that can be used to compare their performance to international participants in TIMSS. The study design will also support the investigation of several linking procedures such as statistical projection and calibration, in addition to the statistical moderation techniques previously employed.¹

The current design of the NAEP-TIMSS 2011 grade 8 linking study includes two major components:

- *The administration of a NAEP-TIMSS linking study with assessment booklets that include both NAEP and TIMSS grade 8 mathematics and science items.* Two sets of such booklets will be given to samples of eighth-grade students, one during the regular NAEP window and the other during the regular TIMSS assessment window in 2011. The data from these two sets of booklets will be used to link NAEP and TIMSS by estimating a function that predicts, on the basis of state NAEP performance, how states would have performed on TIMSS.
- *The administration of TIMSS state benchmarking in eight states.* Benchmarking consists of a normal TIMSS assessment of mathematics and science administered to state samples. The data from TIMSS state benchmarking will be used to validate the accuracy of the projected grade 8 state TIMSS score distribution estimated as a function of state mathematics and science² performance on NAEP.

In order to estimate the linking between NAEP and TIMSS mathematics and science scales, two supplemental samples of students will take portions of both the NAEP and TIMSS assessment. In order to avoid placing extra burden on students by asking them to take both surveys, special study booklets will be created that contain content from both NAEP and TIMSS. These mixed booklets are referred to as “braided” booklets. The two supplemental samples differ in design. The first one is designed to be similar to NAEP and includes TIMSS item blocks; the second is designed to be similar to TIMSS and includes NAEP item blocks.

¹ Phillips, G.W. (2009). *The Second Derivative: International Benchmarks in Mathematics for U.S. States and School Districts*. Washington, DC: American Institutes for Research.

² A NAEP Science assessment in 2011 had not been planned. However, there was such interest in the results of this study that the National Assessment Governing Board authorized a change in the NAEP schedule to conduct a state-level science assessment in 2011, rather than 2013 in order to provide NAEP science results that could serve as the basis for projecting TIMSS science score distributions for states.

The 2011 NAEP operational testing window occurs between January and March. The NAEP program assesses random samples of students within schools. The first part of the NAEP-TIMSS linking study will consist of 10,000 grade 8 students, half taking the mathematics assessments and the other half taking the science assessments.

In 2011 NAEP, there will be ten mathematics blocks paired to form 50 booklets. There will also be nine science blocks paired to form 36 booklets. Students take one subject only.³ The braided test booklets administered during the NAEP window will contain two separately-timed 25-minute cognitive blocks, one from NAEP and one from TIMSS, followed by two sets of NAEP student background questions taking a total of 15 minutes.

The 2011 TIMSS operational testing window in the USA occurs between April and June. In TIMSS, the assessment is based on samples of intact classrooms of students. The second part of the NAEP-TIMSS grade 8 linking study will be administered during the TIMSS testing window. This sample will be drawn from the same schools as the main TIMSS sample. However, the linking sample will be assessed in separate classrooms from the main TIMSS assessment. The student sample size will be 7,500 grade 8 students, half devoted to the mathematics assessment and half devoted to the science assessment. The size of the braided study is as large as that of the main TIMSS assessment.

In 2011 TIMSS, there will be 14 mathematics blocks and 14 science blocks in two pairs forming 14 booklets of two science and two mathematics blocks each. The braided test booklets will contain two separately-timed sections (with a short break in between), each of which contains two cognitive blocks, followed by a 30-minute student background block. The first section will contain a NAEP and a TIMSS block timed at 47.5 minutes⁴ in the same subject (math or science), while the second section, timed at 45 minutes, will contain two TIMSS blocks, one of which is mathematics and the other science.

Scoring of the NAEP window braided book items will be conducted after the TIMSS window assessment. Additionally, operational NAEP science items will be scored after the TIMSS window. Operational NAEP math items must be scored in the regular NAEP scoring window in order to meet the NAEP reporting schedule. Trend scoring procedures will be used to ensure consistency of scoring NAEP mathematics items between the two windows.

Student accommodations in the braided booklet samples will be handled as allowed in the operational assessment in the same window.⁵ Since NAEP has a different “calculator usage” policy, some sort of ‘no calculator’ sign will need to be added to the NAEP blocks in the braided books for which calculators should not be permitted.

³ The one science block designated to be released along with the 2009 NAEP science results will not be used in the 2011 NAEP assessment or the NAEP-TIMSS linking study.

⁴ The extra 2.5 minutes is provided because the NAEP blocks are longer than the TIMSS blocks

⁵ Bilingual and Braille booklet will not be offered in the NAEP window, since those materials are not available for the TIMSS blocks.