National Assessment of Educational Progress (NAEP)
2007 Puerto Rico Mathematics Assessment

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In 2007 the National Center for Education Statistics (NCES) conducted the third National Assessment of Educational Progress (NAEP) mathematics assessment in Puerto Rico, following two earlier assessments in 2003 and 2005. The assessment was given in early 2007 to fourth- and eighth-grade public school students. About 76 percent of Puerto Rico students at grade 4 and about 78 percent at grade 8 attend public schools, while the remaining students attend private schools. Approximately 3,000 students were assessed in each grade.

Spanish is the nearly universal language in Puerto Rico—and the language of instruction, and less than 1 percent of the students had to be accommodated as "Spanish Language Learners." Close to 100 percent of Puerto Rico public school students at both grades 4 and 8 were eligible for the National School Lunch Program, which means that nearly all students came from relatively low-income families.

Overview of the Mathematics Assessment

The assessment in Puerto Rico was administered in Spanish. Students were given 70 minutes to take the assessment, compared to 50 minutes for students in the mainland U.S. Results from earlier administrations showed that students in Puerto Rico omitted a number of questions when they were assessed using standard administration procedures, and it was hoped that the additional time would allow the students to answer more of the questions on the assessment.

NAEP assesses students in five mathematics content areas: 1) number properties and operations, 2) measurement, 3) geometry, 4) data analysis and probability, and 5) algebra. There are separate results for each content area.

NAEP data cannot be used to compare performance in the various content areas—for example, algebra and measurement—because the questions developed for each content area were not designed to be of equal or comparable difficulty. Therefore, student performance in any two content areas is not directly comparable.

Challenges in Reporting 2007 Results for Puerto Rico

NCES was not able to report student performance in Puerto Rico in the same way as for the rest of the United States. NAEP usually summarizes the performance of students on all the individual questions on the NAEP assessment using a single scale score. NCES did report student performance in Puerto Rico using scale scores in 2003 and 2005. When 2007 performance using scale scores were compared to these earlier results, however, these comparisons did not meet generally accepted standards for validity and statistical reliability. Therefore, it was decided not to report 2007 results for Puerto Rico using the traditional NAEP scale scores.

Instead, performance of students in Puerto Rico is reported using average question scores. A question score allows us to show average student performance on a given question. When the answer to a question is either "Correct" or "Incorrect," the question score is the proportion of correct responses. When a question allows for partial credit, the question score is the proportion of correct responses plus a fraction of the partially correct responses. The individual question scores can be averaged together to create a single summary score for the entire assessment and for each of the five content areas. We also use average question scores to make comparisons between groups of students. Average question scores are expressed as decimal numbers between zero and one.

Overall Results

The average question score for grade 4 students in Puerto Rico was 0.26, compared to 0.55 for the nation. At grade 8, the Puerto Rico average was 0.25, compared to 0.51 for the nation.

As with all NAEP results, which are based on samples, average question scores have a margin of error, and when comparing average question scores we must test to see whether the difference is statistically significant—that is, larger than the margin of error. When we say that scores are larger or smaller or lower or higher than one another, we mean that the test for statistical significance has been satisfied.

The differences between Puerto Rico and the nation were statistically significant for both grades.

For each of the content areas at grade 4, we see the same pattern: Puerto Rico's average question score was below that for the nation in each of the content areas.

The average question scores for Puerto Rico students ranged between .21 and .39, while nationally the scores ranged between .53 and .61. In geometry the gap in performance between Puerto Rico fourth-graders and students nationally was smaller than the gap for the four other content areas, while the gap was larger in data analysis and probability.

At grade 8 as at grade 4, the average question scores for Puerto Rico students were lower than the nation for all five content areas. At grade 8, the five average question scores for Puerto Rico students ranged between .23 and .28, while those for the nation ranged from .48 to .56. Gaps

between average question scores for Puerto Rico and the nation did not differ among the five content areas.

Overall Results by Gender

Comparing results for Puerto Rico for male and female students, there were no significant differences in performance at either grade. At grade 4, there were no significant differences between male and female average question scores for any of the content areas. At grade 8, there were two significant differences—male students scored higher in measurement, while female students scored higher in data analysis and probability.

The report contains several examples of questions presented to the students in each content area, along with information about each question and about student performance on those questions. The question scores for all released questions in the assessment can be found in the appendices to the report.

Next Steps: Plans for 2009

Because of the problems we encountered in developing a trend scale for Puerto Rico that met statistical standards, NCES will not be administering the NAEP mathematics assessment in 2009 in Puerto Rico.

Instead, NCES will be conducting a variety of research projects that should help us develop strategies that would allow us to use the NAEP scale to report changes in student performance in Puerto Rico in the same way we report results for the nation and its jurisdictions. These projects range from small-scale qualitative focus groups to quantitative projects to analyze patterns of student responses to specific questions.

Despite the reporting differences, we believe that this report provides useful information for students, parents, educators, and policy makers in Puerto Rico. In closing, I would like to thank all the schools, teachers, and students who participated in the assessment.