MARCH, 2002

The NEGP Monthly, Vol. 2 NO. 30

NEGP MONTHLY

A monthly in-depth look at states and communities and their efforts to reach the National Education Goals
Published by the NATIONAL EDUCATION GOALS PANEL

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Goal 3: Student Achievement

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NEW YORK

WEST VIRGINIA

The NEGP MONTHLY is a publication of the National Education Goals Panel .

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A DECADE OF EFFORT: STATES MAKE PROGRESS IN MATH ACHIEVEMENT, BUT GAPS PERSIST

A decade of effort by the states to improve K-12 math instruction produced steady progress during the 1990s in average scores, according to a new analysis of data from the National Assessment of Educational Progress (NAEP). With just a few exceptions, however, the effort did not reduce the academic gap between white and minority students or between poor and non-poor students.

The National Education Goals Panel commissioned Paul Barton, former director of the Education Policy Center of the Educational Testing Service, to analyze data from state-by-state NAEP assessments between 1990 and 2000. NAEP began state-level assessments of 8th graders in 1990 and of 4th graders in 1992. He analyzed the data under seven categories: average scores, improvements in the bottom quartile, improvements in the top quartile, percent of students scoring proficient, closing of the top/bottom quartile gap, closing of the white/minority gap, and closing of the poor/non-poor gap

The Goals Panel asked for this special analysis in order to track progress according to the challenge set in Goal 3. This states that students would demonstrate knowledge in “challenging subject matter.” Moreover, the objective would be that “the academic performance of all students at the elementary and secondary level will increase significantly in every quartile, and the distribution of minority students in every quartile will more closely reflect the student population as a whole.”

During the 1990s, all states (except Iowa) adopted state standards for math and other subjects. Many states drew upon the standards adopted by the National Council of Teachers of Mathematics that had been published in the late 1980s. In

addition, the National Science Foundation funded state and urban district systemic initiatives to improve math and science instruction, and it distributed evaluations of available resources. The Eisenhower program focused on teacher professional development especially in math and science. Also, the Third International Mathematics and Science Study (TIMSS) and TIMSS-2, which included several school districts and consortia of school districts, provided policymakers and educators with analyses of curriculum, resources, and instructional approaches, in addition to achievement comparisons among the 40 or more countries participating.

These initiatives contributed to widespread improvement in the average math achievement for all student scores, according to the Barton report. Data for the report are drawn from unpublished NAEP tabulations prepared by the Educational Testing Service.

Some states among the 27 that reported improvement experienced quite dramatic gains. In eight states, math achievement remained static, and in one state, scores declined. The analysis includes results from the 36 states, the District of Columbia, and Guam, which participated in the 4th-grade assessments, and the 31 states, the District of Columbia, and Guam, which participated in the 8th-grade assessments.

Fourth Grade Results

At the 4th grade level, about the same number of states produced score gains for students in the bottom quartile (26), as did those with score gains in the top quartile (27). The gap between the average scores in the top and bottom quartiles narrowed in 14 states. Also, in 25 states the percent scoring above the specific cutpoint labeled “proficient” improved. A state may improve in its averages but still may not have enough students reach the proficient level to record a significant increase.

The gap between white and minority scores, however, narrowed in only 2 states (Georgia and North Carolina) remained the same in 32, and increased in 1. Using eligibility for school lunch programs as the measure of poverty, the gap between poor and non-poor students narrowed in only Connecticut; it widened in one state and remained the same in all others.

Several states produced considerable gains in average scores between 1992 and 2000, with nine of them increasing by 10 to 20 scale points. This group included Alabama, Indiana, Louisiana, Michigan, North Carolina, Ohio, Texas, Virginia, and West Virginia.

At the Eighth Grade

Achievement in 8th-grade math has been under particular scrutiny because NAEP and international studies show the achievement of students in this country dips significantly between grades 4 and 8. According to the NAEP analysis, 27 of 31 states raised average 8th-grade math scores; none declined. Also, 21 of the same states raised the average score of students in the bottom quartile, while at the same time, 29 states raised the average score of students in the top quartile. None of the states declined in average scores. As for the percentage of students scoring at the proficient or higher levels, 29 states had a higher percentage by 2000, and none declined.

Because 8th-grade achievement largely moved up at both the top and bottom quartiles on the average, fewer states (8 of 31) reduced the gap between the two. In five states, the gap increased. No states reduced the gap between white and minority scores at the 8th grade, and in two states the

gap increased. Also, no state reduced the gap in scores between poor and non-poor 8th-grade students.

On the other hand, some states made dramatic gains. While the national change in average scores for 8th-grade math was an increase of 13 scale score points, the increase in Illinois, Indiana, Kentucky, Maryland, Michigan, New York, North Carolina, Ohio, Texas, and West Virginia exceeded the national average.

In General

Overall, the results in mathematics achievement are encouraging, according to the report, more so than a previous analysis by Barton of NAEP reading scores or the recent release of the 2000 NAEP science assessment. The majority of participating states and the nation as a whole showed statistically significant positive change in average math scores. Five states - New York, North Carolina, Ohio, Texas, and Virginia - showed improvements at both the 4th and 8th grades in at least five of the seven categories in the analysis. .

The "gap" problem, however, is tenacious. Whether by minority status, poverty, or quartile, little, if any, progress was made during the decade in closing the achievement gap. Also, the nation is far from attaining the goal of having all students score at the proficient level. Only 25 percent of 4th graders and 26 percent of 8th graders reached this level.

The relative success in mathematics over a decade suggests that additional research may identify the factors in policy and practice that are contributing to improvement, the report concludes. States making gains in the largest number of categories ought to be of special interest. Also, numerous tables in the report provide individual states and analysts with more specific statistical data than were analyzed for the report.

Previous reports from the National Education Goals Panel examined the substantial improvements in math scores registered by several states. North Carolina, for example, experienced an increase of 20 points in average 4th-grade scores and 30 points in average 8th-grade scores. It reduced the gap between bottom and top quartiles by 13 points at the 4th grade and by 4 points at the 8th grade. NEGP's study of North Carolina found that the improvements were due to long-time focus and investment, beginning in the mid-1980s. The state uses a cohesive approach including higher expectations and standards, an emphasis on teachers' professional development, and strong state accountability. The same characteristics were found in Texas.

THE NATIONAL EDUCATION GOALS

Goal 1: Ready to Learn

Goal 2: School Completion

Goal 3: Student Achievement and Citizenship

Goal 4: Teacher Education and Professional Development

Goal 5: Mathematics and Science

Goal 6: Adult Literacy and Lifelong Learning

Goal 7: Safe, Disciplined and Alochol- and Drug-free Schools

Goal 8: Parental Participation

VIRGINIA

Virginia is one of the states making progress in all of the categories described in the report - except those related to closing the gaps related to minority status and poverty. At the 4th grade, its average scores improved 10 points, bottom quartile scores improved 14 points; and top quartile scores improved by 4 points. Over the decade, Virginia narrowed the gap between the bottom and top quartiles by 10 points

The key to Virginia's progress, according to Assistant Superintendent for the Division of Instruction Patricia Wright, "is that we make sure everything we do is in accord with core standards." The state's Standards of Learning (SOL) are considered rigorous and drive higher expectations and practice in the four core subject areas. Working with school districts, state officials have invested heavily in teacher professional development targeted specifically to the SOLs.

The SOLs correlate closely with the frameworks of both the National Council of Teachers of Mathematics (NCTM) and NAEP, Wright says. She credits the broad consensus on what should be taught in math to the groundwork laid by NCTM before standard setting in other subjects often became controversial. "NCTM led the way, backed by its own funding," she notes.

The state also "continues to place an emphasis on preparing all students for success in algebra," Wright says. This begins in the middle grades where those identified as potentially having problems are identified by a diagnostic test developed by the state. Teachers design an intervention plan based on the test results.

The alignment of policies with the SOLs extends to higher education. Licensure regulations insure that teachers know both the discipline of math and how to teach it. Too often, Wright says, content courses in math in higher education do not help future teachers understand the concepts underlying learning basic math skills.

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RESOURCES

Raising Achievement and Reducing Gaps: Reporting Progress Toward Goals for Academic Achievement in Mathematics, Paul E. Barton, National Education Goals Panel, 1225 22nd St. NW, Suite 502, Washington, DC 20037; 202/724-0015; www.negp.gov

NEW YORK

Never underestimate the power of high standards and accountability. New York State students made statistically significant gains in scale scores in several categories. Improvements in math NAEP scores improved 20 points in the bottom quartile and 10 points in the top quartile at the 8th grade level. At the 4th grade, the bottom quartile improved 14 scale points, and the gap between the top and bottom quartiles was reduced by 10 scale points. The increase in average scale scores also was statistically significant.

Only two people direct State Education Department efforts in math, according to Jackie Marcano, associate in math. She specializes in assessment; her co-worker focuses on curriculum. The 10 regional service centers, or BOCES, provide professional development in their areas; and teachers have been active involved in changing math practice through county and state associations. Also, for two years the state did its own scoring of math assessments, using 200 teachers at a time to score papers. They learned to use rubrics keyed to the state standards, which have been in place since 1996. The standards span K-12 in two-grade groupings.

It is assessment policy, however, that "has encouraged both teachers and students to work harder," Marcano says. The state has been phasing in the use of new Regents exams that all students must pass. They can begin taking the exams in 10th grade and continue taking them until they pass. Regents exams, considered rigorous, once were considered appropriate only for college-bound students, but state policy turned them into the standard for all students.

Assessments in 4th and 8th grades prepare students for the Regents in high school. A previous 8th-grade math test covered minimal skills. The new testing regimen consists of 20-30 multiple test items, as well as a minimum of 12 open-ended questions that require students to apply their knowledge.

"We try to show elementary and middle grades teachers that they are responsible for results on the Regents," Marcano says. All students take Math-A beginning in the 9th grade, although more advanced students may take the 11/2 -year course earlier. In the past, pre-secondary teachers held low expectations for students who were not top learners because "they expected them to be enrolled in general math in high school and to not need advanced skills," she says. Now, all students must take Math-A.

What is the National Education Goals Panel?

The National Education Goals Panel is a unique bipartisan body of state and federal officials created in 1990 by President Bush and the nation's Governors to report state and national progress and urge education improvement efforts to reach a set of National Education Goals.

Who serves on the National Education Goals Panel and how are they chosen?

Eight governors, four state legislators, four members of the U.S. Congress, and two members appointed by the President serve on the Goals Panel. Members are appointed by the leadership of the National Governors' Association, the National Conference of State Legislatures, the U.S. Senate and House, and the President.

What does the Goals Panel do?

The Goals Panel has been charged to:

- Report state and national progress toward the National Education Goals.
- Work to establish a system of high academic standards and assessments.
- Identify promising and effective reform strategies.
- Recommend actions for state, federal and local governments to take.
- Build a nationwide, bipartisan consensus to achieve the Goals.

The annual Goals Report and other publications of the Panel are available without charge upon request from the Goals Panel or at its web site www.negp.gov. Publications requests can be made by mail, fax, or e-mail, or by Internet.

New York, however, slipped slightly on closing the gap between white/minority students and high income/low income students. "We still have a lot of work to do," Marcano admits.

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WEST VIRGINIA

Fourth graders in West Virginia improved their scores on five of the seven categories, and eighth graders improved their scores on four of the categories, failing to match younger students only on closing the gap between the bottom and top quartiles. At the 4th grade, the average math achievement improved by 10 scale points, while the bottom quartile improved by 12 points. The gap between top and bottom quartiles was reduced by 7 points. At the 8th-grade level, average scores improved by 15 points; the bottom quartile improved by 16 points; and the top quartile improved by 13 points. The state's students made progress on reducing the white/minority and non-poor/poor gaps, but it was not statistically significant.

West Virginia has used the NAEP frameworks as a professional development tool around the state, according to Larry Lamb, math coordinator for the Department of Education. The state's math standards were correlated with the NAEP frameworks "to fill in the gaps in our curriculum," he says. Consequently, "a lot of old arithmetic that was taught in the middle grades is gone." Algebra is now a strong strand in the curriculum beginning in 6th grade, and students also must solve problems and write about their calculations.

Fourth and 8th-grade teachers in every region attended workshops on using the NAEP frameworks as well as using problem solving in instruction. This helped prepare teachers for the professional development now available through a National Science Foundation grant, the Mathematics Education Reform Initiative for Teachers.

The state has worked closely with higher education institutions in the past few years to improve the preparation of teachers, Lamb says. Changes in certification policies now require elementary teachers to have more background in math, and those teaching at the middle-grades level must have math certification. The state also sponsored an Elementary Math Academy, Algebra for All workshops, and is slated to open a Governor's School for Math and Science this year.

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