AssessmentBrief

Public Schools of North Carolina

State Board of Education • Jay Robinson, Chairman • North Carolina Department of Public Instruction • Michael E. Ward, Superintendent

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Research on End-of-Grade Testing: Assessment of Mathematics

ABCs of Public Education

The ABCs of Public Education is a comprehensive plan to reorganize public schools in North Carolina. This plan focuses on:

- strong accountability,
- emphasis on the basics and on high educational standards, and
- maximum local control.

The ABCs Plan places a renewed emphasis on reading, writing, and mathematics, especially in the early grades.

Background on Mathematics Assessment

The North Carolina End-of-Grade Test of Mathematics, which is designed to meet the need for higher standards of achievement for North Carolina students, assesses grade-level knowledge and skills established by the North Carolina *Standard Course of Study.* The *Standard Course of Study* identifies the following seven strands for mathematics:

- numeration,
- geometry,
- patterns and pre-algebra,
- measurement,
- problem-solving,
- data analysis and statistics, and
- computation.

The test contains both an applications section and a computation section with a total of 80 multiple-choice questions at each grade level.

Reporting Mathematics Performance

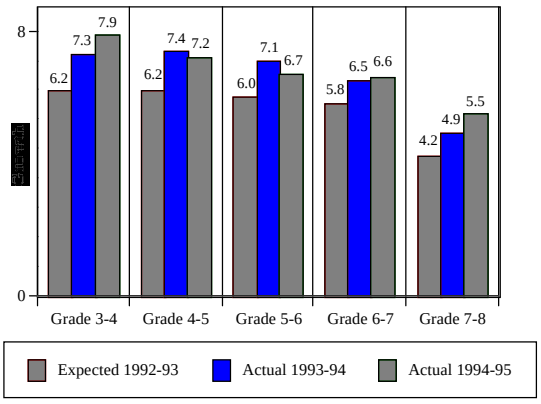
Student performance in mathematics is reported in a variety of contexts, including developmental scale scores and achievement levels. Group and subgroup scores are also reported.

Although the mathematics tests were developed as accountability tests, curriculum information is provided on the goal summary reports. In addition, developmental scale scores depict the amount of growth that actually occurs in student achievement over time. These scores can be used to compare the expected rate of growth (i.e., 1992-93 benchmarks) to actual student or group performance as the student(s) move from grade 3 to grade 8. Achievement levels show how a student or group of students performed in relation to predetermined grade-level standards set using teacher judgment linked to student performance.

Trends in Mathematics Performance

Growth. Figure 1 shows that the actual growth (performance in 1994 and 1995) in mathematics exceeded the expected growth (benchmarks established in 1993) for each cohort group. This performance indicates that for each subsequent incoming class, students demonstrate greater knowledge and skills in the area of mathematics than the students in the baseline group. Therefore, students in subsequent classes require more challenging learning opportunities in mathematics.

Figure 1. End-of-Grade Mathematics Test Results for 1 1993-94, and 1994-95: Expected and Actual Growth



If the rate of growth seen in both 1993-94 and 1994-95 continues, it is projected that eighth-grade students in 1997-98 will be approximately one year ahead of their eighth-grade counterparts in 1992-93.

Figure 2. End-of-Grade Mathematics Results for 1994-95.

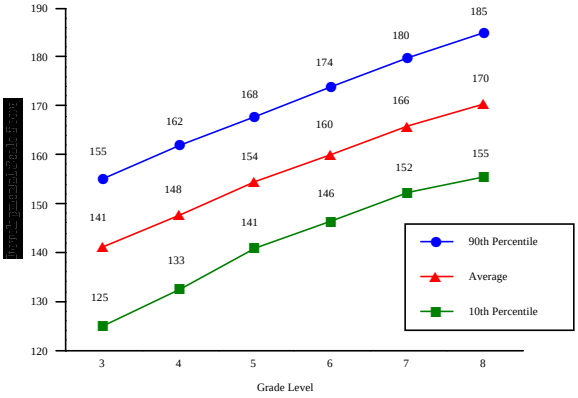
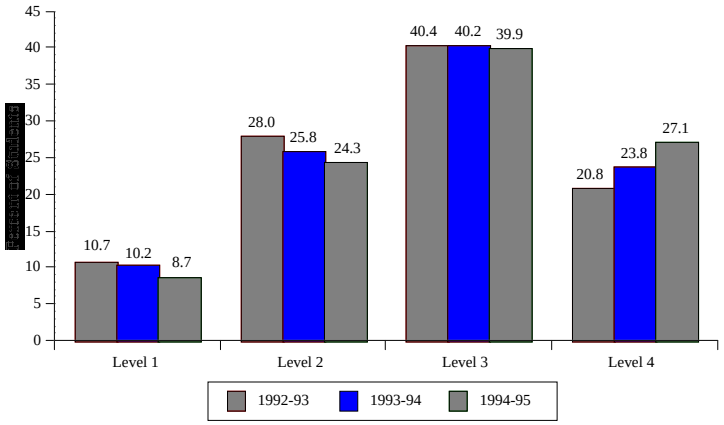


Figure 3. Percent of Students at each Achievement Level in Mathematics Across All Grades for 1992-93, 1993-94, and 1994-95.



Based on the results from the administration of the mathematics test in 1994-95 (Figure 2), the following observations can be made:

- The average score of the top 10 percent of third graders is one point above the average score for all fifth graders.
- Mathematics achievement in the early grades appears to grow at about the same rate as it does in the later grades.
- The gaps in student performance depicted at the 10th percentile, average, and 90th percentile remain basically the same from grade 3 through grade 8.
- There is a wide range of achievement in mathematics within each grade level and within many classrooms.

Achievement Levels. The four achievement levels are standards established using teacher judgment during the initial development of the end-of-grade tests linked with student performance on the tests. The achievement levels set forth expectations of performance in mathematics at each grade. Students performing at Level I do not demonstrate mastery of grade-level competencies in mathematics; students performing at Level II demonstrate inconsistent mastery. In 1995, the State Board of Education established Levels III and IV, or consistent and superior mastery of grade-level competencies respectively, as the standard of performance for each grade. The State Board also stated that students performing at Levels I and II should receive some type of focused intervention at the local level in order to be successful.

Figure 3 shows the percent of students in mathematics across all grades statewide at each of the four achievement levels from 1992-93, 1993-94, and 1994-95. The percentage of students across all grades achieving at Level I continues to decrease, from 10.7 percent in 1992-93 to 10.2 percent in 1993-94 to 8.7 percent in 1994-95. The percentage of students across all grades achieving at Levels III and IV (i.e., at or above grade level proficiency) continues to increase, from 61.2 percent in 1992-93 to 64.0 percent in 1993-94 to 67.0 percent in 1994-95.

A comparison of the 1994-95 state-level mathematics data to the 1992-93 baseline data shows that the percent of students performing at achievement levels III and IV (i.e., at grade level or above) in mathematics improved at every grade level. The increase in students achieving at Levels III and IV means that over 20,000 additional students are reaching grade level proficiency in mathematics. Since 1992-93, over 40,000 additional students have reached grade level proficiency in mathematics.

Trends in Mathematics Subgroup Performance

Mathematics results extracted from state-level subgroup data across all grades in 1994-95 reveal the following:

- While not significantly better, on the average, females tend to score about a half-point to one point above males in all grades.
- Average scores for Black students were lower than the average scores for White students, with Black students performing, on the average, one and one-quarter grade levels behind White students.
- The average score by grade level for students who reported that they do not complete assigned homework is consistently below Level III. Scores are highest for students who do 5-10 hours of homework each week.