## A Different Interpretation of the Data: Most Students Know a Lot

Paul E. Burke

The Nation's Report Card shows that two-thirds of students know most of what we want them to know in math. Among 17-year-olds in school, about two-thirds or more understand averages, areas of rectangles, and basic percent questions. About two-thirds can solve almost all problems that require adding, subtracting, or multiplying with two- or three-digit numbers, fractions, or decimals—with or without a calculator. About two-thirds show the same skills in 24 of 29 word problems.

Fewer students—although still about one-half or more—can divide negative numbers or decimals, convert fractions to decimals, convert inches to miles on a map, define metric measures, or calculate the volume of a box. About one-half can solve probability questions or logical puzzles. The Report Card also includes data on equations in $x$ and $y$, complementary and supplementary angles, and the angles and sides of triangles. Students who have studied these topics do well on the questions; others do not (Brown et al. 1988). No surprises there.

For two reasons, these findings differ a little from other studies of the Nation's Report Card (Anrig and Lapointe 1989, Brown et al. 1988, Dossey et al. 1988). First, I analyze how many students answer each question right, rather than grouping all the questions into one summary scale. Official reports use a summary scale from 0 to 500 that shows how each student ranks compared to others. For example, half of 17-year-olds score 300 or better on the scale. The reports give sample questions typical of what students at this level can do. However, each question is answered right by some of the other half of students too. In fact, every one of these questions is answered right by over two-thirds of students in all (ETS 1988). And this success appears even though some of the higher-order questions are ambiguous or use specialized terms.

The second reason for different findings is that, at the end of each test, I exclude questions that over 200 students did not reach (7 to 8 percent of the students taking a test). If so many students did not have time to reach a question, then many of those who did reach it probably were racing to finish, so these answers do not accurately reflect the students' knowledge. End-of-test guessing, if present, probably does not affect the summary levels in Dossey et al., but does affect the results for specific questions.

The Report Card data are highly useful, although they have their anomalies, as I have mentioned. Other anomalies exist on other tests, such as the oft-quoted *National Geographic* survey that supposedly showed how few countries Americans can find on a map compared to Europeans: this was the 60th question out of 80 here, but the 6th of 7 abroad, a circumstance that may explain Europeans' higher responses (Gallup 1988). Another example is the Report Card writing tests, which criticize students for vagueness, yet give them no clear statement of what is desired (Applebee et al. 1986, NAEP n.d.).

One of the great strengths of re-evaluating the same national data is that different writers' results are indeed consistent, although we may stress students' success or failure differently. This kind of re-analysis is invited by the issuers of the Report Card (Beaton 1988, p. 178). They note that the original goal was to report how many students answered each question right, as I have done. More complex methods were only added later, to summarize the large amounts of information.

Even though most students know a lot, the remaining gaps matter. Eighth or 9th grade is the time to catch up, with a "numeracy" course on applying formulas, percents, the use of sample surveys and correlations, inductive and deductive logic, and basic computer commands.

### *References*


Anrig, G., and A. Lapointe. (November 1989). "What We Know About What Students Don't Know." *Educational Leadership* 47, 3: 4-9.

Applebee, A., J. Langer, and I. Mullis. (1986). *The Writing Report Card*. Princeton: Educational Testing Service.

Beaton, A., et al. (1988). *The NAEP 1985–86 Technical Report*. Princeton: Educational Testing Service.

Brown, C., T. Carpenter, V. Kouba, M. Lindquist, E. Silver, and J. Swafford. (1988). "Secondary School Results for the Fourth NAEP Mathematics Assessment." *Mathematics Teacher* 81: 241–248, 337–347, 397.

Dossey, J., I. Mullis, M. Lindquist, and D. Chambers. (1988). *The Mathematics Report Card*. Princeton: Educational Testing Service.

Educational Testing Service. (1988). *Codebook for Data Tapes of the 1986 Assessment*. Princeton: author.

Gallup Organization. (1988). *Gallup Survey Questionnaire for the National Geographic*. Princeton: author.

National Assessment of Educational Progress. (n.d.). *Reading, Thinking, and Writing*. 1979–80 Assessment. Denver: author.


**Paul E. Burke** is an independent education researcher and a former high school teacher of mathematics, physics, and French. He can be reached at 1101 Third St. S.W., Washington, DC 20024.