5 Comparing Achievement Gaps

A primary objective of federal involvement in education is to ensure equal opportunity for all students, including minority groups and those living in poverty (USDE 2002). NAEP has shown that although there have been gains since 1970, the average mathematics achievement of certain minority groups lag behind that of other students in both the elementary and secondary grades.[30] Numerous programs nationwide are aimed at reducing the mathematics achievement gap between Black and Hispanic students and White students, as well as between students in high-poverty and low-poverty schools; state assessments are monitoring achievement to determine whether, in their state, the gap is closing.

In compliance with *No Child Left Behind*, state education agencies now report school mathematics achievement results separately for minorities, for students eligible for free or reduced price lunch, for students with disabilities, and for English language learners (USDE 2002). These reports can be used to assess how successfully schools are narrowing the achievement gaps and to identify places needing assistance in narrowing their gaps.

Fair and unbiased measurement of the achievement of students from different cultural backgrounds is particularly difficult, and test developers try hard to remove test items that might unfairly challenge some groups more than others. In spite of these efforts, some state assessments may be more attuned to measuring achievement gaps and their narrowing than others. Comparison of NAEP measurement of mathematics achievement gaps to state assessment results can shed light on such differences.

The main objective of this part of the report is to compare the measurement of mathematics achievement gaps by state assessments and NAEP. Specifically, we compare three types of gaps:

- the Black-White achievement gap
- the Hispanic-White achievement gap
- the poverty gap: achievement of students qualifying for free or reduced-price lunch (i.e., disadvantaged students) versus those who do not qualify.[31]

30. Campbell, Hombo, and Mazzeo (2000).

31. We refer to students eligible for free/reduced price lunch as (economically) disadvantaged students.

The focus of these comparisons is not on differences in gaps between states but on differences between NAEP and state measurement of the gap in the same schools in the same state.

Population Profiles of Achievement Gaps

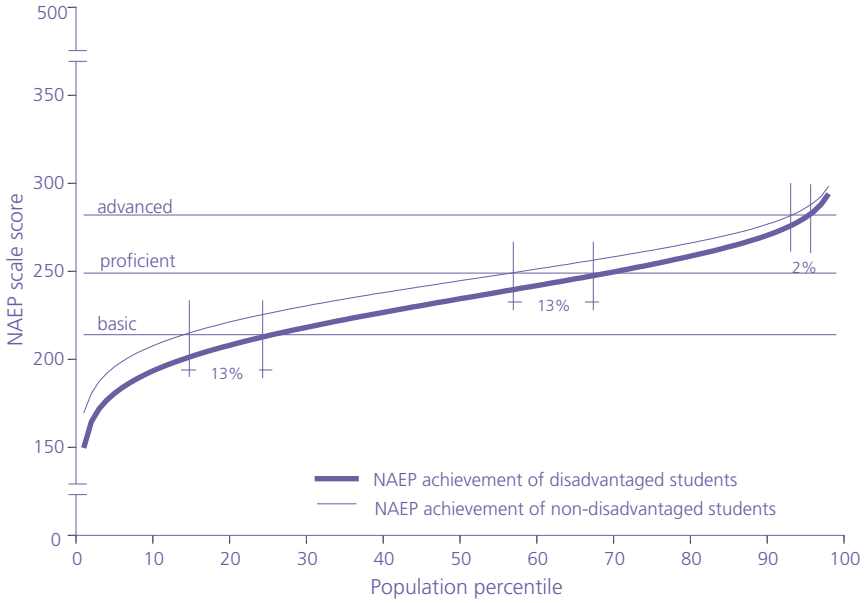
Achievement gaps for whole subpopulations, such as Black students, Hispanic students, or economically disadvantaged students, are complex. What causes one segment of a disadvantaged population to achieve at a lower level may be quite different from the barriers faced by another segment of the same subpopulation. It is easy to forget that in the context of a population achievement gap, there are still many students in the disadvantaged group who achieve at a higher level than typical for non-disadvantaged groups. Expressing a mathematics achievement gap as a single number (the difference in the percentages of children in two groups who meet a standard) hides a great deal of information about the nature of gaps.

Moreover, as Paul Holland (2002) has shown, it is also likely to mislead readers because of the differential placement of the standard relative to the distribution of achievement in the two populations. For example, in figure 19 the poverty gap in mathematics achievement, which is about 10 points on the NAEP scale at the median, is larger in the lower part of the achievement distribution than in the higher part of the distribution. As a result, the gap is 13 percent in achieving the basic level (the distance between the points at which the graphs cross the basic criterion of 214 on the NAEP scale) and 13 percent in achieving the proficient level, but only 2 percent in achieving the advanced level. The graph, or population profile, conveys significantly more information about the poverty gap in mathematics than does a simple comparison of the percentages achieving the standards.

Holland points out that this effect is more striking when examining reduction in gaps. If we hypothetically suppose that at some future date all students would gain 20 points on the NAEP mathematics achievement scale, the population profiles would appear as in figure 20. In this case, the gaps in percent advanced, 8 percent, would be larger than in 2003, while the gap in percent achieving the basic level, 5 percent, would be smaller. Even though the achievement gaps remain constant, they appear to increase or decrease, depending on the position of the standards *vis-à-vis* the distribution of student achievement.

Even though the gap in the percentage of students achieving the basic level might be reduced from 13 percent to 5 percent, the gap in mathematics skills at that level would be just as large as before, larger than among higher-achieving segments of the disadvantaged and non-disadvantaged populations. Even though the gap in the percentage of students meeting the advanced standard might increase from 2 percent to 8 percent, it would be inappropriate to conclude that educators were ignoring the gap among the highest achievers in the two subpopulations.

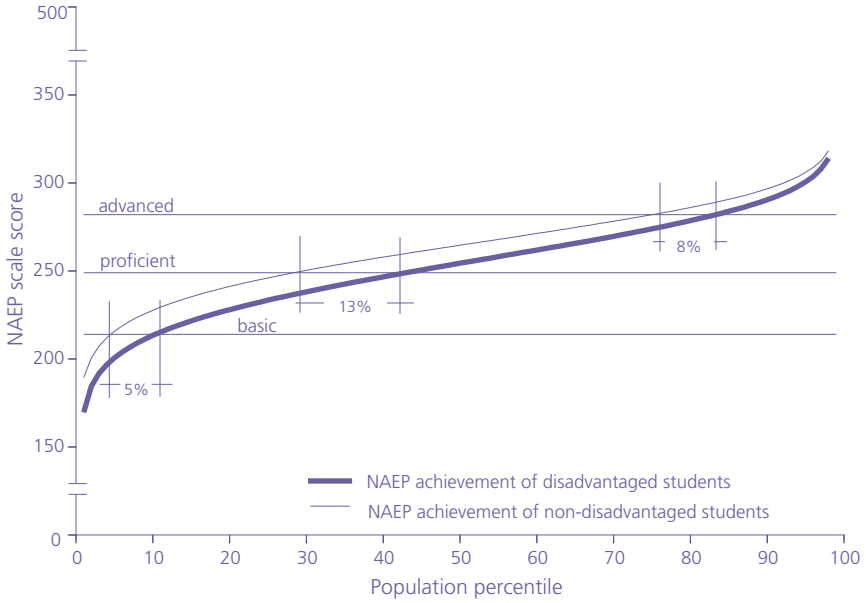
Figure 19. Population profile of the NAEP poverty gap in grade 4 mathematics achievement: 2003



NOTE: Students eligible for free/reduced price lunch are referred to as (economically) disadvantaged.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2003 Mathematics Assessment: Full population estimates.

Figure 20. NAEP poverty gap from a hypothetical uniform 20-point increase on the grade 4 mathematics achievement scale



NOTE: Students eligible for free/reduced price lunch are referred to as (economically) disadvantaged.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2003 Mathematics Assessment: Full population estimates.

If gap measurement must be carried out in terms of percentages meeting standards, it is essential not to be misled by comparisons between gaps measured at different points on the achievement continuum. This effect makes it clear that comparison of NAEP and state assessment measurement of gaps in terms of percentages meeting standards must refer to the same standard for both assessments. Therefore, because individual scale values are not available for state assessments, we must measure gaps at the level of each state's primary standard.

It is important to note, however, that measuring the gap at each state's particular standard renders comparisons of gaps between states uninterpretable, because the standards are different in each state. And even though NAEP applies the same set of standards in all states to produce the biennial Nation's Report Card, comparisons of achievement gaps in different states must be interpreted in the context of variations in the position of the NAEP standards with respect to states' achievement distributions. Comparisons of gaps between states can be found in the Nation's Report Card (http://nces.ed.gov/nationsreportcard).

There are three major limitations in the data that further affect the interpretation of comparisons of gaps as measured by NAEP versus state assessments. The first limitation is that the state assessment data are only available at the school and grade level for the various population groups, not for individuals. The second is that percentages of subgroups meeting standards are suppressed in many schools, due to small samples. The third is that separate scores for subpopulations are not available in the NLSLSASD before 2002, precluding the possibility of comparing NAEP and state assessment of reduction in gaps between 2000 and 2003.

The state assessment data's limitation to school-level aggregate percentages of subgroups achieving standards means that each student is represented as the average of that student's population group in a school. As a result, variability in performance within each group in a school is not captured. The variability across schools using group averages is lower than the variability across schools using individual student scores. Unfortunately, to compare NAEP and state assessment gaps with each other, we must also limit the NAEP data to school averages for subgroups.

In addition, school-level scores are subject to *suppression* when the number of students tested in a subgroup is so small that the state prohibits the release of scores. Suppression rules vary between states; typically, scores are suppressed when fewer than 5 or 10 students are included in the average score. To avoid unreliable NAEP results in gap comparisons between NAEP and state assessment reports, we have omitted from analysis any schools with fewer than three tested subgroup members.[32]

32. Including percentages based on one or two students overestimates the frequency of observing extreme percentages: with one student, the percentage is either 0 or 100. Because small schools in the NAEP sample may be weighted to represent large numbers of small schools, this distorts some population profiles by overestimating the percentages of students in the extreme categories of 0 percent achieving the standard and 100 percent achieving the standard. Suppressing the cases based on one or two students more closely matches the state assessment practices of suppressing scores based on small sample sizes.

Mathematics Achievement Gaps

The State Profile section of this report (appendix D) displays three types of achievement gaps similar to Figure 19, for all states with available data: the Black-White achievement gap, the Hispanic-White achievement gap, and the poverty achievement gap. These are introduced in the following pages through the presentation of population profiles of gaps showing the aggregation of percentages of students meeting states' primary standards. The graphs are not intended to reflect national average achievement gaps because they represent only some states and some schools, but they are informative. Although the graphs portray the aggregate achievement gap as measured against different standards across states, the general size of the gaps, in terms of standards in place in the nation in 2003, is apparent.

An aggregate population profile of the poverty gap in grade 8 mathematics achievement for the states included in this report is shown in the following series of four graphs, which compare mathematics achievement of disadvantaged students with other students. Figures 21 and 22 display the differential achievement as measured by NAEP and as measured by state assessments, respectively. [33]

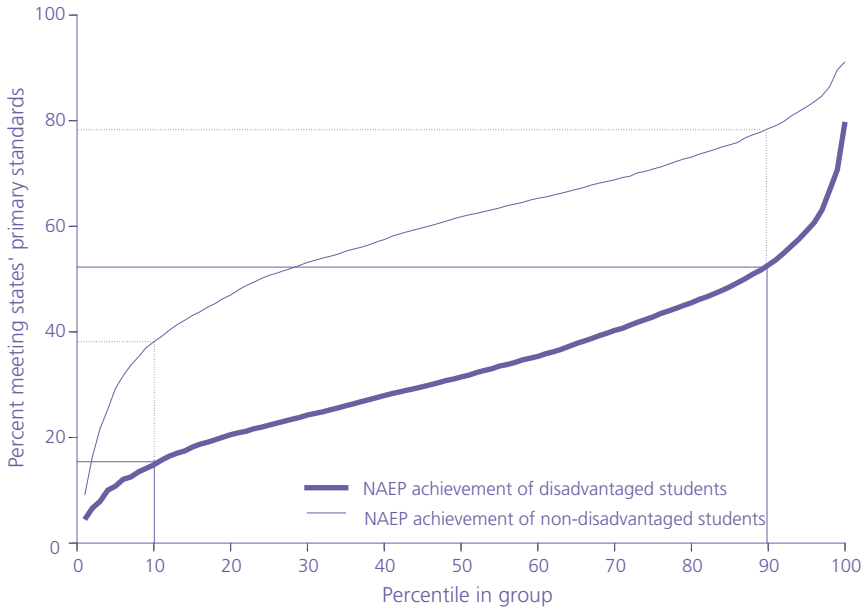
In figure 21, the vertical (*y*) axis measures mathematics achievement. Due to limitations on the data available on state assessment results, mathematics achievement cannot be graphed for each individual student. Instead, it is measured by the percent of students in a school meeting the state's primary mathematics achievement standard. That is, for each student in a subgroup (such as disadvantaged students), the mathematics achievement measure is the percent of students in his or her subgroup in his or her school meeting the standard. Thus, within a particular school, all members of the subgroup have the same mathematics achievement measure, which is the average of all their individual achievement scores. The horizontal (*x*) axis represents all the students in the subgroup in the state or nation, arrayed from those with the lowest mathematics achievement measure on the left to the highest mathematics achievement measure on the right. The units on the horizontal axis are percentiles, from 0 to 100; that is, percentages of the student's subgroup with equal or lower mathematics achievement measures. Figure 21 serves a dual purpose. First, it arrays the disadvantaged student population (shown by the darker line) by percentile, from those in the schools where the fewest disadvantaged students meet the standard to those in schools where the most disadvantaged

33. A school at the 50th percentile on a population profile has an average performance that is higher than the average performance in schools serving half the students in the state and lower than the average performance in the schools serving the other half of the population (except for those in the school itself, of course). However, there may be different numbers of schools serving the upper and lower halves of the population. For example, for minority population profiles, there may be 500 (small) schools serving students in the upper half of the (minority) student population and 100 (larger) schools serving students in the lower half of that population, so the population percentile is not literally a percentile of schools. It is a percentile of the student population served by the schools.

students meet the standard. Second, it also arrays the non-disadvantaged student population (shown by the lighter line) by percentile. Thus, two population profiles can be superimposed on the same graph to display the achievement gap between them.

The population profiles in figure 21 can be read as follows. Focus first on comparing the highest achievers among disadvantaged students versus the highest achievers among non-disadvantaged students. Consider the 90th percentile of each population as an example. The vertical line at the 90th percentile crosses the *disadvantaged* line at 53 percent meeting the standard. That means that 90 percent of the population of disadvantaged students are attending schools where fewer than 53 percent of the disadvantaged students meet the standard and the other 10 percent are in schools where more than 53 percent of the disadvantaged students meet the standard. In other words, students at the *90th percentile of the disadvantaged population are attending schools where 53 percent of the disadvantaged students meet the standard*.

Figure 21. School percentage of economically disadvantaged and non-disadvantaged students meeting states' primary grade 8 mathematics standards as measured by NAEP, by percentile of students in each subgroup: 2003



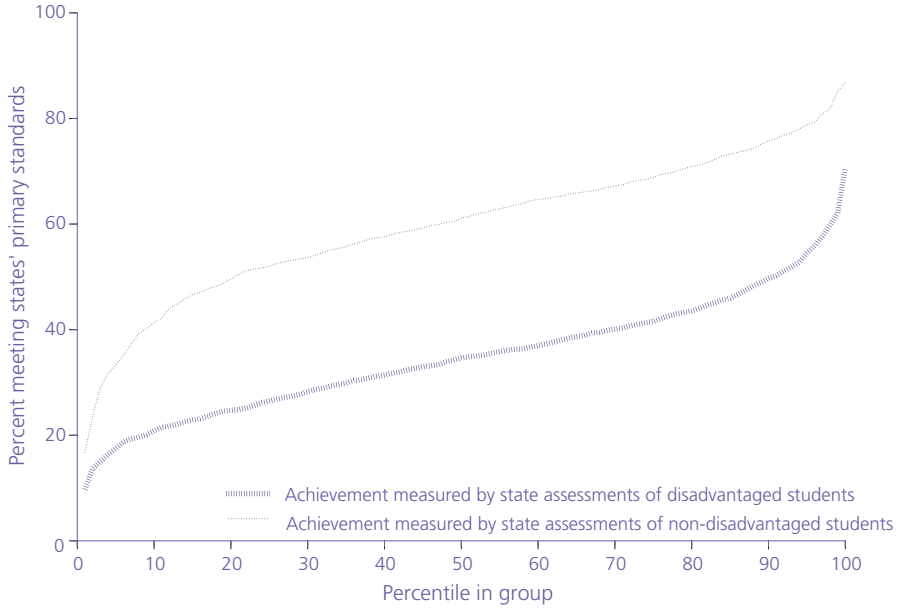
NOTE: Primary standard is the state's standard for *proficient* performance. Students eligible for free/reduced price lunch are referred to as (economically) disadvantaged. Percentile in group refers to the percentage of the disadvantaged (or non-disadvantaged) student population who are in schools with lower (same-group) percentages meeting the states' primary mathematics standards.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2003 Mathematics Assessment: Full population estimates. The National Longitudinal School-Level State Assessment Score Database (NLSLSASD) 2004.

By comparison, the 90th percentile crosses the *non-disadvantaged* line in figure 21 at 79 percent meeting the standard. That means that 90 percent of *non-disadvantaged students* are attending schools where fewer than 79 percent of *non-disadvantaged students* meet the standard and the other 10 percent are in schools where more than 79 percent of *non-disadvantaged students* meet the standard. We can say that the *students at the 90th percentile of the non-disadvantaged population are attending schools where 79 percent of the non-disadvantaged students meet the standard*. Thus, comparing 90th percentile for the disadvantaged student population versus the 90th percentile for the non-disadvantaged student population, there is a gap of 26 points (26=79-53) in percentages between the groups in their school meeting the standard.

Similarly, at the tenth percentile, disadvantaged students are in schools where about 15 percent of disadvantaged students meet the standards. By comparison, non-disadvantaged students at the tenth percentile for their group are in schools where about 39 percent of non-disadvantaged students meet the standards, a gap of 24 percentage points among these relatively low-achieving students in the two groups.

Figure 22. School percentage of economically disadvantaged and non-disadvantaged students meeting states' primary grade 8 mathematics standards as measured by state assessments, by percentile of students in each subgroup: 2003



NOTE: Primary standard is the state's standard for *proficient* performance. Students eligible for free/reduced price lunch are referred to as (economically) disadvantaged. Percentile in group refers to the percentage of the disadvantaged (or non-disadvantaged) student population who are in schools with lower (same-group) percentages meeting the states' primary mathematics standards.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2003 Mathematics Assessment: Full population estimates. The National Longitudinal School-Level State Assessment Score Database (NLSLSASD) 2004.

The graphs in figures 21 and 22 are aggregated across the states and schools for which subgroup percentages achieving mathematics standards are available.[34] Because the primary standards vary from state to state, it is essential in comparing NAEP and state assessment results that the NAEP results are measured relative to each state's standard in that state. Corresponding population profiles of gaps for individual states are included in the State Profile section of this report (appendix D)—these aggregate profiles may provide context for interpreting individual state achievement gaps.

Figures 21 and 22 display similar pictures—throughout the middle range of the student populations, there is an apparently fairly uniform gap of between 20 and 30 percentage points, and this gap is noticeably smaller in the extreme high and low percentiles. Nevertheless, it should be clear that some disadvantaged students are in schools where the percentages of disadvantaged students achieving the standard are greater than the percentages of non-disadvantaged students achieving the standard in other schools. For example, figure 21 showed that the 90th-percentile disadvantaged students are in schools where 53 percent of disadvantaged students meet the standards, which is a greater percentage than among the lowest quarter of the non-disadvantaged student population.[35]

All of the graphs are based on the NAEP schools, weighted to represent the population of eighth graders in each state. Because the use of the aggregate school-level percentages, instead of individual student achievement scores, may have an effect on the position and shape of the population profile graphs, school-level percentages are presented in both NAEP and state assessment graphs. Appendix A presents a description of the method for constructing population profiles based on school-level aggregate achievement measures.

It is difficult to compare the NAEP and state assessment gaps when presented in different figures. Figure 23 combines the NAEP and state assessment profiles for disadvantaged and non-disadvantaged students. The similarity of the NAEP and state assessment results in this figure is notable. Although some discrepancies are worth noting, the overall picture suggests that as a summary across 34 states, NAEP and state assessments are measuring the poverty gap similarly.

Compared to the average state assessment results, the NAEP population profiles appear to exhibit greater variation between the top and bottom of the distributions; that is, there is greater variation in the achievement of mathematics standards

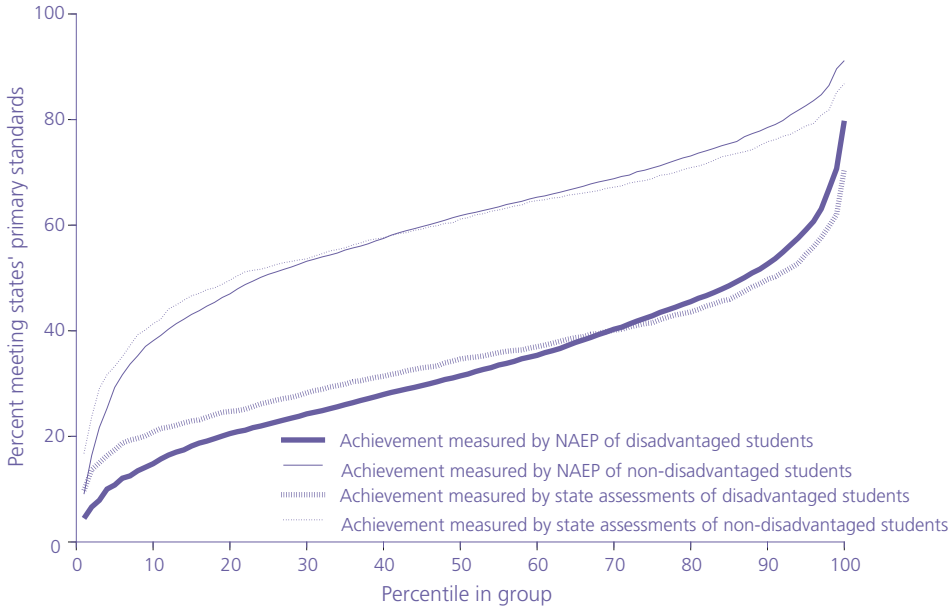
34. States with fewer than 10 percent disadvantaged students or fewer than 10 NAEP schools with non-suppressed percentages for disadvantaged students are excluded due to unstable estimates.

35. Readers should not be confused by the use of *percent* and *percentile* for the two axes in the population profile graphs. These are two completely different measures, which happen to have similar names. For percentiles, there must be a person at the lowest percentile and another at the highest percentile, by definition, because the percentiles just rank the people from lowest (zero, or one, in some definitions) to highest (100). The percent achieving a standard, on the other hand, can be zero for everybody (a very high standard indeed!) or 100 for everybody, or anywhere in between. The only built-in constraint is that the graphs must rise from left to right - higher achieving segments of the (sub)population are ranked in higher percentiles of the (sub)population by definition.

measured by NAEP, within both the disadvantaged and non-disadvantaged populations, than in achievement measured by state assessments (figure 23). Whether this is a real phenomenon or an artifact of the differences in design between NAEP and state assessments is not clear at this time and requires further study. One possibility is that because NAEP percentages meeting standards are generally based on fewer students in each school than state assessment percentages, variation of NAEP school means may naturally be larger than variation of state assessment school means.

In figure 23, information about the size of the difference between NAEP and state assessment measurement of the poverty gap is difficult to separate visually from information about the overall size of the gap. In particular, in the highest achievement percentiles, NAEP reports higher achievement by both groups than the aggregate state assessments do. To focus on the differences between NAEP and state assessments, we eliminate the distracting information by graphing only the *difference* between the profiles (the achievement of the disadvantaged group, minus the achievement of the non-disadvantaged group). The result is the gap profile in figure 24, in which a *zero* gap is the goal, and current gaps fall below that goal.

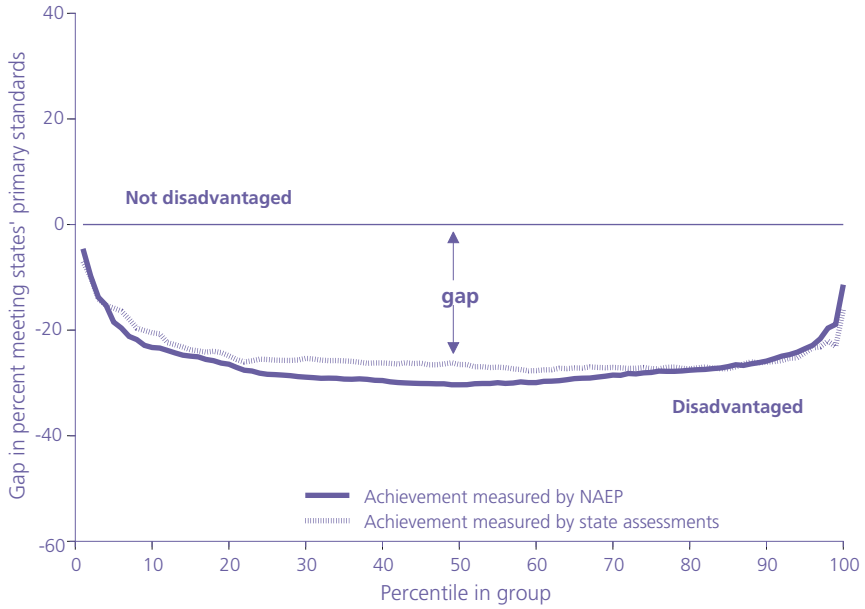
Figure 23. School percentage of economically disadvantaged and non-disadvantaged students meeting states' primary grade 8 mathematics standards as measured by NAEP and state assessments, by percentile of students in each subgroup: 2003



NOTE: Students eligible for free/reduced price lunch are referred to as (economically) disadvantaged. Percentile in group refers to the percentage of the disadvantaged (or non-disadvantaged) student population who are in schools with lower (same-group) percentages meeting the states' primary mathematics standards.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2003 Mathematics Assessment: Full population estimates. The National Longitudinal School-Level State Assessment Score Database (NLSLSASD) 2004.

Figure 24. Profile of the poverty gap in school percentage of students meeting states' grade 8 mathematics achievement standards, by percentile of students in each subgroup: 2003



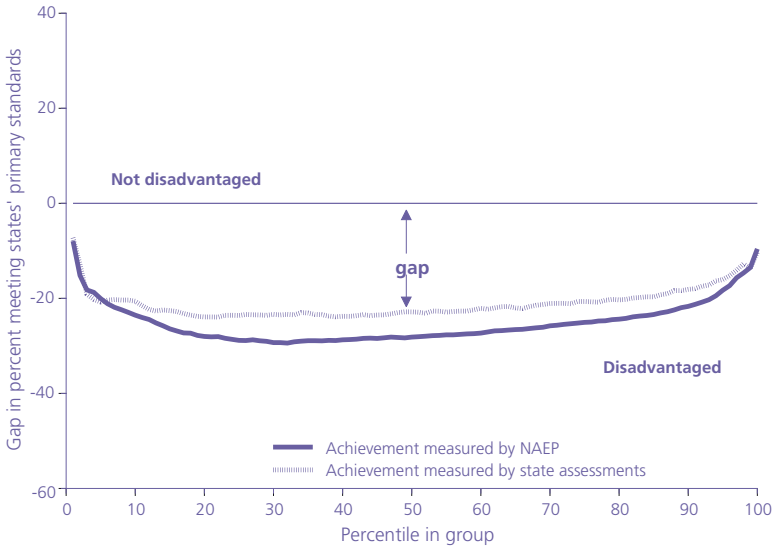
NOTE: Students eligible for free/reduced price lunch are referred to as (economically) disadvantaged. Percentile in group refers to the percentage of the disadvantaged (or non-disadvantaged) student population who are in schools with lower (same-group) percentages meeting the states' primary mathematics standards.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2003 Mathematics Assessment: Full population estimates. The National Longitudinal School-Level State Assessment Score Database (NLSLSASD) 2004.

In figure 24 it becomes clearer how the NAEP and state assessment measurement of poverty gaps compare to each other. Although the gap profiles are similar, NAEP is measuring a larger gap in the lower three-quarters of the two populations. From the 25th to the 50th percentile, NAEP measures a gap of 28 to 30 percent in achieving state standards, while state assessments average a 24 to 26 percent gap. On the other hand, above the 75th percentile, the NAEP and average state assessment poverty gaps are virtually identical. Note that for individual state gap profiles (in appendix D) results of statistical significance tests are reported. Because the graphs presented in this section are not intended for inference about national patterns, no significance tests are reported here.

Similar population profiles can be constructed for other comparisons between subpopulations. We present these to provide a general and approximate national context in which to view the gaps displayed in appendix D for individual states. Figure 25 displays the grade 4 poverty gap corresponding to the grade 8 poverty gap shown in figure 24. The poverty gap profile for grade 4 is similar to that at grade 8, although the average discrepancy between NAEP and state assessment gaps is slightly larger, averaging about 5 percentage points between the 25th and 50th percentiles, compared to a 4 percentage point discrepancy for grade 8.

Figure 25. Profile of the poverty gap in school percentage of students meeting states' grade 4 mathematics achievement standards, by percentile of students in each subgroup: 2003



NOTE: Primary standard is the state's standard for *proficient* performance. Students eligible for free/reduced price lunch are referred to as (economically) disadvantaged. Percentile in group refers to the percentage of the disadvantaged (or non-disadvantaged) student population who are in schools with lower (same-group) percentages meeting the states' primary mathematics standards.

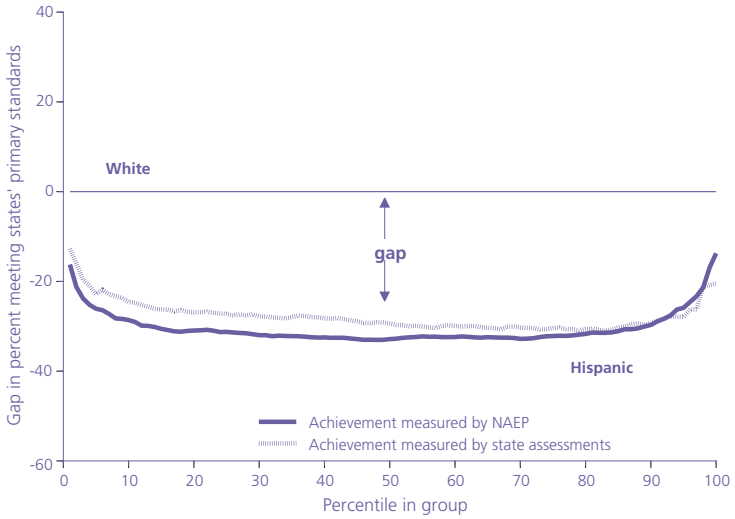
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2003 Mathematics Assessment: Full population estimates. The National Longitudinal School-Level State Assessment Score Database (NLSLSASD) 2004.

It should be noted that this comparison, like all comparisons between NAEP and state assessment results in this report, is based on NAEP and state assessment results in the same set of schools. For example, if the state reported a percentage meeting their standard for disadvantaged students at a school, but the NAEP student sample in that school included no disadvantaged students, that school would not be included in the population profile of disadvantaged students. (Of course, that school might be included in the non-disadvantaged student profiles: the gaps being reported here combine between-school gaps as well as within-school gaps.)

Figures 26 and 27 provide aggregate population gap profiles for the Hispanic-White gap and the Black-White gap in grade 8 mathematics achievement.[36] The Hispanic-White gap is about 30 percent across much of the distribution as measured by NAEP, slightly less when measured by state assessments, while the Black-White gap pattern is about 36 to 37 percentage points as measured by NAEP, about 6 to 7 percent greater than the state assessment measurement of the gap.

36. The aggregate Hispanic-White grade 8 mathematics achievement gap is based on results in 37 states, although sufficient sample sizes are available for comparison of results for individual states in only 14 states. The aggregate Black-White gap is based on results in 39 states, although sufficient sample sizes are available for comparison of results for individual states in only 20 states. The aggregate poverty gap is based on results in 34 states, although sufficient sample sizes are available for comparison of results for individual states in only 28 states.

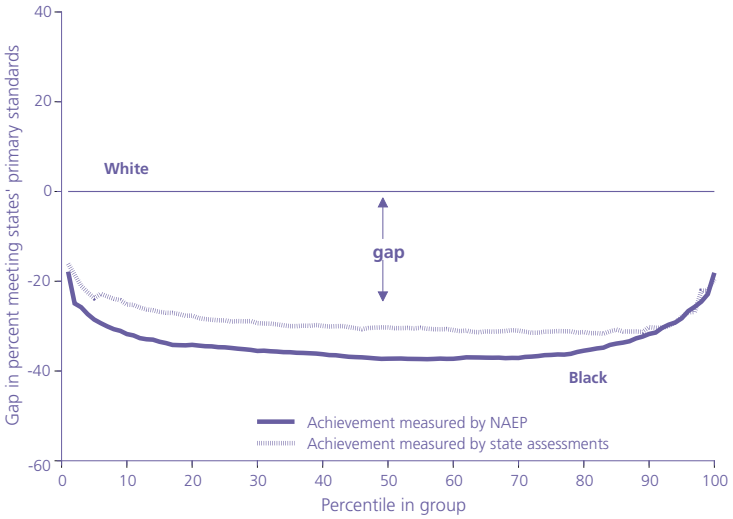
Figure 26. Profile of the Hispanic-White gap in school percentage of students meeting states' grade 8 mathematics achievement standards, by percentile of students in each subgroup: 2003



NOTE: Primary standard is the state's standard for *proficient* performance. Percentile in group refers to the percentage of the Hispanic or White student population who are in schools with lower (same-group) percentages meeting the states' primary mathematics standards.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2003 Mathematics Assessment: Full population estimates. The National Longitudinal School-Level State Assessment Score Database (NLSLSASD) 2004.

Figure 27. Profile of the Black-White gap in school percentage of students meeting states' grade 8 mathematics achievement standards, by percentile of students in each subgroup: 2003



NOTE: Primary standard is the state's standard for *proficient* performance. Percentile in group refers to the percentage of the Black or White student population who are in schools with lower (same-group) percentages meeting the states' primary mathematics standards.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2003 Mathematics Assessment: Full population estimates. The National Longitudinal School-Level State Assessment Score Database (NLSLSASD) 2004.

Corresponding aggregate grade 4 Hispanic-White and Black-White mathematics achievement gap profiles are shown in figures 28 and 29. While the grade 4 gap comparison results are similar to the grade 8 comparisons, in grade 4, state assessments tend to find a slight narrowing of the gap between the upper thirds of the populations, compared to the lower two-thirds of the populations, a pattern that is not seen in the grade 8 comparisons.

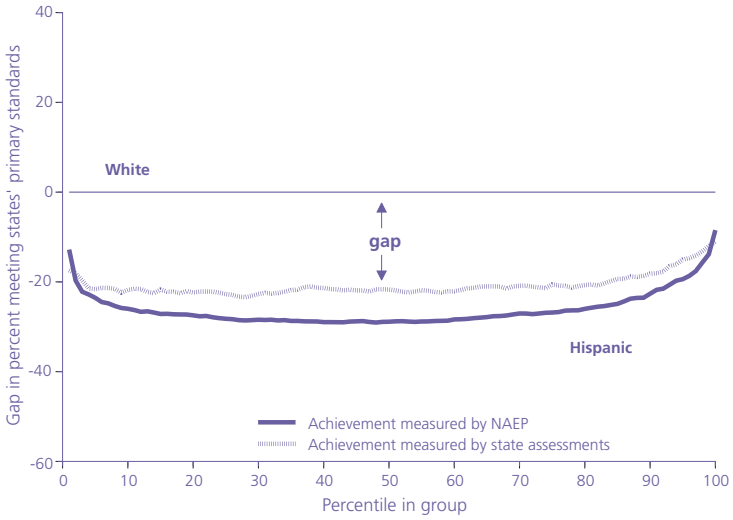
Although the aggregate gap profile can identify small reliable differences in gaps as measured by NAEP and state assessments, the samples in individual states are not sufficiently large to detect small differences. The differences between the NAEP and state assessments in mean state gaps in percentage meeting the primary grade 4 mathematics standards are shown in table 10 for the states in which sufficient subgroup data are available. Although these statistics are based on the overall average, readers can examine Student's *t* test results for various parts of the distributions (halves and quartiles) for individual states in appendix D.

At grade 4, in about one-half of the individual state comparisons (34 of 70), the overall gap as measured by NAEP in 2003 was statistically significantly larger than the gap measured by the state assessment, and in all but two of the other 36 comparisons, the NAEP gap was numerically greater (although not significantly so). NAEP found significantly larger mean gaps than the state assessment did in 14 of 25 Black-White comparisons, in Alabama, Arkansas, Connecticut, Florida, Georgia, Indiana, Kansas, Louisiana, Massachusetts, Missouri, New Jersey, Ohio, South Carolina, and Virginia.

Of 14 Hispanic-White comparisons, NAEP gaps were larger in eight: Arizona, California, Idaho, Illinois, Nevada, New Jersey, New Mexico, and Rhode Island; and of 31 poverty comparisons, NAEP gaps were larger in 12: Alabama, California, Connecticut, District of Columbia, Hawaii, Indiana, Nevada, New Hampshire, Ohio, Vermont, Wisconsin, and Wyoming. Note that Black-White gap results for Kansas and Missouri and poverty gap results for New Hampshire and Vermont might be affected by the fact that the schools available for comparison represented low percentages of the subgroup populations.

At grade 8, as displayed in table 11, NAEP and state assessment measurements of gaps were somewhat more similar to each other. However, in 17 of 62 comparisons, NAEP found a significantly larger gap than the state assessment did, while in only two cases did the state assessment find a significantly larger gap. NAEP found significantly larger Black-White gaps in seven of 20 state comparisons, in Alabama, Florida, Georgia, Mississippi, New York, Texas, and Virginia; significantly larger Hispanic-White gaps in six of 14 states, Arizona, Florida, Idaho, Nevada, New Mexico, and Rhode Island; and significantly larger poverty gaps in four of 28 states, Alabama, Georgia, Hawaii, and Illinois. By contrast, the state's assessments found a larger poverty gap than NAEP did in South Carolina and Wyoming.

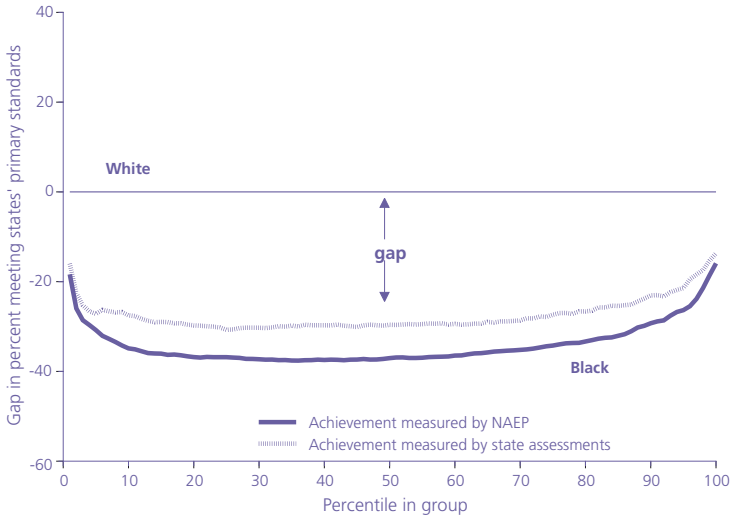
Figure 28. Profile of the Hispanic-White gap in school percentage of students meeting states' grade 4 mathematics achievement standards, by percentile of students in each subgroup: 2003



NOTE: Primary standard is the state's standard for *proficient* performance. Percentile in group refers to the percentage of the Hispanic or White student population who are in schools with lower (same-group) percentages meeting the states' primary mathematics standards.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2003 Mathematics Assessment: Full population estimates. The National Longitudinal School-Level State Assessment Score Database (NLSLSASD) 2004.

Figure 29. Profile of the Black-White gap in school percentage of students meeting states' grade 4 mathematics achievement standards, by percentile of students in each subgroup: 2003



NOTE: Primary standard is the state's standard for *proficient* performance. Percentile in group refers to the percentage of the Black or White student population who are in schools with lower (same-group) percentages meeting the states' primary mathematics standards.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2003 Mathematics Assessment: Full population estimates. The National Longitudinal School-Level State Assessment Score Database (NLSLSASD) 2004.

Table 10. Differences between NAEP and state assessments of grade 4 mathematics achievement race and poverty gaps, by state: 2003

State/ jurisdiction	Black-White	Hispanic-White	Poverty
Alabama	-7.5 *	—	-4.2 *
Alaska	—	—	—
Arizona	—	-12.1 *	—
Arkansas	-8.5 *	—	0.5
California	—	-11.1 *	-6.7 *
Colorado	—	—	—
Connecticut	-9.5 *	-5.4	-5.5 *
Delaware	-1.4	—	0.5
District of Columbia	—	—	-15.8 *
Florida	-8.2 *	-3.8	-3.4
Georgia	-8.4 *	—	-3.9
Hawaii	—	—	-5.7 *
Idaho	—	-10.4 *	—
Illinois	-2.5	-7.1 *	-3.7
Indiana	-22.7 *	—	-11.5 *
Iowa	—	—	—
Kansas	-11.2 *	—	-7.7
Kentucky	-1.3	—	-2.3
Louisiana	-4.7 *	—	-3.2
Maine	—	—	—
Maryland	—	—	—
Massachusetts	-5.4 *	-6.7	—
Michigan	—	—	—
Minnesota	—	—	-2.9
Mississippi	-1.1	—	-3.7
Missouri	-13.3 *	—	-3.7
Montana	—	—	—
Nebraska	—	—	—
Nevada	—	-7.2 *	-7.1 *
New Hampshire	—	—	-10.8 *
New Jersey	-8.5 *	-14.7 *	-5.6
New Mexico	—	-8.5 *	-2.9
New York	-4.1	-5.0	-1.3
North Carolina	-4.8	—	-2.1
North Dakota	—	—	—
Ohio	-8.3 *	—	-8.2 *
Oklahoma	-5.5	—	—
Oregon	—	—	—
Pennsylvania	-4.8	—	-3.3
Rhode Island	—	-13.9 *	—
South Carolina	-5.5 *	—	-2.9
South Dakota	—	—	-3.7
Tennessee	-3.1	—	-0.3
Texas	-2.9	-1.1	—
Utah	—	—	—
Vermont	—	—	-14.3 *
Virginia	-10.3 *	—	—
Washington	—	-0.2	—
West Virginia	—	—	—
Wisconsin	-8.1	—	-9.5 *
Wyoming	—	—	-4.8 *

— Not available.

* NAEP-state difference is statistically significantly at $p<.05$.

NOTE: A positive entry indicates that the state assessment reports the gap as larger than NAEP does; a negative entry indicates that the state assessment reports the gap as smaller.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2003 Mathematics Assessment: Full population estimates. The National Longitudinal School-Level State Assessment Score Database (NLSLSASD) 2004.

Table 11. Differences between NAEP and state assessments of grade 8 mathematics achievement race and poverty gaps, by state: 2003

State/ jurisdiction	Black-White	Hispanic-White	Poverty
Alabama	-8.1 *	—	-3.6 *
Alaska	—	—	—
Arizona	—	-5.4 *	—
Arkansas	0.9	—	4.1
California	—	-4.6	-2.1
Colorado	—	—	—
Connecticut	0.2	1.6	0.6
Delaware	-2.3	—	1.3
District of Columbia	—	—	-1.3
Florida	-6.8 *	-6.3 *	-1.7
Georgia	-13.1 *	—	-7.5 *
Hawaii	—	—	-4.6 *
Idaho	—	-6.4 *	—
Illinois	-1.3	-4.9	-5.6 *
Indiana	-0.5	—	4.2
Iowa	—	—	—
Kansas	—	—	1.5
Kentucky	—	—	-0.2
Louisiana	-1.1	—	-0.7
Maine	—	—	—
Maryland	—	—	—
Massachusetts	—	-4.3	—
Michigan	—	—	—
Minnesota	—	—	—
Mississippi	-6.9 *	—	-4.5
Missouri	-0.8	—	-0.6
Montana	—	—	—
Nebraska	—	—	—
Nevada	—	-5.1 *	-0.0
New Hampshire	—	—	—
New Jersey	-1.7	-2.0	-2.1
New Mexico	—	-7.2 *	-0.7
New York	-9.8 *	-5.9	-1.6
North Carolina	-4.5	—	-1.1
North Dakota	—	—	—
Ohio	—	—	—
Oklahoma	-0.7	—	—
Oregon	—	-5.2	—
Pennsylvania	-4.6	—	-3.3
Rhode Island	—	-3.3 *	—
South Carolina	3.5	—	4.7 *
South Dakota	—	—	-0.3
Tennessee	-2.7	—	3.6
Texas	-7.3 *	-2.4	—
Utah	—	—	—
Vermont	—	—	-4.2
Virginia	-8.6 *	—	—
Washington	—	—	—
West Virginia	—	—	—
Wisconsin	—	—	-1.6
Wyoming	—	—	4.6 *

— Not available.

* NAEP-state difference is statistically significantly at $p<.05$.

NOTE: A positive entry indicates that the state assessment reports the gap as larger than NAEP does; a negative entry indicates that the state assessment reports the gap as smaller.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 2003 Mathematics Assessment: Full population estimates. The National Longitudinal School-Level State Assessment Score Database (NLSLSASD) 2004.

Not very much should be made of these significant results, until additional studies are performed. Examination of the individual state gap profiles in appendix D supports the conclusion that for the most part, measurement of gaps by NAEP and by state assessments were qualitatively similar. There are only two cases in which we were able to carry out comparisons and in which the NAEP gap is more than twice as large as the state assessment gap: these were the grade 4 Black-White gap in Indiana and poverty gap in the District of Columbia. Various factors, both substantive and methodological, may explain the tendency for NAEP to find slightly larger gaps where differences were found.[37] These must be factors that differentially affect the measurement of performance of students in different groups.

Among such possible factors, on the methodological side, there could be differences in student motivation, in methods of analyzing the test scores, or in prevalence of testing accommodations. Similarly, on the substantive side, it is possible that variation in scores on a state assessment, which focuses on what is taught in the schools, is somewhat less related to cultural differences that children bring to their schoolwork, compared to NAEP, because NAEP aims for an overall assessment of mathematics achievement, including both school- and culturally-related components of that performance.

SUMMARY

Comparisons are made between NAEP and state assessment measurement of mathematics achievement gaps in grades 4 and 8 in 2003. Comparisons are based on school-level percentages of Black, Hispanic, White, and economically disadvantaged and non-disadvantaged students achieving the state's primary mathematics achievement standard in the NAEP schools in each state. In most states, the comparison is based on state test scores for grades 4 and 8, but scores from adjacent grades are used for the comparisons in a few states. Comparisons of gaps are subject to data availability. Black-White and poverty comparisons for 2003 are possible in 31 states, and Hispanic-White comparisons are possible in 14.

In about half of the states, gap profiles based on NAEP show somewhat larger gaps than profiles based on state assessments. Of 132 state comparisons (composed of Black-White Hispanic-White, grade 4, and grade 8 comparisons across multiple states), NAEP found significantly larger gaps in 51 and state assessments found larger gaps in 2. These results contrast with results for reading, where NAEP found significantly larger gaps in 13 comparisons, while state assessments found larger gaps in 8 comparisons.

37. The determination of those factors is beyond the scope of the report.