CENTER FOR EVALUATION & EDUCATION POLICY

Education Policy Brief

2013 NAEP: How Does Indiana Compare?

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INTRODUCTION

Known as "the Nation's Report Card," the National Assessment of Educational Progress (NAEP) is the U. S. Government assessment used since the late 1960s to measure student achievement in many subject areas, including mathematics, reading, science, and United States history. Different subject areas are assessed each year and data have been available for all states plus the District of Columbia and Department of Defense Schools since the mid 1990s. The 2013 NAEP assessed mathematics and reading performance and results were released in November. Comments made in the Indianapolis Star were typical: "Hoosier students' gains on a national report card ranked among the top four states in math and reading" (Wang, 2013). Indeed, Indiana ranked in the top four for increase in average scale scores from 2011 to 2013 for grade 4 mathematics (with Tennessee, the District of Columbia, and Arizona) and grade 4 reading (with Tennessee, the District of Columbia, and Minnesota). The increase in grade 8 scores was less impressive but Indiana's improvement was still strong, ranking in the top 8 for mathematics and the top 15 for reading.

Indiana has a history of doing reasonably well on national and international assessments. Chein, Spradlin, and Plucker (2007) found that Indiana students outperformed the nation on average in grades 4 and 8 mathematics, and also had the highest or second highest average scale scores for 2000, 2003, and 2005 when compared to neighboring states. In addition, Rutkowski, Wild, and Rutkowski (2013) reported strong performance on the 2011 Trends in International Mathematics and Science Study (TIMSS) mathematics assessment: Indiana's grade 4 and 8 students performed better than the United States as a whole and "compared favorably to the Top 10 performing countries" (p. 7).

U.S. Secretary of Education Arnie Duncan credited Indiana's "work to raise standards and target teacher effectiveness" (Wang, 2013) for the strong 2013 NAEP results. Former State Superintendent of Public Instruction Tony Bennett asserted that "the policy framework we put in place afforded schools the opportunity to expect more of children" (Elliott, 2013), while Teresa Meredith, president of the Indiana State Teachers Association, gave credit to Indiana's state standards movement in the early 2000s. Education blogger Steve Hinnefeld (2013) wondered if the implementation of the grade 3 IREAD test in the 2011-2012 school year—and, in particular, the many students who did not pass and were held back in third grade—may have had an effect. In this report, we provide details of the 2013 Indiana NAEP results followed by commentary on the extent to which state-level policies and priorities had an impact on those results.

USING NAEP TO COMPARE STATES

Before detailing the performance of Indiana students on NAEP, it is important to note that the number of students assessed in each state is relatively small. In Indiana, NAEP tested about 3000 grade 4 students and about 2600 grade 8 stu-

dents in each of the two content areas. The students tested are representative of the gender, racial, and socioeconomic demographics in Indiana and thus while the sample sizes are small, they are similar to sample sizes in previous years and adequate for providing an overall sense of the performance of Indiana students. However, the small state samples lead to a relatively large margin of error when comparing states. It is also important to note that all state-level data reported by NAEP are for public school students only. NAEP collects data on students in private schools for national results but there are not enough private school students in some states to draw conclusions and thus all state-level data, including the NAEP results reported for Indiana, are for public school students only. To allow for comparison of Indiana data to national results, all national results discussed in this brief are for public school students.

2013 MATHEMATICS RESULTS FOR INDIANA

In 2013, Indiana's average scale score ranked 4th among the 50 states plus DC and Department of Defense Schools for grade 4 mathematics. Given the imprecision in state scores, however, the Indiana score was significantly higher than only 38 states. In grade 8 mathematics, Indiana tied for 16th place but was significantly lower than 6 states and significantly higher than 25 states. In other words, all that can be said is that Indiana's average mathematics scores were somewhere between 4th and 14th at grade 4 and between 7th and 27th at grade 8. Table 1 shows the states and jurisdictions higher, equal to, and lower than Indiana in mathematics.

2013 READING RESULTS FOR INDIANA

Although Indiana's average scale score was tied for 15th in reading at grade 4 and tied for 26th at grade 8, the same ambiguity in rankings that appeared in mathematics occurs in reading. Thus, Indiana 4th graders were somewhere between 7th and 29th and eighth graders were

TABLE 1. Indiana's Ranking Relative to Other States and Jurisdictions on NAEP 2013 Mathematics

	Number	States*
		Grade 4
States significantly higher	3	MA, MN, NH
No significant difference	10	VT, CO, NJ, WY, KS, ND, OH, VA, WA, MD
States significantly lower	38	IA, ME, DoDEA, NC, WI, MT, PA, CT, DE, HI, NE, UT, FL, TX, ID, KY, RI, SD, AZ, AR, GA, MO, NY, OR, TN, IL, OK, MI, SC, WV, AK, NV, CA, AL, NM, LA, MS, DC
		Grade 8
States significantly higher	6	MA, NH, NJ, MN, VT, ND
No significant difference	20	CO, DoDEA, KS, OH, PA, WA, ME, MT, WI, TX, VA, WY, MD, SD, ID, NC, CT, IL, IA, NE
States significantly lower	25	OR, RI, UT, MO, AK, DE, NY, FL, HI, KY, AZ, MI, SC, GA, AR, NV, TN, CA, OK, WV, LA, NM, MS, AL, DC

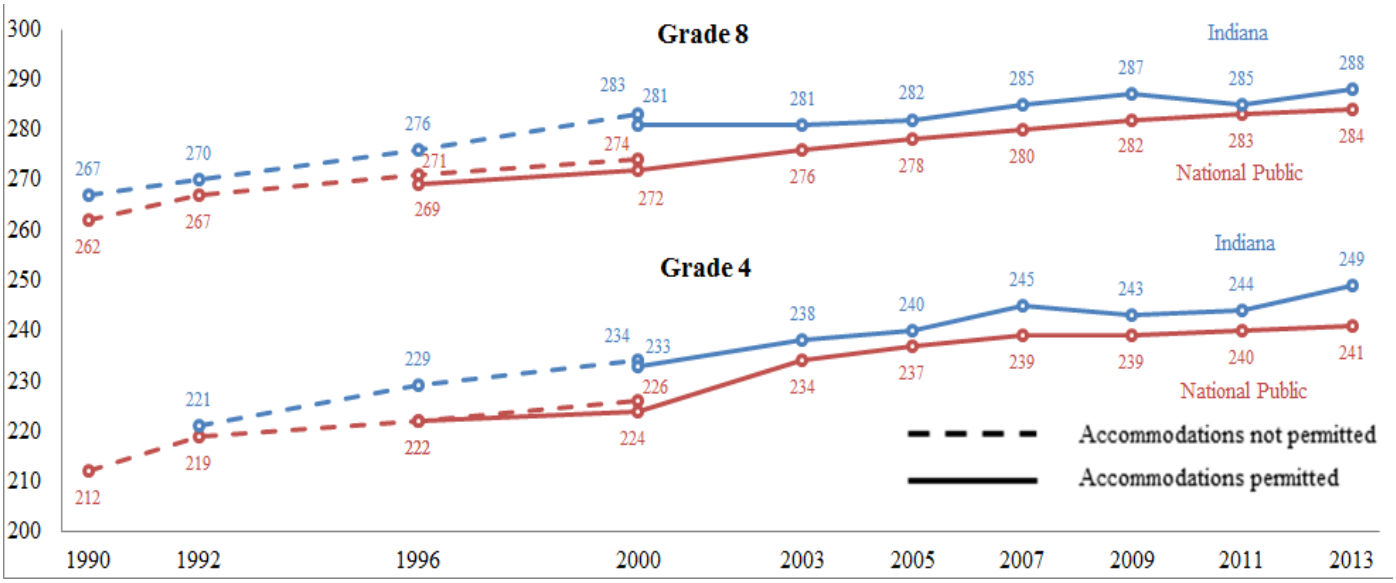
*Includes change in scores for the District of Columbia and the Department of Defense Education Activity.

TABLE 2. Indiana's Ranking Relative to Other States and Jurisdictions on NAEP 2013 Reading

	Number	States*
		Grade 4
States significantly higher	6	DoDEA, MD, MA, NH, CT, VT
No significant difference	22	NJ, VA, CO, FL, MN, DE, PA, WY, ME, WA, IA, KY, NY, ND, OH, KS, MT, NE, RI, UT, MO, NC,
States significantly lower	23	GA, WI, TN, AL, AR, ID, IL, OR, SD, MI, OK, TX, HI, WV, NV, SC, AZ, CA, LA, AK, MS, DC, NM
		Grade 8
States significantly higher	13	DoDEA, MA, NJ, CT, MD, NH, VT, MT, PA, WA, CO, MN, WY
No significant difference	23	ID, KY, UT, IA, ME, NE, OH, ND, OR, SD, VA, WI, IL, KS, MO, RI, DE, FL, MI, NY, GA, NC, TN
States significantly lower	15	TX, AR, CA, NV, OK, AK, SC, AZ, HI, AL, LA, WV, NM, MS, DC

*Includes change in scores for the District of Columbia and the Department of Defense Education Activity.

FIGURE 1. NAEP Mathematics Average Scale Scores for Indiana and the Nation, 1990-2013



Note: The difference between Indiana and the nation is statistically significant ($p < .05$) for both grades for all years except grade 4 in 1992 and grade 8 in 2011.

TABLE 3. NAEP Achievement Level Descriptions

Level	Description
Basic	Partial mastery of prerequisite knowledge and skills that are fundamental for proficient work at each grade.
Proficient	Solid academic performance for each grade assessed. Students reaching this level have demonstrated competency over challenging subject matter, including subject-matter knowledge, application of such knowledge to real-world situations, and analytical skills appropriate to the subject matter.
Advanced	Superior performance.

between 14th and 37th. Table 2 shows the states and jurisdictions higher than, equal to, and lower than Indiana for reading.

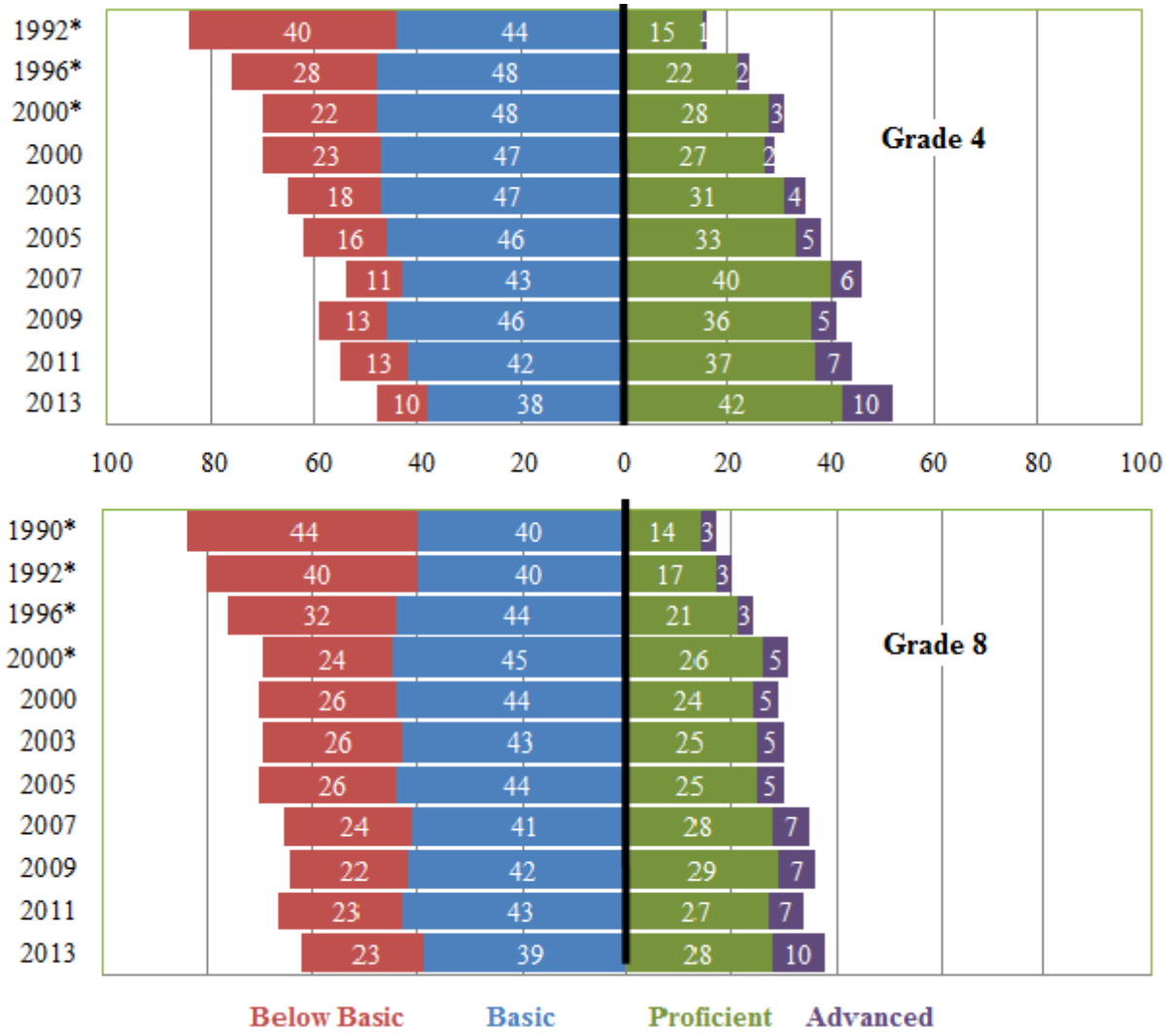
GROWTH OVER TIME IN MATHEMATICS

Most NAEP items are used for several years making it possible to assess changes in performance over time. Figure 1 shows the average scale scores on NAEP for Indiana and the nation's fourth and eighth graders from 1990 to 2013. From 1996 to 2000, NAEP transitioned from an assessment that did not allow accommodations for students with disabilities to one that does. In some cases, changes of this sort can mean that comparisons before and after are not valid. For NAEP, however, the change in students' average scores was small, no more than two points for the years when students took both versions. Given this small difference, considering trends from 1990 to 2013 can be justified (Kloosterman & Walcott, 2007).

As can be seen in Figure 1, except for 1992, Indiana's grade 4 students have significantly outperformed the nation on mathematics. In addition, Indiana's grade 8 mathematics scores have been significantly above the national average in every testing year except 2011. Of equal importance is the fact that, like the nation as a whole, Indiana's scores have improved steadily since 1990. Specifically, Indiana's grade 4 average scale scores improved from 221 in 1992 to 249 in 2013. For grade 8, the scores improved from 267 in 1990 to 288 in 2013. Kloosterman and Walcott (2007) estimated that an 11- to 12-point gain is approximately one grade level of growth for fourth graders and an 8- to 10-point gain is approximately one grade level of growth for eighth graders. Using this estimate, Indiana's 2013 fourth graders are at least 2 grade levels above 1992 fourth graders. Similarly, Indiana's 2013 eighth graders performed at least 2 grade levels above their 1990 counterparts. These gains, which are similar to gains for the nation as a whole, are substantial and far more than gains in any other content area assessed by NAEP.

In addition to reporting NAEP results

FIGURE 2. Percent of Indiana Students at Each NAEP Achievement-Level for Mathematics



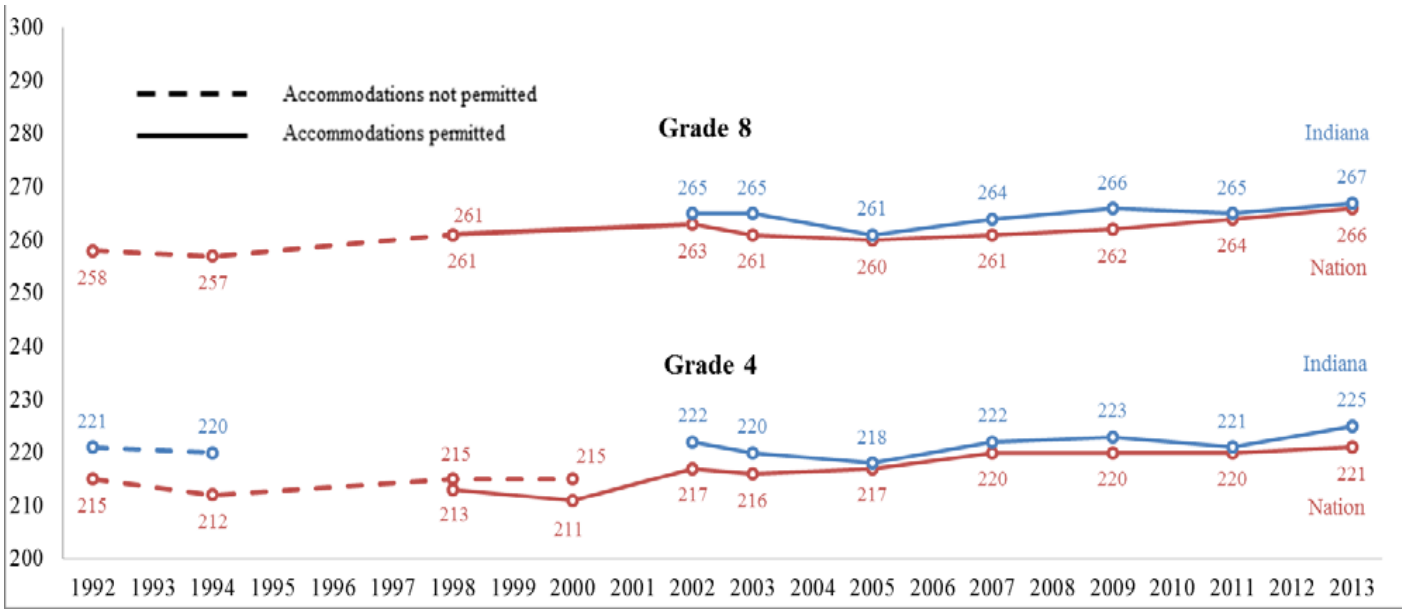
*Accomodations were not permitted.

by overall scale scores, NAEP reports scores by the percentage of students at each of four achievement levels: below basic, basic, proficient, and advanced (Table 3). Although it is often assumed that these levels are set by official policy, they are only being used on a trial basis meaning that "achievement levels should continue to be interpreted and used with caution" (National Center for Educational Statistics, 2012). The levels are related to scale scores so while they do not provide any different information than scale scores, they do provide a more focused way of interpreting the data. Many analysts have found problems with the achievement levels (see, for example, Harvey, 2011), but even if the criticisms of the particular cut-scores used for the achievement levels are valid, changes in the percent of students at the higher levels is evidence of improvement on the assessments.

As Figure 2 shows, the proportion of Indiana fourth graders scoring at the proficient or higher level in mathematics has increased from 16% in 1992 to 54% in 2013. Similarly, the proportion of fourth graders scoring at the advanced level has increased from 1% in 1992 to 10% in 2013. The shift for eighth graders is less pronounced, but still large and statistically significant: from 17% proficient or better in 1990 to 38% proficient or better in 2013. The percent of students at the advanced level increased from 3 % in 1990 to 10% in 2013.

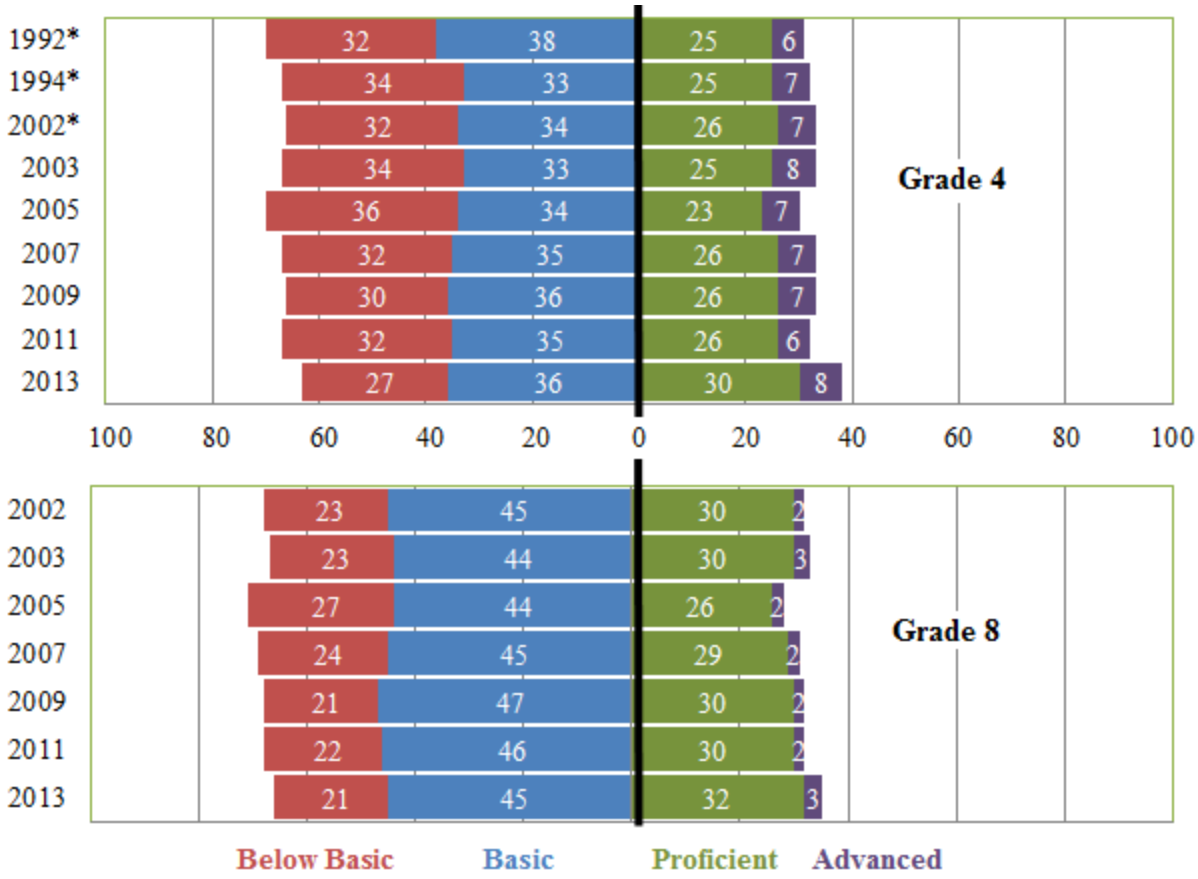
Some have criticized the cutoffs for the NAEP proficient level as too high (e.g., Rothstein, Jacobson, & Wilder, 2006) although Chester Finn (2008), chair of the National Assessment Governing Board (NAGB) when the NAEP assessment levels were established, described proficient as "the 'central level,' the one that all students ought to attain and the proper benchmark for American education" (p. 180). Diane Ravitch (2013), a former NAGB member herself, described proficient differently: "a solid A and not less than a B+" (p. 47). Furthermore, she described basic as "probably a B or C" (p. 47). By Ravitch's standard, basic may be a better indication of whether students are performing at grade level. The decrease in the percentage of grade 4 stu-

FIGURE 3. NAEP Reading Average Scale Scores for Indiana and the Nation, 2002-2013



Note: The difference between Indiana and the nation is statistically significant ($p < .05$) in 1992, 1994, 2002, 2003, 2007, 2009, and 2013 for grade 4 and 2003, 2007, and 2009 for grade 8.

FIGURE 4. Percent of Indiana Students at Each NAEP Achievement-Level for Reading



*Accomodations were not permitted.

dents below basic has been substantial, from 40% in 1992 to just 10% in 2013. At grade 8, the change has been less, but still large with 44% below basic in 1990 and only 23% below basic in 2013. Most of the improvement, however, was in the 1990s – the percent of students scoring below basic in 2013, is not substantially different than 2000.

GROWTH OVER TIME IN READING

Figure 3 shows the Indiana and national average scale scores in reading from 1992 to 2013. Like mathematics, both the grade 4 and grade 8 results include a break in the trend line because of a change in accommodation policies. Grade 4 also includes a gap in the Indiana results because state-level data were not collected in 1998 or 2000. For grade 8, state-level data were not collected until 2002.

For grade 4, Indiana's reading average scale scores showed a statistically significant change from 221 in 1992 to 225 in 2013. The practical significance of such a small change, however, seems slight. For grade 8, the change, from 265 in 2002 to 267 in 2013, was not statistically significant. For both grades, the trends for Indiana are similar to the trends for the nation as a whole.

NAEP reports reading results using the same achievement levels as mathematics: below basic, basic, proficient, and advanced (Table 3). As would be expected by looking at the minimal change in scale scores, the percentage of U. S. students performing at proficient or above has changed only modestly over the last 20 years. At grade 4, the percentage scoring at proficient or advanced increased from 32% in 1992 to 38% in 2013 and at grade 8, the increase was from 32% in 2002 to 35% in 2013 (Figure 4). With respect to Indiana, more grade 4 students were at basic or above in reading (68%) as compared to mathematics (60%) in 1992 but with greater improvements in mathematics there is now a higher proportion of grade 4 students in Indiana and nationally below basic in reading as compared to mathematics. At grade 8, the proportion of students at or above basic in mathematics and reading was quite different in 1990 (56% vs. 77%) but is now almost the same (77% vs. 79%).

CHANGE IN SCORES FROM 2011 TO 2013

Although the overall trend for NAEP average scale reading scores has been relatively flat, there was a significant jump in grade 4 Indiana scores from 221 in 2011 to 225 in 2013. In mathematics, the overall trend has featured steady increases, but the change from 2011 to 2013 in grade 4 (244 to 249) was larger than usual. Much of the reporting on this change has focused on the fact that these changes were the 4th largest of any state (see, for example, Wang, 2013). As with average scale scores, however, not all differences in ranking are statistically significant. In fact, while no state or jurisdiction had changes in scores significantly greater, Indiana's grade 4 improvements were statistically higher than only about half of the states and jurisdictions (Table 4). At grade 8, Indiana's improvement was statistically equivalent to most other states (Table 4).

RESULTS FOR DEMOGRAPHIC SUBGROUPS

In addition to overall results, NAEP reports results by a variety of demographic variables including gender, race-ethnicity, and free or reduced-price lunch eligibility. When Indiana data are broken down by subgroup, the trends are quite similar to the trends for the nation as a whole. With respect to gender, Indiana's boys scored enough higher to be statistically better than girls in mathematics for some 1990s test administrations (1996 for grade 4; 1992 and 1994 for grade 8) but there have been no statistically significant differences since. At the national level, the differences tend to be one or two scale points, but with the large sample size, these differences are usually statistically significant. Nationally in

TABLE 4. Indiana's Change in NAEP Average Scale Scores Relative to Other States and Jurisdictions from 2011 to 2013.

	Number of States*			
	Mathematics		Reading	
	Grade 4	Grade 8	Grade 4	Grade 8
States with significantly more improvement	0	0	0	0
No significant difference in improvement	25	43	28	49
States with significantly less improvement	26	8	23	2

*Includes change in scores for the District of Columbia and the Department of Defense Education Activity.

FIGURE 5. 2013 Indiana and National Public NAEP Mathematics Average Scale Scores by Race/ethnicity

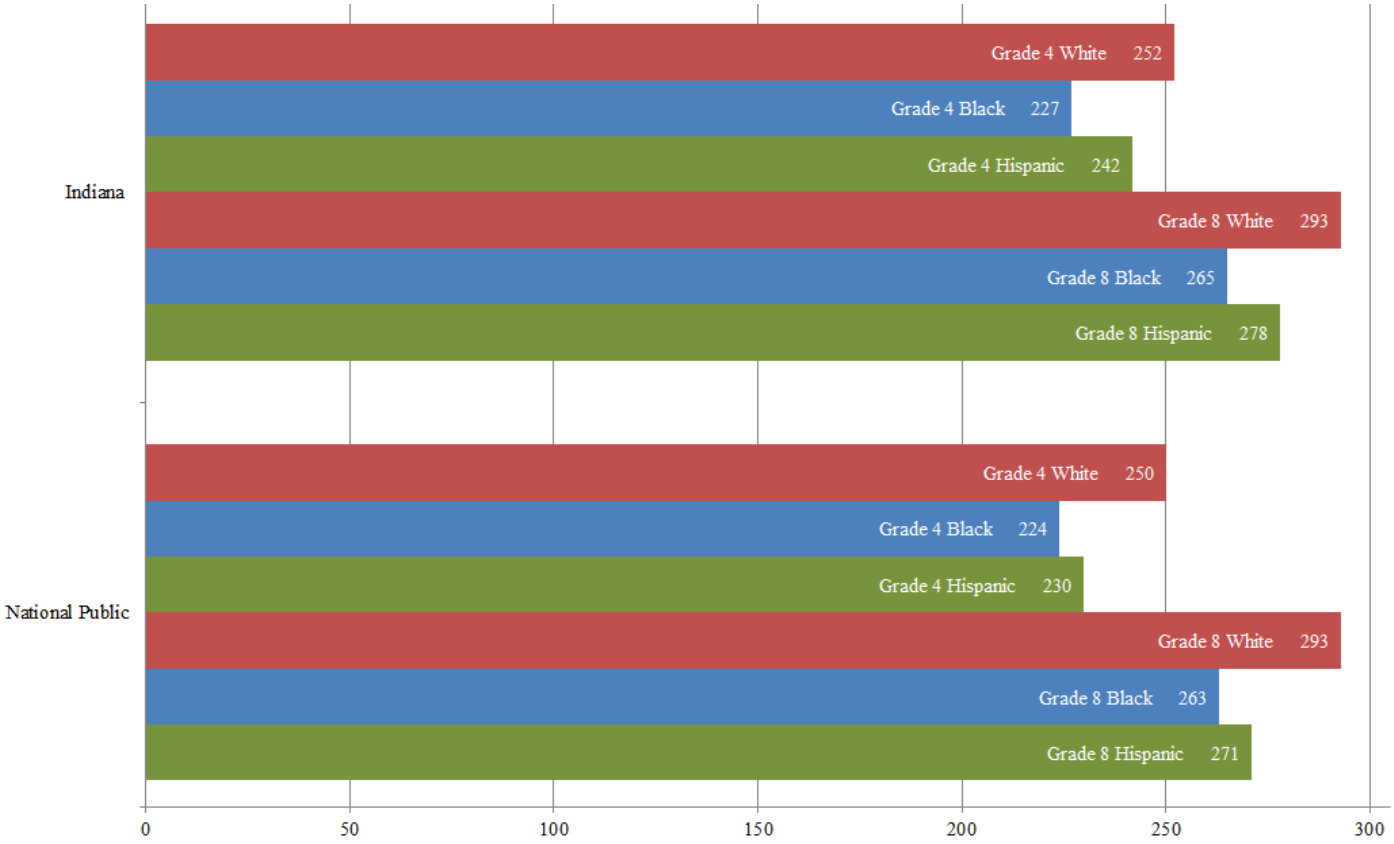


FIGURE 6. 2013 Indiana and National Public NAEP Reading Average Scale Scores by Race/ethnicity

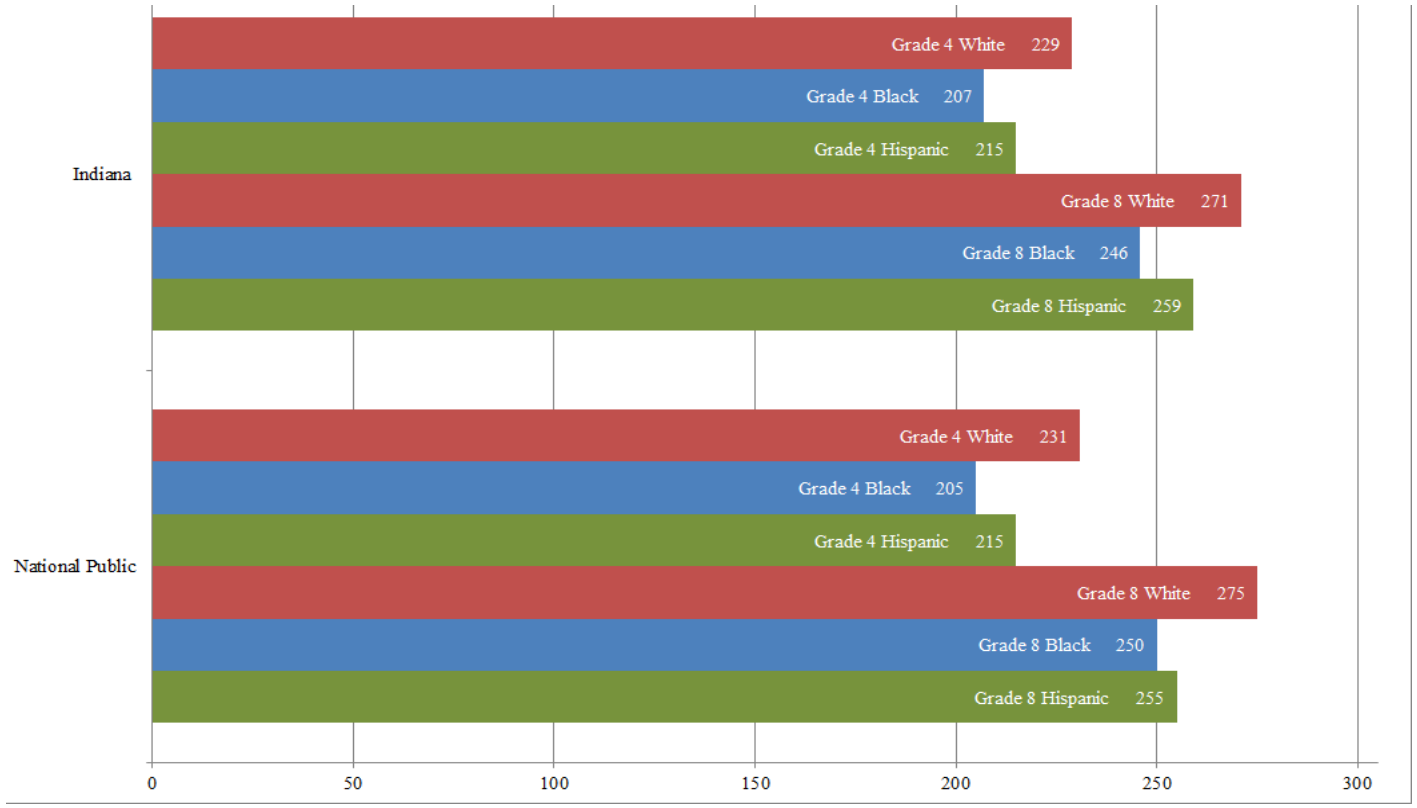


FIGURE 7. 2013 Indiana and National Public NAEP Mathematics Average Scale Scores by Free- or Reduced-lunch Eligibility

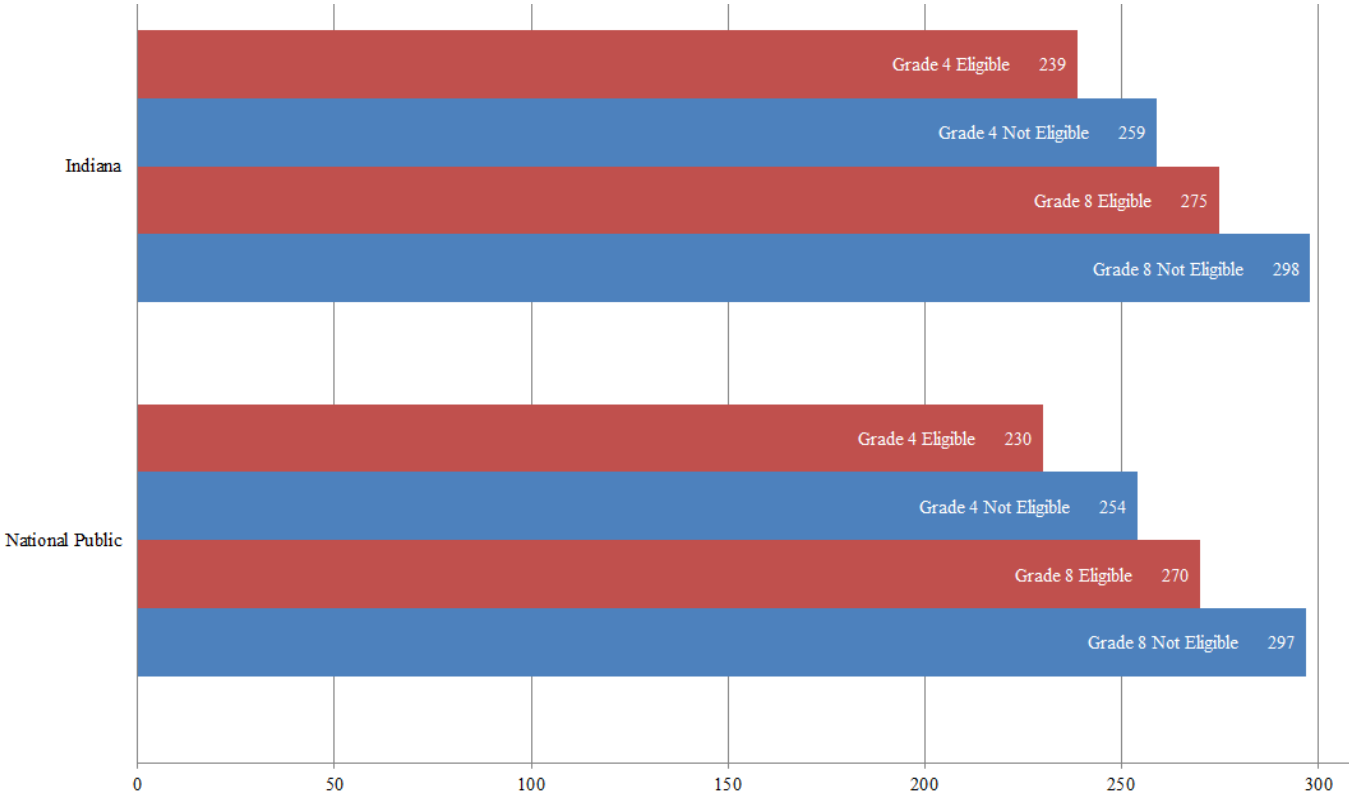
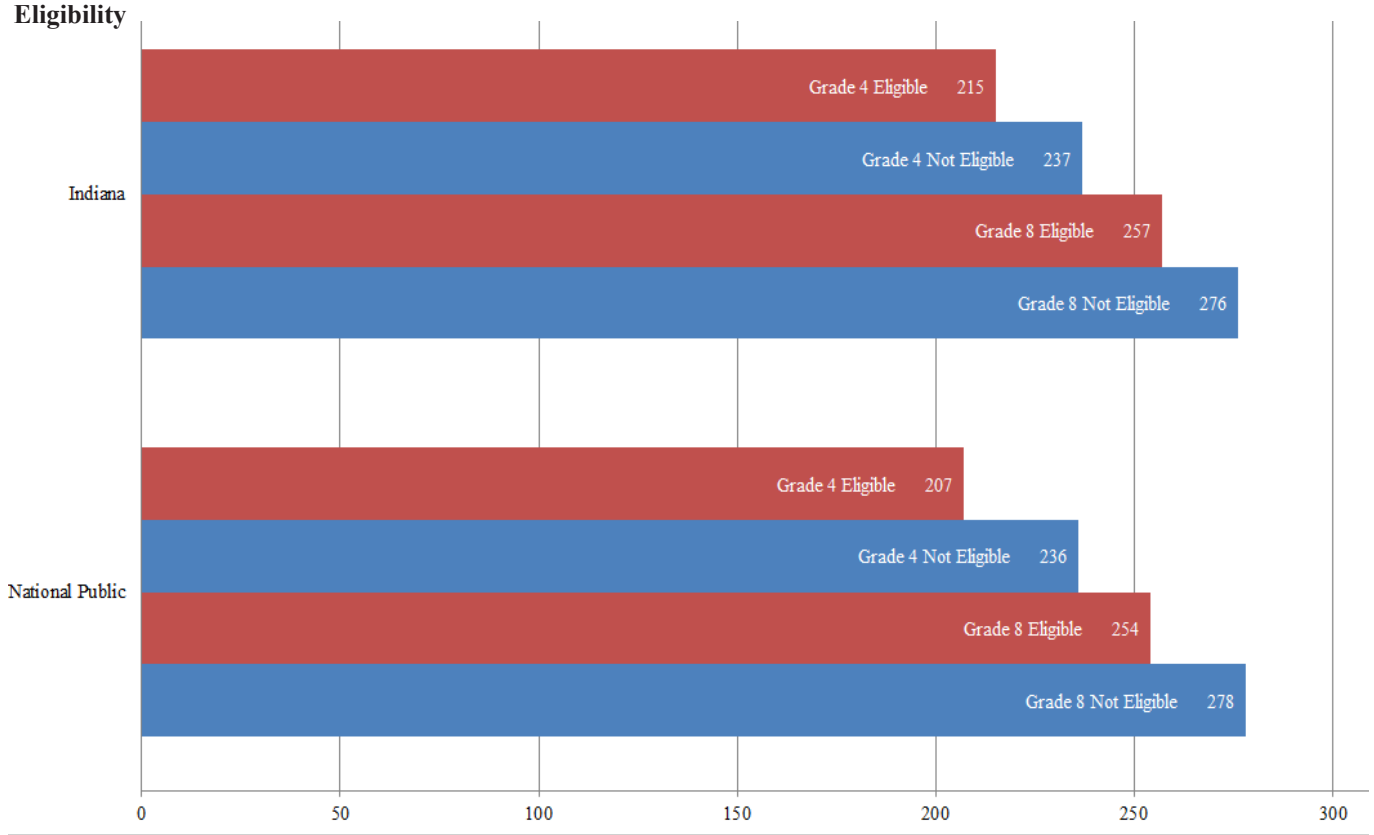


FIGURE 8. 2013 Indiana and National Public NAEP Reading Average Scale Scores by Free- or Reduced-lunch Eligibility



reading, girls score about 7 points better than boys at grade 4 and about 10 points better than boys at grade 8 depending on the year. Because of the small Indiana sample size, there tends to be more variation in the gap from year to year, but the overall Indiana gap is quite similar to the national gap.

When data are analyzed by the NAEP race-ethnicity variable, differences by subgroup are far more dramatic than differences by gender. Figures 5 and 6 show the 2013 Indiana and national mathematics and reading average scale scores broken down by the three of the five race-ethnicity categories used by NAEP: white, black, and Hispanic. The other two categories, Asian/Pacific Islander and American Indiana/Alaska Native were not included because, for nearly all test administrations, the number of Indiana students in these categories was too small to draw any conclusions. As can be seen, regardless of grade level or subject area, the highest scoring of these subgroups is white students. Hispanic students' scores were substantially below white students, and black students were still lower. As was the case with gender, Indiana results are similar to those for the nation as a whole. It is important to remember that the figures represent averages for each subgroup and that there are many high and low performing students in each category. That being said, these are large differences. Although the NAEP scaling system is not designed to compare grade 4 to grade 8 performance, the difference between the fourth and eighth grade 2013 average scale score was 43 points in mathematics (Figure 1) and 45 points in reading (Figure 3). The differences between various groups is always less than the difference between grade 4 and 8 but not always that much. The extent to which closing achievement gaps can be documented depends on the data and methodology used (Brown Center, 2012; Rowan, Hall, & Haycock, 2010) but the gaps are so large that a prolonged effort will be necessary if there is any hope of equalizing educational outcomes based on racial or ethnic status.

Related to the issue of substantial achievement gaps based on race and ethnicity is the issue of achievement gaps based on income. Figures 7 and 8 shows the 2013 average scale scores for students who were and were not eligible for free- or reduced-price lunch. As can be seen in the figures, (a) the gaps are similar in magnitude to race-ethnicity gaps and (b) while Indiana students scored a bit higher than the national sample in 2013, the gaps based on free or reduced price lunch eligibility are similar for Indiana and the nation as a whole. Of equal importance is that with the high correlation between socio-economic status and race-ethnicity, it has been argued that the racial and ethnic gaps are related to SES gaps and thus it will be difficult to close such gaps without addressing issues of economic disparity (Lubienski & Crockett, 2007).

INDIANA NAEP RESULTS AND STATE-LEVEL POLICY

It is always tempting to look at changes in scores on tests like NAEP as evidence of the effects of recently implemented policies, but education is a complex endeavor and such causal links cannot be definitively made. The influence of state standards may be a factor, as might changes in state education policy. Still, the implementation of IREAD-3 and the changes in grade 3 retention rates are very likely to be the major reason why grade 4 Indiana students scored so much higher in mathematics and reading in 2013 than their counterparts in 2011.

In 2011-2012, 15.1% of the third graders tested did not pass IREAD-3. Although there are no statewide data on the exact percentage of students held back, we know that 6.9% of the 2011-2012 third graders received exemptions allowing promotion to fourth grade (Indiana Department of Education, n.d.). This suggests that up to 8% of students that would have been promoted to grade 4 in 2012-2013 remained in grade 3. Warren and Saliba (2012) estimated that Indiana's retention rate for grade 3 was 2% or less from 2002 through 2009. Thus, relative to prior years, it is reasonable to assume that many of the weakest readers – comprising what would have been about 6% of the grade 4 population in 2013 – were not tested in 2013 because they were still in grade 3. Dropping such a high proportion of weak students substantially inflates the overall gain.

Further evidence that retention due to IREAD-3 rather than other state-level policies accounts for the unusually high gains in grade 4 comes from the grade 8 data. The accountability measures and new curriculum standards instituted in Indiana in the last few years are consistent across grade level. Thus, if those measures were responsible for the grade 4 gains, there would be similar gains at grade 8. The grade 8 mathematics score increased more than normal between 2011 and 2013 but the 2011 score was lower than 2009 (Figure 1) suggesting that the 2011 score was unusually low due to statistical chance. In other words, the significant gain in mathematics was probably due as much to the surprisingly low score in 2011 as it was to gain from 2011 to 2013. Looking at mathematics and reading together (Figures 1 and 3), we see that from 2000 to 2013 Indiana eighth graders have always been a few points above the national average. The 2013 data fit that pattern. In short, retention due to IREAD-3 and normal variability in state-level scores, rather than state level standards and accountability policies, are the major reasons for the perceived gains by Indiana students between 2011 and 2013

With respect to achievement gaps, it is clear that gaps based on race, ethnicity, and SES are substantial and difficult to close. We did not report data on gaps over time, but when the large margin of error in state samples for demographic subgroups is taken into account, it does not appear that Indiana is doing any better or worse than the nation as a whole when it comes to closing gaps. Gender gaps are more of an issue in reading than they are in mathematics but to the extent that there are gaps, they have been relatively stable.

CONCLUSION: TRENDS CONTINUE

Despite claims that the jump in Indiana's 2013 NAEP results were due to state-level policy changes, the data show that the gains are not that much different from those of past years. In mathematics, Indiana continued its slow, steady improvement, in both average scale scores and the percent of students in higher achievement levels. Looking at the data by gender, race-ethnicity, and free- or reduced-lunch status shows a similar pattern. In reading, the trend continued to be relatively flat in average scale scores overall and for subgroups, and there has been only modest change in achievement levels. Rather than recent changes in state policy, it is likely that teachers, parents, better curricula, and higher standards – factors that have been important for a long time – are the drivers of these trends.

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WEB RESOURCES

NAEP website (NAEP instruments and results)
http://nces.ed.gov/nationsreportcard

CEEP website for NAEP research underway at IU
http://ceep.indiana.edu/ImplicationsFromNAEP

National Assessment Governing Board website (this group sets NAEP policy)
http://www.nagb.org

TIMSS website (TIMSS instruments and results)
http://timss.bc.edu

School Matters website with summary of Indiana TIMSS data
http://inschoolmatters.wordpress.com/2013/06/19/surprise-indiana-students-among-worlds-best-in-math-and-science

Indiana DoE website explaining IREAD
http://www.doe.in.gov/assessment/iread

Education Trust website (this group focuses on achievement gaps)
http://www.edtrust.org

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