

spotlight

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NORTH CAROLINA VS. THE WORLD

Comparisons of educational inputs and outcomes

KEY FACTS: • In 2008, North Carolina's elementary schools' per-student expenditure ranked sixth-highest in the world, and N.C.'s secondary schools' expenditure was fifth-highest.

• A majority of the world's highest-performing nations offered performance pay or diverted a substantial percentage of school expenditures to private schools or did both.

• Nations with the highest per-pupil expenditures did no better on measures of student performance than countries that spent less.

• Comparisons of student performance show that public school students in North Carolina are struggling to match the performance of our economic competitors throughout the world.

• Researchers found that consistently improving school districts had world-class standards, curricula, and assessments; a focus on raising the quality of school personnel; a data system that guides decision-making and instruction; and transparency and clarity in their reform efforts.

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the North Carolina State Board of Education and the N.C. Department of Public Instruction have affirmed that the state must “produce globally competitive students” capable of staying “ahead of international competition.”¹ To this end, state education leaders and elected officials have spent much time and thousands of dollars visiting outstanding public school systems in Europe and Asia. So far, very few of the lessons learned from these annual junkets have become policy or proposed legislation.

Indeed, beyond trendy catchphrases and lofty goals, state education officials are not taking steps to measure the global competitiveness of North Carolina's public school students. How will North Carolinians ever know that their children possess the knowledge and skills to make them competitive with their international counterparts if the state does not compile comparative data? In other words, why did state leaders set a goal if they will not (or cannot) measure progress toward it?

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Currently, the state relies on conventional measures of student performance, such as graduation rates, test scores, and course completion.² All are key performance indicators that provide information on the performance of students within North Carolina and, in some cases, nationally. None of them provides information in the context of global competitiveness because our economic competitors abroad do not participate in state and national testing programs.

This study employs multiple studies and data sources to fill the gaps left by the state's unacceptable omission of international inputs and outcomes. The first section of the report examines inputs, including per-pupil expenditures, teacher compensation, and school organization. Of course, many public education advocates complain that North Carolina, and the United States generally, lack the resources to make public school students internationally competitive. There is ample evidence that such is not the case. North Carolina's per-pupil expenditures place the state among the highest-spending industrialized nations in the world. North Carolina does not fare as well in the ranking of teacher compensation, but high income taxes imposed on workers elsewhere does much to mitigate those nations' relative advantage in gross salary. Finally, international data suggest that school choice and performance pay are common features of the public education systems in Europe.

So what does our significant investment in public education yield? Not much, according to multiple studies that link North Carolina's National Assessment of Educational Progress (NAEP) results to Program for International Student Assessment (PISA) scores. In most cases, North Carolina hovers around the international average in reading and math. In other words, the state falls very short of staying "ahead of international competition." Public school students in economically competitive European and Asian nations easily outperform students from North Carolina.

Overall, the evidence suggests that, despite ample resources, public school students in North Carolina fail to meet or exceed the performance of many of our economic competitors throughout the world. Simply put, the state has failed to "produce globally competitive students," and that failure is a cause for serious concern.

Financial Inputs

Compared with their peers in nations around the world, North Carolina's students receive sufficient financial resources. The latest available per-student expenditure statistics from the OECD are from 2008.³ During that year, North Carolina's elementary schools' per-student expenditure ranked sixth-highest in the world.⁴ Per-student expenditures for secondary school students in the state was fifth-highest in the world (see Table 1).⁵

Throughout the world, personnel costs represent the largest portion of per-pupil expenditures. In North Carolina, salary and benefits represent approximately 90 percent of education spending.⁶

Unfortunately, researchers often focus on teacher salary alone, even though salary represents one part of the total value of teacher compensation. The OECD recognizes this shortcoming in the teacher salary rankings. They caution,

Teachers' salaries are one component of teachers' total compensation. Other benefits such as regional allowances for teaching in remote regions, family allowances, reduced rates on public transport and tax allowances on the purchase of cultural materials may also form part of teachers' total remuneration. There are also large differences in taxation and social-benefits systems in OECD countries. All this should be borne in mind when comparing salaries across countries.⁷

Thus, the statutory teacher salary figures listed in Table 2 do not include deferred compensation, benefits, supplements, or conditional payments, which may add thousands to the overall teacher compensation package. For example, North Carolina's matching benefits for 2009 included 7.65 percent of salary for Social Security, 8.14 percent of salary for retirement, and \$4,157 for hospitalization. Additionally, local salary supplements, which would add an average of \$3,483 to the base salary, are not included (see Table 2).⁸

Table 1. Per Student Expenditure, 2008⁹

<i>Jurisdiction</i>	<i>Primary Per-Student Expenditure</i>	<i>Rank</i>	<i>Secondary Per-Student Expenditure</i>	<i>Rank</i>
Luxembourg	\$13,648	1	\$19,898	1
Norway	\$11,077	2	\$13,070	3
Iceland	\$10,599	3	\$9,007	19
Denmark	\$10,080	4	\$10,720	8
Austria	\$9,542	5	\$11,741	4
North Carolina	\$9,089	6	\$10,963	5
Sweden	\$9,080	7	\$9,940	12
Switzerland	\$9,063	8	\$17,825	2
England*	\$8,758	T-9	\$9,487	T-14
Scotland*	\$8,758	T-9	\$9,487	T-14
Italy	\$8,671	11	\$9,315	16
Belgium (Fl.)*	\$8,528	T-12	\$10,511	T-9
Belgium (Fr.)*	\$8,528	T-12	\$10,511	T-9
Ireland	\$7,795	14	\$10,868	7
Canada	\$7,648	15	\$8,388	22
Japan	\$7,491	16	\$9,092	17
Netherlands	\$7,208	17	\$10,950	6
Spain	\$7,184	18	\$9,792	13
OECD Average	\$7,153	N/A	\$8,972	N/A
Finland	\$7,092	19	\$8,659	20
Australia	\$6,723	20	\$9,052	18
France	\$6,267	21	\$10,231	11
Germany	\$5,929	22	\$8,606	21
New Zealand	\$5,582	23	\$6,994	25
Korea	\$5,420	24	\$7,931	23
Portugal	\$5,234	25	\$7,357	24
Poland	\$4,855	26	\$4,525	28
Hungary	\$4,495	27	\$4,658	27
Slovak Republic	\$4,137	28	\$3,956	29
Czech Republic	\$3,799	29	\$6,174	26
Chile	\$2,707	30	\$2,564	30
Mexico	\$2,246	31	\$2,333	31
Estonia	N/A	N/A	N/A	N/A
Greece	N/A	N/A	N/A	N/A
Israel	N/A	N/A	N/A	N/A
Slovenia	N/A	N/A	N/A	N/A
Turkey	N/A	N/A	N/A	N/A

* Some data sources for tables in this report differentiate between England and Scotland; others (such as used here) use data for the United Kingdom in general. Similarly, some sources differentiate between the Flemish Belgium and the French Belgium; others do not.

Table 2. Statutory Teacher Pay, 2009¹⁰

<i>Jurisdiction</i>	<i>Lowest Statutory Base Teacher Salary</i>	<i>Primary Teacher Salary</i> 15 years' experience/ minimum training	<i>Secondary Teacher Salary</i> 15 years' experience/ minimum training	<i>Highest Statutory Base Teacher Salary</i>	<i>Marginal personal income tax</i> Includes employee Social Security-like contribution	<i>Performance Pay?</i>
Luxembourg	\$51,799	\$74,402	\$111,839	\$139,152	47.0%	No
Switzerland	\$48,853	N/A	N/A	\$98,495	23.2%	No
Denmark	\$46,950	\$54,360	\$62,279	\$62,279	43.5%	Yes
Germany	\$46,446	\$57,005	\$68,619	\$77,628	56.1%	No
Spain	\$40,896	\$47,182	\$53,759	\$65,267	32.6%	No
Netherlands	\$37,974	\$50,370	\$60,174	\$66,042	40.5%	Yes
Ireland	\$36,433	\$60,355	\$60,355	\$68,391	50.0%	No
Norway	\$35,593	\$43,614	\$46,247	\$46,495	44.8%	Yes
Australia	\$34,664	\$48,233	\$48,233	\$48,233	31.5%	No
Portugal	\$34,296	\$41,771	\$41,771	\$60,261	34.5%	No
Finland	\$32,692	\$41,415	\$49,237	\$61,089	47.0%	Yes
Belgium (Fl.)	\$32,429	\$45,614	\$58,470	\$70,382	54.9%	No
England	\$32,189 (U.K.)	\$47,047	\$47,047	\$47,047	31.0% (U.K.)	Yes
Scotland	\$32,143 (U.K.)	\$51,272	\$51,272	\$51,272	31.0% (U.K.)	No
Belgium (Fr.)	\$31,545	\$44,696	\$57,613	\$69,579	54.9%	No
Austria	\$30,998	\$41,070	\$45,712	\$67,135	48.2%	Yes
Sweden	\$30,648	\$35,349	\$38,584	\$44,141	31.5%	No
Korea	\$30,522	\$52,820	\$52,699	\$84,529	22.1%	No
North Carolina	\$30,430	\$41,760	\$41,760	\$52,550	29.4% (U.S.)	No
OECD Average	\$29,767	\$38,914	\$43,711	\$53,651	N/A	N/A
Slovenia	\$29,191	\$35,482	\$35,482	\$37,274	43.1%	Yes
Italy	\$28,907	\$34,954	\$39,151	\$48,870	38.7%	No
Iceland	\$28,767	\$32,370	\$32,676	\$34,178	35.7%	No
Japan	\$27,995	\$49,408	\$49,408	\$64,135	25.7%	No
Greece	\$27,951	\$34,209	\$34,209	\$41,265	37.0%	No
Turkey	\$25,536	\$27,438	\$28,076	\$30,335	32.6%	No
France	\$24,006	\$33,359	\$36,145	\$52,150	31.7%	No
Israel	\$18,935	\$28,929	\$25,013	\$37,874	35.0%	No
Czech Republic	\$17,705	\$23,806	\$25,537	\$28,039	31.1%	Yes
Mexico	\$15,658	\$20,415	N/A	N/A	12.5%	Yes
Chile	\$15,612	\$22,246	\$23,273	\$30,548	7.0%	Yes
Estonia	\$14,881	\$15,758	\$15,758	\$21,749	22.4%	Yes
Slovak Republic	\$12,139	\$13,964	\$13,964	\$15,054	29.9%	Yes
Hungary	\$12,045	\$14,902	\$17,894	\$25,783	62.0%	Yes
Poland	\$9,186	\$15,568	\$20,290	\$21,149	26.7%	Yes
Canada	N/A	N/A	N/A	N/A	31.5%	N/A
New Zealand	N/A	N/A	N/A	N/A	34.0%	N/A

* See note under Table 1.

In addition, the marginal tax rates of a nation may severely limit the amount of take-home pay available to a teacher. While nations such as Luxembourg and Denmark boast some of the highest annual teacher salaries among OECD nations, very high national taxes, regional taxes, and Social Security–like contribution taxes drastically reduce take-home salary. These salary figures are further complicated by differences in cost of living, which tend to deflate the value of the salaries earned by teachers in European countries (see Table 2).

Excluding benefits and local salary supplements, North Carolina’s starting teacher salary in 2009 was lower than that of many of the nations on the list, but it still exceeded the international average by \$663. The state starting salary ranked 18th out of 34 countries. By the time a teacher reached the middle (15-year) and top of the salary schedule, North Carolina’s ranking increased slightly. At the top of the salary schedule, the state’s teacher salary climbed to sixteenth out of 33 countries, but it did not grow as fast as the international average (see Table 2).¹²

The OECD reported a majority of the world’s highest-performing nations offered teachers performance pay. Eighteen member nations offered additional payments to award outstanding teaching.¹³ Six of these countries supplied incidental payments for superior teaching, while three nations included performance pay in the teachers’ annual salary. Seven countries provide teachers both incidental and annual performance payments.¹⁴

A handful of North Carolina school districts have implemented pilot programs, but the state does not have the kind of performance-pay system that appears to be commonplace throughout the world.¹⁵

The Organization of Schools

A number of PISA nations offer some kind of public or private school choice to parents. Such countries as Australia, Belgium, Chile, and Denmark divert a substantial percentage of school expenditures to private schools. Naturally, these nations have a high percentage of students who attend charter or charter-like schools (similar to charter schools) and private schools (see Table 3). On the other hand, North Carolina allocates a small portion of public funds to private schools, primarily for driver’s education and special education services. Table 3 looks at school choice availability, funding, and enrollment in 2009, but it was in 2011 that the NC General Assembly approved the state’s Special Needs Tax Credit, which is why it does not appear in the “tax credit” column in the table.

The Netherlands and Belgium are good examples of high-performing nations that had a significant number of students exercising public school choice. In fact, North Carolina was far below the international average in percentage of students that attended a charter or charter-like school. The recent elimination of the 100-school cap on charter schools, as well as enrollment growth in existing charters, will increase the share of students attending North Carolina charter schools.

The percentage of students who exercise school choice varies by level of schooling. While the data in Table 3 capture the total percentage of students who chose to attend a public or private school, they masked the differences between primary students and students in lower and upper secondary schools. In Japan and Korea considerable numbers of students migrated to private schools as they entered lower and upper secondary schools (see Appendix A).

In Japan, nearly 99 percent of students enrolled in a public primary school. By the time Japanese students reached the lower secondary level, 93 percent of them remained in public school. At the upper secondary level, the percentage plummeted to 69 percent, as 31 percent of families opted for an independent private school. In South Korea, public school attrition was even more dramatic. While 99 percent of students began their academic careers in public primary schools, only 54 percent remained in public schooling by the time they reached the upper secondary level. At that level, 46 percent of students attended a taxpayer-supported private school. With the exception of Belgium and Chile, no OECD nation had a lower percentage of upper secondary students in public schools than Korea (see Appendix A).¹⁶

Table 3. School Choice Availability, Funding, and Enrollment, 2009¹⁷

<i>Jurisdiction</i>	<i>Direct public expenditure on public institutions (percentage)</i>	<i>Direct public expenditure on private institutions (percentage)</i>	<i>Indirect public transfers / payments to the private sector (percentage)</i>	<i>Offer Vouchers</i>	<i>Have Student-Centered Funding</i>	<i>Offer Tax Credits</i>	<i>Percent of students in public schools</i>	<i>Percent of students in charter or charter-like schools</i>	<i>Percentage of students in private schools</i>	<i>Percentage of students in home schools</i>
Australia	71.9	16.9	11.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Austria	97.8	N/A	2.2	No	No	No	92.8	7.1	N/A	0.1
Belgium*	44.3	53.2	2.5	Yes	No	No	44.0	55.9	N/A	0.06
Canada	98.0	2.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Chile	59.0	40.4	0.5	Yes	Yes	No	44.8	48.9	6.3	N/A
Czech Republic	91.6	4.1	4.3	No	Yes	No	98.2	1.8	N/A	N/A
Denmark	82.4	7.2	10.4	No	No	No	82.1	17.4	0.4	0.03
England*	74.2 (U.K.)	6.3 (U.K.)	19.5 (U.K.)	No	No	No	N/A	N/A	N/A	N/A
Estonia	N/A	N/A	N/A	Yes	Yes	Yes	N/A	N/A	N/A	N/A
Finland	90.2	6.6	3.1	N/A	Yes	No	97.5	2.4	N/A	0.07
France	84.5	12.4	3.1	Yes	Yes	No	82.0	17.5	0.4	N/A
Germany	80.3	11.2	8.5	Yes	No	Yes	93.4	6.6	N/A	N/A
Greece	N/A	N/A	N/A	No	No	No	93.4	N/A	6.6	N/A
Hungary	82.9	13.7	3.4	No	Yes	No	91.1	8.3	N/A	0.66
Iceland	96.7	2.2	1.1	No	Yes	No	98.5	1.5	N/A	N/A
Ireland	90.8	N/A	9.2	No	Yes	No	99.5	N/A	0.4	0.06
Israel	N/A	N/A	N/A	Yes	No	No	N/A	N/A	N/A	N/A
Italy	96.4	1.1	2.4	Yes	No	Yes	94.3	N/A	5.7	N/A
Japan	96.4	3.6	0.1	No	No	No	96.9	N/A	3.1	N/A
Korea	80.8	17.7	1.5	No	No	No	92.5	6.6	0.9	N/A
Luxembourg	97.7	N/A	2.3	No	No	No	88.0	4.3	7.7	N/A
Mexico	94.2	N/A	5.8	No	No	No	89.9	N/A	10.1	N/A
Netherlands	91.9	N/A	8.1	No	Yes	No	30.0	70.0	N/A	N/A
New Zealand	88.0	4.2	7.8	Yes	No	No	84.8	10.8	3.4	0.96
North Carolina	99.8	0.2	N/A	No	No	No	87.3	2.2	5.9	4.6
Norway	87.2	3.7	9.1	No	No	No	97.4	2.5	N/A	0.06
OECD Average	86.3	11.0	5.1	N/A	N/A	N/A	85.8	14.3	3.6	0.36
Poland	N/A	N/A	N/A	Yes	Yes	No	97.2	0.8	2.0	0.06
Portugal	90.1	8.1	1.8	N/A	Yes	Yes	86.2	3.4	10.4	0.01
Scotland*	74.2 (U.K.)	6.3 (U.K.)	19.5 (U.K.)	No	Yes	Yes	N/A	N/A	N/A	N/A
Slovak Republic	88.5	6.9	4.6	Yes	Yes	No	94.0	6.0	N/A	N/A
Slovenia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Spain	84.7	13.7	1.6	Yes	No	No	68.3	28.3	3.4	N/A
Sweden	84.7	9.8	5.5	No	Yes	No	91.8	8.1	N/A	0.01
Switzerland	89.8	7.4	2.8	No	No	No	94.5	1.8	3.6	N/A
Turkey	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

* See note under Table 1.

Belgium, Chile, Japan, and Korea are not unique in this regard. A relatively high percentage of students in other nations, including Australia, France, Iceland, Hungary, New Zealand, and the United Kingdom, opt to attend an independent or taxpayer-supported private secondary school (see Appendix A). In other words, school choice is common among secondary school students in these nations, even though most of these students begin their academic careers in conventional public schools.

Unlike students in many countries, a high percentage of North Carolina students chose to attend a district high school (see Appendix B). An average of 88 percent of first- through fourth-graders attended a traditional public school during the 2008–09 school year. That percentage dipped to 85 percent for grades five through eight and rebounded to 88 percent in grades nine through twelve.¹⁸

Three factors accounted for this decrease. First, there were relatively few charter high schools available, and these schools were distributed unevenly around the state. In 2009, only 31 of 100 charter schools offered high school courses, and a majority of these schools were located in urban and suburban counties.¹⁹ In this way, students who attended a charter elementary or middle school did not have the option to enroll in a charter high school. Second, fewer families chose to home-school their children during the high school years, perhaps out of concerns about their ability to provide advanced math and science instruction. Finally, there is little public financial support for students who would be better served by attending a private middle or high school but cannot afford to do so.

Student Performance: North Carolina vs. the World

Currently, there are no easy ways to compare academic achievement in North Carolina to student performance in other nations. North Carolina does not participate in international testing programs like the Program for International Student Assessment (PISA) or the Trends in International Mathematics and Science Study (TIMSS). Minnesota and Massachusetts voluntarily participated in the 2007 TIMSS, but state and district participation in international assessments is often not practical, affordable, or popular.²⁰ Of course, students who reside in other states and nations do not participate in North Carolina’s state testing program, the ABCs of Public Education.

In response to the variability of testing programs and incompatibility of results, researchers have devised ways to compare international testing results with federal math and reading tests, namely the biennial National Assessment of Educational Progress (NAEP). Statistical techniques that “link” results from two different tests, though imperfect, provide a reasonable estimate of how state performance compares internationally (see Table 4).²¹

For example, Gary W. Phillips of the American Institutes of Research employed this approach in a 2007 study titled “Chance Favors the Prepared Mind: Mathematics and Science Indicators for Comparing States and Nations.” Phillips standardized NAEP scores from 2007 and compared them to the 2003 Trends in International Mathematics and Science Study (TIMSS). The report used NAEP and TIMSS data to compare scores of a representative sample of eighth-grade students in 45 countries.²²

Overall, eighth-graders from North Carolina ranked tenth in math, significantly lower than Singapore, Hong Kong, Korea, Chinese Taipei, Japan, and Belgium. Four nations had math performance similar to North Carolina, and 36 nations had lower math scores. Unfortunately, in a comparison of compared 2005 NAEP science results to 2003 TIMSS science scores, North Carolina’s ranking fell to nineteenth in the world. North Carolina had scores similar to 14 other nations. Students in nine nations (or jurisdictions) performed better than North Carolina’s eighth graders, while students in 22 nations performed worse.²³

In 2011, researchers Paul Peterson, Ludger Woessmann, Eric Hanushek, and Carlos Lastra-Anadon recently published a linking study that allowed direct comparisons between state reading and math performance on the NAEP and the Program for International Student Assessment (PISA) test.²⁴ Peterson’s process of statistical linking was similar

Table 4. Statistical Linking Studies and Student Performance

<i>Study</i>	<i>Subject & Test(s)</i>	<i>Grade / Group</i>	<i>Higher performance than North Carolina</i>	<i>Similar performance to North Carolina</i>	<i>Lower performance than North Carolina</i>
Peterson et al (2011)	Math – PISA & NAEP	Class of 2011	Shanghai, Singapore, Hong Kong, Korea, Finland, Taiwan, Liechtenstein, Switzerland, Japan, Canada, Netherlands, Macao, Belgium, New Zealand, Germany, Australia, Estonia, Iceland, France, Slovenia, Denmark	Austria, Slovakia, Norway, Sweden, Luxemburg, Czech Rep, Hungary, Poland, Portugal, United Kingdom	Latvia, Lithuania, Greece, Dubai, Russia, Israel, Croatia, Turkey, Serbia, Bulgaria, Uruguay, Trinidad and Tobago, Romania, Chile, Thailand, Mexico, Qatar (Selected)
Peterson et al (2011)	Reading – PISA & NAEP	Class of 2011	Shanghai, Korea, Finland, Hong Kong, Singapore, New Zealand, Japan, Canada, Australia, Belgium, France, Switzerland, Germany, Norway	Iceland, Poland, Sweden, Liechtenstein, Ireland, Estonia Israel, Italy, Netherlands, Poland, United Kingdom	Portugal, Slovenia, Greece, Luxembourg, Austria, Czech Rep, Slovakia, Spain, Latvia, Dubai, Macao, Croatia, Lithuania, Turkey, Russia, Bulgaria, Trinidad and Tobago, Chile, Uruguay, Serbia (Selected)
Phillips (2007)	Math – NAEP & TIMMS	Grade 8	Singapore, Hong Kong, Korea, Chinese Taipei, Japan	Belgium, Netherlands, Hungary, Estonia	Slovak Republic, Australia, Russian Federation, Malaysia, Latvia, Lithuania, Israel, England, Scotland, New Zealand, Sweden, Slovenia, Italy, Bulgaria, Norway
Phillips (2007)	Science – NAEP & TIMMS	Grade 8	Singapore, Chinese Taipei, Korea, Hong Kong, Japan, Estonia, England, Hungary	Netherlands, Australia, Sweden, New Zealand, Slovak Republic Lithuania, Slovenia, Russian Federation, Scotland, Belgium, Latvia, Malaysia, Israel, Bulgaria	Italy, Jordan, Norway, Romania, Serbia, Egypt, Chile, Lebanon
Mullis et al. ²⁵ (2001)	Math – TIMMS	Grade 8	Singapore, Hong Kong, Chinese Taipei, Korea, Japan, Belgium, Netherlands, Canada, Malaysia, Finland, Slovenia, Hungary, Slovak Republic	Australia, Russian Federation, Czech Republic, Bulgaria, England, Latvia, New Zealand, Cyrus, Lithuania, Israel, Thailand, Italy	Moldova, Romania, Tunisia, Iran, Macedonia, Jordan, Turkey, Indonesia, Chile, Philippines, Morocco, South Africa
Martin et al. ²⁶ (2001)	Science - TIMMS	Grade 8	Chinese Taipei, Singapore, Hungary, Japan, Korea, Netherlands, Australia, Czech Republic, England, Finland, Slovak Republic, Belgium, Slovenia, Canada	Hong Kong, Russian Federation, Bulgaria, New Zealand, Latvia, Italy, Malaysia, Lithuania	Thailand, Romania, Israel, Cyprus, Moldova, Macedonia, Jordan, Iran, Indonesia, Turkey, Tunisia, Chile, Philippines, Morocco, South Africa
Johnson et al. ²⁷ (1998)	Math – NAEP & TIMMS	Grade 8	Australia, Austria, Belgium, Bulgaria, Canada, Czech Republic, France, Hong Kong, Hungary Ireland, Japan, Korea, Netherlands, Russian Federation, Singapore, Slovak Republic, Slovenia, Sweden, Switzerland, Thailand	Cyprus, Denmark, England, Germany, Greece, Iceland, Israel, Latvia, Lithuania, New Zealand, Norway, Romania, Scotland, Spain	Colombia, Iran, Kuwait, Portugal, South Africa
Johnson et al. (1998)	Science – NAEP & TIMMS	Grade 8	Austria, Bulgaria, Czech Republic, England, Hungary, Japan, Korea, Netherlands, Singapore, Slovenia	Australia, Belgium, Canada, Germany, Hong Kong, Ireland, Israel, New Zealand, Norway, Russian Federation, Scotland, Slovak Republic, Spain, Sweden, Switzerland, Thailand	Colombia, Cyprus, Denmark, France, Greece, Iceland, Iran, Kuwait, Latvia, Lithuania, Portugal, Romania, South Africa

to the technique employed by Phillips, but education researchers continue to debate whether the TIMMS or the PISA provides an appropriate comparison for U.S. states and the nation.²⁸

The Organization for Economic Cooperation and Development (OECD), which administers the PISA, tests the math and reading proficiency of a representative sample of 15-year-olds from participating nations. On a handful of measures, North Carolina fared reasonably well. For example, North Carolina’s white public school students, as well as students with at least one college-educated parent, were in the top tier in reading and math performance. These student populations were on par with peers from Canada, Japan, and the Netherlands. Unfortunately, both categories of students still failed to compete with high-achieving nations such as South Korea and Finland. Moreover, proficiency rates fell below 40 percent in reading and 50 percent in math.

North Carolina’s general public school population hovered around the international average in reading and math performance, but approximately two-thirds of our students did not meet international proficiency standards in these subjects. As a result, North Carolina’s performance was comparable to those of Poland and the United Kingdom and far behind the leaders of the pack. Even more troubling, few of our public school students reached the “advanced” level of performance. Only eight percent of our students performed well enough to achieve this distinction, comparable to nations such as the Czech Republic and Hungary.

In late 2012 or early 2013, the U.S. Department of Education’s National Center for Education Statistics plans to publish a NAEP-TIMMS linking study. The study of eighth-graders will compare state NAEP math and science results with international TIMMS scores in those subjects. Participating states included Alabama, California, Colorado, Connecticut, Florida, Indiana, Massachusetts, Minnesota, and North Carolina.²⁹

In the end, comparisons of student performance show that public school students in North Carolina are struggling to match the performance of our economic competitors throughout the world.³⁰ A closer examination of educational inputs provides clues about the systemic and organizational traits that produce strong outputs.

North Carolina’s Peers

For comparison purposes, I chose ten “peer” countries with enrollment totals that are relatively similar to North Carolina’s: Greece, Czech Republic, Hungary, Austria, Switzerland, Denmark, Finland, New Zealand, Norway, and the Slovak Republic.³¹

According to Peterson et al., Finland, Switzerland, New Zealand, Denmark, Austria, Slovak Republic, and Norway

Table 5. North Carolina and Its International Peers³²

<i>Country</i>	<i>Math Performance (Peterson, 2011)</i>	<i>Reading Performance (Peterson, 2011)</i>	<i>Enrollment 2008–09 (All institutions)</i>	<i>Total 2008 Population</i>	<i>Primary Per-Pupil Expenditure</i>	<i>Primary Rank</i>	<i>Secondary Per-Pupil Expenditure</i>	<i>Secondary Rank</i>
Norway	Higher than NC	Higher than NC	1,250,412	4,707,000	\$11,077	1	\$13,070	2
Denmark	Higher than NC	Similar to NC	1,411,190	5,460,000	\$10,080	2	\$10,720	5
Austria	Higher than NC	Lower than NC	1,702,316	8,333,000	\$9,542	3	\$11,741	3
North Carolina	N/A	N/A	1,668,577	9,269,633	\$9,089	4	\$10,963	4
Switzerland	Higher than NC	Higher than NC	1,514,257	7,583,000	\$9,063	5	\$17,825	1
Finland	Higher than NC	Higher than NC	1,388,187	5,306,000	\$7,092	6	\$8,659	6
New Zealand	Higher than NC	Higher than NC	1,322,526	4,188,000	\$5,582	7	\$6,994	7
Hungary	Similar to NC	Similar to NC	2,150,217	10,035,000	\$4,495	8	\$4,658	9
Czech Republic	Similar to NC	Lower than NC	2,152,977	10,262,000	\$3,799	9	\$6,174	8
Greece	Lower than NC	Lower than NC	2,182,624	11,217,000	N/A	N/A	N/A	N/A

outperformed North Carolina in math. The state's math performance was similar to those of Hungary and the Czech Republic. Only Greece's was substantially lower than the NC average. In reading, North Carolina surpassed three nations, equaled two, and scored lower than four (see Table 5).

Of the nine nations that have expenditure data available, three had a higher per-pupil expenditure than North Carolina, and six spent less. Students from the Czech Republic and Hungary had math performances similar to North Carolina's students, yet both of those nations spent approximately half of what North Carolina spent per student. Students in the nations on the list with the highest per-pupil expenditure did no better than students in countries that spent considerably less. In other words, there was a very weak relationship between per-pupil expenditure and student performance.

Recommendations

In their 2010 report, "How The World's Most Improved School Systems Keep Getting Better," Mona Mourshed, Chinezi Chijioke, and Michael Barber of McKinsey & Company examined 20 improving school systems, including three in the United States, to unearth the core elements of their turnaround and continued success.³³

The researchers found that the most common interventions among the cohort included:

- 1. Technical skill building: strengthening professional development for new and tenured teachers and principals.*
- 2. Student assessment: assessing students at the regional or national level for various grades and subjects.*
- 3. Data systems: gathering, analyzing, and sharing data on system performance (schools, students, educators, geographic areas), and using data as a tool to direct the allocation of system support.*
- 4. Revised standards and curriculum: defining what students should know, understand, and be able to do, and creating the accompanying teaching content.*
- 5. Teacher and principal compensation: introducing a reward schemes for high performance, and structuring teacher and principal compensation in accordance with the role they play.*
- 6. Policy documents and education laws: facilitating the improvement journey by articulating the aspirations, objectives, and priorities of the reform program.³⁴*

They concluded that the reform process must be systemic and not piecemeal, so partial adoption of one or two of these interventions would not produce measurable and sustainable improvements in the school system. North Carolina's scattershot, politically motivated education reform efforts demonstrate the folly of the piecemeal approach.

Three themes run through the McKinsey & Co. recommendations. First, the researchers found that improving school districts had world-class standards, curricula, and assessments. Second, those districts focused on raising the quality of school personnel, including a compensation system that rewarded superior teachers and a data system that guided decision-making and instruction.

Finally, the districts in the study valued transparency and clarity in their reform efforts. Sadly, North Carolina's public schools have made little substantive progress in most of these areas.

What does this mean for North Carolina's public schools? Four immediate reforms could get the state on the road to international competitiveness:

1. Develop a comprehensive performance pay system for teachers and administrators using value-added and other measures.
2. Adopt high-quality assessments and curricula that are nationally or internationally benchmarked.
3. Continue efforts to promote transparency and data-driven decision making.
4. Raise teacher quality reducing barriers to the profession and strengthening teacher accountability.

In addition, legislators and state education leaders should focus on long-term reforms that would allow the above reforms to flourish, such as expanding public and private school choice and moving to student-centered funding.

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End Notes

1. North Carolina Department of Public Instruction (NC DPI), "Mission Statement," www.ncpublicschools.org/organization/mission.
2. NC DPI, "Priority Measures," January 2011, www.ncpublicschools.org/performance. Measures include the following: 4-year cohort Graduation Rate; Performance on National Assessment of Educational Progress (NAEP); Scoring 3 or above on AP Exams and % of graduates taking; High school graduates who enroll in Postsecondary Programs; SAT composite and % of graduates taking (anticipate adding the ACT); Freshmen enrolled in at least one remedial course; 5-year cohort Graduation Rate; Students passing or excelling on both math and reading EOG and EOC assessments; LEAs requiring a Graduation Project; Students completing a Concentration in a CTE, arts, language, or JROTC cluster; and Graduates passing Algebra II or equivalent.
3. Organization for Economic Development and Cooperation (OECD), "Education at a Glance 2011: OECD Indicators," OECD Publishing, 2011, p. 218, www.oecd.org/document/2/0,3746,en_2649_37455_48634114_1_1_1_37455,00.html.
4. According to the OECD, "These [per-pupil expenditure] comparisons are based on purchasing power parities (PPPs) for GDP, not on market exchange rates. They therefore reflect the amount of a national currency required to produce the same basket of goods and services in a given country as produced by the United States in USD." ("Education at a Glance 2011," p. 280.)
5. OECD calculates expenditure per student by dividing the total expenditure by educational institutions at a given level, e.g., primary and secondary, by the corresponding full-time equivalent enrollment. Per OECD definition ("Education at a Glance 2011," p. 486), total expenditure includes current and capital expenditures. For this reason, I added average per-pupil capital cost to the operating or current average per-pupil expenditure for North Carolina. North Carolina's average per-student expenditure in 2008 was \$8,521.66 in operating expenditures and \$848.55 in capital expenditures for a rounded total of \$9,370. Regrettably, North Carolina does not track total expenditure by educational institutions at elementary and secondary levels. Thus, to separate North Carolina's total per-student expenditures into "elementary" and "secondary" categories, I examined the United State average, as reported by the OECD, and assumed that the proportion between elementary and secondary expenditures were similar in North Carolina. The average elementary expenditure for the United States was three percent lower than the national average. The secondary expenditure was 17 percent higher than the national average. Although this appears out of balance, recall that the elementary expenditure is an average of nine grade levels (including kindergarten) and the secondary expenditure is an average of four grade levels.
6. NC DPI, Division of School Business, "Highlights of the North Carolina Public School Budget," February 2009, p. 3.
7. *Ibid.*, p. 408.
8. NCDPI, "Highlights of the North Carolina Public School Budget," February 2009, p. 14; NC DPI, "Local Salary Supplements 2008-09," August 2009, p. 3.
9. OECD, "Education at a Glance 2011," pp. 218-223.
10. *Ibid.*, p. 415-421.
11. OECD, "Table I.4: Marginal personal income tax and social security contribution rates on gross labor income, 2009," OECD Tax Database, Center for Tax Policy and Administration, www.oecd.org/document/60/0,3746,en_2649_34533_1942460_1_1_1_1,00.html#tbw. Percentages represent 100 percent of the average wage (in national currency)—i.e., the national average wage—and includes social security contribution by the employee but not by the employer.
12. NC DPI, "Highlights of the North Carolina Public School Budget," p. 14; NC DPI, "Fiscal Year 2008–2009 North Carolina Public School Salary Schedules," July 2008, www.ncpublicschools.org/fbs/finance/salary.
13. OECD, "Education at a Glance 2011," p. 413.
14. *Ibid.*, p. 421.
15. See Terry Stoops, "Performance Pay for Teachers: Increasing Student Achievement in Schools with Critical Needs," John Locke Foundation *Policy Report*, September 2008, www.johnlocke.org/research/show/policy%20reports/175.
16. OECD, "Education at a Glance 2011," p. 306.
17. OECD, "Education at a Glance 2011," pp. 448-449. For percentage distribution of student enrollment in various types of educational institutions, see OECD, "Education at a Glance 2010: OECD Indicators," OECD Publishing, 2010, p. 429.
18. See Appendix A and B. The public and charter school figures reflect Average Daily Membership (ADM), and all enrollment statistics are for the 2008-2009 school year. North Carolina's home school statistics categorize students by age, not grade. For the purposes of this study, ages were converted to grade levels.
19. NC DPI, "Table 34 - Charter School Final Pupils By Grade" [Statistical Profile Online], www.dpi.state.nc.us/fbs/resources/data.
20. Gary W. Phillips, "The Second Derivative: International Benchmarks in Mathematics for U.S. States and School Districts," Washington, DC: American Institutes for Research, 2009, p. 21. As Mark Schneider observed in a 2009 Education Next article, "What would be gained if, in addition to the nation as a whole, individual states were to participate directly in these assessments by testing a much larger and more representative sample of students? Not as much as many advocates would have us believe, and probably not enough to justify the considerable cost." See Mark Schneider, "The International PISA Test: A risky investment for states," Education Next, Vol. 9, No. 4, Fall 2009, educationnext.org/the-international-pisa-test.
21. Paul W. Holland, "A Framework and History for Score Linking," in *Linking and Aligning Scores and Scales* (Dorans, Pommerich and Holland, Eds.), New York: Springer, 2007.
22. Gary W. Phillips, "Chance Favors the Prepared Mind: Mathematics and Science Indicators for Comparing States and Nations," Washington, DC: American Institutes for Research, 2007.
23. Two years later, Phillips published a report that used statistical linking to benchmark state mathematics standards against an international TIMMS standard.

In his state-by-state assessment of fourth- and eighth-grade math standards, Phillips awarded North Carolina a C+ for both fourth- and eighth-grade math standards. He concluded, “[A]n overwhelming majority of states in the United States are performing at the C+ and C level, which represents a level of mathematics learning that is below the international benchmark of B.” While the state matched the international (OECD) and U.S. *averages*, North Carolina fell short of the international *benchmark*. See Phillips, “The Second Derivative,” p. 22.

24. Paul E. Peterson, Ludger Woessmann, Eric A. Hanushek, and Carlos X. Lastra-Anadón, “Globally Challenged: Are U. S. Students Ready to Compete?” Harvard’s Program on Education Policy and Governance & Education Next, Taubman Center for State and Local Government, Harvard Kennedy School, *PEPG* Report No.: 11-03, August 2011, hks.harvard.edu/pepg. See also Hanushek, Eric A., Paul E. Peterson, and Ludger Woessmann, “Teaching Math to the Talented,” *Education Next* Vol. 11, No. 1, Winter 2011, educationnext.org/teaching-math-to-the-talented.
25. Ina Mullis, Michael Martin, Eugenio Gonzalez, Kathleen O’Connor, Steven Christowski, Kelvin Gregory, Robert Garden, and Teresa Smith, “Mathematics Benchmarking Report: TIMSS 1999–Eighth Grade,” International Study Center, Lynch School of Education, Boston College, 2001. See also Michael O. Martin, Kelvin D. Gregory, Kathleen M. O’Connor and Steven E. Stemler, “TIMSS 1999 Benchmarking Technical Report,” International Study Center, Lynch School of Education, Boston College, 2001.
26. Martin, Michael, Ina Mullis, Eugenio Gonzalez, Kathleen O’Connor, Steven Chrostowski, Kelvin Gregory, Teresa Smith, and Robert Garden, “Science Benchmarking Report: TIMSS 1999–Eighth Grade,” International Study Center, Lynch School of Education, Boston College, 2001.
27. Eugene G. Johnson and Adriane Siegendorf, U.S. Department of Education, National Center for Education Statistics, “Linking the National Assessment of Educational Progress and the Third International Mathematics and Science Study: Eighth-Grade Results,” NCES 98-500, Washington, DC: Government Printing Office, May 1998. See also Eugene G. Johnson, Jon Cohen, Wen-Hung Chen, Tao Jiang, and Yu Zhang, U.S. Department of Education, “2000 NAEP–1999 TIMSS Linking Report,” NCES 2005–01, Washington, DC: National Center for Education Statistics, 2003.
28. See Jay Greene, “When the Best is Mediocre,” *Education Next*, Vol. 12, No. 1, Winter 2012, p. 39, educationnext.org/when-the-best-is-mediocre.
29. International Center for Education Statistics, “NAEP-TIMSS Linking Study: Comparing State Academic Performance Against International Benchmarks,” NCES 2011-472, U.S. Department of Education, August 2011, p. 2.
30. Unfortunately, this is a both a state and national problem. In 2010, U.S. Secretary of Education Arne Duncan observed, “With the exception of some improvement in science from 2006 to 2009, U.S. performance on the PISA has been largely stagnant. The U.S. is not among the top-performing OECD nations in any subject tested by PISA—though U.S. students express more self-confidence in their academic skills than students in virtually all OECD nations. This stunning finding may be explained because students here are being commended for work that would not be acceptable in high-performing education systems. The hard truth is that other high-performing nations have passed us by during the last two decades.” U.S. Secretary of Education Arne Duncan, “Remarks at OECD’s Release of the Program for International Student Assessment (PISA) 2009 Results,” December 7, 2010, www.ed.gov/news/speeches/secretary-arne-duncans-remarks-oecd-release-program-international-student-assessment-.
31. The total includes district school (1,456,558), charter school (36,409), home school (77,065), and private school (98,577) enrollment for the 2008–09 school year. For data, see Department of Administration, North Carolina Division of Non-Public Education (NCDNPE), “2009 North Carolina Private School Statistics,” June 2009, www.ncdnpe.org/hhh500.aspx. NCDNPE, “2009 North Carolina Home School Statistics,” June 2009, www.ncdnpe.org/homeschool2.aspx; NC DPI, “Statistical Profile Online,” www.dpi.state.nc.us/fbs/resources/data.
32. *Ibid.*, and OECD, “OECD StatExtracts [database],” www.oecd.org/home/0,2987,en_2649_201185_1_1_1_1_1,00.html; OECD, “Education at a Glance 2011,” pp. 218-223; and Peterson et al., “Globally Challenged,” pp. 6-10 (op. cit., note 27).
33. Mona Mourshed, Chinezi Chijioke, and Michael Barber, “How The World’s Most Improved School Systems Keep Getting Better,” McKinsey & Company, November 2010, mckinseysociety.com/how-the-worlds-most-improved-school-systems-keep-getting-better.
34. *Ibid.*, p. 53.
35. OECD, “Education at a Glance 2011,” p. 306.
36. NCDNPE, “2009 North Carolina Private School Statistics”; NCDNPE, “2009 North Carolina Home School Statistics”; and NC DPI, “Table 1 — LEA Final Pupils By Grade” [Statistical Profile Online].

Appendix A. Percentage of students in primary and secondary education

By type of institution, OECD nations, 2009³⁵

Nation	Primary			Lower Secondary			Upper Secondary		
	Public	Public-supported private	Independent private	Public	Public-supported private	Independent private	Public	Public-supported private	Independent private
Australia	69.5	30.5	N/A	65.8	34.2	N/A	69.7	30.1	0.2
Austria	94.4	5.6	N/A	91.1	8.9	N/A	89.6	10.4	N/A
Belgium	45.9	54.1	N/A	39.7	60.3	N/A	43.7	56.3	N/A
Canada	95.0	5.0	N/A	92.3	7.7	N/A	94.0	6.0	N/A
Chile	42.2	51.8	6.0	47.1	46.9	6.0	41.5	51.9	6.6
Czech Republic	98.5	1.5	N/A	97.4	2.6	N/A	85.9	14.1	N/A
Denmark	86.5	13.2	0.3	74.2	25.1	0.8	97.8	2.1	0.1
Estonia	96.0	N/A	4.0	96.9	N/A	3.1	96.2	N/A	3.8
Finland	98.6	1.4	N/A	95.6	4.4	N/A	86.2	13.8	N/A
France	85.1	14.3	0.5	78.2	21.5	0.3	68.6	30.4	1.0
Germany	96.1	3.9	N/A	91.1	8.9	N/A	92.5	7.5	N/A
Greece	92.7	N/A	7.3	94.4	N/A	5.6	95.1	N/A	4.9
Hungary	91.7	8.3	N/A	90.9	9.1	N/A	80.2	19.8	N/A
Iceland	98.1	1.9	N/A	99.2	0.8	N/A	79.4	20.3	0.3
Ireland	99.6	N/A	0.4	100.0	N/A	N/A	98.3	N/A	1.7
Israel	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Italy	93.2	N/A	6.8	96.0	N/A	4.0	91.1	3.6	5.3
Japan	98.9	N/A	1.1	92.8	N/A	7.2	69.0	N/A	31.0
Korea	98.6	N/A	1.4	81.6	18.4	N/A	54.3	45.7	N/A
Luxembourg	91.8	0.4	7.9	80.9	10.7	8.4	84.0	7.2	8.8
Mexico	91.7	N/A	8.3	88.7	N/A	11.3	81.5	N/A	18.5
Netherlands	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
New Zealand	87.6	10.2	2.1	82.9	12.1	5.0	72.0	15.7	12.2
Norway	97.7	2.3	N/A	96.9	3.1	N/A	90.5	9.5	N/A
Poland	97.4	0.7	1.9	96.2	1.1	2.7	86.9	1.3	11.9
Portugal	88.1	3.2	8.7	81.2	5.1	13.7	75.8	4.0	20.2
Slovak Republic	94.2	5.8	N/A	93.6	6.4	N/A	86.4	13.6	N/A
Slovenia	99.7	0.3	N/A	99.9	0.1	N/A	96.2	2.0	1.8
Spain	68.5	27.8	3.7	67.8	28.8	3.3	77.5	12.1	10.4
Sweden	92.4	7.6	N/A	89.7	10.3	N/A	85.5	14.5	N/A
Switzerland	95.5	1.4	3.0	92.0	2.8	5.2	93.3	2.8	3.9
Turkey	97.8	N/A	2.2	N/A	N/A	N/A	97.1	N/A	2.9
United Kingdom	94.9	0.1	5.0	80.7	13.3	6.0	56.0	38.1	5.9
United States	90.2	N/A	9.8	90.9	N/A	9.1	91.2	N/A	8.8
OECD average	89.5	7.6	2.9	85.8	10.7	3.5	81.2	13.1	5.7

Appendix B. North Carolina School Enrollment

By grade, 2008–09³⁶

	<i>District</i>	<i>Charter</i>	<i>Private</i>	<i>Home</i>	<i>Total</i>	<i>District percent</i>	<i>Charter percent</i>	<i>Private percent</i>	<i>Home percent</i>
Kindergarten	113,961	3,270	9,486	N/A	126,717	90%	3%	7%	N/A
1st grade	115,227	3,355	8,187	2,557	129,326	89%	3%	6%	2%
2nd grade	115,908	3,367	8,076	5,090	132,441	88%	3%	6%	4%
3rd grade	115,275	3,328	7,903	6,686	133,192	87%	2%	6%	5%
4th grade	111,498	3,240	7,829	7,137	129,704	86%	2%	6%	6%
5th grade	109,131	3,417	7,766	7,463	127,777	85%	3%	6%	6%
6th grade	106,845	3,712	8,205	7,781	126,543	84%	3%	6%	6%
7th grade	105,754	3,313	7,985	7,789	124,841	85%	3%	6%	6%
8th grade	107,429	2,840	7,827	7,614	125,710	85%	2%	6%	6%
9th grade	124,404	1,862	6,733	6,979	139,978	89%	1%	5%	5%
10th grade	105,211	1,455	6,503	6,477	119,646	88%	1%	5%	5%
11th grade	94,413	1,038	6,123	6,477	108,051	87%	1%	6%	6%
12th grade	85,441	934	5,922	5,015	97,312	88%	1%	6%	5%