Benchmarking for Success:

Ensuring U.S. Students Receive a World-Class Education

A report by the National Governors Association, the Council of Chief State School Officers, and Achieve, Inc.

National Governors Association
Founded in 1908, the National Governors Association (NGA) is the collective voice of the nation's governors and one of Washington, D.C.'s most respected public policy organizations. Its members are the governors of the 50 states, three territories and two commonwealths. NGA provides governors and their senior staff members with services that range from representing states on Capitol Hill and before the Administration on key federal issues to developing and implementing innovative solutions to public policy challenges through the NGA Center for Best Practices. For more information, visit www.nga.org.

Council of Chief State School Officers
The Council of Chief State School Officers (CCSSO) is a nonpartisan, nationwide, nonprofit organization of public officials who head departments of elementary and secondary education in the states, the District of Columbia, the Department of Defense Education Activity, and five U.S. extra-state jurisdictions. CCSSO provides leadership, advocacy, and technical assistance on major educational issues. The Council seeks member consensus on major educational issues and expresses their views to civic and professional organizations, federal agencies, Congress, and the public.

Achieve, Inc.
Created by the nation's governors and business leaders, Achieve is a bipartisan, non-profit organization that helps states raise academic standards, improve assessments and strengthen accountability to prepare all young people for postsecondary success. At the 2005 National Education Summit, Achieve launched the American Diploma Project (ADP) Network, a coalition that has grown to 34 states, educating nearly 85% of public school students in the United States. The ADP Network is committed to aligning high school expectations with the demands of college, career and life. To learn more about Achieve, visit www.achieve.org.

National Governors Association
444 N. Capitol Street NW, Suite 267
Washington, DC 20009
202-624-5300
www.nga.org

Benchmarking for Success:

Ensuring U.S. Students Receive a World-Class Education

A report by the National Governors Association,
the Council of Chief State School Officers, and Achieve, Inc.

Table of Contents

Foreword

We are living in a world without borders. To meet the realities of the 21st century global economy and maintain America's competitive edge into the future, we need students who are prepared to compete not only with their American peers, but with students from all across the globe for the jobs of tomorrow.

States have voluntarily taken the lead in developing standards-based education, but policymakers lack a critical tool for moving forward—international benchmarking. This report is intended to help states take the next steps toward ensuring that American students receive a world-class education that positions them to compete and innovate in the 21st century.

International benchmarking will help state policymakers identify the qualities and characteristics of education systems that best prepare students for success in the global marketplace. The stakes are high, and improving our educational system will require commitment and insight not just from state leaders but many other stakeholders as well. With this in mind, the National Governors Association, the Council of Chief State School Officers, and Achieve, Inc. have joined to provide to states a roadmap for benchmarking their K-12 education systems to those of top-performing nations.

The partners' recommendations were informed by an International Benchmarking Advisory Group consisting of education experts representing education institutions, the business community, researchers, former federal officials, and current state and local officials. The Advisory Group's expertise and experience helped the partners identify the need for international comparisons and provide guidance for benchmarking state education system practices in areas such as standards, accountability, educator workforce, and assessments. The partner organizations will work with states to develop and implement these recommendations.

Governors recognize that new economic realities mean it no longer matters how one U.S. state compares to another on a national test; what matters is how a state's students compare to those in countries around the globe. America must seize this moment to ensure that we have workers whose knowledge, skills, and talents are competitive with the best in the world.

Governor Janet Napolitano
Arizona

Governor Sonny Perdue
Georgia

Craig R. Barrett
Chairman of the Board
Intel Corporation

Co-Chairs, International Benchmarking Advisory Group

Acknowledgements

This report was researched and written by Craig D. Jerald, president of Break the Curve Consulting in Washington, D.C.

At the National Governors Association Center for Best Practices, Ilene Berman, program director in the education division, and Dane Linn, director of the education division, supervised the project. Leadership and staff of the National Governors Association (NGA), Council of Chief State School Officers (CCSSO), and Achieve, Inc. played instrumental roles in the project. The following individuals provided useful guidance and feedback in the development of the report: Achieve, Inc. President Mike Cohen and Vice President for Advocacy and Outreach Sandy Boyd; NGA Executive Director Ray Scheppach, NGA Center Director John Thomasian, NGA Communications Director Jodi Omear, Senior Communications Manager Christopher Cashman, and Education, Early Childhood and Workforce Committee Director Joan Wodiska; CCSSO Executive Director Gene Wilhoit, Deputy Executive Director Scott Montgomery, Legislative Director Scott Frein, and Communications Director Kara Schlosser. Within the NGA Office of Communications, Publications and Communications Manager Andrea Brachtesende provided editing and design assistance.

The partner organizations extend special thanks to the members of the International Benchmarking Advisory Group who offered valuable insights, useful data, and timely review of earlier drafts. The partners also acknowledge the contributions of governors' staff and chief state school officers to the report.

The Bill & Melinda Gates Foundation and GE Foundation generously supported the preparation of this publication.

International Benchmarking Advisory Group

To develop this report, the National Governors Association (NGA), Council of Chief State School Officers (CCSSO), and Achieve, Inc. invited national, state, and local education and policy leaders to serve on an International Benchmarking Advisory Group. The Advisory Group provided the three partner organizations with valuable insights and helped frame this bipartisan Call to Action. They collectively support the recommendations herein for internationally benchmarking state K-12 education systems.

Co-Chairs:

Governor Janet Napolitano, Arizona
Governor Sonny Perdue, Georgia
Craig R. Barrett, Chairman of the Board, Intel Corporation

Members:

Steven A. Ballmer, Chief Executive Officer, Microsoft Corporation

Governor Donald L. Carcieri, Rhode Island

Mitchell Chester, Commissioner of Education, Massachusetts Department of Elementary and Secondary Education

Christopher Edley, Jr., Dean and Professor of Law, University of California–Berkeley

Chester E. Finn, Jr., President, Thomas B. Fordham Institute

Beverly L. Hall, Superintendent, Atlanta Public Schools

James B. Hunt, Jr., Chairman, the James B. Hunt, Jr. Institute for Educational Leadership and Policy at the University of North Carolina–Chapel Hill and former Governor of North Carolina

Kati Haycock, President, The Education Trust

Dwight Jones, Commissioner of Education, Colorado Department of Education

Governor Tim Kaine, Virginia

Janet Murguía, President and Chief Executive Officer, National Council of La Raza

Thomas Payzant, Professor of Practice, Harvard Graduate School of Education

Charles B. Reed, Chancellor, California State University

Richard W. Riley, Senior Partner with EducationCounsel LLC, former U.S. Secretary of Education, and former Governor of South Carolina

Andreas Schleicher, Head of the Indicators and Analysis Division, Directorate for Education, Organisation for Economic Co-Operation and Development

William H. Schmidt, University Distinguished Professor, Michigan State University

Vivien Stewart, Vice President for Education, Asia Society

Phillip Uri Treisman, Executive Director, The Charles A. Dana Center at the University of Texas at Austin

Bob Wise, President, Alliance for Excellent Education and former Governor of West Virginia

I. Executive Summary

I. Executive Summary

Around the globe, governments are eagerly comparing their educational outcomes to the best in the world. The goal is not just to see how they rank, but rather to identify and learn from top performers and rapid improvers—from nations and states that offer ideas for boosting their own performance. This process, known as "international benchmarking," has become a critical tool for governments striving to create world-class education systems.

In American education, "benchmarking" often simply means comparing performance outcomes or setting performance targets (or "benchmarks"). But in business and among education leaders in other countries, it means much more. The American Productivity and Quality Center puts it this way: "Benchmarking is the practice of being humble enough to admit that someone else has a better process and wise enough to learn how to match or even surpass them."

Countries and states have good reason to make the effort. Technological, economic, and political trends have combined to increase demand for higher skills while heightening competition for quality jobs. Rule-bound jobs on factory floors and in offices are being automated and outsourced. The world's knowledge-and-innovation economy favors workers who have postsecondary education or training, strong fundamental skills in math and reading, and the ability to solve unfamiliar problems and communicate effectively.

At the same time, new technologies and corporate strategies have opened the global labor market to billions of people from places like Eastern Europe, India, China, and Brazil who had been left out. An increasing variety of work tasks can be digitized and performed nearly anywhere in the world. More jobs are going to the best educated no matter where they live, which means that Americans will face more competition than ever for work.

International trade agreements, such as China's membership in the World Trade Organization in 2001, have hastened this transformation. Since 1980, global trade has grown 2.5 times faster than the global gross domestic product (GDP). Recent estimates put today's world exports at $12.5 trillion, nearly 20 percent of world GDP.

The global economy is here to stay, with recent research suggesting that it is evolving and its impact intensifying at a stunning pace. "Globalization is happening faster than people think," says Vivek Wadhwa, Wertheim Fellow at Harvard Law School's Labor and Worklife program and Duke University Executive in Residence. His recent research shows that companies are no longer just outsourcing production but are farming out *innovation* as well. "Having India and China conduct such sophisticated research and participate in drug discovery was unimaginable even five years ago," he says.

Education is a tremendously important lever for ensuring competitiveness and prosperity in the age of globalization, albeit not the only one. Recent economic studies show that high skills lead to better wages, more equitable distributions of income, and substantial gains in economic productivity. Higher math performance at the end of high school translates into a 12 percent increase in future earnings. If the United States raised students' math and science skills to globally competitive levels over the next two decades, its GDP would be an additional 36 percent higher 75 years from now.

The race is on among nations to create knowledge-fueled innovation economies. In Singapore, Germany, China, Brazil, Korea, and other countries around the world, educational improvement is viewed as a critical part of that mission. Nations and states are therefore working hard to benchmark their education systems to establish a solid foundation for economic development in the 21st century. Some are finding innovative ways to measure their students' progress internationally. Others are examining high-performing and fast-improving nations to learn about best practices that they then adapt or adopt to improve their own systems.

American education has not adequately responded to these new challenges. The United States is falling behind other countries in the resource that matters most in the new global economy: human capital. American 15-year-olds ranked 25th in math and 21st in science achievement on the most recent international assessment conducted in 2006. At the same time, the U.S. ranked high in inequity, with the third largest gap in science scores between students from different socioeconomic groups.

The U.S. is rapidly losing its historic edge in educational attainment as well. As recently as 1995, America still tied for first in college and university graduation rates, but by 2006 had dropped to 14th. That same year it had the second-highest college dropout rate of 27 countries.

State leaders already are deeply engaged in efforts to raise standards, advance teaching quality, and improve low-performing schools. International benchmarking provides an additional tool for making that process more effective, offering insights and ideas that cannot be garnered solely from looking within and across state lines. To that end, the partner organizations and International Benchmarking Advisory Group call on state leaders to take the following actions:

State leaders also should tackle "the equity imperative" by creating strategies for closing the achievement gap between students from different racial and socioeconomic backgrounds in each of the action steps above. Reducing inequality in education is not only socially just, it's essential for ensuring that the United States retain a competitive edge.

Research shows that education systems in the United States tend to give disadvantaged and low-achieving students a watered down curriculum and place them in larger classes taught by less qualified teachers—exactly opposite of the educational practices of high-performing countries.

Action 1: Upgrade state standards by adopting a common core of internationally benchmarked standards in math and language arts for grades K-12 to ensure that students are equipped with the necessary knowledge and skills to be globally competitive.

Action 2: Leverage states' collective influence to ensure that textbooks, digital media, curricula, and assessments are aligned to internationally benchmarked standards and draw on lessons from high-performing nations and states.

Action 3: Revise state policies for recruiting, preparing, developing, and supporting teachers and school leaders to reflect the human capital practices of top-performing nations and states around the world.

Action 4: Hold schools and systems accountable through monitoring, interventions, and support to ensure consistently high performance, drawing upon international best practices.

Action 5: Measure state-level education performance globally by examining student achievement and attainment in an international context to ensure that, over time, students are receiving the education they need to compete in the 21st century economy.

The federal government can play an enabling role as states engage in the critical but challenging work of international benchmarking. First, federal policymakers should offer funds to help underwrite the cost for states to take the five action steps described above. At the same time, policymakers should boost federal research and development (R&D) investments to provide state leaders with more and better information about international best practices, and should help states develop streamlined assessment strategies that facilitate cost-effective international comparisons of student performance.

As states reach important milestones on the way toward building internationally competitive education systems, the federal government should offer a range of tiered incentives to make the next stage of the journey easier, including increased flexibility in the use of federal funds and in meeting federal educational requirements and providing more resources to implement world-class educational best practices. Over the long term, the federal government will need to update laws to align national education policies with lessons learned from state benchmarking efforts and from federally funded research.

Nations around the world are facing a new education imperative, and many are seizing the historical moment to provide their citizens with better opportunities and stronger economies.

America must seize this moment too, with states leading the way. Many states already are working hard to improve standards, teaching quality, and accountability, but policymakers lack a critical tool—international benchmarking.

The U.S. can take pride in many aspects of its education system, from the high performance of its teenagers on international civics tests to the strength of its higher education institutions.

But if state leaders want to ensure that their citizens and their economies remain competitive, they must look beyond America's borders and benchmark their education systems with the best in the world. The state mandate to educate all students remains, but the world that students will enter after school has changed.

For Andreas Schleicher, head of the Indicators and Analysis Division at the Organisation for Economic Co-Operation and Development's Directorate for Education, the case for adopting a global view to improving education is undeniable:

> It is only through such benchmarking that countries can understand relative strengths and weaknesses of their education system and identify best practices and ways forward. The world is indifferent to tradition and past reputations, unforgiving of frailty and ignorant of custom or practice. Success will go to those individuals and countries which are swift to adapt, slow to complain, and open to change.

II. The Need for Action

II. The Need for Action

Around the globe, governments are eagerly comparing their educational outcomes to the best in the world. The goal is not just to see how they rank, but rather to identify and learn from top performers and rapid improvers—from nations and states that offer ideas for boosting their own performance. This process, known as "international benchmarking," has become a critical tool for governments striving to create world-class education systems.

In American education, "benchmarking" often simply means comparing performance outcomes or setting performance targets (or "benchmarks"). But in business and among education leaders in other countries, it means much more: Comparing outcomes to identify top performers or fast improvers, learning how they achieve great results, and applying those lessons to improve one's own performance. The American Productivity and Quality Center puts it this way: "Benchmarking is the practice of being humble enough to admit that someone else has a better process and wise enough to learn how to match or even surpass them."[1]

A Skills-Driven Global Economy

Governments have good reason to benchmark and improve their education systems. Technological, economic, and political trends have increased demand for higher skills while heightening competition for quality jobs. In the U.S., outsourcing and automation have dramatically altered the mix of jobs in the labor force. The proportion of American workers in blue-collar and administrative support jobs plummeted from 56 percent to 39 percent between 1969 and 1999, and the share of jobs requiring more education and specialized skills—work that is managerial, professional, and technical in nature—increased from 23 percent to 33 percent over the same period.[2]

Skill demands *within* jobs are rising as well. A study that analyzed typical tasks in the American workplace found that routine manual and cognitive tasks that follow a set of prescribed rules are rapidly being taken over by computers or workers in other countries. But more sophisticated tasks are on the rise, specifically those that require workers to "bring facts and relationships to bear in problem solving, the ability to judge when one problem-solving strategy is not working and another should be tried, and the ability to engage in complex communication with others," along with "foundational skills" in math and reading.[3]

Technology is changing not just how work gets done, but also where it can be done. Advances in telecommunications allow companies to digitize work tasks and products so that jobs can be performed virtually anywhere in the world. And new management software has enabled firms to shift from "vertical" production—where all tasks are done in sequence in the same place—to "horizontal" production in which tasks are carved up and shipped out to wherever they can be done best and cheapest. The result, according to a blue-ribbon commission report released last year, "is a world in which it is just as easy to create work teams on four continents as it is to create work teams composed of people from four divisions of the same firm located in the same city."[4]

While all these changes took place, political and economic developments opened the doors of this new global economy to more than a billion new workers from Russia, Eastern Europe, China, India, and other developing countries who now compete for jobs with those in developed nations. Harvard economist Richard Freeman calls this "The Great Doubling" of the global workforce. At first, low-skilled, low-paying jobs were outsourced to these workers, but now some higher skilled jobs—from analyzing X-rays to tutoring high school students to preparing tax returns—are migrating abroad, too.[5] The twin forces of globalization and computerization mean that any job reducible to a set of scripted rules is vulnerable to outsourcing or automation.[6]

International trade agreements, such as China's membership in the World Trade Organization in 2001, have sped this transformation along. Although some firms have long had global links, globalization is now pervasive: More nations are joining the marketplace, more goods and services are traded globally, and more of the production process is interconnected in a worldwide supply web. Since 1980, global trade has grown 2.5 times faster than the global gross domestic product (GDP). Recent estimates put today's world exports at $12.5 trillion, nearly 20 percent of world GDP.[7]

Recent research suggests that globalization is not only here to stay, it is evolving and intensifying at a rapid pace. In June, Harvard and Duke University researchers published the first in a series of studies documenting how corporations are no longer just outsourcing production; they are beginning to outsource *innovation* as well. For example, big pharmaceutical companies such as Merck, Eli Lilly, and Johnson & Johnson are relying on India and China not only for manufacturing and clinical trials, but also for advanced research and development. As a result, scientists in those countries are rapidly increasing their ability to innovate and create their own intellectual property; the global share of pharmaceutical patent applications originating in India and China increased fourfold from 1995 to 2006.[8]

"Globalization is happening faster than people think," says Vivek Wadhwa, the researcher and former entrepreneur who led the study. "Having India and China conduct such sophisticated research and participate in drug discovery was unimaginable even five years ago."[9] Wadhwa's team is finding the same kind of rapid change in a wide range of industries—from telecommunications and computer networking to aerospace and computers. Indeed, the National Academy of Engineering recently noted that nearly all of the top 20 U.S.-based semiconductor companies have opened design centers in India, nine of them since 2004.[10] "Our take is that the global technology landscape has changed dramatically over the last decade," says Wadhwa, "and that we're at the beginning of a new wave of globalization."[11]

Education for Economic Growth

As a result of these trends, American workers are competing not only with skilled workers here, but with those living in far-away places. Labor economists Frank Levy and Richard Murnane argue that "over the long run, better education is the best tool we have to prepare the population for a rapidly changing job market."[12] Studies show that higher math performance at the end of high school translates into substantially higher future earnings; an increase of one standard deviation in math scores translates into a 12 percent boost in wages.[13] Family income for households headed by someone with a college degree grew by nearly 40 percent from 1973 to 2006, compared with less than 6 percent for families headed by someone with only a high school diploma.[14]

Fortune may favor the prepared mind, but it also favors the prepared *place*—whether that place is a nation, a region, or an individual state. To lay a solid foundation for widespread economic growth, governments around the world are adopting policies aligned with a 21st century economy that is increasingly knowledge-fueled, innovation-driven, and global in scope. The Organisation for Economic Co-Operation and Development (OECD) estimates that each additional year of schooling among the adult population raises a nation's economic output by between 3 percent and 6 percent.[15] New studies by Stanford economist Eric Hanushek and others have found strong evidence that high skills lead to elevated individual wages, a more equitable distribution of income, and substantial gains in economic productivity.[16]

Indeed, Hanushek estimates that if the U.S. improved enough to become a top-performing nation on international assessments between 2005 and 2025, by 2037 its GDP would be an additional 5 percent higher than if skills stayed the same. Improving human capital pays off even more handsomely over a longer time horizon: By 2080, America's GDP would be *36 percent higher* than would be the case if the U.S. remained mediocre in math and science.[17]

The implications are clear: In today's world, high wages follow high skills, and long-term economic growth increasingly depends on educational excellence. Unfortunately, American education has not adequately responded to these challenges. As other countries seize the opportunity to improve their education systems so their citizens can benefit from new economic opportunities, the United States is rapidly losing its leading edge in the resource that matters most for economic success: human capital.

Four decades ago America had the best high school graduation rate in the world, but by 2006 it had slipped to 18th out of 24 industrialized countries.[18] For most of the 20th century, the U.S. set the standard for quality in higher education—and, in many respects, it still does. But other countries learned from our success and are now catching up or pulling ahead. As recently as 1995 America was still tied for first in the proportion of young adults with a college degree, but by 2000 it had slipped to 9th and by 2006 to 14th—below the OECD average for the first time.[19] According to the latest OECD figures, the U.S. has one of the highest college dropout rates in the industrialized world.[20]

Even if the U.S. improves its high school and postsecondary graduation rates, it will be difficult if not impossible to maintain its historic dominance in the supply of educated workers. Already, America's share of the world's college students has dropped from 30 percent in 1970 to less than half that today.[21] And because of their sheer size, China and India will surpass both Europe and the United States in the number of secondary and postsecondary graduates produced over the next decade.[22] Many experts have concluded that since the U.S. can no longer compete in *quantity* of human capital, it will have to compete in *quality* by providing its young people with the highest level of math, science, reading, and problem-solving skills in the world.

But so far American education has not adequately responded to the skills challenge either. Out of 30 industrialized countries participating in the OECD's Programme for International Student Assessment (PISA) in 2006, the U.S. ranked 25th in math and 21st in science achievement (**Figure 1**). The performance gap between the United States and top-performing nations is huge: American students lag about a full year behind their peers in the countries that perform best in mathematics.[23] Even our "best and brightest" cannot compete with excellent students elsewhere. According to the OECD, "the United States does not just have more students performing badly—it also has many fewer students performing well."[24] America's best math students performed worse than the best math students in 22 other OECD nations. Moreover, only 1.3 percent of U.S. 15-year-olds performed at the highest PISA level in mathematics, while among the top 10 countries the share of high performers was three to seven times as large.[25]

American students seemed to perform better on the most recent Trends in International Mathematics and Science Study (TIMSS), conducted in 2003. For example, fourth-graders scored "above average" in mathematics among participating countries while eighth-graders scored either above average or about average depending on the calculation.[26] However, when compared only with more developed nations that are America's economic competitors, U.S. performance on TIMSS looks more like its performance on PISA. In 2005, the American Institutes for Research (AIR) analyzed a group of industrialized nations participating in both TIMSS and PISA; among that group, U.S. students consistently performed below average across international assessments. "U.S. performance is below the 12-country average at both low- and high-skill levels and low and high-levels of item difficulty."[27]

American students tend to perform better on international assessments of reading than they do in math and science. But U.S. 15-year-olds perform only about average among industrialized countries, and fourth graders' reading scores have stagnated while other countries have made sizeable gains. "Reforms aimed at improving reading achievement seem to have propelled Russia, Hong Kong, and Singapore from middle to top rankings [on the Progress in International Reading Literacy Study (PIRLS)]," *Education Week* reported last year, "even as U.S. performance stood still."[28]

Moreover, a 2003 PISA assessment of students' ability to solve real-world problems found that fewer than half of U.S. 15-year-olds are analytical problem-solvers who can communicate well about solutions. Among 29 industrialized nations, the U.S. had the fifth highest percentage of very weak problem-solvers and the sixth lowest percentage of strong problem-solvers.[29] Such results suggest that U.S. schools not only are failing to provide many students with strong foundational skills in subjects like math and science, but they also are not providing enough students with the broader skills that the modern workplace increasingly demands.

Schools also must find ways to provide students with the "global awareness" that the globalization of work requires.[30] To collaborate on international work teams, manage employees from other cultures and countries, and communicate with colleagues and clients abroad, Americans will need to know and understand much more about the rest of the world than they do now.[31] "A pervasive lack of knowledge about foreign cultures and foreign languages threatens the security of the United States as well as its ability to compete in the global marketplace and [to] produce an informed citizenry," the National Academy of Sciences warned last year.[32]

The Equity Imperative

Some might argue that it is enough to produce the next generation of elite "rocket scientists" who can invent new technologies and spur innovation. There is a widespread belief that providing America's top students with a world-class education is the single most important way to boost economic growth. This notion is often paired with a conviction that focusing on educational equity for all sacrifices excellence for the few who are already advanced. But these are myths. Our national commitment to closing achievement gaps is not only compatible with a global competitiveness agenda, it is essential for realizing that agenda.

Figure 1: U.S. 15-Year-Old Performance Compared with Other Countries

Programme for International Student Assessment (PISA)

Average is measurably higher than the U.S.
Average is measurably lower than the U.S.

Mathematics (2006)			Science (2006)			Reading (2003)			Problem Solving (2003)		
Rank		*Score*	*Rank*		*Score*	*Rank*		*Score*	*Rank*		*Score*
1	Finland	548	1	Finland	563	1	Finland	543	1	Korea	550
2	Korea	547	2	Canada	534	2	Korea	534	2	Finland	548
3	Netherlands	531	3	Japan	531	3	Canada	528	3	Japan	547
4	Switzerland	530	4	New Zealand	530	4	Australia	525	4	New Zealand	533
5	Canada	527	5	Australia	527	5	New Zealand	522	5	Australia	530
6	Japan	523	6	Netherlands	525	6	Ireland	515	6	Canada	529
7	New Zealand	522	7	Korea	522	7	Sweden	514	7	Belgium	525
8	Belgium	520	8	Germany	516	8	Netherlands	513	8	Switzerland	521
9	Australia	520	9	United Kingdom	515	9	Belgium	507	9	Netherlands	520
10	Denmark	513	10	Czech Republic	513	10	Norway	500	10	France	519
11	Czech Republic	510	11	Switzerland	512	11	Switzerland	499	11	Denmark	517
12	Iceland	506	12	Austria	511	12	Japan	498	12	Czech Republic	516
13	Austria	505	13	Belgium	510	13	Poland	497	13	Germany	513
14	Germany	504	14	Ireland	508	14	France	496	14	Sweden	509
15	Sweden	502	15	Hungary	504	15	United States	495	15	Austria	506
16	Ireland	501	16	Sweden	503	16	Denmark	492	16	Iceland	505
17	France	496	17	Poland	498	17	Iceland	492	17	Hungary	501
18	United Kingdom	495	18	Denmark	496	18	Germany	491	18	Ireland	498
19	Poland	495	19	France	495	19	Austria	491	19	Luxembourg	494
20	Slovak Republic	492	20	Iceland	491	20	Czech Republic	489	20	Slovak Republic	492
21	Hungary	491	21	United States	489	21	Hungary	482	21	Norway	490
22	Luxembourg	490	22	Slovak Republic	488	22	Spain	481	22	Poland	487
23	Norway	490	23	Spain	488	23	Luxembourg	479	23	Spain	482
24	Spain	480	24	Norway	487	24	Portugal	478	24	United States	477
25	United States	474	25	Luxembourg	486	25	Italy	476	25	Portugal	470
26	Portugal	466	26	Italy	475	26	Greece	472	26	Italy	469
27	Italy	462	27	Portugal	474	27	Slovak Republic	469	27	Greece	448
28	Greece	459	28	Greece	473	28	Turkey	441	28	Turkey	408
29	Turkey	424	29	Turkey	424	29	Mexico	400	29	Mexico	384
30	Mexico	406	30	Mexico	410						
OECD average		498	*OECD average*		500	*OECD average*		494	*OECD average*		500

Source: Organisation for Economic Co-Operation and Development and U.S. Department of Education.

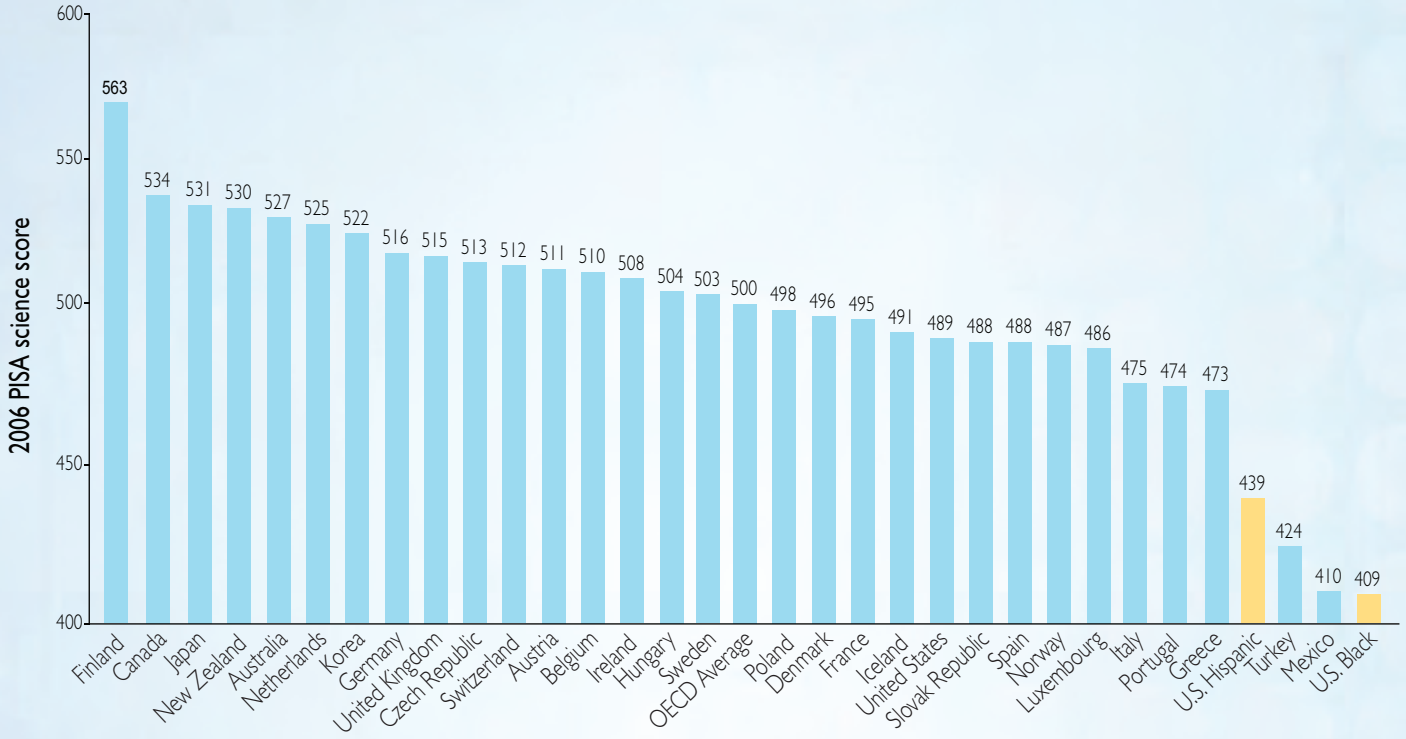
Recent studies offer compelling evidence that educational equity is just as important for economic competitiveness as it is for social justice. Hanushek and colleagues specifically analyzed economic data to answer this question: "Which is more important for growth—having a substantial cadre of high performers or bringing everyone up to a basic level of performance?" They found that to truly maximize growth, it is not enough to produce a high-achieving elite; a nation's economic success also depends on closing achievement gaps to ensure that all students attain a solid foundation of knowledge and skills.[33] Another recent study of 14 developed countries concluded that "increasing the average level of literacy will have a greater effect on growth than increasing the percentage of individuals who achieve high levels of literacy skills."[34]

But the U.S. has a long way to go before it achieves that goal. While American 15-year-olds rank in the *bottom-third* of developed nations in overall performance in math and science, they rank in the *top-third* when it comes to gaps between students from different family backgrounds.[35] In fact, the difference in science scores between students from different socioeconomic backgrounds is bigger in the United States than in almost any other country.[36] Fortunately, international assessments also show that it is possible to realize high average performance alongside more equitable performance. Across several continents, countries like Japan, Korea, Finland, and Canada demonstrate that students from disadvantaged backgrounds need not automatically perform poorly in school.[37]

Learning how some countries achieve performance that is both higher and more equitable has tremendous implications in this country given America's long-term demographic outlook. Demographers now predict that "minorities" will constitute the majority of schoolchildren by 2023 and of working-age Americans by 2039.[38] In 2006, U.S. Hispanic 15-year-olds performed below the average of every OECD country except Turkey and Mexico in science literacy, and black students performed even worse (**Figure 2**).[39] America cannot remain competitive if half of its population graduates from high school so poorly prepared that it is unable to thrive in the global knowledge economy. States that plan to grow their economies *must* find ways to close their achievement gaps.

Of course, some critics of international assessments claim that America's disappointing performance is inevitable precisely because of its demographic challenges. But the data do not support such beliefs: Overall, U.S. 15-year-olds are slightly above the international average when it comes to families' social, economic, and cultural status.[40] The problem is that America's education system does a poor job supporting students and offering equal learning opportunities. According to OECD, in 2006, the U.S. ranked fourth out of 30 countries in the relative *impact* that socioeconomic background had on students' PISA science achievement.[41] Another recent study measuring the impact of family background on TIMSS results found a similar pattern: "The U.S. falls in the top quarter of the most unequal countries."[42]

Figure 2: U.S. Minority Performance Below Averages of Most Industrialized Nations



Source: Baldi, S., Y. Jin., M. Skemer, P.J. Green, and D. Herget. Highlights from PISA 2006: Performance of U.S. 15-Year-Old Students in Science and Mathematics Literacy in an International Context. Washington, DC: U.S. Department of Education, National Center for Education Statistics, December 2007, pp. 6 &15.

Other Countries Pulling Ahead

America's global position is slipping not because U.S. schools are getting worse. Rather, America is losing ground because its educational outcomes have mostly stagnated while those in other countries have surged. Nations that formerly lagged far behind the U.S. have caught up with and in some cases even surpassed it.

Korea, for instance, has gone from well behind to significantly ahead of the United States in high school attainment in just a few generations—an education triumph that has helped fuel the country's tremendous progress (**Figure 3**). In 1960, Mexico's economic productivity was twice as large as Korea's, but by 2003 Korea's GDP was twice as large as Mexico's. According to the World Bank, "the contribution of knowledge … was a key factor in Korea's miracle of rapid economic growth."[43]

Other countries have made rapid strides in building competitive knowledge-and-innovation economies. "At the end of World War II, a single nation stood atop Mount Innovation, and it was the United States," notes former Harvard Business School professor John Kao in his 2007 book *Innovation Nation*. "Now, powerful new climbers have emerged to challenge U.S. supremacy. … Some may be surprising—Brazil, Denmark, Estonia, Finland, New Zealand, Singapore, and Taiwan."[44] *Not* surprisingly, some of those same nations also top the list of countries achieving high performance or seeing big gains on international assessments.

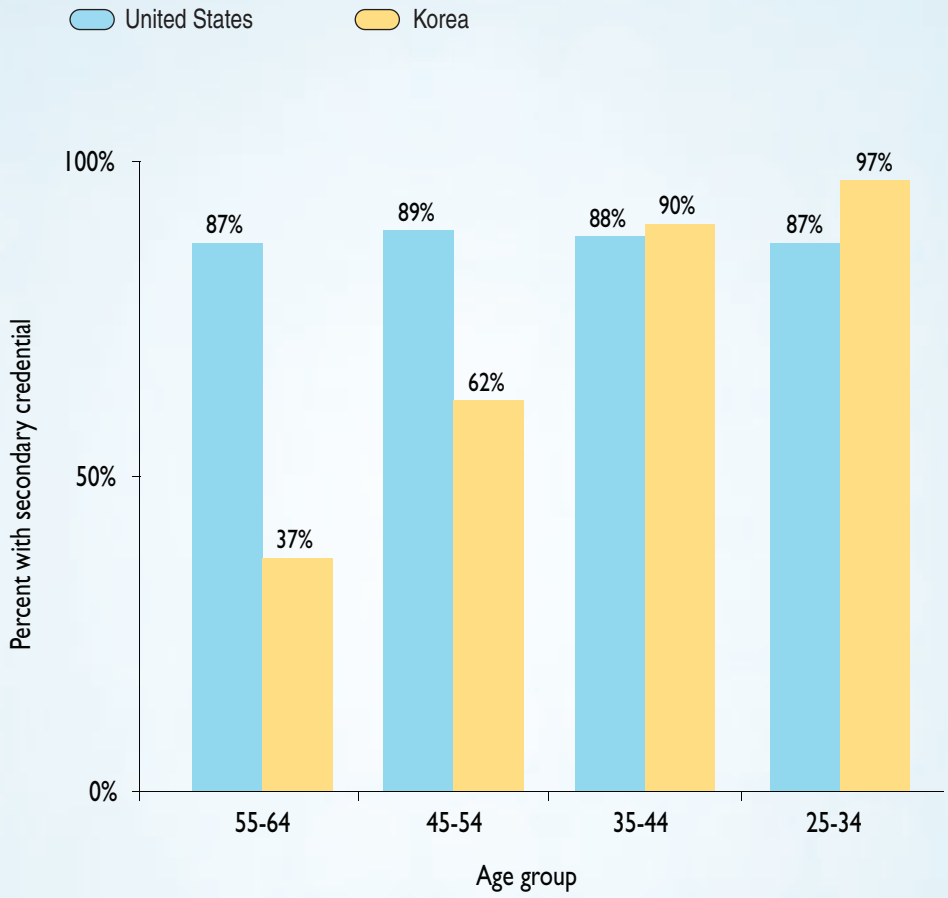
"Young Chinese, Indians, and Poles are not racing us to the bottom," *New York Times* columnist Thomas Friedman observed in 2005. "They do not want to work for us; they don't even want to be us. They want to dominate us—in the sense that they want to be creating the companies of the future …."[45]

These governments are giving their people an edge by making major efforts to improve K-12 education. Between 2000 and 2006, Poland increased its PISA reading achievement by 29 points—almost a year's worth of learning—while decreasing the proportion of achievement variation across schools from 51 percent to 12 percent. Improving average skills while decreasing the achievement gap is no accident: Poland's major education reforms are now bearing fruit.[46]

Some countries are working hard to compare their performance internationally and to use those comparisons to drive improvement. Mexico plans to link its national assessment to PISA and has set presidential targets for 2012 and for 2030. Brazil has benchmarked every secondary school against PISA so that each one receives two scores—one benchmarked to the national metric and one benchmarked to PISA. The goal is to have all Brazilian secondary schools achieving at the international average by 2021. "Instead of spending years complaining that they don't do well, they turned it around to talk about what to do about it and to measure progress," says Andreas Schleicher, head of the Indicators and Analysis Division at OECD's Directorate for Education.[47]

Many nations are going beyond performance to benchmark their policies and practices with the world's top performers—and making major strategic changes as a result. When Germany received disappointing results on the PISA 2000 assessment, leaders commissioned a team of experts from high-performing and innovative countries to investigate best practices and provide advice. In 2003, the German government launched a $4.6 billion package of education reforms, including a program to expand learning time by introducing 10,000 all-day schools across the country.[48] And by 2004, Germany's 16 *Länder* (states) began to adopt common, jointly developed "national education standards"—something that previously had been considered politically daunting if not impossible.[49]

Figure 3: Korea's Education Advancement



Source: Organisation for Economic Co-Operation and Development. Education at a Glance 2008. Paris: OECD, September 2008, p. 43, Table A1.2a.

Germany is not alone in its response to international assessment results. A recent evaluation of the policy impact of PISA found that the assessment has had a major influence on educational policy and practice in many OECD countries, most notably on educational standards and curricula as well as on systems of evaluation and accountability.[50]

Countries have responded to TIMSS and PIRLS results as well. A 2005 study found that 10 out of 18 developing nations had changed their science curricula in response to the TIMSS 1999 results, and eight had changed their math curricula—including "relocating into grade 8 topics that had been taught later."[51] Hong Kong's reading reforms, which boosted its fourth-grade PIRLS achievement from significantly below the U.S. to significantly above it, were enacted in response to disappointing results on the 2001 assessment.[52] Singapore's impressive math and science performance on TIMSS assessment is hardly a mistake; rather, the outcomes resulted from major education reforms the country launched in response to poor performance on the Second International Science Study (a precursor of TIMSS) in the mid-1980s.[53]

Vivien Stewart, vice president of the Asia Society, says she is often impressed by the openness and eagerness of education leaders in other countries to learn from and apply international best practice. "Singapore is currently at the top and China is rapidly improving and India is just beginning to improve, but they are all very interested in using international best practices," she says. "China, before it engages in any reforms, will send teams to examine best practices around the world. Although this is mostly done at the national level, it's increasingly done at the province level too. China is doing this with a vengeance because they traditionally have been cut off from the rest of the world, and they want to catch up quickly. A lot of the Chinese curriculum reforms are based on looking at systems in other parts of the world."[54]

China's educational efforts are well matched with its economic aspirations. In 2006, the country's Eleventh Five-Year-Plan put technological innovation squarely at the center, emphasizing the need to develop a "rich talent base" and calling for the government to "cultivate talents with creativity and completely improve our capacity of self-innovation so top universities in China will become an important force for the establishment of an innovation nation."[55] A July 2008 study found that the University of California, Berkeley had been displaced by not one but two Chinese universities as the top undergraduate feeder institutions for U.S. Ph.D. programs.[56] In addition, while America could once expect talented foreigners studying here to stay and contribute to the U.S. economy after graduation, foreign-born specialists educated in this country are increasingly returning home to take advantage of new economic opportunities in their own countries.

Many other regions and nations are working to benchmark and improve education to attract high-skilled, high-paying jobs. In 2000, the European Union (EU) heads of state adopted the goal of becoming "the most competitive and dynamic knowledge-based economy in the world," encouraging member nations to introduce a host of education and other reforms. Since then, the EU has adopted educational goals that are internationally benchmarked, and publishes an annual report that allows national leaders to compare results within Europe as well as with the U.S. and other countries around the world. The 2008 edition emphasizes the critical role of international benchmarking: "All Member States can learn from the best performers in the Union. … This is why the Council asked for the three best performing countries (leaders) in specific policy areas to be identified."[57]

Such attitudes stand in stark contrast to the United States, which so far has largely ignored the international benchmarking movement in education. "The U.S. education system in general is very introverted," observes Sir Michael Barber, a former top education official in Great Britain who now focuses on international benchmarking at McKinsey and Company, a global management consulting firm.[58] The U.S. participates in far fewer international benchmarking studies than do many other countries, especially compared with those working hardest to improve. In June, a group of governors attending an NGA- and Hunt Institute-sponsored seminar on educational competitiveness learned that the U.S. is the only OECD country with a federal-style education system where most state leaders have no regular and reliable information to compare student performance internationally.

Barber argues that will need to change if the U.S. wants to remain competitive. "All around the world," he says, "governments are seeking insights into how to improve education systems, and many understand that the only way for a country or a state to keep up globally is to look at what's happening with best practice around the world."[59]

Of course, the U.S. education system has strengths as well as weaknesses, and plenty to teach other countries. For example, U.S. ninth-graders scored well above average on the 1999 Civic Education Study, ranking sixth out of 28 countries overall and first in students' ability to critically interpret political information. Moreover, the U.S. was one of only two countries whose students scored above average not only in civics content, but also on measures of positive civic engagement and attitudes.[60] Clearly, educators in emerging democracies can look to the U.S. for lessons in how to prepare students for active civic engagement.

Many countries also find much to admire about America's higher education system and reforms around the globe have been informed by the U.S. "You have created a public-private partnership in tertiary education that is amazingly successful," Singapore's Education Minister Tharman Shanmugaratnam told *Newsweek* in 2006. "The government provides massive funding, and private and public colleges compete, raising everyone's standards." Moreover, some Asian countries have looked to U.S. schools for ideas on how to encourage innovation and risk taking. "America has a culture of learning that challenges conventional wisdom, even if it means challenging authority," says Shanmugaratnam. "These are the areas where Singapore must learn from America."[61]

But the U.S. cannot afford to rest on its past accomplishments. The global knowledge economy is here, and if state leaders want to ensure that their citizens can compete in it, they must seize the initiative, looking beyond America's borders and benchmarking their education systems with the best in the world. The state mandate to educate all students remains, but the world that schools are preparing students for has changed—and will continue to change—dramatically.

OECD's Schleicher says the case for adopting a global perspective on improving education is undeniable:

> It is only through such benchmarking that countries can understand relative strengths and weaknesses of their education system and identify best practices and ways forward. The world is indifferent to tradition and past reputations, unforgiving of frailty and ignorant of custom or practice. Success will go to those individuals and countries which are swift to adapt, slow to complain, and open to change.[62]

Myths and Realities about International Comparisons

Myth: *Other countries test a more select, elite group of students.*

Reality: That might have been true for early international assessments, but it is no longer true today. According to Jim Hull, who examined international assessments for the National School Boards Association, "Since the 1990s, due to better sampling techniques and a move by more countries to universal education, the results represent the performance of the whole student population, including students who attend public, private, and vocational schools, students with special needs, and students who are not native speakers of their nation's language."[63]

While the U.S. still sets a relatively high age for compulsory education among OECD nations, that does not automatically translate into higher rates of school enrollment. U.S. enrollment rates in primary and secondary education are the same as or below those in other industrialized nations. For example, among OECD member nations, the U.S. ranks only 22nd in school enrollment of 5- to 14-year-olds and 23rd in enrollment of 15- to 19-year-olds.[64]

Moreover, on the most recent PISA assessment, OECD member nations on average tested a *higher* proportion of 15-year-olds than did the U.S. (97 percent versus 96 percent of those enrolled in schools, and 89 percent versus 86 percent of the entire 15-year-old population), which refutes the idea that the U.S. was disadvantaged by testing a broader population.[65] While no assessment is perfect, PISA, TIMSS, and PIRLS all have tight quality-control mechanisms, including very strict and transparent guidelines for sampling students and administering assessments. All exclusions must be thoroughly documented and justified, and total exclusions must fall below established thresholds.

Myth: *The U.S. performs poorly because of poverty and other family factors.*

Reality: According to the U.S. Department of Education, the U.S. looks about average compared with other wealthy nations on most measures of family background.[66] Among the OECD's 30 member nations, U.S. 15-year-olds are slightly *above* the international average on a composite index of economic, social, and cultural status (ESCS); only 11 percent of U.S. students fall within the lowest 15 percent of the ESCS internationally.[67] Moreover, America's most affluent 15-year-olds ranked only 23rd in math and 17th in science on the 2006 PISA assessment when compared with affluent students in other industrialized nations.[68] In fact, when the OECD uses statistical methods to estimate how PISA scores would look if the ESCS index were equalized across all countries—a leveling of the playing field—U.S. performance actually looks *worse* rather than better.[69]

This is not to say that demographics are unimportant in American schools: The U.S. ranks high in the impact that family background has on student achievement (fourth out of 30 countries),[70] in part because its education system does a particularly poor job supporting students and equalizing learning opportunities. For example, a 2006 study published in the *European Journal of Political Economy* found that out of 18 developed nations, the U.S. is the only country where weaker students are more likely to be enrolled in larger classes.[71] Another study found that the U.S. has one of the largest gaps in access to qualified teachers between students of high and low socioeconomic status.[72]

Myth: *Cultural factors prevent U.S. students from performing as well as those in other nations, particularly Asian countries.*

Reality: U.S. 15-year-olds reported spending *more* time on self study or homework in science, math, and reading than did students on average across the 30 OECD nations taking the 2006 PISA assessment, including those in Japan and, except for math, in Korea.[73] Moreover, high-performing nations and states can be found all over the world, not just in Asia. For example, the five top-scoring nations in the 2006 PISA science assessment were located on four different continents, reflecting a range of cultures: Europe (Finland), North America (Canada), Asia (Japan), and Oceania (New Zealand and Australia).

Singapore is often singled out for its top performance on the TIMSS math assessment, which some say must be due to an unusually strong work ethic. But that belief was challenged in a 2005 study by the American Institutes for Research (AIR): "Singaporean students are hardworking, but if Singapore's success is attributable only to work ethic, how can we account for the fact that its high achievement is a comparatively recent development? On the Second International Science Study in the mid-1980s, Singaporean fourth graders scored only 13th out of 15 participating nations, and Singaporean eighth graders did no better than their U.S. counterparts …. In response to these poor scores, Singapore's Ministry of Education re-engineered and strengthened the education system, reforming both the science and mathematics curriculum."[74]

Countries such as Finland, Korea, and Hong Kong have achieved major improvements in learning outcomes over time without changing their national cultures. In fact, as recently as the mid-1980s Finnish students performed only about average among OECD nations on tests used at the time.[75] Hong Kong instituted numerous reading reforms that boosted its fourth-graders' performance from significantly below the U.S. in 2001 to significantly above it in 2006.[76]

Of course, cultural attitudes can play a role in achievement. Studies conducted in the 1980s found that mothers and students in some Asian countries were likely to attribute success in math more to effort than to innate ability, while the reverse was true for Americans.[77] But experimental studies have shown that students' beliefs can be changed in ways that positively impact learning; the National Mathematics Panel recommended that such strategies be used more widely in American classrooms.[78]

Myth: *Other countries are less diverse.*

Reality: The U.S. is a diverse nation, but that diversity should not prevent states from improving student achievement. Among the 11 other OECD countries that like the U.S. had more than 10 percent immigrant students, all of them performed higher in math and nine performed higher in science.[79] And Singapore, which scored at the top of the most recent TIMSS math assessment, is not as homogeneous as many assume. According to the 2005 AIR report, "Arguments about Singapore's homogeneity are not persuasive. ... Singapore has three major ethnic groups. About three-fourths of Singapore's population is Chinese, but almost a quarter is Malay or Indian. Like the United States, Singapore experienced serious ethnic strife in the 1960s."[80]

Cultural homogeneity has been cited as a factor in Finland's high achievement in that it lends itself to a great deal of agreement about education and education reform. But Finland's success also is attributable to very different educational policies and practices in areas like teacher recruitment and student support.[81]

Myth: *Wealthier countries spend more than the U.S. on education.*

Reality: The U.S. is wealthier and spends more on education than most other countries. Among the OECD's 30 member nations, the U.S. ranks highest in GDP per capita and second highest in educational expenditures.[82] A report on the U.S. economy published by OECD last year observed, "On average, and relative to other OECD countries, U.S. students come from well-educated, wealthy families and … go to schools that are unusually well-financed. Given any of these factors, U.S. students might be expected to be among the world leaders."[83] However, while the U.S. ranks high in education spending, it ranks only near the middle of OECD nations in its "effort" to fund education when expenditures are compared with wealth (gross national product).[84]

Myth: *U.S. attainment rates cannot be compared with other countries' because the U.S. tries to educate many more students.*

Reality: The U.S. does rank higher than average on access to higher education, but that does not explain its very low college-completion rates. While America's entry rate for four-year and advanced postsecondary programs exceeds the OECD average by 10 percentage points (64 percent to 54 percent), its college "survival rate" trails the OECD average by 17 points (54 percent to 71 percent).[85] According to OECD, "Comparatively high drop out rates in the United States are [negatively] contributing to the United States' relative standing against other countries" in educational attainment.[86]

Myth: *Education does not really affect the economy anyway.* A Nation at Risk *warned that America's economy would suffer, but that never happened.*

Reality: While *A Nation at Risk* erred in linking the recession of the early 1980s to educational stagnation (other factors such as the business cycle are more important over the short term), the report was correct that improving education is critical to America's economic competitiveness. New research based on extensive data from many countries over several decades confirms that cognitive skills as measured by international tests strongly influence long-term economic growth.[87]

Other factors matter too, of course. In fact, America's historic advantages in other areas have made up for its students' mediocre skills and allowed the U.S. to grow its economy without significantly improving its schools. First, the sheer size of the U.S. and its much earlier investment in mass secondary and postsecondary education gave it a significant numerical advantage in human capital. Second, its open and agile economy, flexible labor markets, and intellectual property protections enabled industry to make better use of the human capital available.[88]

But those historic advantages are eroding as other countries imitate the U.S. example. America already has lost its lead in educational attainment, and many countries are instituting economic reforms. "Eventually, our competitors will narrow our economic lead as they learn how to create their own versions of agility and scale," says economist Anthony Carnevale. "At that point, the competition will really come down to who has the best human capital."[89]

III. Five Steps Toward Building Globally Competitive Education Systems

III. Five Steps Toward Building Globally Competitive Education Systems

States have both the authority and the responsibility to provide students with a high-quality education, and state leaders *already* are deeply engaged in efforts to raise standards, improve teaching quality, and help low-performing schools and students improve. For example, 34 states now belong to the American Diploma Project Network, an initiative dedicated to making sure that every high school graduate is prepared for college or work. In those states, governors, state superintendents of education, business executives, and college leaders are working to improve high school standards, assessments, and curricula by aligning expectations with the demands of postsecondary education and work.

International benchmarking provides an additional tool for making every state's existing education policy and improvement process more effective, offering insights and ideas that cannot be garnered by examining educational practices only within U.S. borders. State leaders can use benchmarking to augment their "database of policy options" by adding strategies suggested by international best practice to the range of ideas already under consideration. Indeed, international benchmarking should not be a stand-alone project, but rather should function as a critical and well-integrated component of the regular policy planning process.

The following action steps were carefully chosen to help states focus their efforts on the policy areas that have both a high impact on student performance and also a high potential for best practice learning—in other words, where existing research has shown significant differences in how high-performing nations or states organize education compared with traditional approaches in most U.S. states. However, this should not be viewed as a static checklist. Benchmarking is a process of discovery as well as adaptation, and state leaders should keep an open mind as they collect information on practices abroad to expand their policy toolkits.

For example, action steps two through four address the major elements of what can be thought of as the "instructional delivery system"—the people, tools, and processes that translate educational expectations into teaching and, ultimately, into learning for students. Other countries have shown that all of these elements can be tightly aligned and focused through systematic reform, so they should not be considered in isolation. And because benchmarking is meant to broaden the policy lens, revealing lessons that might not be apparent in a limited state or national context, state leaders should be attuned to all the ways that other nations are delivering instruction more efficiently and effectively—from educational technology to school finance to governance.

Finally, higher education leaders should be asked to join international benchmarking efforts as full participants so existing initiatives are better coordinated with pre–K-12 and higher education policies through P-16 councils and other mechanisms. For example, higher education plays a key role in the recruitment and training of teachers and an increasingly important role in ensuring that high school graduation standards reflect college- and career-readiness requirements. Partnering with higher education also will facilitate a robust discussion about college graduation rates, which are very low in the United States and have contributed to the erosion of America's preeminence in higher education. Since the responsibility probably lies both with K-12 preparation and with higher education practice, leaders from both sectors should work together to ensure that attainment rates are internationally competitive.

The Action Steps

Action 1: *Upgrade state standards by adopting a common core of internationally benchmarked standards in math and language arts for grades K-12 to ensure that students are equipped with the necessary knowledge and skills to be globally competitive.*

Research has revealed striking similarities among the math and science standards in top-performing nations, along with stark differences between those world-class expectations and the standards adopted by most U.S. states. According to Bill Schmidt, a Michigan State University researcher and expert on international benchmarking, standards in the best-performing nations share the following three characteristics that are not commonly found in U.S. standards:

Focus. World-class content standards cover a smaller number of topics in greater depth at every grade level, enabling teachers to spend more time on each topic so that all students learn it well before they advance to more difficult content. In contrast, state content standards in the U.S. typically cover a large number of topics in each grade level—even first and second grade. U.S. schools therefore end up using curricula that are "a mile wide and an inch deep."

Rigor. By the eighth grade, students in top-performing nations are studying algebra and geometry, while in the U.S., most eighth-grade math courses focus on arithmetic. In science, American eighth-graders are memorizing the parts of the eye, while students in top-performing nations are learning about how the eye actually works by capturing photons that are translated into images by the brain.[90] In fact, the curriculum studied by the typical American eighth-grader is two full years behind the curriculum being studied by eighth-graders in high-performing countries.[91]

Coherence. Math and science standards in top-performing countries lay out an orderly progression of topics that follow the logic of the discipline, allowing thorough and deep coverage of content. In contrast, standards in many U.S. states resemble an arbitrary "laundry list" of topics, resulting in too much repetition across grades. "In the United States the principle that seems to guide our curriculum development is that you teach everything everywhere," says Michigan researcher Schmidt, "because then somehow somebody will learn something somewhere."[92]

To upgrade state standards, leaders will be able to leverage the Common State Standards Initiative, an upcoming joint project of NGA, CCSSO, Achieve, the Alliance for Excellent Education, and the James B. Hunt, Jr. Institute for Educational Leadership and Policy. The initiative will enable all states to adopt coherent and rigorous standards in K-12 math, reading, and language arts that are fully aligned with college and career expectations and also internationally benchmarked against leading nations. Achieve is developing an important tool for the initiative: a set of voluntary, globally competitive reference standards based on the existing American Diploma Project (ADP) framework. Because of how it was originally developed, the ADP framework *already* reflects the skills necessary to succeed in college and in well-paying jobs in today's labor market. Achieve is now working to further calibrate the framework to reflect international expectations as well as recent research on college and career readiness.

A key goal of the initiative will be to ensure that standards reflect all three of the critical dimensions exemplified by high-performing nations—not only rigor but also focus and coherence. In a study published last year, Schmidt and a colleague found that trying to cover too many topics per grade clearly has a negative influence on student learning, even when the order of topics is otherwise coherent. At the eighth-grade level, the researchers found "a decrease of fifty in the number of intended topics and grade combinations would predict an increase in achievement of almost three-fourths of a standard deviation. … The amount of 'clutter' created by covering too many topics … must be kept small."[93] Therefore, the internationally benchmarked common core of standards should not be seen as an addition to existing standards, but rather the foundation for states to establish rigorous standards that also are fewer and clearer (**Figure 4**).

Figure 4: Mathematics Topics in Content Standards of 21 States

Topic	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8
Whole number meaning	●	●	●	●	⊙	○		
Whole number operations	●	●	●	●	⊙	○		
Measurement units	⊙	●	●	⊙	●	●	●	⊙
Common fractions	○	⊙	⊙	⊙	●	⊙	○	○
Equations and formulas	○	○	⊙	⊙	⊙	●	●	●
Data representation and analysis	●	●	●	●	●	●	●	⊙
2-D geometry: basics	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
Polygons and circles	●	●	●	●	●	●	●	⊙
Perimeter, area and volume		○	○	○	⊙	●	●	⊙
Rounding and significant figures								
Estimating computations	○	○	⊙	⊙	⊙	⊙	⊙	⊙
Properties of whole number operations	○	○	○	○				
Estimating quantity and size			○					
Decimal fractions			○	⊙	⊙	⊙	○	○
Relationship of common and decimal fractions				○	○	○		
Properties of common and decimal fractions								
Percentages					○	⊙	⊙	○
Proportionality concepts						⊙	○	
Proportionality problems						⊙	⊙	⊙
2-D coordinate geometry			○	⊙	○	○	○	⊙
Geometry: transformations	⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
Negative numbers, integers, and their properties						○	⊙	○
Number theory					⊙	○	○	○
Exponents, roots and radicals						○	○	●
Exponents and orders of magnitude							○	○
Measurement estimation and errors	○	○	⊙	○	⊙	⊙	⊙	○
Constructions w/ straightedge/ruler and compass								
3-D geometry	●	●	●	⊙	●	⊙	●	⊙
Congruence and similarity					○	⊙	⊙	○
Rational numbers and their properties						⊙	⊙	○
Patterns, relations, and functions	⊙	●	●	●	⊙	●	●	●
Slope and trigonometry								

○ Intended by 67 percent of the 21 states
⊙ Intended by 83 percent of the 21 states
● Intended by *all* of the 21 states

Bold yellow line shows content coherence typical of top-performing countries

Source: Schmidt, W.H., C.H. Wang, and C.C. McKnight. Curriculum Coherence: An Examination of U.S. Mathematics and Science Content Standards from an International Perspective. Journal of Curriculum Studies 37, no. 5, 2005, pp. 525-559. (p. 541, Figure 4)

Action 2: *Leverage states' collective influence to ensure that textbooks, digital media, curricula, and assessments are aligned to internationally benchmarked standards and draw on lessons from high-performing nations and states.*

Research shows that top-performing countries support rigorous, coherent standards with a wide range of tightly aligned instructional tools—from assessments to classroom curriculum materials. In the U.S., while each state retains its own authority to make decisions in those areas, states can more efficiently reflect international best practice by working cooperatively on ways to upgrade those elements of their standards-based education systems.

Assessment offers a good example. Top-performing countries administer assessments that are more rigorous and better aligned with standards than the tests U.S. students typically take. For example, AIR found that Singapore's math assessments expect greater rigor and depth in mathematical knowledge; to test that knowledge, they employ fewer multiple choice questions and more problems that require multistep solutions and finding unknowns. In fact, Singapore's sixth-grade assessment proved more challenging than the eighth-grade math tests given in seven states as well as the eighth-grade National Assessment of Educational Progress.[94]

Such assessments typically are more expensive to develop and administer than the multiple-choice exams commonly used in the U.S. However, states can save time and money by sharing resources and expertise to develop high-quality voluntary assessments or a common pool of assessment items. That kind of collective effort also can ensure the availability of voluntary assessments or assessment items that are aligned with the internationally benchmarked standards to be developed through the Common State Standards Initiative.

The same is true when it comes to the components of the curriculum. Schmidt and colleagues found that the coherence typical of math standards in high-performing countries "is translated into textbooks, workbooks, diagnostic tests for teacher use, and other classroom materials that enable teachers to bring the curriculum into the classroom in a relatively consistent, effective way. In turn, the curriculum serves as an important basis for the nation's preservice teacher education and for ongoing professional development."[95]

While textbooks are only one of many kinds of instructional tools, they usefully illustrate the power of state collaboration to address international best practice. Researchers have found that U.S. textbooks, compared with those used in high-performing countries, are less aligned with standards and much less focused and coherent in the topics they cover. "If you look at U.S. textbooks," Schmidt and colleagues observe, "you'll find there is no textbook in the world that has as many topics as our mathematics textbooks, bar none."[96] For example, common elementary math textbooks in the U.S. cover almost twice as many topics per grade as do Singapore's. As a result, math textbooks in Singapore expect students to complete about one thorough lesson on a single topic per week, while U.S. students are expected to complete about one lesson on a narrowly focused topic each day.[97]

The problem is not simply a lack of focus and coherence in individual state standards, but also a lack of agreement *across* state standards. Publishers of math textbooks market them nationally by cramming them with enough topics to cover states' widely divergent standards. The Common State Standards Initiative partly solves this problem by providing a more focused and coherent set of expectations around which to develop textbooks and digital media. By working in concert to address concerns about length, focus, and coherence with commercial publishers, states can ensure that new expectations for textbooks, digital media, and other instructional materials are being addressed by the industry.

Finally, states can pool resources to develop entirely new tools, such as replacement units or diagnostic assessments that align with internationally benchmarked standards. In doing so, leaders should collaborate to ensure that curriculum supports take advantage of the newest technologies, including multimedia strategies, to support instruction. Harvard Business School professor Clayton Christensen predicts that by 2019 half of all high school courses will be delivered online.[98] Some research indicates that countries are pursuing a wide range of strategies and goals to encourage the use of computers and information technology for instruction, suggesting that there might be much to learn in this area from international benchmarking.[99]

Action 3: *Revise state policies for recruiting, preparing, developing, and supporting teachers and school leaders to reflect the human capital practices of top-performing nations and states around the world.*

Beyond establishing world-class educational standards, high-performing nations also adopt policies to ensure that students receive the best instruction possible. Recent studies have identified major differences in how top-performers and fast-improvers recruit, train, and support their teachers and school leaders compared with the policies in place in most U.S. states. Tackling these challenges can yield big dividends. Studies by U.S. researchers have found that assigning students to strong teachers for three years in a row can boost their test scores by as much as 50 percentile points above what they would gain with three ineffective teachers in a row.[100]

According to a study by Sir Michael Barber and Mona Mourshed of McKinsey and Company, the best-performing nations begin by recruiting top talent to the teaching profession: Korea recruits from the top 5 percent of graduates, Finland the top 10 percent, and Singapore the top 30 percent. The McKinsey researchers found that some countries accomplish this by setting a high initial bar and limiting access to teacher training to prevent an oversupply of candidates—especially weak ones—which, along with other strategies, raises the status of the profession and aids in recruitment.[101] "Finns have come to cherish good educators as Texans do ace quarterbacks," Kao writes in *Innovation Nation*.[102]

In contrast, the U.S. teacher pipeline seems to discourage individuals with competitive academic skills from entering and remaining in the profession. College students with high SAT and ACT scores are less likely to train to become teachers, less likely to take a teaching job, and less likely to stay in the classroom after a few years.[103] The likelihood that a highly talented female in the top 10 percent of her graduating class would become a teacher shrank by half, from about 20 percent to about 10 percent, between 1964 and 2000.[104]

Top-performing nations and provinces also use a range of strategies to provide teachers with excellent training and ongoing professional development—both of which are mostly mediocre in the United States. An international study released last year by the International Association for the Evaluation of Educational Achievement (IEA) and Michigan State University found that college students preparing to be teachers have weaker knowledge of mathematics and take less rigorous math courses than those in other countries. "What's most disturbing is that one of the areas in which U.S. future teachers tend to do the worst is algebra, and algebra is the heart of middle school math," say Bill Schmidt, who directed the study.[105]

Top-performing nations are going well beyond recruitment and initial training to build a 21st century teaching force, however. According to Schleicher and Stewart, "These countries are abandoning the traditional factory model, with teachers at the bottom of the production line receiving orders from on high, to move toward a professionalized model of teachers as knowledge workers. In this model, teachers are on a par with other professionals in terms of diagnosing problems and applying evidence-based practices and strategies to address the diversity in students' interests and abilities."[106] Such countries recognize that quality of classroom instruction is the most critical element of any education system, and they work to build cultures that combine high expectations with strong support and empowerment of teachers.

However, bolstering teacher professionalism does not mean asking teachers to create everything from scratch. Korea's Institute for Curriculum and Evaluation operates a Teaching and Learning Center that offers information about the national curriculum; promotes aligned instructional practices; and provides educators with a wide range of teaching materials, guidelines, and assessment tools.[107] The New Zealand Ministry of Education has supported development of tools for formative assessment, including Assessment Tools for Teaching and Learning, which can be used to assess literacy and numeracy of upper elementary and lower secondary students, as well as national curriculum exemplars in all subject areas. Teachers use the tools to evaluate the impact of instruction on student learning and adjust teaching to better meet students' needs.[108]

Based on conversations with many local educators across the United States, Education Trust President Kati Haycock underscores that benchmarking efforts should consider the immediate concerns of classroom teachers: "What do the leading countries do with children who arrive behind? What is international best practice for improving the performance of language minorities? How do teachers differentiate instruction without losing sight of rigorous standards?"[109] Since educators ultimately will be responsible for ensuring that students meet the new globally competitive standards, policymakers should take care to incorporate such questions into their benchmarking research.

Top nations and states also focus on developing excellent school leaders and charge principals with ensuring that teachers provide consistently high-quality instruction. The state of Victoria in southeastern Australia recently implemented an intensive strategy to improve educational leadership that has been dubbed "cutting edge" by international experts. The strategy is closely aligned with the state's comprehensive effort to improve schools and includes a rigorous principal selection process; mentoring programs for new principals and a coaching program for experienced ones; a "balanced scorecard" approach to principal performance management; an accelerated program for high-potential leaders; and a program to develop high-performing principals. The government has established 19 separate leadership-development opportunities, each firmly rooted in research and best practice (**Figure 5**).[110]

Singapore's approach to developing leaders is widely admired too. Singapore screens prospective school leaders using a rigorous process and then provides a six-month training program run by the National Institute of Education. The program includes management and leadership courses from leading executive training programs; one day per week spent in schools to come up with innovative solutions to practical problems; group projects; two-week overseas placements with major corporations; and rigorous evaluation.[111] Great Britain recently revamped its national approach to developing principals based on a careful study of that model.[112]

Sir Michael Barber emphasizes that there are important lessons for improving teaching and leadership that can be adapted and applied across nations—and vigorous policy efforts can result in rapid improvements. When the British government surveyed adults aged 24 to 35 in the year 2000 about switching jobs, teaching ranked 92nd out of 150 career choices. But in a follow-up survey conducted in 2005, after improvements to teacher training coupled with a vigorous marketing campaign, teaching came out on top.[113] "Our benchmarking suggests that the same broad policies are effective in different systems irrespective of the cultural context in which they are applied," Barber and Mourshed conclude in their report.[114] U.S. state leaders could learn much from such examples; particularly during the current economic downturn, there might be many adults with strong content backgrounds who could be induced to switch to a career in teaching.

In the U.S., costs related to human capital account for the vast majority of education spending. The goal for international benchmarking should be to ensure the most effective and efficient use of funds for preparation, recruitment, training, ongoing development, and support. This will require a careful examination of how higher education institutions and systems in top-performing countries are structured to encourage young people to enter the teaching field and prepare them to become quality instructors at the elementary and secondary level.

Figure 5: Leadership Development Opportunities in Victoria, Australia

Name of Programme	Open to	Description	Aspirant leaders	Assistant principals	Principals
Master in School Leadership	All after 5 years teaching	Taught modules, in-school elements and mentoring or shadowing; 2 years	√	√	√
Building capacity for improvement	Teams of teachers	Briefing, residential and day workshops, coaching support and feedback; 1 year	√	√	√
Building the capacity of school leadership teams	School leadership teams	Three-day residential, action research in school, 3 coaching sessions, follow-up workshop; 1 year	√	√	√
Leading across effective small schools	Small school teams	Three 1-day forums, action learning project, Web-based support, mentor with small school experience; 1 year	√	√	√
Leading in effective schools (strategic planning)	High potential leaders	Briefing, preparatory activities and 360-degree feedback, two workshops, 4 coaching sessions and ongoing e-mail contact; 1 year	√	√	
Preparing for leadership	Experienced teachers	Two-day conference, four-day workshops, background reading, pre- & post-programme 360-degree feedback, school based project, shadowing; 1 year	√		
Leading for student learning	Expert teachers	Five days workshops, reading and data collection, 360-degree feedback, peer learning groups; 1 year	√		
Leading professional learning	Professional development coordinators	One year part-time programme	√	√	
Scholarships for postgraduate study	Postgraduate teachers	Range of postgraduate courses	√	√	
Eleanor Davies school leadership programme	Female leading teachers / APs	Five months including mentoring, reading, seminars, school based project	√	√	
Leaders in the making	Assistant principals	One year with workshops and strategic planning project	√	√	
Stepping up to the principalship	Assistant principals	One year, including data-collection, workshop, shadowing, reviews		√	
Educational leadership: shaping pedagogy	APs and principals	One year, including preparation, intensive workshop, review, feedback, action planning		√	√
Human leadership: developing people	APs and principals	One year, development and implementation of a professional learning plan		√	√
Technical leadership: thinking and planning strategically	APs and principals	One year, including strategic planning project		√	√
Mentoring for first time principals	First time principals	One year			√
Coaching to enhance the capabilities of experienced principals	Experienced principals	One year with assigned coach			√
Development programme for high performing principals	Principals	Over a two-year period including contribution to system development and individual professional development			√
Building the capacity of the principals of small schools	Principals of small schools	One year			√
Teachers professional leave	All teachers	30 days	√		

Source: Matthews, P., H. Moorman, and D. Nusche. In Pont, B., D. Nusche, and D. Hopkins (Eds.), Improving School Leadership, Volume 2: Case Studies on System Leadership. Organisation for Economic Co-Operation and Development, Paris: OECD, 2008, pp. 179–213. (p. 196, Box 7.5)

Action 4: *Hold schools and systems accountable through monitoring, interventions, and support to ensure consistently high performance, drawing upon international best practices.*

Top-performing nations exhibit a wide range of different approaches to the functions commonly defined in the U.S. under the rubric of "accountability." But recent research suggests that such nations share several key strategic priorities and employ a broader range of tools for managing those priorities than is evident in this country.

First, most high-performing nations use multiple mechanisms to monitor school performance, including annual student assessments in key grades and whole-school reviews or "inspections." Such inspections evaluate the performance of a school against a broad set of criteria, including, but not limited to, student achievement and also examine the school *practices* that contribute to student results. Inspections take many different forms in different countries, including annual reviews conducted by an external agency; annual self evaluations complemented by an external review every few years; and self reviews coupled with external reviews on a much more occasional basis, often initiated by schools themselves.[115] New York City recently adopted a system of school inspections based on the British model.[116]

One advantage of such an approach is that leaders can more precisely diagnose the root causes of underperformance and, consequently, better match interventions with specific needs. According to a benchmarking report commissioned by Achieve for the state of Ohio, the British system "takes account of each school's day-to-day working and its capacity for change. … When [the Office for Standards in Education] finds poor student outcomes and poor quality leadership, for instance, it calls for stronger measures than it would for a school with bad test scores but competent leadership."[117]

Second, some top-performing countries have adopted policies to ensure that every student succeeds by monitoring students' progress and intervening to prevent them from falling too far behind. In Finland, every school employs "special education teachers" who receive additional training to provide individual or small-group support to students who need it, mainly in Finnish language arts and mathematics. On average, about 30 percent of students receive such additional help every year, sometimes even the best students. The goal is to identify any student who is having difficulty at a particular point in time and get that student caught up and able to handle a rigorous classroom curriculum.[118]

In Singapore, schools use a national examination to identify upper elementary grade students who are having difficulty in math. Those students then receive special instruction based on an adapted curriculum framework taught by trained Mathematics Support Teachers. Importantly, they also receive about 30 percent *more* math instruction than their peers so that they can cover the same rigorous content, only at a slower pace.[119]

According to Schleicher and Stewart, many of the countries that perform well on PISA have established strong norms and mechanisms to support students. Teachers in such countries "don't have the option of making students repeat the school year—retention is not permitted—or transferring students to schools with lower performance requirements," they say. "Even where retention or transfers are technically possible, incentive structures for teachers and schools encourage teachers to address and solve challenges rather than hand them to others."[120]

Moreover, a thoughtful approach to accountability can help ensure that students experience a curriculum consistent with state standards and also that academic expectations do not vary too much across schools and classrooms. Even though Finland has an educational culture that greatly values the autonomy granted to local educators, its government recently tightened the national core curriculum after evaluations revealed too many gaps between students' classroom grades and their assessment results. "Another reason for the new approach is the fact that students use their final school reports in basic education when applying to upper secondary education institutions," says Reijo Laukkanen of the Finnish National Board of Education. "Thus, the new rules also safeguard the equality of students."[121]

Finally, top-performing nations balance accountability with greater school autonomy. A number of studies based on PISA, TIMSS, and PIRLS have found that students perform better in systems that give schools greater freedom to hire and reward teachers, purchase supplies and make other school-specific budget allocations, and choose curriculum materials and teaching methods.[122] Those studies also show that decentralization works best when it is combined with various forms of accountability. According to one team of researchers, the positive impact of school autonomy coupled with choice and accountability amounts to more than one-and-a-half grade-level equivalents on the PISA assessment.[123]

In general, however, there is still much to learn about forms of accountability in other nations. One area that states might examine closely as part of their benchmarking work is how other nations use assessment for accountability. What kinds of assessments do they administer in which grades and subjects? What content and skills do those tests measure? What kinds of questions do they use—multiple choice or more open-ended problems? How are assessments scored? And how are the results published and used for accountability purposes?

Action 5: *Measure state-level education performance globally by examining student achievement and attainment in an international context to ensure that, over time, students are receiving the education they need to compete in the 21st century economy.*

As states establish world-class standards and adopt other policies based on international best practice, leaders will want information on whether students are benefiting from the changes and are meeting higher expectations. "States are no longer competing with just the states next door but with countries around the world," argues Vivien Stewart. "Their students are competing with students in Singapore, Shanghai, and Salzburg; it's important to have a sense of whether they are being prepared to thrive in a global, knowledge-based economy."[124] Over time such data also can help prevent newly upgraded, internationally benchmarked state standards from slipping back below globally competitive levels.

In most industrialized countries with a federal-style education system, state leaders already have access to that kind of information because most take part in PISA at state levels and some also participate in TIMSS. In the U.S., governors and chief state school officers would welcome the opportunity to compare student performance internationally. However, state leaders are concerned about the number of tests students already are required to take for various purposes as well as the costs of administering additional assessments. Currently the U.S. is characterized by an overly cumbersome and fragmented testing system in which the federal government, states, districts, and schools together administer many different assessments to meet a wide variety of purposes.

Therefore, states can best address this action step through cooperative action to find a streamlined and cost-effective solution for generating international student achievement comparisons. Since all states already are required to participate in the National Assessment of Educational Progress (NAEP), leaders can use their collective leverage to work with the National Assessment Governing Board (NAGB) to explore the feasibility of upgrading NAEP to yield results that are comparable with existing international assessments such as TIMSS, PIRLS, and PISA. The strategy should permit states to secure representative school-level samples to analyze the relationship between school-level practices and student achievement, which in turn would enable leaders to craft policies promoting more widespread use of effective practices.

Adapting NAEP to yield internationally comparable results will be easier to accomplish in the case of TIMSS and PIRLS. TIMSS is more closely aligned with NAEP, and they both assess students in math and science in grades four and eight. Similarly, PIRLS tests students in reading in grade four, though a recent U.S. Department of Education study found that PIRLS incorporates easier reading passages than NAEP while also assessing some kinds of reading tasks that NAEP does not.[125]

Since PISA assesses 15-year-olds in participating nations, NAGB would need to explore how to adjust NAEP samples to include a comparable group of young people, as well as how to incorporate the more open-ended assessment items that characterize PISA. (PISA relies on "constructed response" items over multiple choice questions by a margin of two to one, while the reverse is true for TIMSS and NAEP.[126]) However, many consider PISA to be an important complement to TIMSS and PIRLS because, while the majority of countries participating in TIMSS are low-

and middle-income countries, PISA focuses on the lead industrialized countries that are the main economic competitors of the United States (**Appendix A, pg. 41**). In addition, PISA assesses students near the end of compulsory education on whether they can *apply* what they have learned in math, science, and reading to solve real-world problems.

Governors, chief state school officers, and other leaders also should work to develop assessments that indicate whether students are on track for college readiness. The best example of such an initiative is California's Early Assessment Program (EAP), a collaborative effort among the California State Board of Education, the California Department of Education, and California State University (CSU). EAP allows students to take an additional component of the Grade 11 California Standards Test in reading and mathematics. The results provide an "early warning" that signals the student's college-readiness status; students who meet the benchmark are exempt from having to take the CSU placement test, which is normally given to students after they enroll.[127] Fourteen states in the American Diploma Project Network are developing a common end-of-course exam for Algebra II that is intended to serve the same purpose.

Of course, each state has the authority to make its own decisions regarding assessment and leaders always can choose to administer one or more of the existing international tests. For many policymakers, the most significant difference between TIMSS and PISA is in the type of content and skills each assesses. According to an analysis by the U.S. Department of Education, "TIMSS and NAEP appear to have the most in common, with a focus on material that is more likely to be taught through the school curriculum than PISA, which is more situation and phenomena-based. … TIMSS and PISA differ in a number of respects, including a greater focus on factual knowledge in mathematics and science in TIMSS than in PISA, and a greater focus on problem solving and the critical evaluation of information in PISA than in TIMSS. Moreover, PISA has a greater focus on data analysis, statistics and probability in mathematics than either TIMSS or NAEP [**Table 1**]."[128]

Some U.S. states already have participated in the TIMSS assessment, including Massachusetts and Minnesota in 2007. The IEA and the U.S. Department of Education are working to develop cost models for various levels of state participation in the next administrations of TIMSS and PIRLS in 2011. While no U.S. state has yet participated in PISA, most federal education systems around the world—including Australia, Belgium, Canada, Germany, Italy, Mexico, Spain, Switzerland, and the United Kingdom—have worked with OECD to report PISA results for states or provinces. Across OECD nations, state-level results are generated using a variety of strategies, offering U.S. states several proven models to consider.

A few nations and states have experimented with approaches that do not require students to take the full international assessment every few years. One option is to embed a selection of PISA or TIMSS items into existing state assessments. Another is to generate a statistical "link" using NAEP tests that can then be used to estimate state PISA or TIMSS performance. Such options are less expensive, and in practice are less burdensome on schools that must administer the tests, but what they save in dollars, time, and effort, they sacrifice in depth of data, since policymakers will not be able to dig beneath overall averages.

In addition to achievement, state leaders should gather information to compare educational *attainment* with top-performing and fast-improving nations, starting with indicators published by the OECD in its annual *Education at a Glance* report. Many of the raw data necessary are already collected by federal statistical agencies. For the OECD's 2008 report, the United States provided comparable data on the following key indicators:

- Percentage of 25- to 34-year-olds who have attained at least a high school degree;
- Percentage of 25- to 34-year-olds who have attained a postsecondary degree;
- Upper secondary graduation rate;
- Postsecondary entry rate;
- Postsecondary graduation and completion rates; and
- Number of postsecondary science degree holders per 100,000 employed among 25- to 34-year-olds.

Finally, state leaders should create an explicit plan to ensure that their investment yields more than a new set of numbers—including a strategy for communicating the results; a strategy for analyzing the results to dig beneath averages and identify significant patterns, strengths, and weaknesses; and the designation

Table 1. The Three Major International Assessments

	PISA	TIMSS	PIRLS
Sponsor	Organisation for Economic Co-Operation and Development	International Association for the Evaluation of Educational Achievement	International Association for the Evaluation of Educational Achievement
Grades or ages tested	15-year-olds	Fourth and eighth graders	Fourth graders
Subjects tested	Math, science, and reading every three years; special problem solving assessment in 2003	Math and science	Reading
Content tested	Ability to apply math, science, and reading to solve real-world problems	Attainment of knowledge and skills in math and science curriculum	Reading comprehension skills
Testing cycle	Every 3 years	Every 4 years	Every 5 years
Last administration	2006	2007	2006
Next administration	2009	2011	2011
Cost for state participation	2009: $250,000 to $550,000 depending on level of participation	2007: $600,000 for full participation including *both* 4th and 8th grades, or $350,000 for a full sample in just one grade 2011: To be determined	2011: To be determined
Type of test questions	About two-thirds constructed response and one-third multiple choice	About one-third constructed response and two-thirds multiple choice	About one-half constructed response and one-half multiple choice
Sub-topics for which scores are reported	**Math (2003):** Quantity; space and shape; change and relationships; uncertainty **Science (2006):** Overall knowledge; knowledge about earth and space; knowledge about living systems; knowledge about physical systems; identifying scientific issues; explaining phenomena scientifically; using scientific evidence **Reading (2000):** Retrieving information; interpreting texts; reflection and evaluation	**Math:** Grade 4–Number; patterns and relationships; measurement; geometry; data. Grade 8–Number; algebra; measurement; geometry; data **Science:** Grade 4–Life science; physical science; earth science. Grade 8–Life science; chemistry; physics; earth science; environmental science	Reading for literary purposes; reading for informational purposes; retrieving and straightforward inferencing; interpreting, integrating, and evaluating
Technical alignment with NAEP: Can scores be equated to NAEP?	Little alignment; not enough to crosswalk scales and scores	Significant alignment; enough for some researchers to crosswalk scales and scores*	Unknown
Nations participating	*Please refer to Appendix A for a complete list of countries participating in each.*		

* See for example Phillips, G.W. (2007). *Chance Favors the Prepared Mind: Mathematics and Science Indicators for Comparing States and Nations.* Washington, DC: American Institutes for Research.

of an agency or agencies responsible for collecting additional information and making recommendations for improvement.

Addressing the Equity Imperative

Rather than addressing equity as an isolated action step, state leaders should approach it as an overarching or "interdisciplinary" imperative as they tackle each of the action areas described above. Recent research shows that other nations arrange their education systems more equitably. For example, the U.S. falls short across the following dimensions:

- An opportunity gap in access to qualified teachers that is among the largest in the world;[129]
- The only country where lower performing students and children with less-educated parents are likely to be taught in *larger* classes;[130] and
- Math teachers less likely than those in high-performing countries to include conceptual strategies along with basic computation for low-achieving students.[131]

In other words, education systems in the United States tend to give disadvantaged and low-achieving students a watered down curriculum in larger classes taught by less qualified teachers—*exactly the opposite of what high-performing countries do.*

States could greatly improve their repertoire of policy strategies for promoting academic equity by examining specific strategies in other countries. Korea, for example, has two major policies for encouraging more equal access to qualified teachers. First, teachers are rotated within districts on a regular basis every five years. Second, the government offers educators a wide range of attractive incentives to teach in remote areas and regions with disadvantaged populations, including smaller class size, less in-class teaching time, salary stipends, the chance to choose the next school placement, and a competitive advantage when seeking administrative positions.[132]

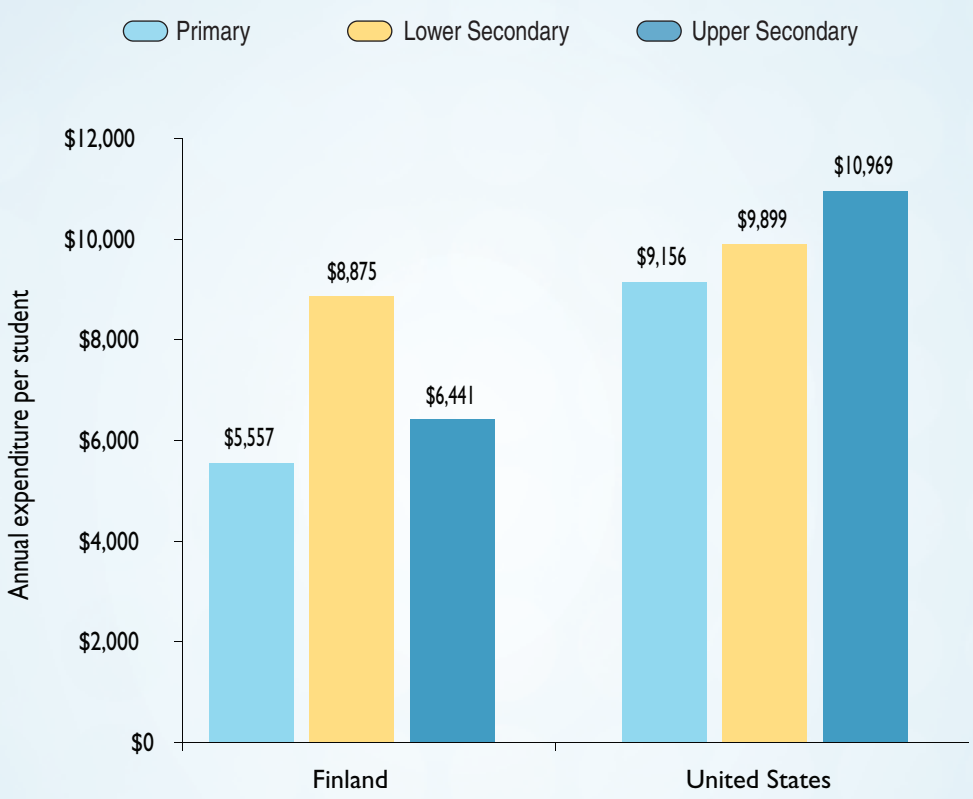
Many high-performing countries also provide intensive, targeted academic supports to students, such as the Finnish and Singaporean intervention strategies described above. The Finnish example is particularly interesting in that it is one of four overlapping "layers" of intensifying interventions for students who fall behind. The first line of attack is formed by regular classroom teachers who receive intensive training to deal with diverse learning challenges through teacher preparation internships, which might deal with "students performing at different levels to the special needs of immigrant children to more difficult cases of fetal alcohol syndrome or attention deficit hyperactivity disorder."[133]

The second line of attack is made up of classroom teaching aides who often work with individuals or small groups of students, followed by the highly trained "special education" teachers described above. Finally, students whose lack of progress is due to family or social difficulties outside of school can be referred to "multi-disciplinary teams."[134] According to a recent case study by the OECD, "Overall, these approaches to minimizing the number of students falling behind display two features: intensification (providing more time by more instructors) and alternative approaches (rather than 'more of the same') ... But they do so in consistent ways, working with the classroom teacher on the specific subjects students are having trouble with, rather than relying on a grab bag of after-school programs and tutoring efforts randomly distributed by grade levels and subjects."[135]

Such supports continue through lower secondary education, including a "class teacher" who follows a particular group of students for three years to monitor individual progress.[136] Indeed, when Finland ended early tracking of students and moved toward a more equitable system in the 1980s, leaders realized that lower secondary education would be a problem spot in the pipeline where vulnerable students might fall off track, so they specifically targeted greater funding toward the lower secondary grades—and continue to do so today (**Figure 6**).[137]

Some would argue that the U.S. cannot learn from Finland because it is a more equitable country socially and economically. However, it is telling that Finland's commitment to equity does not stop at the schoolhouse door; rather, the education system itself has been carefully constructed to maximize equity and ensure consistently high levels of performance for all students. According to an OECD report on educational equity best practices published last year, "Many countries could usefully follow the successful Finnish approach to learning difficulties, offering a sequence of intensifying interventions which draw back into the mainstream those who fall behind."[138]

Figure 6: Finland Targets Funds Toward Lower Secondary Where Needs Are Greatest



Source: Organisation for Economic Co-Operation and Development. Education at a Glance 2008. Paris: OECD, September 2008, p. 219, Table B1.1a. Figures represent annual expenditure on educational institutions per full-time equivalent students for all services in 2005, in equivalent U.S. dollars converted using purchasing power parity for gross domestic product.

IV. The Federal Role

IV. The Federal Role

If benchmarking were only about measuring and comparing outcomes, the federal government might be able to play a leading role. However, because benchmarking is also—and most critically—about improving policy, states must take the lead. States have primary authority over the policy areas that other nations are most eager to benchmark and improve: standards, assessments, curriculum, and the education workforce. States already have led in raising standards, with 16 having adopted a common core of college- and career-ready expectations in math and reading for high school graduation.

The United States is not alone in this regard. Countries such as Canada, Australia, Germany, and Spain have federal-style education systems where states retain a great deal of authority over education. And in many of those countries, states are taking a leading role in benchmarking educational performance and policies. For example, the public outcry over mediocre results on the 2000 PISA assessment led to a historic new partnership between Germany's federal government and its 16 *Länder* (states), with the *Länder* taking responsibility for the establishment of shared education standards and assessments for schools across the nation while the federal government provided support for those and other state reforms.

America can learn from that example, too: While states must take the lead, the federal government can help. And the federal government can do that best by playing an *enabling* role grounded in a new vision for the historic state–federal partnership in education—one that is *less* restrictive and mandate-driven and *more* encouraging of innovation. As states take on the important work of benchmarking their education systems to the best in the world, the federal government can assist states in specific ways at each stage of the journey:

- As soon as possible, the federal government should offer new funding or allow existing funds to be used to help underwrite the cost for states to take the five action steps described above related to standards and assessment, curriculum, human capital, and accountability.
- At the same time, the federal government should increase its own investment or focus existing resources toward better research and development in this area to provide state leaders with more and better information about tools for benchmarking and international best practice in education. For example, the U.S. Department of Education should:
  1) Support efforts to collect and share international achievement and attainment data relevant to states; help state leaders identify good comparison nations or provinces for benchmarking; and collect and disseminate information about best practices of high-performing and fast-improving nations and provinces around the world; and
  2) Convene a technical advisory committee on assessment to make recommendations for generating internationally benchmarked results by state without adding significantly to costs and testing time. The committee should disseminate useful technical information about existing assessments, share policy options for improving and streamlining state assessment systems, and review the feasibility of adapting NAEP to generate international comparisons as described above.
- As states reach important milestones on the way toward building internationally competitive education systems, the federal government should offer a range of tiered incentives to make the next stage of the journey easier. With accountability at the core for greater results, such incentives could include:
  1) Increased flexibility in the use of federal funds;
  2) Increased flexibility in meeting requirements of existing federal education laws so that states are not thwarted in their efforts to adapt and adopt international best practices; and
  3) Additional funds to help states implement world-class practices.
- Over the *long term*, the federal government should change existing federal laws to align national education policies with the lessons learned from state benchmarking efforts and from federally funded research.

Over time, the combination of better information, additional support, and more flexibility for innovation would greatly accelerate state progress in developing and implementing world-class education systems. And that, in turn, will benefit all Americans, safeguarding U.S. economic security and ensuring continued prosperity in the new global economy.

V. Conclusion

V. Conclusion

Other nations have benefited from America's historic example by expanding educational opportunities for their own citizens. Now it is time for U.S. leaders to ensure that Americans develop the skills they need to compete—and help the U.S. remain competitive—in a rapidly changing world.

The federal government can help, but states must lead. They must look beyond their borders and America's shores to fully understand how to benchmark expectations for student learning. They must significantly broaden the policy lens by drawing lessons from the highest performing, most equitable, and fastest advancing nations and states around the globe and adapting the very best educational practices to incorporate here at home.

If states in other countries can shape the response to the global education imperative, states in America must do so as well. And state leaders have both the authority and an obligation to ensure that students attend globally competitive schools and school districts. America cannot maintain its place in the world—economically, socially, or culturally—unless all of its students gain the skills that allow them to compete on a global scale. The United States will only achieve true international competitiveness when state education policies and institutions are restructured to meet 21st century realities.

Appendix A: Countries Participating in International Assessments

Appendix A: Countries Participating in International Assessments

Table reflects the most recent test year for which participation information is available.

	PISA 2009	TIMSS 2007 4th	TIMSS 2007 8th	PIRLS 2006
Africa				
Algeria		X	X	
Botswana			X	
Djibouti		X		
Egypt			X	
Ghana			X	
Morocco		X	X	X
South Africa			X	X
Tunisia	X	X	X	
Asia				
Azerbaijan	X			
Bahrain			X	
Chinese Taipei	X	X	X	X
Dubai (UAE)	X			
Hong Kong SAR	X	X	X	X
Indonesia	X		X	X
Iran, Islamic Republic		X	X	X
Israel	X		X	X
Japan	X	X	X	
Jordan	X		X	
Kazakhstan	X			
Korea, Republic of	X		X	
Kuwait		X	X	X
Kyrgyzstan	X			
Lebanon			X	
Macao-China	X			
Malaysia			X	
Mongolia		X	X	
Oman			X	
Palestinian Authority			X	
Qatar	X	X	X	X
Saudi Arabia			X	
Shanghai (China)	X			
Singapore	X	X	X	X
Syria			X	
Thailand	X		X	
Turkey	X		X	
Uzbekistan			X	
Yemen		X		
South America				
Argentina	X			
Brazil	X			
Chile	X			
Colombia	X	X	X	
Dominican Republic	X			
Panama	X			
Peru	X			
Trinidad and Tobago	X			
Uruguay	X			
Oceania				
Australia	X	X	X	
New Zealand	X	X		X

	PISA 2009	TIMSS 2007 4th	TIMSS 2007 8th	PIRLS 2006
Europe				
Albania	X			
Armenia		X	X	
Austria	X	X		X
Belgium	X			X
Bosnia & Herc			X	
Bulgaria	X		X	X
Croatia	X			
Cyprus		X	X	
Czech Republic	X	X	X	
Denmark	X	X		X
England	X	X	X	X
Estonia	X			
Finland	X			
France	X			X
Georgia			X	X
Germany	X	X		X
Greece	X			
Hungary	X	X		X
Iceland	X			X
Ireland	X			
Italy	X	X	X	X
Latvia	X		X	X
Liechtenstein	X			
Lithuania	X	X	X	X
Luxembourg	X			X
Macedonia, Republic of				X
Malta		X		
Moldova, Republic of	X	X	X	X
Montenegro, Republic of	X			
Netherlands, The	X	X		X
Norway	X	X	X	X
Poland	X			X
Portugal	X			
Romania	X		X	X
Russian Federation	X	X	X	X
Scotland	X	X	X	X
Serbia, Republic of	X		X	
Slovak Republic	X	X		X
Slovenia	X	X	X	X
Spain	X		Basque	X
Sweden	X	X	X	X
Switzerland	X			
Ukraine		X	X	
North America				
Belize				
Canada	X	X	X	X
El Salvador		X	X	
Honduras		X	X	
Mexico	X			
Trinidad and Tobago				X
United States	X	X	X	X
Totals	*68*	*40*	*55*	*40*

Source: National Center for Education Statistics and Organisation for Economic Co-Operation and Development.

Endnotes

1 Webb, R. Benchmarking Definitions. *APQC's Benchmarking Blog*, February 3, 2006, http://apqcbenchmarking.blogspot.com/2006_02_01_archive.html.

2 Levy, F., and R. J. Murnane. *The New Division of Labor: How Computers Are Creating the Next Job Market*. Princeton, NJ: Princeton University Press, 2004, pp. 39–44.

3 Ibid, p. 6. The analysis in question could not directly measure task changes within jobs, only changes related to the shifting mix of jobs, so it actually underestimated the extent to which skill demands are increasing across the economy.

4 National Center on Education and the Economy. *Tough Choices for Tough Times: The Report of the New Commission on the Skills of the American Workforce*. Washington, DC: National Center on Education and the Economy, 2007, p. 19.

5 Friedman, T. L. *The World Is Flat*. Farrar, Straus & Giroux, New York, 2005.

6 Levy, F., and R. J. Murnane. How Computerized Work and Globalization Shape Human Skill Demands. In Suarez-Orozco, M. M. (Ed.), *Learning in the Global Era: International Perspectives on Globalization and Education*. Berkeley, CA: University of California Press, 2007.

7 National Governors Association. *Innovation America: A Final Report*. Washington, DC: National Governors Association, 2007, p. 2.

8 Wadhwa, V., B. Rissing, G. Gereffi, J. Trumpbour, and P. Engardio. *The Globalization of Innovation: Pharmaceuticals*. Kansas City, MO: The Ewing Marion Kauffman Foundation, June 2008, p. 11.

9 Ewing Marion Kauffman Foundation. "Innovation Is Rapidly Globalizing: India and China Are Becoming Centers of Pharmaceutical R&D Says Kauffman Foundation Study," news release, June 11, 2008, Kansas City, MO.

10 National Academy of Engineering Committee on the Offshoring of Engineering. *The Offshoring of Engineering: Facts, Unknowns, and Potential Implications (Free Executive Summary)*. Washington, DC: National Academies Press, Washington, DC, 2008, p. 1. Available at: http://www.nap.edu/catalog/12067.html.

11 Wadhwa, V. Losing Our Lead in Innovative R&D. *Business Week*, June 10, 2008. Available at: http://www.businessweek.com/technology/content/jun2008/tc20080610_151383.htm.

12 Levy, F., and R. J. Murnane. *The New Division of Labor*, p. 155.

13 In these studies, "high math performance" is defined as a one standard deviation increase in scores on standardized assessments. Hanushek, E. A., and L. Woessmann. The Role of Cognitive Skills in Economic Development. *Journal of Economic Literature* 46, no. 3, September 2008, pp. 607–68 (p. 617).

14 Mortenson, T. Average Family Income by Educational Attainment of Householder 1967 to 2006. *Postsecondary Education OPPORTUNITY*, no. 185, November 2007, pp. 14–16 (p. 15).

15 Organisation for Economic Co-Operation and Development. *Education at a Glance: OECD Indicators 2006*. Paris: OCED, 2006, p. 154.

16 Hanushek and Woessmann. *The Role of Cognitive Skills in Economic Development*, p. 657.

17 Ibid, 648–50.

18 Organisation for Economic Co-Operation and Development. *Education at a Glance 2008*. Paris: OECD, September 2008, p. 65, Table A2.1.

19 Ibid, p. 87, Table A3.2.

20 Ibid, p. 98, Table A4.1.

21 Freeman, R. B. *Does Globalization of the Scientific/Engineering Workforce Threaten U.S. Economic Leadership?* Cambridge, MA: National Bureau for Economic Research, June 2005, p. 4.

22 Schleicher, A., and V. Stewart. Learning from World-Class Schools. *Educational Leadership* 66, no. 2, October 2008, pp. 44–51 (p. 50, Figure 2: Graduation Projections).

23 Organisation for Economic Co-Operation and Development. *Economic Survey of the United States 2007*. Paris: OECD, May 2007, p. 100.

24 Ibid, p. 115.

25 Organisation for Economic Co-Operation and Development. *PISA 2006 Volume 2: Data*. Paris, December 2007 (p. 230, Table 6.2c and p. 227, Table 62a). "Best" math students are defined as those performing at the 95th percentile of the performance distribution in each country. "Performed worse" is defined as lower mean achievement based on statistically significant difference at 95 percent confidence level.

26 Eighth-graders scored above average when the average is calculated as the mean score across participating countries. However, a reanalysis by the co-directors of the TIMSS and PIRLS International Study Center, which oversaw the assessment, revealed that "using an approach dependent on participating countries has caused the international average to shift with each assessment." Based on a scale that is stable over time, American eighth-graders performed "about the same as the TIMSS scale average." See Mullis, I. V. S., and M. O. Martin (2007). TIMSS in Perspective: Lessons Learned from IEA's Four Decades of International Mathematics Assessments. In Loveless, T. (Ed.), *Lessons Learned: What International Assessments Tell Us About Math Achievement*. Washington, DC: Brookings Institution Press, 2007, pp. 9–36.

27 Ginsburg, A., G. Cooke, S. Leinwand, J. Noell, and E. Pollack. *Reassessing U.S. International Mathematics Performance: New Findings from the 2003 TIMSS and PISA*. Washington, DC: American Institutes for Research, November 2005, pp. iv–v.

28 Manzo, K. K. (2007, December 5). America idles on international reading test. *Education Week, 27*(14), p. 11.

29 Organisation for Economic Co-Operation and Development. *Problem Solving for Tomorrow's World: First Measures of Cross-Curricular Competencies from PISA 2003*. Paris, OECD, 2004, p. 144, Table 2.1.

30 Stewart, V. Becoming Citizens of the World. *Educational Leadership* 64, no. 7, April 2007, pp. 8–14.

31 Committee for Economic Development. *Education for Global Leadership: The Importance of International Studies and Foreign Language Education for U.S. Economic and National Security*. Washington, DC: Committee for Economic Development, 2006, pp. 1–2.

32 National Academy of Sciences Committee to Review the Title VI and Fulbright-Hays International Education Programs. *International Education and Foreign Languages: Keys to Securing America's Future (Free Executive Summary)*. Washington, DC: National Academies Press, 2007, p. 1.

33 Hanushek, E. A., D. T. Jamison, E. A. Jamison, and L. Woessmann. Education and Economic Growth. *Education Next* 8, no. 2, Spring 2008, pp. 62–70 (pp. 68–69).

34 Coulombe, S., and J. F. Tremblay. Literacy and Growth. *Topics in Macroeconomics* 6, no. 2, 2006: article 4, p. 23.

35 Organisation for Economic Co-Operation and Development. *PISA 2006 Volume 1: Analysis*. Paris: OECD, December 2007, p. 58, Figure 2.11c; and p. 318, Figure 6.20b.

36 Schleicher, A., and V. Stewart. Learning from World-Class Schools, p. 47.

37 Ibid, p. 48.

38 Roberts, S. In a Generation, Minorities May Be the U.S. Majority. *New York Times*, April 14, 2008.

39 Baldi, S., Y. Jin, M. Skemer, P. J. Green, and D. Herget. *Highlights from PISA 2006: Performance of U.S. 15-Year-Old Students in Science and Mathematics Literacy in an International Context*. Washington, DC: U.S. Department of Education, National Center for Education Statistics, December 2007, pp. 6, 15.

40 Organisation for Economic Co-Operation and Development. *PISA 2006 Volume 2: Data*. Paris: OECD, December 2007, p. 45, Table 2.6.

41 Organisation for Economic Co-Operation and Development. *PISA 2006 Volume 1: Analysis*. Paris: OECD, December 2007, p. 184, Figure 4.6.

42 Schutz, G., H. W. Ursprung, and L. Woessmann. Education Policy and Equality of Opportunity. *KYKLOS* 61, no. 2, pp. 279-308 (p. 292).

43 The World Bank. *Korea as a Knowledge Economy: Evolutionary Process and Lessons Learned (overview of report)*. Washington, DC: World Bank, 2006, p. 1.

44 Kao, J. *Innovation Nation: How America Is Losing Its Innovation Edge, Why It Matters, and What We Can Do to Get It Back*. New York: Simon & Shuster, 2007, p. 53.

45 Friedman, T. L. *The World Is Flat*. New York: Farrar, Straus & Giroux, 2005, p. 256.

46 Viadero, D. PISA Results Scoured for Secrets to Better Science Scores. *Education Week* 27, no. 17, Jan. 9, 2008, p. 10.

47 Personal interview with Andreas Schleicher in Washington, DC, June 24, 2008.

48 Deutsche Welle. Germany Moves to All-Day Schools. May 12, 2003. Available at: http://www.dw-world.de/dw/article/0,2144,864144,00.html.

49 Ertl, H. Educational Standards and the Changing Discourse on Education: The Reception and Consequences of the PISA Study in Germany. *Oxford Review of Education* 32, no. 5, November 2006, pp. 619–634.

50 Organisation for Economic Co-Operation and Development. *External Evaluation of the Policy Impact of PISA*. Paris: OECD, 2008.

51 Elley, W. B. How TIMSS-R Contributed to Education in Eighteen Developing Countries. *Prospects* 35, no. 2, June 2005, pp. 199–212 (p. 203).

52 Hegarty, S. F. *Statement by Dr. Seamus F. Hegarty, Chairperson, International Association for the Evaluation of Educational Achievement (IEA): Why PIRLS Is Important*. TIMSS & PIRLS International Study Center, Boston College, Nov. 28, 2007, p. 2.

53 Ginsburg, A., G. Cooke, S. Leinwand, J. Noell, and E. Pollack. *Reassessing U.S. International Mathematics Performance: New Findings from the 2003 TIMSS and PISA*. Washington, DC: American Institutes for Research, November 2005, p. 8.

54 Telephone interview with Vivien Stewart, June 20, 2008.

55 DeHann, R. L., and K. M. V. Narayan. *Education for Innovation: Implications for India, China, and America*. Rotterdam, The Netherlands: Sense Publishers, 2008, p. 3.

56 Mervis, J. Top Ph.D. Feeder Schools Are Now Chinese. *Science* 321, no. 5886, July 2008, p. 185.

57 Commission of the European Communities. *Progress Towards the Lisbon Objectives in Education and Training: Indicators and Benchmarks 2008*. Brussels, Belgium: Commission of the European Communities, 2008.

58 Telephone interview with Sir Michael Barber, June 23, 2008.

59 Ibid.

60 Torney-Purta, J., R. Lehmann, H. Oswald, and W. Schulz. *Citizenship and Education in Twenty-Eight Countries: Civic Knowledge and Engagement at Age Fourteen*. Amsterdam, The Netherlands: International Association for the Evaluation of Educational Achievement, 2001, pp. 7, 15.

61 Zakaria, F. We All Have a Lot to Learn. *Newsweek*, Jan. 9, 2006. Available at: http://www.newsweek.com/id/47366.

62 Organisation for Economic Co-Operation and Development. *Education at a Glance: OECD Indicators 2006*. Paris: OECD, 2008, p. 18.

63 Hull, J. *International Assessments and Student Achievement: Archived Chat*. Available at: http://www.centerforpubliceducation.org/site/c.kjJXJ5MPIwE/b.2481343/k.F068/Archived_chat_International_assessments_and_student_achievement.htm.

64 Organisation for Economic Co-Operation and Development. *Education at a Glance 2008*. Paris: OECD, 2008, p. 343, Table C2.1 and p. 345, Table C2.3.

65 Schleicher, A. *Benchmarking Internationally: The Need Confronts Reality.* Presentation at the ECS National Forum on Education Policy in Austin, Texas, July 2, 2008 (slide 26). PowerPoint slides available at http://www.ecs.org/html/meetingsEvents/NF2008/NF2008_resources.asp.

66 National Center for Education Statistics. *Variation in the Relationship Between Nonschool Factors and Student Achievement on International Assessments*. Washington, DC: U.S. Department of Education, April 2006. The United States had a higher than average rate on only one characteristic studied—the proportion of students in single-parent families.

67 Organisation for Economic Co-Operation and Development. *PISA 2006 Volume 1: Analysis*. Paris: OECD, December 2007, p. 184, Figure 4.6, column 4.

68 Organisation for Economic Co-Operation and Development. *PISA 2006 Volume 2: Data,* Paris: OECD, December 2007, p. 157, Table 4.11. Affluent students are defined as those in the top quarter of their respective countries on an OECD composite index of economic, social, and cultural status.

69 Ibid, p. 184, Figure 4.6, column 1.

70 Organisation for Economic Co-Operation and Development. *PISA 2006 Volume 1: Analysis*. Paris: OECD, December 2007, p. 184, Figure 4.6, column 3. The impact refers to 2006 PISA science scores. Researchers have found that the United States ranks high on impact of social background on TIMSS scores as well. See, for example, Schutz, G., H. W. Ursprung, and L. Woessmann. Education Policy and Equality of Opportunity, p. 292.

71 West, M. R., and L. Woessmann. Which School Systems Sort Weaker Students into Smaller Classes? International Evidence. *European Journal of Political Economy* 22, no. 4, 2006, pp. 944–68.

72 Akiba, M., G. K. LeTendre, and J. P. Scribner. Teacher Quality, Opportunity Gap, and National Achievement in 46 Countries. *Educational Researcher* 36, no. 7, October 2007, pp. 369–87.

73 Organisation for Economic Co-Operation and Development. *PISA 2006 Volume 2: Data*. Paris: OECD, December 2007, pp. 191–93, Table 5.17.

74 Ginsburg, A., S. Leinwand, T. Anstrom, E. Pollock, and E. Witt. *What the United States Can Learn from Singapore's World-Class Mathematics System*. Washington, DC: American Institutes for Research, January 2005, p. 8.

75 Schleicher, A. *The Economics of Knowledge: Why Education Is Key for Europe's Success*. Brussels, Belgium: The Lisbon Council, 2006, p. 9.

76 Hegarty, S. F. *Statement by Dr. Seamus F. Hegarty,* p. 2.

77 Stevenson, H., and J. Stigler. *The Learning Gap*. New York: Summit Books, 1992.

78 National Mathematics Advisory Panel. *The Final Report of the National Mathematics Advisory Panel*. Washington, DC: U.S. Department of Education, March 2008, p. 31.

79 Organisation for Economic Co-Operation and Development. *PISA 2006 Volume 2: Data*. Paris: OECD, December 2007, p. 114, Table 4.2c.

80 Ginsburg, A., S. Leinwand, T. Anstrom, and E. Pollock. *What the United States Can Learn from Singapore's World-Class Mathematics System,* p. 8.

81 Välijärvi, J., P. Kupari, P. Linnakylä, P. Reinikainen, S. Sulkunen, J. Törnroos, and I. Arffman. The Finnish Success in PISA – And Some Reasons Behind It 2. Finland: Institute for Educational Research, University of Jyväskylä, 2007.

82 Organisation for Economic Co-Operation and Development. *PISA 2006 Volume 2: Data*. Paris: OECD, December 2007, p. 45, Table 2.6.

83 Organisation for Economic Co-Operation and Development. *Economic Survey of the United States 2007*. Paris: OECD, May 2007, pp. 100–101.

84 Organisation for Economic Co-Operation and Development. *Education at a Glance 2008*. Paris: OECD, 2008, p. 223, Table B1.4.

85 Organisation for Economic Co-Operation and Development. *Education at a Glance 2007*. Paris: OECD, September 2007, p. 294, Table C2.4 and p. 72, Table A3.6.

86 Organisation for Economic Co-Operation and Development. *Education at a Glance 2006: OECD Briefing Note for the United States*. Paris: OECD, September 2006, p. 3.

87 For the most recent overview of such research, see Hanushek, E. A., and L. Woessmann. The Role of Cognitive Skills in Economic Development.

88 Carnevale, A. P. Education and the Economy: If We're So Dumb, Why Are We So Rich? *Education Week* 24, no. 21, February 2, 2005, pp. 40-41, 52.

89 Ibid, p. 41.

90 Schmidt, W. Comments during panel discussion at the Hunt Institute and National Governors Association Governors Education Symposium. Cary, North Carolina, June 9, 2008.

91 Schmidt, W. The Role of Curriculum. *American Educator* 23, no. 4, Fall 2005. Available at: http://www.aft.org/pubsreports/american_educator/issues/fall2005/schmidt.htm.

92 Schmidt, W. Comments during panel discussion at the Hunt Institute and National Governors Association Governors Education Symposium.

93 Schmidt, W., and R. T. Houang. Lack of Focus in the Mathematics Curriculum: Symptom or Cause? In *Lessons Learned: What International Tests Tell Us about Math Achievement* (T. Loveless, ed.), Washington, DC: Brookings Institution Press, 2007, pp. 65–84 (pp. 77–78).

94 Ginsburg, A., S. Leinwand, T. Anstrom, and E. Pollock. *What the United States Can Learn from Singapore's World-Class Mathematics System*.

95 Schmidt, W., R. Houang, and L. Cogan. A Coherent Curriculum: The Case of Mathematics. *American Educator* 26, no. 2, Summer 2002, pp. 10–26, 47 (p. 19).

96 Ibid, p. 12. The finding is based on an examination of textbooks in 37 countries.

97 Ginsburg, A., S. Leinwand, T. Anstrom, and E. Pollock. *What the United States Can Learn from Singapore's World-Class Mathematics System*, pp. 41–42.

98 Christensen, C. M., and M. B. Horn. How Do We Transform Our Schools? *Education Next* 8, no. 3, Summer 2008, pp. 13–19.

99 Wagemaker, H. *Highlights of Findings from Major International Study on Pedagogy and ICT Use in Schools*. 2006. Available at: http://www.utdanningsdirektoratet.no/upload/Forskning/Internasjonale_undersokelser/sites2006_presentasjon.pdf.

100 Haycock, K. Good Teaching Matters: How Well-Qualified Teachers Can Close the Gap. *Thinking K-16* 3, no. 2, 1–14, Summer 1998, p. 3. Based on Sanders, W. L., and J. C. Rivers. *Cumulative and Residual Effects of Teachers on Future Student Academic Achievement*. Knoxville, TN: University of Tennessee Value-Added Research and Assessment Center, 1996, p. 9, Table 1.

101 Barber, M., and M. Mourshed. *How the World's Best-Performing School Systems Come Out on Top*. London: McKinsey and Company, September 2007. See also Wang, A. H., A. B. Coleman, R. J. Coley, and R. P. Phelps. *Preparing Teachers Around the World*. Educational Testing Service, Princeton, NJ, May 2003. That earlier study also found that high-performing countries tend to "frontload" quality control, using higher stakes filters at earlier points in the teacher pipeline than is typical in the United States. Some countries also used quality control "backstops" later in the pipeline by requiring rigorous probationary induction periods during which teachers are not guaranteed permanent posts. In contrast, the United States used a high-stakes filter at only one of eight possible points in the teacher pipeline—initial certification.

102 Kao, J. *Innovation Nation,* p. 85.

103 Education Week. *Quality Counts 2000: Who Should Teach?* Bethesda, MD, 2000. The findings are based on an *Education Week* analysis of data from the federal Baccalaureate and Beyond study.

104 Corcoran, S., W. N. Evans, and R. Schwab. Women, the Labor Market, and the Declining Relative Quality of Teachers. *Journal of Policy Analysis and Management* 23, no. 3, 2004, pp. 449–70.

105 Michigan State University. "MSU Study Finds that U.S. Middle School Teachers Are Ill-Prepared," news release, Dec. 11, 2008, Lansing, MI.

106 Schleicher, A., and V. Stewart. Learning from World-Class Schools, p. 49.

107 Organisation for Economic Co-Operation and Development. *Teachers Matter: Attracting, Developing and Retaining Effective Teachers*. Paris: OECD, 2005, p. 202.

108 Organisation for Economic Co-Operation and Development. *Formative Assessment: Improving Learning In Secondary Classrooms*. Paris: OECD, 2005, pp. 38-39.

109 E-mail communication from Kati Haycock, November 12, 2008.

110 Matthews, P., H. Moorman, and D. Nusche. Building a Leadership Capacity for System Improvement in Victoria, Australia. In Pont, B., D. Nusche, and D. Hopkins (Eds.), *Improving School Leadership, Volume 2: Case Studies on System Leadership*. Paris: Organisation for Economic Co-Operation and Development, 2008, pp. 179–213.

111 Barber, M., and M. Mourshed. *How the World's Best-Performing School Systems Come Out on Top*.

112 Barber, M. Comments during presentation at the Hunt Institute National Governors Association Governors Education Symposium, Cary, North Carolina, June 8, 2008.

113 Barber, M. Comments during presentation at the Hunt Institute National Governors Association Governors Education Symposium.

114 Barber, M., and M. Mourshed. *How the World's Best-Performing School Systems Come Out on Top*, p. 16.

115 Ibid, pp. 36–37.

116 Archer, J. British Inspectors Bring Instructional Focus to N.Y.C. *Education Week.* May 16, 2006, Available at: http://www.edweek.org/ew/articles/2006/05/17/37inspect.h25.html.

117 Achieve, Inc. *Creating a World-Class Education System in Ohio*. Washington, DC: Achieve, Inc., 2007, p. 64.

118 Barber, M., and M. Mourshed. *How the World's Best-Performing School Systems Come Out on Top,* p. 38.

119 Ginsburg, A., S. Leinwand, T. Anstrom, and E. Pollock. *What the United States Can Learn from Singapore's World-Class Mathematics System,* pp. 34-35.

120 Schleicher, A., and V. Stewart. Learning from World-Class Schools, p. 49.

121 Laukkanen, R. Finnish Strategy for High-Level Education for All. In Soguel, N. C., and P. Jaccard (Eds.), *Governance and Performance of Education Systems*, 2008, pp. 305–24 (p. 318).

122 See, for example, Woessmann, L. International Evidence on School Competition, Autonomy, and Accountability: A Review. *Peabody Journal of Education* 82, no. 2–3, June 2007, pp. 473–97; and Fuchs, T., and L. Woessmann. What Accounts for International Differences in Student Performance? A Re-examination using the PISA Data. *Empirical Economics* 32, no. 2–3, 2007, pp. 433–64.

123 Woessmann, L., E. Ludemann, G. Schutz, and M. R. West. *School Accountability, Autonomy, Choice, and the Level of Student Achievement: International Evidence from PISA 2003*. OECD Education Working Paper No. 13. Paris: Organisation for Economic Co-Operation and Development, Dec. 21, 2007, p. 1.

124 Telephone interview with Vivien Stewart, June 20, 2008.

125 Stephens, M., and M. Coleman. *Comparing PIRLS and PISA with NAEP in Reading, Mathematics, and Science (Working Paper)*. Washington, DC: U.S. Department of Education, National Center for Education Statistics, 2007.

126 Hutchison, D., and I. Schagen. Comparisons between PISA and TIMSS: Are We the Man with Two Watches? In Loveless, T. (Ed.), *Lessons Learned: What International Assessments Tell Us about Math Achievement*. Washington, DC: Brookings Institution Press, 2007, pp. 227–61 (p. 238).

127 For more information, visit the Early Assessment Program (EAP) Web site at http://www.calstate.edu/EAP.

128 Gonzales, P., J. C. Guzmán, L. Partelow, E. Pahlke, L. Jocelyn, D. Kastberg, and T. Williams. *Highlights from the Trends in International Mathematics and Science Study (TIMSS) 2003* (NCES 2005–005). Washington, DC: U.S. Department of Education, National Center for Education Statistics, 2004, pp. 101–3.

129 Akiba, M., G. K. LeTendre, and J. P. Scribner. Teacher Quality, Opportunity Gap, and National Achievement in 46 countries. *Educational Researcher 36*, no. 7, October 2007, pp. 369–87.

130 West, M. R., and L. Woessmann. Which School Systems Sort Weaker Students into Smaller Classes? International Evidence. *European Journal of Political Economy* 22, no. 4, 2006, pp. 944–68.

131 Desimone, L. M., T. Smith, D. Baker, and K. Ueno. Assessing Barriers to the Reform of U.S. Mathematics Instruction from an International Perspective. *American Educational Research Journal* 42, no. 3, Fall 2005, pp. 501–35 (p. 524).

132 Kang, N. H., and M. Hong. Achieving Excellence in Teacher Workforce and Equity in Learning Opportunities in South Korea. *Educational Researcher* 37, no. 4, May 2008, pp. 200–207.

133 Grubb, N., H. M. Jahr, J. Neumüller, and S. Field. *Equity in Education Thematic Review: Finland Country Note*. Paris: Organisation for Economic Co-Operation and Development, 2005, p. 20.

134 Ibid, pp. 19–20.

135 Ibid, p. 20.

136 Ibid, p. 20.

137 Laukkanen, R. Finnish Strategy for High-Level Education for All. In Soguel, N. C., and P. Jaccard (Eds.), *Governance and Performance of Education Systems*. The Netherlands: Springer Publishing, 2008, pp. 305–24 (p. 312).

138 Field, S., M. Kuczera, and B. Pont. *No More Failures: Ten Steps to Equity in Education*. Paris: Organisation for Economic Co-Operation and Development, 2007, p. 109.


National
Governors
Association
1908 – 2008


Leadership, Advocacy, Service
CCSSO
The Council of Chief State
School Officers


Achieve