

## **Examining the Role of International Achievement Tests in Education Policy Reform: National Education Reform and Student Learning in Five Countries**

### **Executive Summary**

Since the 1990s, as the international spotlight has increasingly focused on comparing student performance across countries on international achievement tests, countries have started competing with one another to achieve coveted high rankings on these tests. A number of countries that have consistently outperformed others have strived to maintain their high rankings, while others—whose initial performance was less than stellar—have undertaken significant actions to improve student scores on these tests and thus their international ranking. One of these actions has been to practice benchmarking: sending educators to visit other countries that have achieved and maintained high rankings to identify promising practices in these countries that can be applied in their own countries.

This intense interest in identifying what seems to ‘work’ in improving student learning, as demonstrated in performance on these international achievement tests, has led to a number of country studies designed to identify best practices that contribute to improvements in learning outcomes.

This education policy paper was undertaken to identify, both for ‘developing’ countries and donors who support education in these countries, best practices in education policy reform that are believed to contribute to improvements in student learning outcomes with a focus on increasing equity in performance among student populations. This paper uses as a point of departure five country cases where student learning, as measured by scores on one or more international achievement tests, has increased over time.

The international achievement tests selected for this policy paper are the following:

- PISA (Program for International Student Assessment), which has been administered by the OECD (Organization for Economic Cooperation in Development) every three years since 2000 to a representative sample of 15 year olds starting with 32 countries in 2000 and increasing to 67 countries in 2009. PISA focuses on 15-year-olds’ capabilities in reading literacy, mathematics literacy, and science literacy. It includes measures of general or cross-curricular competencies such as problem solving and it emphasizes functional skills that students have acquired as they near the end of compulsory schooling.
- TIMSS (Trends in Mathematics and Science Study) which been administered every four years since 1995 by Boston College under contract to the IEA (International Association for the Evaluation of Educational Achievement) in mathematics and science literacy to a representative sample of 4th and 8th grade students. 59 countries participated in TIMSS in 2007 along with 6 ‘benchmarking’ participants.



- PIRLS (Progress in International Reading Study), in reading literacy that has been administered since 2001 every 5 years by Boston College under contract to the IEA to a representative sample of 4th grade students. 41 countries participated in 2006.
- SACMEQ (Southern Africa Consortium for Monitoring Educational Quality), an international non-profit organization with membership from 17 Eastern and South African Ministries of Education that receives technical assistance from UNESCO's International Institute for Educational Planning (IIEP). SACMEQ has administered tests in reading and mathematics to random samples of 6th graders every six years since 1995.

The cases are: Singapore, Germany, Brazil, Namibia, and the state of Massachusetts in the United States:

- Singapore, one of the four 'Asian Tigers', is a small city-state in Southeast Asia, which has been a consistently high performer both on PISA and TIMSS since Singapore started participating in the two tests. Since Singapore became an independent state in 1965 education has been a top priority. The country has undergone several waves of comprehensive education reforms over time beginning in 1965 when it was a 'third world' nation with a small well educated elite and a majority of citizens who were poor and illiterate.
- Germany is a large and powerful federal system located in Europe. Shocked by its relatively low performance on PISA in 2000, German educators visited other countries that were more successful on PISA to identify reforms that they could implement at home and that would make Germany more competitive on PISA and other international achievement tests. Since 2000 Germany's performance on PISA is showing a small but steady increase over time.
- Brazil, also a federal system and the largest country in South America, is a case of a low performer on early PISA tests whose scores on PISA have increased steadily over time. This appears to be due in large part to significant and ongoing education reforms carried out at the national, state and municipal levels. A significant focus of Brazil's reforms has been on equalizing educational opportunity, along with increasing educational quality, for Brazil's poorest states in the north.
- Namibia is a lower-middle income country located in southern Africa. At its independence in 1990 Namibia's leaders took a conscious decision to elevate the status of education. Since 1990 Namibia has undertaken ambitious and sweeping reforms to its education system focused on increasing education quality and equity. Like Brazil, Namibia has focused on increasing education opportunities and quality in the northern and poorer states. Democracy with a constructivist approach to learning has been and continues to be an important underpinning of its education reforms. Between 2001 and 2007 Namibia's scores on SAQMEC on both reading and mathematics underwent substantial increases, the largest of the 15 participating

African countries. This was in large part attributable to increases in performance among the northern poorer states.

- The state of Massachusetts (U.S.), with the formulation by John Adams in the late 1770s of its state constitution, has placed a high value on equitable access to quality education. Since the mid 1990s Massachusetts' ranking on the National Assessment of Education Performance (NAEP) has increased from number four to number one on math and reading in 4th and 8th grades. Massachusetts, which first benchmarked itself on TIMSS in 1999, achieved high scores in math and science and has continued over time to improve its standing on TIMSS relative to other countries worldwide. Like Singapore, Brazil, and Namibia, an important focus of Massachusetts' education reforms has been focusing its efforts on increasing educational quality in underserved districts.

This review identified ten reform characteristics among the five cases that would appear to contribute to improved student learning outcomes:

1. A comprehensive systems approach to education reform that pays attention to linkages between reforms.
2. Continuity in political will accompanied by a shared vision regarding what the education system should be achieving.
3. An appreciation that reforms are not implemented in a linear fashion but instead one needs to have the creativity and flexibility to adjust course to adapt to opportunities and challenges as they emerge.
4. Establishing and implementing clear standards, accompanied by curricula that specify what children should be learning in key subjects at each level as they move up the educational ladder.
5. A system of accountability to ensure that schools are meeting established standards.
6. Ensuring that adequate attention is given to enhancing student performance in math and science.
7. Attracting qualified individuals to the teaching profession.
8. Establishing and maintaining high quality professional development programs (pre-service and in-service) geared to specified standards.
9. Establishing equitable access to quality learning as a key element of reforms.
10. Benchmarking performance in education against that of other countries with the objective of improving student learning.

The five cases selected for this policy paper, plus the extensive literature that goes beyond these cases, suggests that the tools for improving education systems are similar across



countries, no matter their level of development, as is the challenge of implementing effective change at scale. What differs is the context, implementation capacity, persistence, and the extent to which debilitating weaknesses in some aspects of the education system may fundamentally undermine the successful implementation of a given policy. The overall implication, therefore, is that ‘developing’ countries have a great deal to learn from ‘developed’ countries when it comes to improving student learning. In addition, and as is stressed in the closing section of the report, ‘developed’ countries have a great deal to learn from ‘developing’ countries.

An important message from the five cases is that reform is possible and it can make a difference in children’s learning. However, reform initiatives need to be long-term and appropriately contextualized. For example, while having quality teachers is a key element, there isn’t one ‘best’ way to achieve this; instead, a range of policy and cultural dimensions needs to be considered and pursued.

Six implications for ‘developing’ countries and donors that support these countries emerge from this education policy paper:

1. There is no substitute for sustained political will over time at the highest levels, especially where successive political actors share a common vision.
2. There is a lot to be gained from keeping abreast on an ongoing basis of innovations in enhancing student learning in other countries, including ‘developed’ countries, and adopting/applying those that are relevant to the country’s context and needs.
3. There is no ‘silver bullet’; it is important to adopt and implement a comprehensive systems approach that takes into account the range of policy and institutional reforms required to improve a given aspect of student learning along with the linkages between the reforms.
4. Educational reforms targeted at improving student learning are of little use unless there are systems in place to hold implementers accountable.
5. The recent focus among bilateral donors on improving reading literacy is important; however, in a world where countries are increasingly interconnected (economically and otherwise) and where being competitive requires skills in technology, it is also important to prioritize math and science.
6. Countries that are the best performers on international achievement tests of student learning are those where becoming a teacher is competitive and teaching is a ‘respected’ profession. ‘Developing’ countries, where being a teacher is often the career of last resort, should take steps to progressively increase the qualifications of professionals that enter the teaching force and accrue to teachers the level of professional respect that they deserve.

There is much yet to be learned regarding the precise linkages between education policy reform and student learning. There is also much yet to be done to track education

policy reforms to determine whether they are successfully being implemented as well as assessing their impact more broadly beyond just improvements in student learning.

This paper closes with three questions that the authors consider to be worthy of further reflection:

1. What are the risks of using performance on standardized tests (state, national, and international), focusing on student achievement in reading, science, and math, as exclusive measures of students learning?
2. What can ‘developed’ countries learn from ‘developing countries’ when it comes to making improvements in student learning?
3. What can be learned from the ‘failures’ of education reforms, especially where these reforms are tied to performance on international achievement tests?

## Introduction and Overview

Since the 1990s, as the international spotlight has increasingly focused on comparing student performance across countries on international achievement tests, countries have started competing with one another to achieve coveted high rankings. A number of countries that have consistently outperformed others have strived to maintain their standing, while others—whose initial performance was less than stellar—have undertaken significant actions to improve student scores and thus their international ranking.

One of these actions has been to practice benchmarking—sending educators to visit other countries that have achieved and maintained high rankings in order to identify promising practices that can be applied in their own countries.

This intense interest in identifying what works in improving student learning, as demonstrated by performance on these international achievement tests, has led to a number of country studies designed to identify best practices in improving learning outcomes.

This education policy paper uses as a point of departure five cases where student learning, as measured by scores on one or more international achievement tests, have increased over time. The cases are: Singapore, Germany, Brazil, Namibia, and the state of Massachusetts in the United States.

This paper has two objectives: (1) Identify key education policy reforms linked to improvements in student learning that these cases share in common; and (2) Identify useful insights that ‘developing’ countries, along with the donors that assist these countries, can draw from these cases.

This education policy paper ends with three questions for further reflection: (1) What are the risks of using performance on standardized tests (state, national, and international) as the exclusive measure of how much students are learning? (2) What can ‘developed’ countries learn from ‘developing countries’ when it comes to making improvements in student learning? (3) What can be learned from the ‘failures’ of education reforms, especially where these reforms are tied to performance on international achievement tests?



## Background

Discussions about improving the quality of education are not new. The debate goes back as far as the 4th century BC, when the noted philosopher Plato set forth his views on education. During the 19th and 20th centuries, education philosophers such as John Dewey, E.D. Hirsch, Jr., and Paulo Freire wrote seminal works that set forth their views, in some cases conflicting, regarding what is required to ensure that children learn and acquire the skills they need to function in society. Two theories in particular, Progressivism (initiated by John Dewey) and the New Right (E.D. Hirsch, Jr.), have shaped many of the different reform efforts in both the United States and abroad.

Dewey believed that learning was active and schooling unnecessarily long and restrictive. His philosophy was that children came to school to do things and gain real, guided experiences which fostered their capacity to contribute to society. For example, Dewey believed that students should be involved in real-life tasks and challenges such as measuring their yard as a way of using and applying math. Progressivism is still seen today in U.S. education programs such as Outward Bound, in Latin America through the Active Schools, and within Paulo Freire's constructivist approaches.

E.D. Hirsch, Jr., on the other hand, states that, "Critics have long complained that public education in the United States is an institutional and intellectual monopoly," (1996, p. 63). He argues that the educational beliefs and practices of Progressivism that value student-centered, naturalistic, hands-on, process-driven, and thinking-skills-oriented schooling, established by Dewey and others in the 1920s, is what has destroyed student learning and performance in the United States. In his book, *The Schools We Need*, Hirsch argues that schools need to be focused on verbal instruction (lecture), the transmission of a body of coherent, discipline-based, and factual content (dominant knowledge), that is reinforced by distributed practice (drill, repetition, and memorization), and measured by formal assessment.

Few rigorous studies and evaluations have provided solid evidence of which of these approaches, and combinations or variations thereof, have substantively impacted learning outcomes over time. However, student learning outcomes are only one aspect of education. It is important to remember that education serves many purposes: socialization, teaching of literacy and numeracy, workforce preparation, and citizenship, among others. While this education policy paper focuses on lessons learned about education reform as it relates to learning outcomes, the authors recognize that student learning is a narrow interpretation of the overall value of schooling.

## *Increased Emphasis on Student Learning*

Starting in the 1990s and into the 21st century, as developing countries have come closer and closer to achieving universal primary education, donors and governments have become increasingly interested in reforms focused on education quality and relevance, with a particular focus on student learning. In the United States, the No Child Left Behind (NCLB) initiative, launched in 2003, aimed to establish a system of

accountability that permits states and the federal government to determine whether the quality of education is improving at the school and district level.

Over the last two decades, many developing countries (often with the assistance of bilateral and multilateral donors) have launched comprehensive education reforms whose primary objective has been to increase education quality and relevance with a focus on student learning outcomes. In designing their reforms, a number of these countries have looked toward best practices in the ‘developed’ world.

In part motivated by goal 6 of the Education for All (EFA) Initiative for the year 2015, which focuses on improving the quality of education<sup>1</sup>, and in part by the need to have a concrete ‘evidenced based’ means of assessing whether their reforms are in fact increasing education quality, a number of countries have launched their own national, and in some cases regional or state level, achievement tests. The National Assessment of Education Progress (NAEP)<sup>2</sup>, used in the U.S. to gauge state success on meeting the No Child Left Behind (NCLB) goals, is one example, as are the achievement tests that all states in the U.S. have been obligated to develop and apply to track progress at the district and school level towards improved student outcomes. Another example is Brazil, which has established an innovative Index of Basic Education Quality (IDEB), combining achievement data with information on school attendance, repetition, and graduation rates. IDEB has made it possible to set targets and assess progress at the federal, state, municipal, and school levels.

### *The Push for International Achievement Tests*

Since the mid 1990s, and prompted by the increasing focus on student learning, multilateral organizations such as the Organization for Economic Cooperation and Development (OECD), the International Association for the Evaluation of Educational Achievement (IEA), and the United Nations Educational, Scientific, and Cultural Organization (UNESCO) have designed and administered international achievement tests designed to assess progress in student learning over time within and across participating countries. The Program for International Student Assessment (PISA), the Trends in Mathematics and Science Study (TIMSS), Progress in International Reading Study (PIRLS), the Southern Africa Consortium for Monitoring Educational Quality (SACMEQ), and the Program on the Analysis of Education Systems for West Africa (PASEC) have made it possible to track and compare student learning in participating countries over time in such subjects as reading, math and science. The countries that participated in PISA, TIMSS, and PIRLS in their early years were primarily ‘developed’ countries. However, over time more and more ‘developing’ countries are also participating in these tests and, along with their ‘developed’ neighbors, benchmarking their performance against scores of other countries.

<sup>1</sup>Goal 6 of the EFA reads as follows: “Improving all aspects of the quality of education and ensuring excellence of all so that recognized and measurable learning outcomes are achieved by all, especially in literacy, numeracy and essential life skills.”

<sup>2</sup>NAEP, or The National Report Card, has been administered every two years since 1972 by the National Center for Education Statistic (NCES) to a representative sample of students in all 50 U.S. states. NAEP collects and reports 4th, 8th and 11th grade student performance at the national, state, and local levels.





### **About the International Achievement Tests**

PISA has been administered by the OECD every three years since 2000 to a representative sample of 15 year-olds in a given country. PISA's primary focus has been the OECD countries, but it has progressively incorporated countries outside of the OECD as well. It focuses on 15-year-olds' capabilities in reading literacy, mathematics literacy, and science literacy. PISA also includes measures of general or cross-curricular competencies such as problem solving. PISA emphasizes functional skills that students have acquired as they near the end of compulsory schooling. The number of countries participating in PISA has increased from 32 in 2000 to 67 in 2009.

TIMSS has been administered by Boston College under contract to the IEA every four years since 1995 to a representative sample of 4th and 8th grade students. The tests focus on mathematics and science literacy. Forty-one countries along with two 'benchmarkers' participated in TIMSS in 1995; 59 countries participated in TIMSS in 2007 along with six 'benchmarking' participants.

PIRLS has also been administered by Boston College under contract to the IEA. It has been administered every five years since 2001 to a representative sample of 4th grade students; the test focuses on reading literacy. Thirty-five countries participated in PIRLS in 2001; 41 countries participated in 2006.

SACMEQ is an international non-profit organization that receives technical assistance from UNESCO's International Institute for Educational Planning (IIEP). Fifteen Eastern and Southern African Ministries of Education are members of SACMEQ. In 1995, SACMEQ administered tests in reading and mathematics to random samples of 6th graders in six participating countries (SACMEQ I). All 15 countries participated in SACMEQ II in 2001 and SACMEQ III in 2007.

In a number of instances, participating countries and states, dissatisfied with their performance on one or more of these tests, have visited other countries that have scored higher to learn from their reforms. Some have gone as far as to adjust their own standards, curricula, and national/state tests to be positioned to increase their results when they next participate in the international test.

### ***Linking Performance with Education Reforms***

Few would venture to attribute increases in performance on international achievement tests directly to a specific education reform or sets of reforms. However, policymakers are increasingly looking to assessment results to measure system performance. Recently, a number of efforts have been made to identify how data and information from assessments contributed to system reforms that contributed to improved learning over time.

In 2007, the education division of the McKinsey Company, using PISA 2003 scores as a basis, selected the top ten education systems, along with seven systems that have shown a strong improvement trajectory over time, to examine education reforms/practices and



draw broader lessons for education systems around the world. In 2009, McKinsey used a variety of measures (PISA, TIMSS, national /state tests) to select a range of developing and developed countries whose performance had increased over time to tease out best practices/lessons learned from educational reforms carried out in these countries. Best practices were tailored to categories of countries in terms of their level of educational development: going from poor to fair, from fair to good, from good to great, and from great to excellent.

In 2011, the OECD published a volume that included case studies of countries that had been high performers on PISA between 2000 and 2009, along with countries whose performance on PISA had increased over the same time period. The objective was to identify best practices and lessons learned that might be applicable to other countries; in this case, the United States.

In addition, a number of organizations (including the World Bank) have carried out in-depth studies to identify lessons learned from education reform efforts around the world. Several of these studies drew from the results of PISA, TIMSS, PIRLS, and SACMEQ to illustrate how participating countries compare with others and attempt to identify factors contributing to increases in test scores over time.

### *Linking Student Learning to Economic Growth*

Over the past decade, education researchers have generated evidence that actual learning, and not years of schooling completed, is what contributes to economic growth. As stated in a World Bank document that looks at education trends in Brazil:

*The crucial yardstick is not learning measured by national standards, but in comparison with the best performing education systems globally. Analyzing data on student performance on internationally benchmarked tests (such as PISA, TIMSS, and PIRLS) from more than 50 countries over a 40-year period, education researchers Hanushek and Woessman (2009, 2010) have demonstrated a tight correlation between average student learning levels and long-term economic growth. A country with average test performance one standard deviation higher than another's (approximately the difference between the average scores of Brazil and the United Kingdom or Norway on the 2009 PISA exam) will have enjoyed a 2 percent point higher average annual growth rate in GDP over the 1960–2000 period.*

### *Toward 'Evidence-based' Donor Education Strategies*

In keeping with the trends outlined above, several multilateral and bilateral donors have recently issued education policies and strategies that focus on improving student learning; all have an evidence-based focus.

The World Bank provides one example. In its recently issued strategy for 2020, *Learning for All: Investing in People's Knowledge and Skills to Promote Development*, which adopts a broad systems approach, the strategy reads, "Operationally, the Bank will increasingly focus its financial and technical aid on system reforms that promote learning outcomes. To achieve this, the Bank will focus on helping partner countries build the national capacity to govern and manage education systems, implement quality and equity



standards, measure system performance against national education goals, and support evidence-based policy making and innovations.”

Two bilateral donors, the United States through the United States Agency for International Development (USAID) and Great Britain through its Department for International Development (DFID), also take an evidence-based approach in their recently issued education strategies; both include a focus on improving student learning. USAID’s education strategy, *Opportunity through Learning*, has as one of its three goals “improved reading skills for 100 million children in primary grades by 2015.” One of the three strategic priorities of DFID’s education strategy, *Learning for All 2010 – 2015*, is, “quality of teaching and learning, particularly for basic literacy and numeracy.” The principal difference is that USAID focuses on reading literacy, whereas DFID focuses both on reading literacy and numeracy.

### Cases Selected For This Education Policy Paper

After an extensive review of the existing literature, five cases—four countries and one state in the U.S.—were identified for this paper. Each has participated in one or more international achievement tests focusing on learning, and each has shown increases in scores/improvements in rankings relative to other participating countries over time:

- Singapore, one of the four ‘Asian Tigers’, is a small city-state in Southeast Asia, which has been a consistently high performer both on PISA and TIMSS since Singapore started participating in the two tests. Since Singapore became an independent state in 1965, education has been a top priority. The country has undergone several waves of comprehensive education reforms over time, beginning in 1965 when it was a ‘third world’ nation with a small well educated elite and a majority of citizens who were poor and illiterate.
- Germany is a large and powerful federal system located in Europe. Shocked by its relatively low performance on PISA in 2000, German educators visited other countries that were more successful on PISA to identify reforms that they could implement at home and that would make Germany more competitive on PISA and other high stakes international tests. Since 2000, Germany’s performance on PISA has shown a small but steady increase.
- Brazil, also a federal system and the largest country in South America, is a case of a low performer on early PISA tests whose scores on PISA have increased steadily over time. This appears to be due in large part to significant ongoing education reforms carried out at the national, state and municipal levels. A major focus of Brazil’s reforms has been on equalizing educational opportunity, along with increasing educational quality, for Brazil’s poorest states in the north.
- Namibia is a lower-middle income country located in southern Africa. At its independence in 1990, Namibia’s leaders took a conscious decision to elevate the status of education. Since 1990, Namibia has undertaken ambitious and sweeping reforms to its education system, focusing on increasing education quality

and equity. Like Brazil, Namibia has focused on the northern and poorer states. Democracy with a constructivist approach to learning has been and continues to be an important theme underpinning education reforms. Between 2001 and 2007, Namibia's scores on SAQMEC on both reading and mathematics saw the highest increases of the 15 participating African countries. These improvements were in large part attributable to increases in performance among the poorer states in the north.

- The state of Massachusetts (U.S.) has placed a high value on equitable access to quality education since the late 1770s, with the formulation of its state constitution by John Adams. Since the mid 1990s, Massachusetts' ranking on the National Assessment of Education Performance (NAEP) has increased from number four to number one on math and reading in 4th and 8th grades. Massachusetts, which first benchmarked itself on TIMSS in 1999, achieved high scores in math and science and has continued over time to improve its standing on TIMSS relative to other countries worldwide. Like Singapore, Brazil, and Namibia, an important focus of Massachusetts' education reforms has been focusing its efforts on increasing educational quality in underserved districts.

## Reform Characteristics Shared in Common Among the Five Cases

The five individual cases studies may be found in Annex 1. Each one has three main components: (1) A summary of trends over time on performance on the international achievement tests in which it has participated; (2) A broader country/state context situating education reforms; and (3) An overview of education reforms and key characteristics. Where relevant, efforts to increase equity in education services are addressed, along with available data on how learning outcomes have improved over time.

Below, commonalities among the cases are described:

1. A comprehensive systems approach to education reform that emphasizes linkages between reforms (Singapore, Germany, Brazil, Namibia, Massachusetts). In not one of the cases was there the conviction that learning could be enhanced with one single 'silver bullet'. Instead, there was an appreciation that improving student learning requires a holistic systems approach that addresses a wide range of factors that need to be present for enhancing student learning along with the relationships among these factors (from enhanced policies, to changes in administrative systems, to establishing standards and preparing curricula, to teaching to those standards, to training teachers and working with parents). In Singapore, for example, a full range of policies was put in place to promote development and support for teachers and school leaders. They included: the recruitment of qualified individuals into the profession; their preparation to enter the profession; their induction into the profession; their professional development; their evaluation and career development; and their retention over time. In addition, Singapore linked teacher preparation



with research outcomes on aspects of teaching that enhance student learning. Other examples for each of the five cases may be found in Annex 1.

2. Continuity in political will, accompanied by a shared vision regarding what the education system should be achieving (Singapore, Brazil, Namibia, and Massachusetts). An important reason that Singapore has raced to the top in terms of scores on international achievement tests is that, since independence in 1965, the importance of education as an avenue to economic growth has remained high on the country's political agenda. Similarly, continued political will and a common vision (despite changes in administrations) has characterized education policy in the state of Massachusetts since the passage of the Massachusetts Education Reform Act (MERA) in 1993. MERA was designed to equalize learning opportunities throughout the state with an initial focus in improving student learning in low-income districts. In Namibia, improving student learning, with the conviction that all members of the population deserve access to a quality education, has been high on the country's political agenda since achieving independence from South Africa in 1990. A shared vision for improving education quality and equity has been high on Brazil's political agenda since 1995 when Fernando Cardozo was elected President.
3. An understanding that reforms are not implemented in a linear fashion but need the flexibility to adapt to new opportunities and challenges. (Singapore, Brazil) In Singapore, where education is closely tied to goals for economic growth, successive administrations, while maintaining a common vision, have made adjustments in specific objectives as Singapore's opportunities and challenges in the world market have evolved. Between 1969 and 1978, the primary focus of Singapore's education reforms was on expanding opportunities for education to the majority of its population that was poor and had little or no access to schooling. Having achieved significant improvements in education access, between 1979 and 1996 Singapore shifted its focus to improving efficiency. Multiple pathways were created for retaining students, improving quality and producing a more technically skilled labor force needed to achieve new economic goals. Since 1997, and to prepare itself to compete in a knowledge economy, Singapore again shifted its education system toward a focus on innovation, creativity and research. In Brazil, education reforms set in place by President Cardozo in 1995 were enhanced and adjusted by President Lula when he took office in 2003. FUNDEF, a fund for financing sub-national spending on primary and lower-secondary education, was extended to upper secondary school and pre-school and renamed. Bolsa Escola, a decentralized conditional cash transfer program promoting education, was consolidated with other cash transfer programs into Bolsa Familia, and coverage grew from 4.9 million families in 2002 to 12 million in 2009.
4. Establishing and implementing clear standards and curricula that specify what children should be learning in key subjects at each level as they move up the educational ladder (Namibia, Massachusetts). In its desire to be competitive in science and math on TIMSS, the state of Massachusetts established and

implemented a set of specific standards (to a certain extent tied to the contents of the TIMSS tests) regarding what students should achieve at different levels in the official curricula. Namibia, with assistance from external donors (primarily USAID), also developed a set of standards and accompanying curricula that are being implemented that provides a framework for the official curriculum.

5. Ensuring that adequate attention is given to enhancing student performance in math and science (Singapore, Germany, Massachusetts, and Brazil). The state of Massachusetts, in deciding to benchmark its performance in math and science against countries around the world by participating in TIMSS in 1995 and 2007, has made a special effort to improve math and science curricula. As a result, between 1999 and 2007, Massachusetts' 8th grade ranking on TIMSS in science achievement went from sixth to third in science, and from eleventh to sixth in mathematics. Germany developed the SINUS-Transfer program as a direct consequence of its unsatisfactory performance in math and science on TIMSS 1995. Other initiatives include national scientific research projects that examine factors influencing mathematics and science competence. Singapore, in order to compete in the knowledge economy, places a great deal of emphasis on mathematics, science, and technology. Brazil, which also aspires to play an important role in the knowledge economy, is moving in the same direction.
6. Attracting highly qualified individuals to the teaching profession (Singapore, Germany, and Brazil in process). Singapore has built a system that actively recruits talent to the teaching force. Prospective teachers are carefully selected from the top one-third of the secondary school graduating class. Like Singapore, Germany selects its teachers from the top third of its high school graduates. The Ministry of Education in Brazil is establishing an assessment system for new teachers, which sets standards for entry into the profession.
7. Establishing and maintaining high quality professional development programs (pre-service and in-service) geared to specific standards (Singapore, Germany, and Namibia). In Singapore, all incoming teachers receive training in the Singapore curriculum at the National Institute of Education (NIE). There is a close working relationship between NIE and the schools, where all new teachers are closely mentored for the first few years. Once placed in schools, teachers are entitled to 100 hours of professional development per year. Each school has a fund through which it can support teacher growth, including developing fresh perspectives by going abroad to learn about aspects of education in other countries and benefitting from experiential learning in Singapore in the business and community sectors. In Germany, the preparation of most teachers at the university level is more extensive than it is for most other professions. All candidates for university degrees in teaching, including elementary school teachers, must undertake extensive work in the subjects they will teach. All states require that teachers participate in an extended period of supervising and mentoring by master teachers before they can become



regular full-time teachers. A major focus of Namibia's comprehensive education reform has been teacher professional development.

8. Equitable access to quality learning as a key element of reforms (Singapore, Brazil, Namibia, Massachusetts). Singapore has come a long way since independence (1965) in increasing equitable access to quality learning. Singapore now ranks as one of the countries in the world that shows the least differential between high and low-income students in performance on international achievement tests. The Brazilian education system has made increasing equitable access to quality learning a high priority. FUNDEF, introduced in 1995, guarantees a national minimum level of spending per student in primary education, provides for a federally mandated system of funding redistribution within states along with a federally-managed top-up fund supplemented with federal resources, and mandates that 60 percent of the total per-student allocation be spent on teacher salaries and 40 percent to other operating costs. The impact of the FUNDEF mandate in its first several years was a 70 percent increase in average teacher salaries in poorer municipalities in the northeast and northern regions of Brazil. In Namibia, a key focus of education reform and external donor assistance since independence in 1990 has been improving education access, efficiency and quality in its poorer northern states. Between 2000 and 2007, Namibia had the highest increase in scores on 6th grade reading and math of the 15 African countries that participate in SACMEQ; this was, in large part, attributed to significant increases in reading and math scores among 6th grade students living in the country's northern region. The Massachusetts Education Reform Act (MERA) of 1993 was the state's response to a class action suit against the state brought and won by poorer districts for violating provisions in its constitution (dating 1780) that provide for equity in education quality. Efforts under MERA appear to be paying off: between 2001 and 2011 performance among low income 4th graders on reading in the state achievement test, MCAS, increased by 6 points, as compared to 1 point for white students and 2 points for the state average. Over the same period low-income eighth grade students improved by 25 points in reading as compared to 10 and 12 points, respectively, for white eighth grade students and the state average for eighth graders. Over this same time period, increases in performance among low-income 4th and 8th graders on math increased at the same pace as white students and as the overall state on MCAS.
9. Establishing a system of accountability to ensure that schools are meeting established standards (Singapore, Massachusetts, and Brazil). Setting standards in and of itself is an important step toward improving education quality and student learning. However, without a system of accountability that assesses whether standards are being met and holds responsible parties accountable, it is difficult to ensure compliance. Massachusetts, as part of the No Child Left Behind legislation, has established the Massachusetts Comprehensive Assessment System (MCAS), linked to state academic standards, to track progress at the student, district, and school level in meeting student achievement targets. The Massachusetts Education and Reform Act (MERA) requires the state to hold schools and districts accountable



for student performance and provide remedies for persistent underperformance. In addition, MERA requires that all students pass the MCAS test to graduate from high school. Those that perform high enough receive tuition waivers to attend state institutions of higher learning. Brazil has established the innovative IDEB index—which includes enrollment, graduation, and student achievement scores—and set targets for what districts and schools should achieve. Schools that achieve pre-established targets are given increased autonomy; the rest receive special attention. In Singapore, serious attention is paid to setting annual goals, garnering the needed support to meet them, and assessing whether they have been met. Reward and recognition systems include honors and salary bonuses.

10. Benchmarking performance in education against that of other countries with the objective of improving student learning (Singapore, Germany, Brazil, and Massachusetts). Singapore, in spite of continually scoring at or near the top on international achievement tests, constantly visits other countries to see what can be learned from innovations in their education systems that can be implemented at home. When Germany achieved less than desirable scores on PISA and TIMSS, it visited other countries that had been more successful on both tests to learn from their approaches and apply relevant aspects back in Germany with the hopes that this would result in increased scores on both tests. A key motivation for Brazil and the state of Massachusetts to participate in PISA (Brazil) and TIMSS (Massachusetts) was to benchmark their performance against that of other countries as well as to learn from best practices in countries that achieved higher rankings to improve scores on student learning.

## Implications for ‘developing’ Countries and for Donors that Support These Countries

The five cases selected for this education policy paper, plus the literature that goes beyond the review of these cases, suggest that the tools for improving education systems are similar across countries, no matter their level of development, as is the challenge of implementing effective change at scale. For example, teacher training or curriculum reform is undermined by systemic weaknesses in teacher pay compensation (when teachers are late or vastly underpaid or regularly receive their salaries late), teacher attendance, school fees, corruption, etc. What differs between countries is the context, implementation capacity, persistence, and the extent to which debilitating weaknesses in some aspects of the education system may fundamentally undermine the successful implementation of a given policy. The education issues facing low and middle-income countries ARE different in type, but the challenge of implementing effective change at scale is common to all.

The overall implication, therefore, is that ‘developing’ countries have a great deal to learn from ‘developed’ countries when it comes to improving student learning. In addition, and as is stressed in the closing section of the report, ‘developed’ countries have a great deal to learn from ‘developing’ countries.



An important message from the five cases is that reform is possible and can make a difference in children’s learning. However, reform initiatives need to be long-term and appropriately contextualized. For example, while having quality teachers is a key element of an education system, there isn’t one best way to achieve this; instead, a range of policy and cultural dimensions must be considered and pursued.

Six implications for ‘developing’ countries and donors that support these countries emerge from this education policy paper:

**1. There is no substitute for sustained political will at the highest levels over time, accompanied by a common vision for reform.**

Many an education reform, and many a donor-supported educational endeavor, has fallen by the wayside due to ebbs and flows in political will for education reform and/or a lack of continuity of vision regarding what is to be accomplished by the reforms. As Namibia demonstrates, a clear vision of what is to be accomplished in education over time, accompanied by continuing support for implementing this vision at the highest levels of government, with broad support from civil society, is fundamental to achieving major education reform.

**Namibia: 20 years of commitment to education driven by the political imperative of democratic inclusion**

Namibia, located in southern Africa with a population of 2.1 million, enjoys one of the highest levels of per capita income in Africa. However, this statistic is misleading. With a Gini index<sup>3</sup> of 74, Namibia also has one of the most unequal income distributions in the world. Much of the majority black population, who are concentrated in the Northern regions, is poor and engaged in subsistence agriculture, and over 21 percent of the adult population of the country is estimated to be HIV positive.

With political independence in 1990, there was an immediate, radical and dramatic shift away from the South African apartheid system of ‘bantus education’ based on separation of language and ethnic groups to one based on the concepts of equality, access and democracy. The newly adopted constitution made the government responsible for providing access to compulsory education through age 16. Education policy decisions were all driven by the political imperative of democratic inclusion.

From the outset of the education reform development in 1990, the Namibian government’s goals were all related to nation building and democratization. Till now, the education reform movement has been consistently guided by the overarching principles of equity, access, and quality. Leaders have come and gone, but the political imperative of democratic inclusion has remained.

As the government’s enrollment and parental participation goals were largely met, education leaders moved toward reforms designed to improve the quality of the education system. At the same time, there was greater public participation in decisions

3 A statistical measurement of income inequality.

related to schooling, and learner performance became an increasingly important feature of the reform effort. The government focused on the six ‘formerly disadvantaged’ regions in the north of the country that holds nearly 70 percent of Namibia’s school age children.

With ongoing donor financial support and technical assistance, Namibia has made significant strides in increasing education quality and equity. Between 2001 and 2007, Namibia’s increase in 6th grade student performance in reading and math was the highest of SACMEQ’s 15 participating Eastern and Southern African countries, including a large increase in scores in the poorest Northern regions.

## **2. ‘developing’ countries can successfully benchmark innovations from ‘developed’ countries.**

A common refrain encountered in collecting the information for this education policy paper (both in documents reviewed and among individuals interviewed) has been the blanket statement that best practices from ‘developed’ countries are not applicable for ‘developing’ countries.

Experience, including the cases included in this education policy paper, suggests that the tools for improving education systems are similar across countries, no matter their level of development, as is the challenge of implementing effective change at scale. The differences lie in the context, implementation capacity, persistence, and the extent to which debilitating weaknesses in some aspects of the education system may fundamentally undermine the successful implementation of a given policy.

Singapore provides an excellent example of a country that, over a 50-year period, has evolved from a ‘third world’ country to becoming one of the four ‘Asian Tigers’. Along the way Singapore, an avid benchmarker, has visited other countries to learn from their experiences and bring home innovations in education back home. Other ‘developing’ countries that, like Singapore from its earlier days, are on a steady upward trajectory in terms of their basic indicators of developmental and economic ‘health’, and with which have a desire to become competitive in the international high-tech market, have a great deal to learn from Singapore’s experience.

A number of the educational innovations introduced by the governments of Namibia (a lower middle income developing country with large pockets of severe poverty) and Brazil (a ‘newly industrialized country’, also with large pockets of poverty) are benchmarked on successful experiences in ‘developed’ countries. These include: adopting standards to serve as the basis for developing curricula, textbooks and teaching methodologies; designing assessments to assess whether these standards are being met; and taking steps to increase the quality and professionalism of the teaching force.

**Dispelling common myths about the so-called ‘developing’ world, which is no longer worlds away from the ‘developed’ world.**

Dr. Hans Rosling, Professor of International Health at the Karolinska Institute in Sweden and co-founder and chairman of the Gapminder Foundation which developed Trendalyzer software, uses his system to dispel common myths about the so-called ‘developing’ world, which is no longer worlds away from the West. As he points out in a video presentation, available on the TED website most ‘developing’ countries are on the same trajectory toward health and prosperity, and many countries are moving twice as fast as the west did. Drawing from United Nations data and other credible sources, he transforms development statistics into moving bubbles and flowing curves that show global trends on key indicators of poverty over time.

To quote Rosling in his presentation that appears on the TED website:

*I find my experience from 20 years of Africa is that the seemingly impossible is possible. In 50 years they've gone from a pre-Medieval situation to a very decent 100-year-ago Europe (in terms of statistics on health and the economy) with a functioning nation and state. I would say that sub-Saharan Africa has done best in the world during the last 50 years. We don't consider where they have come from.*

**3. There is no ‘silver bullet’ in education reform; it is important to adopt and implement a comprehensive systems approach that takes into account the range of policy and institutional reforms required to improve a given aspect of student learning, along with the linkages between reforms.**

Based on years of research and experience, the World Bank’s education strategy for 2020 argues for a holistic ‘systems’ approach to sustainably improve learning outcomes. This applies to all countries, whether ‘developed’ or ‘developing’.

*Operationally, the Bank will increasingly focus its financial and technical aid on system reforms that promote learning outcomes. To achieve this, the Bank will focus on helping partner countries build the national capacity to govern and manage education systems, implement quality and equity standards, measure system performance against national education goals, and support evidence-based policy making and innovations (p. 6).*

The five cases chosen for this education policy paper all adopted a systems approach. In not one of the cases was there the expectation that one ‘silver bullet’ would lead to improved learning outcomes. Instead, in each of the five cases—from an established ‘developed’ country (Germany) and a ‘developed’ state in the U.S. (Massachusetts) to a ‘graduate developed’ country (Singapore), a ‘newly industrialized country’ (Brazil), and ‘lower-middle income developing’ country (Namibia)—a comprehensive systems approach to education reform, which linked elements of the system together, was adopted.

### **An integrated systems approach to education policy reform in Singapore**

The Republic of Singapore is a city-state in Southeast Asia with a population of 5 million, located off the southern tip of the Malay Peninsula. In 1963, Singapore became a fully independent nation after separating from Malaysia.

There have been three phases in the development of Singapore's education system: (1) survival driven, from 1969–1978, with a primary focus on expanding opportunities for education to all; (2) efficiency driven, from 1979–1996, during which multiple pathways were created to reduce the drop-out rate, improve quality and produce the more technically-skilled labor force needed to achieve new economic goals; and (3) ability-based, aspiration driven, from 1997 to the present, during which there was a focus on innovation, creativity and research in the attempt to build a knowledge economy.

In setting out to improve efficiency and quality and use education as a vehicle to compete in a knowledge economy, Singapore has adopted a comprehensive systems approach to education reform centered on a clear vision of what is needed in education. Deliberate steps have been taken to align the education system to economic development goals. An integrated system of planning has been put in place whereby the Manpower Ministry works with various economic agencies responsible for promoting specific industry groups to identify critical manpower needs and project demands for future skills. These are then fed back both into pre-employment training and continuing education and training.

Serious attention is paid to setting annual goals, garnering the needed support to meet them, and assessing whether they have been met. At the institutional level, both policy coherence and implementation consistency are brought about by a very close tripartite relationship between the Ministry of Education, the National Institute of Education (NIE, the country's only educator training institution), and the schools. The Ministry is responsible for policy development, while NIE conducts research and provides pre-service training to educators. NIE's research is fed back to the Ministry and is used to inform policy development.

The Ministry of Education formulates and implements education policies. No policy is announced without a plan for building the capacity to meet it. While, in recent years, more autonomy has been given to schools so as to encourage more innovation, there is strong centralization in terms of the curriculum, examinations and assessments, incentives for students to work hard, and accountability measures for teachers and principals.

Since independence Singapore's education policy framework has been built on commitment to equity and merit. The goal of the education system is to nurture every child, no matter what his ability or achievement level. There is a strong focus on mathematics, science and technical skills given the linkages between skills in these areas and the country's economic development. Singapore has also put in place a



comprehensive and intensive human resource system to obtain high-quality teachers and school leaders: there is active recruitment of talent, accompanied by comprehensive training and serious and continuing support.

Singapore's education policy framework includes a comprehensive approach to teacher performance appraisal and to recognizing teachers who are effective. There is a careful emphasis on leadership selection and training at the school level. Incorporated in the policy framework are mechanisms for continuous improvement. International benchmarking is used as a tool for improvement.

#### **4. Accountability is an important underpinning for improving learning.**

The World Bank 2020 education strategy stresses the importance of accountability as an important underpinning to improving learning. The five cases that serve as the information base for this case study corroborate the importance of accountability.

Accountability is a 'system' intervention broadly applied, and the challenge is implementation. As a supporting intervention, implementation must be linked to, and directly support, the policies and activities that address teacher and principal performance. Testing, for example, is an essential tool for knowing what students are learning. However, it is worthless without: a) ensuring that people are accountable for results, b) ensuring that the information that comes out of it is available to teachers and principals in a usable form, and c) having mechanisms in place to fix identified weaknesses (training, supplemental funding, etc).

Accountability is likely to vary somewhat from country to country, depending on the nature of the reforms carried out and the political and cultural characteristics of the country. Accountability can be at the administrative level, at the school level, or the level of the teacher.

In the five cases, an important ingredient for accountability is the establishment of educational standards that clearly specify what students should be learning at different levels. These standards should be coupled with tests (either formal or informal) examinations designed to assess whether and to what extent standards are being met, as well as a means to take corrective actions once the results of the assessments are in hand.

Brazil's index of Basic Education Quality (IDEB) provides one example of how an assessment system is being used to promote accountability.



### **Brazil's Index of Basic Education Quality (IDEB)**

In 2007, the Brazilian Ministry of Education introduced an innovative tool for the systematic monitoring of basic education progress in every school, municipality, state, the federal district, and region of the country. The index is innovative because it combines measures of student learning results with student flows (grade progression, repetition, graduation, etc.). Because it includes both test scores and pass rates, the index discourages schools from both the automatic promotion of children who are not learning and g. However, it also discourages schools from holding children back to boost learning scores. Avoiding incentives for grade retention is important in Brazil, since average primary repetition rates are approximately 20 percent, the highest in Latin America.

The IDEB builds on the progress Brazil has made in scaling up its national student assessment system to a technically well-regarded learning assessment that was applied every two years to all 4th and 8th grade students in mathematics and Portuguese, called the Prova Brasil. The IDEB measure combines Prova Brasil test results with administrative data on school enrollments, repetition and grade promotion. The raw scale of the exams ranges from 0 to 500, and the standardized scale ranges between 0 and 10. Pass rates are calculated based on the information reported by each school to the National School Census, applied annually by the Ministry of Education. The IDEB index for each grade and subject is calculated as the product of the standardized Prova Brasil score for the last grade in the cycle and the average pass rate for the cycle evaluated.

The IDEB has become rapidly accepted in Brazil as the leading metric for gauging the relative performance of individual schools and municipal and state systems. Biannual IDEB results are widely reported in the media, and the federal government has established targets for the improvement of primary and secondary education results for every one of Brazil's 26 states and the federal district, and 5,564 municipal school systems. Within states and municipalities, IDEB reveals the relative performance of different schools. At the secondary school level, the index is based on SAEB test results (applied in a representative sample of schools in each state and the federal district) and student flow data. Thus, it generates state-level, but not school or municipal level scores.

Just one example of its impact is the way the IDEB has facilitated the implementation of teacher bonus programs at both the state and municipal levels over the past three years. Although the different state and municipal programs in operation have a number of alternative design features, all are based on annual targets for improvement in IDEB metrics. From the standpoint of federal education policy, this has created a powerful platform for comparative analysis of state (and federal district) and municipal innovations in basic education.

Source: Reynaldo Fernandes (2007), INEP (2008)



**5. While focusing on improving reading literacy is important, this should not be done at the expense of math and science skills.**

Learning to read and comprehend what one is reading is arguably one of the most important things that a child needs to be successful in later learning; a focus on early literacy is important especially in countries where there is data showing poor literacy skills among primary and secondary students. Taking this into consideration, two major bilateral donors, USAID and DFID, have chosen to focus on the acquisition of early reading skills at the primary level (although DFID addresses numeracy as well). However, experiences from Singapore, Germany, Massachusetts, and increasingly Brazil (along with many other countries not included in this policy paper) demonstrate that it is also important to ensure that students possess strong skills in mathematics and science, especially if a key focus of the country's strategy for economic growth is stimulating export growth in the high-tech market.

**Singapore's strong focus on mathematics, science and technical skills**

While improving reading skills was undeniably an important focus of Singapore's reforms in its early days as a nation, as its economy evolved and consciously positioned itself in the global market economy, mathematics and science assumed a steadily increasing role in the education curriculum. Singapore's approach to mathematics, developed in the 1980s from reviews of mathematics research around the world and refined several times since, is based on the idea of instilling 'math sense' in students. Teachers cover far less material than in many other countries, but they cover it in depth; the goal is to truly master mathematics concepts. At the same time, the national science curriculum in primary and lower secondary grades develops the idea of science as inquiry. Co-curricular activities such as mathematics and science fairs, competitions, and learning trails (where students apply mathematics and science concepts in outdoor settings) are used to generate interest in the subjects.

**6. A high quality teaching force is of the utmost importance.**

While the child's home environment is undeniably a critical factor in the acquisition of knowledge and skills, one of the most important takeaways from PISA-related research is the importance of the teacher to student learning. A high quality teacher who has been effectively trained at the beginning of his/her career, who is respected in his/her community, and who is given flexibility in deciding how to prepare his/her students to meet educational standards, can accomplish a great deal. This is the case in Singapore and Germany, along with Finland and Korea, two other countries that consistently rank in the top tier on PISA and TIMSS.

Today there are many 'developing' countries (and even some 'developed' countries) where being an elementary or secondary school teacher is not seen as a 'desirable' profession. Salaries are low, working conditions are difficult, and teachers are given

little respect. Consequently, individuals with the high qualifications are not attracted to teaching.

Recognizing that having ‘quality’ teachers is critical for ensuring gains in learning, countries like Brazil and Namibia are taking steps to increase the quality of the teaching force. Brazil is increasing remuneration for teachers working in low-income regions and designing special entry tests for teachers. In Namibia, several policies in the early years focused on teacher development. Both countries realize (as was the case with Singapore in its early years following independence) recognize that this will not happen overnight.

In countries where education is not highly valued, steps need to be taken to increase the prestige of the teaching profession. In countries where teachers’ salaries are lower than other civil servants, or even below the poverty level like in the Dominican Republic, steps need to be taken to bring teacher salaries to parity with similar professions. In countries where entrance to teacher training colleges is not competitive and/or where teachers are being overproduced, standards for entry need to be elevated and spots for new entrants reduced. This can be a multi-decade effort. However, this does not mean that a given country should wait to act on this eventual transformation.

A study carried out under the auspices of the National Bureau for Economic Research (NBER) followed one million urban-dwelling 4th grade students in the United States, representing various socio-economic classes, through adulthood. As excerpts from the Executive Summary of the study show below, effective teachers (the teacher’s value-added) have a positive impact not only on students’ test scores but on several measures over the long-term. These students are more likely to attend college, earn higher salaries, live in better neighborhoods, and save more for retirement. They are also less likely to have children as teenagers.

**The long-term impacts of teachers: teacher value added and student outcomes in adulthood**

Many policy makers advocate increasing the quality of teaching, but there is considerable debate about the best way to measure and improve teacher quality. One method is to evaluate teachers based on their impacts on students’ test scores, commonly termed the ‘value-added’ (VA) approach. A teacher’s value-added is defined as the average test-score gain for his or her students, adjusted for differences across classrooms in student characteristics such as prior scores. Proponents argue that using VA can improve student achievement (e.g. Hanushek 2009); while critics argue that test score gains are poor proxies for a teacher’s true quality (e.g. Baker et al. 2010).

The debate about VA stems from two fundamental questions. First, does VA accurately measure teachers’ impacts on scores, or does it unfairly penalize teachers who may systematically be assigned lower achieving students? Second, do high VA teachers improve their students’ long-term outcomes, or are they simply better at teaching to the test? Researchers have not reached a consensus about the accuracy and long-term impacts of VA because of data and methodological limitations.



We address these two questions by tracking one million children from a large urban school district from 4th grade to adulthood. We evaluate the accuracy of standard VA measures using several methods, including natural experiments that arise from changes in teaching staff. We find that when a high VA teacher joins a school, test scores rise immediately in the grade taught by that teacher; when a high VA teacher leaves, test scores fall. Test scores change only in the subject taught by that teacher, and the size of the change in scores matches what we predict based on the teacher's VA.

In the second part of our study, we analyze whether high VA teachers also improve students' long-term outcomes. We find that students assigned to higher VA teachers are more successful in many dimensions. They are more likely to attend college, earn higher salaries, live in better neighborhoods, and save more for retirement. They are also less likely to have children as teenagers.

### Three Questions Worthy of Further Reflection

There is much yet to be learned regarding the precise linkages between education policy reform and student learning. There is also much yet to be done to track education policy reforms to determine whether they are successfully being implemented, as well as assessing their impact more broadly, beyond just improvements in student learning.

This education policy paper opened with two questions, both of which have been addressed in prior sections. It closes with three questions that the authors consider worthy of further reflection:

**1. What are the limitations of using performance on standardized tests (state, national, international) as the exclusive measure of how much students are learning?**

A frequent complaint among teachers in countries that exclusively use standardized tests to gauge how much students are learning, and consequently how effective they and their schools are, is that they are obligated to devote a great deal of time teaching their students to perform well on the tests, to the detriment of other important competencies that children should be exposed to in school.

This has definitely been the case in the United States with regard to the No Child Left Behind Legislation. NCLB judges the effectiveness of reforms undertaken by states, localities, schools, and teachers to improve student learning by increases in student scores on state-specific standardized tests. And yet, students are also expected to learn to interact in a broader society, practice principles of participatory democracy, and develop problem-solving skills that will serve them in their daily lives.

It is worth noting that Singapore, unlike the United States (and a consistently a high performer on TIMSS), does not have its own internal high stakes standardized tests. Students are tested with the explicit purpose of providing feedback that can be used by

the Ministry of Education to improve learning effectiveness. These tests are not used to pass judgment on the performance of individual schools and teachers. In addition, the focus of its curriculum goes far beyond student learning as measured by performance on high stakes international tests. The education system in Singapore is equally interested in instilling in students the values and behaviors to become useful and productive citizens as well as excel in the labor force, contributing to the country's economic competitiveness.

Namibia, whose education objectives go far beyond student academic learning to include a focus on democracy, has also opted not to use national high-stakes tests to punish or reward schools, teachers, and students. Tests administered to a random sample of students throughout the country are used to identify gaps in municipal and regional performance. This information guides policy makers in adjustments that need to be made in policies as well as education service delivery. It is also used to design teacher-training programs tailored to specific needs in different regions and districts. Like Singapore, Namibia is interested in ensuring that students are exposed to fundamental democratic principles that they will exercise throughout their lives.

These patterns raise the question: should the donor community be encouraging countries, in addition to developing academic standards and tests to assess whether students are being taught to those standards, to find effective ways to assess whether their education systems are in fact producing citizens that are able to solve daily problems and be effective members of society?

## **2. What can 'developed' countries learn from 'developing countries' when it comes to making improvements in student learning?**

So much of the existing literature on student learning focuses on policies taken and strategies implemented by 'developed' countries to improve student learning. Though this literature is important, the authors of this paper would like to remind the broader education community that 'developed' countries can also learn from policies adopted and strategies implemented by 'developing' countries.

In this review, two examples emerge: Brazil and Namibia. The first is a recent 'newly industrialized country' with large pockets of severe poverty and the second is a 'lower middle income country,' also with large pockets of severe poverty.

Brazil's IBED index, described above, represents an innovative approach to classifying and setting targets for performance at the state, municipal and school level as it blends achievement test data with information on enrollment, repetition, and graduation rates. In a recent review of education in Brazil, the World Bank lauded Brazil for this initiative and cited it as an example for other countries around the world: "Brazil can be considered not only the leader in the LAC region, but also a model globally."



Namibia, as seen by the dramatic increase on its 6th grade English and math scores on SACMEQ between 2001 and 2007, has maintained a constructivist approach to learning that encourages student initiative, inquiry, and problem solving in addition to the basics of English and math. This is unusual, given the global value that is placed on international test rankings. If anything, the tendency has been to move away from constructivist approaches since they do not focus specifically on the knowledge acquisition required to perform well on student achievement tests.

In the coming years it will likely be possible to find more and more examples of best practices from ‘developing’ countries, both in general and specifically for improving learning.

### **3. What can be learned from the ‘failures’ of education reforms, especially where these reforms are tied to performance on international achievement tests?**

Education reform is messy and often unpredictable. It is not usually linear, but proceeds at a pace and in a fashion that reflects the country’s cultural context and the political environment of the country at a given point in time. For every best practice identified in the existing literature that attempts to tie actions taken under education reforms to performance on international achievement tests, there is at least one challenge or problem facing the reform, if not more.

The literature tying country/state performance on international achievement tests to education reforms tends to focus on what ‘works,’ converting ‘best practices’ into lessons learned for other countries/states. cursory attention is given to the multifold challenges involved in accomplishing these reforms, not to mention improvements in country systems on indicators not directly related to learning. One example is the country specific PISA studies.

There is much to be learned from challenges and what doesn’t work, in addition to best practices and what does work. In the future, more effort should be extended to do precisely this.



## Annex 1: Cases

### Singapore: rapid improvement followed by strong performance

#### *Singapore's performance over time on international tests*

Singapore has been a long time participant in TIMSS (1995, 1999, 2003, and 2007), has participated in both PIRLS tests (2001, 2007), and just recently joined PISA (2009).

**Performance on TIMSS:** Singapore has consistently ranked number one or two in 8th grade science since it started participating in TIMSS in 1995. In 4th grade science Singapore has consistently rated number one. Between 1995 and 2003, Singapore's ranking jumped from number 10 to number one on 4th grade math, a position it continued to hold in 2007.

**Performance on PIRLS:** Singapore's ranking on PIRLS rose from being tied as 14th country on PIRLS 2001 to being tied as 4th country on PIRLS 2006.

**Performance on PISA:** Singapore participated for the first time on PISA in 2009. It came in number 4 in reading, number 2 in math, and number 4 in science.

#### *Setting the context*

The Republic of Singapore is a Southeast Asian city-state with a population of 5 million located off the southern tip of the Malay Peninsula. Made up of 63 islands, Singapore is highly urbanized. Singapore had been a part of various local empires since it was first inhabited in the second century AD. In 1963 it became a fully independent nation after separating from Malaysia. Since then it has seen a massive increase in wealth and became one of the Four Asian Tigers. The economy depends heavily on the industry and service sectors.

Singapore's first Prime Minister following independence set out two overarching goals: build a modern economy and create a sense of Singaporean national identity. He recruited the best and brightest people into his early government and sought to promote economic growth and job creation. In the 1960s, the emphasis was on attracting labor-intensive foreign manufacturing to provide jobs for its low-skilled workforce. In the 1970s and 1980s, a shift to more skill-intensive manufacturing led to an emphasis on technical fields. From the mid-1990s on, Singapore sought to become a player in the global knowledge economy, encouraging more research and innovation-intensive industries and seeking to attract scientists and scientific companies from around the globe.

Singapore's small size and political stability have enabled it to be versatile in responding to rapidly changing environments. With a small limited domestic market, Singapore has had to become highly integrated in the global economy. To survive several global recessions and the ever-present uncertainties of the global economy, continuous innovation has been essential.



There have been three phases in the development of Singapore's education system: (1) survival driven, from 1969–1978, with a primary focus on expanding opportunities for education to all; (2) efficiency driven, from 1979–1996, during which multiple pathways were created to reduce the drop-out rate, improve quality and produce the more technically-skilled labor force needed to achieve new economic goals; and (3) ability-based, aspiration driven, from 1997 to the present, during which there was a focus on innovation, creativity and research in the attempt to build a knowledge economy.

### *Characteristics of education reform in Singapore*

More than any other country in the world, Singapore has aggressively pursued a policy of advancing in education and other arenas by systematically benchmarking the world's best performances and creating a world class education system based on what they have learned through their benchmarking:

- Alignment of the education system to economic development goals. As Singapore evolved from an economy based on port and warehousing activities, through a low-wage, labor-intensive manufacturing economy, and then to a more capital and skill-intensive industry, and finally to its current focus on knowledge-intensive industrial clusters, the education system has been expected to ramp up the quality of its education and the supply of specific skills needed to make Singapore globally competitive.
- An integrated system of planning. The Manpower ministry works with various economic agencies (such as the Economic Development Board) responsible for promoting specific industry groups to identify critical manpower needs and project demands for future skills. These are then fed back both into pre-employment training and continuing education and training. The ministry of Education and the institutions of higher and post-secondary education then use these skill projections to inform their own education planning, especially for universities, polytechnics and technical institutes.
- A clear vision of what is needed in education. Because of the value placed on human resource development and the understanding of its critical relationship to economic development, Singapore's government provides a very clear vision of what is needed in education.
- Accountability. Serious attention is paid to setting annual goals, to garnering the needed support to meet them and to assessing whether they have been met. Data on student performance are included, but so are a range of other measures, such as contributions to school and community and judgments by a number of senior practitioners. Reward and recognition systems for teachers include honors and salary bonuses.
- Close links between policy implementers, researchers and educators. At the institutional level, both policy coherence and implementation consistency are

brought about by the very close tripartite relationship between the Ministry of Education, the National Institute of Education (NIE, the country's only teacher training institution), and the schools. The Ministry is responsible for policy development, while NIE conducts research and provides pre-service training to educators. NIE's research is fed back to the Ministry and is used to inform policy development.

- Policies with the means to implement them. Singapore is a 'tightly coupled' system in which the key leaders of the ministry, NIE, and the schools share responsibility and accountability. No policy is announced without a plan for building the capacity to meet it. In recent years, Singapore has loosened its tight coupling somewhat. More autonomy has been given to schools so as to encourage more innovation. However, there are still strong alignments among the curriculum, examinations and assessments, incentives for students to work hard, and accountability measures for teachers and principals.
- Strong central role of the Ministry of Education: The Ministry of Education formulates and implements education policies and is responsible for the development and administration of the mainstream schools and the registration of private schools. Together with the Singapore Examinations and Assessment Board, it exercises control over the entire national examination system. The Ministry provides curriculum guides and syllabi for the various subjects in the curriculum and ensures that the syllabi remain current with developments in the subject disciplines and meet the needs of the nation. However, schools are given the autonomy to develop their own school-based curriculum and introduce different pedagogical approaches and instructional materials that best suit the needs of their students.
- Commitment to equity and merit. The goal of the education system is to nurture every child, no matter what his ability or achievement level. Attention and resources are devoted to both low achievers and high achievers. At independence, there were large attendance and achievement gaps between the Chinese population, on the one hand, and the Tamil and Malay populations on the other. Children who require additional support in learning to read are identified through screening tests at the start of first grade and are provided with daily systematic intervention by teachers in small groups (8–10 students) in learning support programs so that they do not fall behind.
- A strong focus on mathematics, science and technical skills. In both primary and secondary, mathematics and science are core subjects. The approach to mathematics, developed in the 1980s from reviews of mathematics research around the world and refined several times since, is based on the assumption that the role of the mathematics teacher is to instill 'math sense'. Teachers cover far less material than they do in many other countries, but they cover it in depth; the goal is to master mathematics concepts. The national science curriculum in primary and lower secondary focuses on the idea of science as inquiry. Co-curricular activities such as



mathematics and science fairs, competitions, and learning trails (where students apply mathematics and science concepts in outdoor settings) are used to generate interest in the subjects among students.

- High-quality teachers and principals: In earlier times, Singapore often had teacher shortages and was not always able to attract the highest quality teaching force. In the 1990s, Singapore put in place a comprehensive and intensive human resource system to obtain high-quality teachers and school leaders who could meet its needs. The system rests on active recruitment of talent, accompanied by coherent training and serious and continuing support. Prospective teachers are carefully selected from the top one-third of the secondary school graduating class.
- Comprehensive teacher training and compensation: Prospective teachers receive a monthly stipend that is competitive with the monthly salary for fresh graduates in other fields. All teachers receive training in the Singapore curriculum at the National Institute of Education. There is a close working relationship between NIE and the schools, where all new teachers are closely mentored.
- Teacher compensation competitive with other professions. The Ministry of Education keeps a close watch on occupational starting salaries and adjusts them for new teachers to ensure that teaching is equally attractive to new graduates as other occupations. There are retention bonuses, and high-performing teachers can also earn a significant amount in performance bonuses.
- Strong commitment to professional development: Teachers are entitled to 100 hours of professional development every year. Much professional development is school-based, led by staff developers. Each school also has a fund through which it can support teacher growth, including developing fresh perspectives by going abroad to learn about aspects of education in other countries. Teacher networks and professional learning communities encourage peer-to-peer learning. Teachers can also benefit from experiential learning in the business and community sectors.
- A comprehensive approach to teacher performance appraisal and to recognizing effective teachers: Teacher performance is appraised annually along 16 different competencies including the teachers' contribution to the academic and character development of the students in their charge, their collaboration with parents and community groups, and their contribution to their colleagues and the school as a whole. Teachers who do outstanding work receive a bonus from the school.
- A careful emphasis on leadership selection and training: Young teachers are continuously assessed for their leadership potential and given opportunities to demonstrate and learn. For example, they can serve on committees and be promoted to head of department at a relatively young age. Some are transferred to the Ministry of Education for a period of time. After these experiences are monitored, potential principals are selected for interviews and go through leadership situational exercises. If they pass these, then they receive six months of executive leadership

training T NIE, with their salaries paid. The process is comprehensive and intensive, and includes an international study trip and a project on school innovation.

- School summative examinations linked to national examinations: The use of standardized tests is not common. Instead, the Singapore Examinations and Assessment Board, in collaboration with the Ministry of Education, conducts national examinations. Students are also assessed both formally and informally in schools. At every level, schools generally conduct at least two summative examinations, one at the end of each semester. These assessments tend to adhere closely to the approach and format adopted in the national examinations. For formative assessments, teachers adopt different modes ranging from pen-and-paper tasks, such as written tests and worksheets, to oral presentations and portfolios. Formative assessments provide useful indicators for teachers to monitor their students' progress, identify their strengths and weaknesses, and provide meaningful and immediate feedback. They also enable teachers to modify their teaching methods and materials to suit the needs and abilities of their students.
- A system which is continuously being improved. Singapore has inculcated an attitude and developed mechanisms for continuous improvement. Officials from the Ministry and NIE frequently visit schools and have a good sense of what is going on. There is also a high level of investment in research relative to the size of the country, which feeds back into system improvements.
- Extensive use of international benchmarking as a tool for improvement and to move up the educational value chain. Staff of the ministry, the NIE, and the schools visit other systems and explore international best practices. Typically, the visits and research focus on very specific issues and on what does and does not work in implementing particular policies. Principals and master teachers are also encouraged to examine innovations in other countries and explore how they could be adapted for use in Singapore.

## Germany: Once weak international standing prompts strong nationwide reforms for rapid improvement

### *Germany's performance over time on international tests*

Germany has been a steady participant in PISA (2000, 2003, 2006, and 2009) and in PIRLS (2001, 2006). Germany participated twice in TIMSS (1995 and again in 2007, skipping 1999 and 2003).

Performance on PISA: Germany has shown small but steady gains in performance on PISA in reading, math, and science since it first started participating in PISA in 2000. In 2000, Germany was below the OECD average (score of 484) on reading. By 2009, Germany's score on PISA had risen to just below the OECD average (494) on reading.



On math and science, Germany's scores (already slightly above the 500 average) rose 10 and 4 points, respectively, between 2000 and 2009.

Performance on TIMSS: In 1995, the first year Germany participated in TIMSS (8th grade only), Germany ranked 3rd of the 28 participating countries in mathematics (with a score of 503) and number 19 (score of 531) in science. In 2007 (4th grade only), Germany's ranking was 12 both on math (525) and science (528), above the TIMSS average of 500.

Performance on PIRLS: In 2001, Germany ranked 11th in reading literacy on PIRLS (539); when PIRLS was administered again in 2006 it had moved up to 7th in reading literacy (548), gaining 9 points. Both scores are well above the PIRLS average of 500.

### *Setting the context*

Germany is a federal republic consisting of 16 federal states. With a population of 81.8 million, Germany is the most populous member state in the European Union and also has the largest economy. It is one of the major political European powers, with a rich history that dates back to 100 AD. In 1945, following its defeat in World War II, Germany was divided by the allied occupation and evolved into two states: East and West Germany. In 1990, Germany was reunified.

Each federal state has legislative and administrative powers over all policy issues within its geographic boundaries, including its education system. The individual ministries of education join in the Standing Conference of the Ministers of Education and Cultural Affairs of the Laender in the Federal Republic of Germany to collaborate on matters of education, science, research, and culture. A treaty between the federal states standardizes certain crucial aspects of the German school system across the federal states, such as the definition of a grade scale or the total duration of compulsory education.

### *Characteristics of education reform in Germany*

The unsatisfactory performance of German students on international comparative studies (e.g., TIMSS 1995, PISA 2000, and PISA 2003) led Germany to aggressively visit other countries that had achieved high scores on PISA and TIMSS performed better in order to learn from their best practices. In 2004, under a set of major educational reforms, Germany implemented various measures to enhance the quality of education, both regionally and nationally.

The following are key characteristics of Germany's reforms:

- Instituting national educational standards. The PISA shock drove an ambitious reform program, including a new national system of standards and tests in 2004. The new standards, which are binding for all federal states, specify the curricular elements for core subjects that are to be achieved by students after a defined number of school years. The curricular elements function as an outline for how to meet the standards.



- Easing slowly into national examinations and assessments. When Germany instituted its package of reforms in 2004, it chose not to create a test-driven accountability system with high stakes for students or teachers. In part, this was the result of a desire to keep teachers enthusiastic about the whole reform package. Many federal states have implemented or are in the process of implementing comparative tests that monitor student achievement within a given federal state or even across different federal states. However, since the 2007/8 school year, nationwide standardized tests began to be implemented at the end of grade 3 in German and mathematics and at the end of grade 7 in German, mathematics and a foreign language, to evaluate whether the national education standards were actually being met.
- Good quality teachers: Germany selects its teachers from the top third of its high school graduates. The preparation of new teachers in university is more extensive than most other countries and for most other professions in Germany. All candidates for university degrees in teaching, including elementary school teachers, must undertake extensive work in the subjects they will teach. The recent reforms require the teacher education program to provide candidate teachers with skills enabling them to diagnose and address the specific problems faced by struggling students. All states require that teachers participate in an extended period of supervising and mentoring by master teachers before they can take up their duties and become regular full-time teachers.
- Multiple steps taken to improve performance in science and math. The SINUS-Transfer program was developed as a direct consequence of Germany's unsatisfactory performance on TIMSS 1995; one of its core elements is the focus on intensified cooperation among teachers. Other efforts to address Germany's low performance on TIMSS 1995 included the launching of national scientific research projects that examine factors influencing mathematics and science competence. Furthermore, the individual federal states have originated a vast number of initiatives that promote education in mathematics and science on a regional level.
- The use of incentives, especially for students: German students work hard in school because they know that their opportunities in life are a function of the formal qualifications they earn, and the qualifications they earn are a function of how well they do in school.
- The value of having a dual system that combines formal learning with apprenticeships: Germany's flexible combination of formal schooling with apprenticeship represents a very powerful approach to providing students with skills, knowledge and motivation that could prove decisive on a national scale in international competition. An important objective in the German system is for students to leave with the ability to set work goals, create a plan for achieving them, and then working in a disciplined way to execute that plan. The system also values being an effective member or leader of a team, working independently, drawing on



experience and theory to solve a wide variety of actual problems, and the ability to think analytically and creatively.

- International benchmarking and accountability: Prior to the PISA shock, Germany had no interest in what other countries were doing to bring their education systems up to world-class status. However, after the PISA 2000 results, Germany became an avid international benchmarker. Not only did Germany send teams all over the world to learn from other nations, but it deliberately built participation in international comparative testing regimes into its own national testing scheme, so that it would never again be surprised by its standing in relation to other countries.

## Brazil: policy continuity and sustained reform in education

### *Brazil's performance over time on international tests*

Brazil has been a long-time participant in PISA (2000, 2003, 2006, and 2009). It has not participated in either TIMSS or PIRLS.

### PISA

Brazil, with scores ranging from the mid 300s to the low 400s, remains a low performer on PISA and is well below the average score of 500. That said, between 2000 and 2009, Brazil improved its mathematics score by 52 points from a base of 336, representing the strongest mathematics improvement of the 70 countries that participated in PISA during this period. Combining scores on reading, math and science, Brazil had the third largest overall improvement on PISA between 2000 and 2009, moving from 368 to 401.

### *Setting the context*

Brazil is the largest country in South America and is the world's fifth largest country in terms of both size and population, with over 192 million people. Formerly a Portuguese colony, Brazil achieved independence in 1822 and has been a presidential republic since 1889. Its current Constitution, formulated in 1988, defines Brazil as a Federal Republic. The Republic consists of a Federal District, 26 States, and 5,564 Municipalities. As one of the world's fastest growing major economies, Brazil has extreme income inequality, with the majority of the poor located in the northern regions. In 1996, Brazil had high dropout rates in the North and Northeastern regions (18.4% and 17% respectively), while the average dropout rate for the nation was 13.9%. Repetition rates followed the same pattern: 20.7% in the North and 21.2% in the Northeast, as compared with 13.3% nationally.

Between 1990 and 2010, Brazil's improvement in the educational attainment of the labor force was one of the fastest on record. Primary repetition and dropout rates have gone down considerably, both for the country as a whole and for the North and Northeastern regions. Secondary school enrollment in Brazil is now the highest in the

LAC region. Major gaps in performance are also closing, such as preschool and primary school completion.

### *Characteristics of education reform in Brazil*

A major education reform was introduced to Brazil with the election of President Cardoso in 1995, including the following components: (1) equalizing funding across regions, states and municipalities with the FUNDEF reform; (2) measuring the learning of all children on a common national yardstick (SAEB followed by Prova Brasil); and (3) promoting the educational opportunity of students from poor families (Bolsa Escola). With these reforms, plus the Law of Directives and Bases of Education (LDB), issued in 1996, and the first national curriculum guidelines, the Ministry of Education put in place the core elements of a national education policy.

In 2002, the newly elected Lula administration not only retained these core policies but expanded and strengthened them. FUNDEF financing for equalization was extended to secondary schools and pre-schools and was renamed FUNDEB. Bolsa Escola was consolidated with other transfer programs into Bolsa Família and coverage grew from 4.9 million families in 2002 to 12 million in 2009. Policies such as Bolsa Família have helped to narrow the gap in average schooling attainment between children from the top and bottom income groups over the past decade and a half. Learning outcomes for students from the lowest income quintiles have also improved, and the rise in PISA scores for the two lowest income quintiles over the past three years is particularly impressive. Unlike some of the other Latin American countries that participated, Brazil boosted PISA scores more for the lowest income groups than it did for the richer quintiles.

The following are key characteristics of the Brazil's reform over time:

- **Federal oversight:** After 1995, the federal government began to assume a stronger oversight role in several areas that are key for the management of a large and decentralized education system. In basic education, these included the normative functions of setting a basic legal framework for the sector (Lei de Diretrizes e Bases), national curriculum guidelines, developing nationally vetted lists of textbooks and reading books, supporting the development and delivery of teacher training and upgrading programs, and providing targeted technical and financial assistance to low-performing municipal education systems through the 2008 PAR initiative (Plano de Ações Articuladas).
- **System coherence and alignment** While system coherence is far more difficult to accomplish in a federal system, especially one that has states with such different economic and social conditions, Brazil has made significant progress in this direction. Brazil's central government has (1) established policies that foster a systemic approach to education and use state funding as incentives for implementing similar policies; (2) created a synthetic index, the IDEB, to establish standards for schools; (3) publicized scores that show performance levels in each



state and school to create public pressure for improvement; (4) identified and published promising practices that successful states have used and shared them with state leaders as possible strategies for improvement; and (5) held meetings with, and required improvement plans from, secretaries of education in low performing states.

- A comprehensive results measurement system: From a starting point of no information on student learning in 1994, the Cardoso and Lula administrations have systematically constructed one of the world's most impressive systems for measuring education results in terms of the quality and relevance of student and school performance information it provides. The system is composed of Prova Brazil (a census test held with 4th, 8th, and 11th grade students every two years in math and Portuguese which provides data at the state and municipal level) and IBED (a composite index of education quality which combines scores on Prova Brazil with data on student enrollment, repetition, and graduation). The Prova Brazil test and IDEB rankings have become a high-visibility source of public information on school and system performance. They are also the measurement anchor for a new wave of policies in Brazil aimed at creating stronger incentives for teachers and schools. In 2000, Brazil joined PISA and worked to ensure comparability between the national and international scoring scales. With an IDEB score for all but the smallest of Brazil's 175,000 primary and secondary schools, 5,000-plus municipal school systems, 26 state systems and the federal district systems, every single segment of the Brazilian education system can benchmark how well its students are learning and how efficiently its school or school system is performing.
- Establishing accountability in a federal system. Brazil has used the IDEB index to establish accountability at the school, municipality and state levels. The Ministry of Education has used its public statements, planning documents, and public relations initiatives to create public interest in IDEB results as a measure of improvements in educational quality in local schools. The business and industrial constituencies support these efforts. Local communities want their schools to score well in the ratings.
- Improving teacher and principal quality. Before the reforms, the standards for entering the teaching profession were very low. Teacher education institutions focused on the philosophy of education rather than the knowledge and skills needed to be an effective teacher. Recent efforts by the ministry and the São Paulo Secretariat are models for where to start to improve the teaching force. The ministry is proposing an assessment system for new teachers that could establish standards for entry into the profession. In addition, the 1996 Law of Directives and Bases of National Education require each state and municipality to establish career paths for teachers. Several states are creating career paths that link salaries to expertise, and some are developing incentive programs.
- Establishing standards for teachers. Recognizing the importance of establishing teacher standards is a key move toward increasing teacher quality in Brazil. An

examination for teachers prior to entering the classroom is a first step towards a better-qualified teaching corps, as is the initiative for all states and municipalities to develop career plans that connect expertise with compensation. A nationally available examination will help small states and municipalities that have not already developed examinations for entry-level teachers.

- Increase in funding for education and equity in the distribution of resources. From approximately 2% of GDP in 1995, basic education spending rose to 4% of GDP in 2008. FUNDEF, introduced in 1995, (1) guarantees a national minimum level of spending per student in primary education; (2) provides for a federally mandated system of funding redistribution within states along with a federally-managed top-up fund supplemented with federal resources; and (3) mandates that 60% of the total per student allocation be spent on teacher salaries and 40% to other operating costs. In addition, the federal government provided BRL 1 billion to support high schools by compensating the poorest states for their contribution to FUNDEF. The impact of the FUNDEF mandate in its first several years was a 70% increase in average teacher salaries in poorer municipalities in the Northeast and Northern regions of Brazil.
- Incentives for student attendance and learning: Brazil is still experimenting with incentives. It has established incentives for student attendance through the Bolsa Família, which provides a monthly payment to families in the lowest income quintile to parents who send their children to school and for regular health checkups. Through the Bolsa Família the poorest families have been raised to subsistence level, giving them the hope of continued social mobility and improving their interest in their children receiving an education. Teachers also found Bolsa Família to be a useful tool for enhancing attendance, by threatening parents with withdrawal of the bonus if their children's attendance slipped. By 2009, Bolsa Família covered more than 12 million families, or 97.3% of the target population, across Brazil.
- Use of benchmarking: Brazil's focus on teacher quality, accountability and school management is consistent with the best practices of high-performing countries. IDEB, which uses the U.S. National Assessment of Educational Progress (NAEP) and PISA as models, establishes goals for every school and measures their progress towards that goal.



## Namibia: An evolving educational reform characterized by continuity and based on strong ideological beliefs

### *Namibia's performance on SACMEQ over time*

Namibia was one of 15 African countries that participated in SACMEQ in 2001 and 2007. On reading, Namibia increased its mean score from 449 to 497 points, improving Namibia's rank from 14th to 10th. In mathematics, Namibia's mean score increased from 431 to 473 points, moving Namibia from 15th to 13th place. This was the highest increase in scores on both reading and mathematics of all of the 15 participating countries. However, even with these gains, Namibia's scores are below the SACMEQ mean of 500.

The shift in scores between 2001 and 2007 was due mainly to increases in reading and math scores in Namibia's poorer northern region. The score gap between Namibia's poorest and richest quintiles was narrowed from 130 to 107 in reading, and from 120 to 78 in math.

### *Setting the context*

Namibia's colonial history illustrates the dominant influences on the country's political, economic, and social life. A former German colony, Namibia was occupied during World War I by South Africa, which annexed the territory after World War II. The South-West Africa People's Organization (SWAPO) initiated a guerrilla war of independence in 1966, which culminated with independence in 1990. SWAPO has governed the country since that time.

Namibia, located in southern Africa with a population of 2.1 million, enjoys one of the highest levels of per capita income in Africa. However, this statistic is misleading. With a Gini (wealth equality) index of 74, Namibia also has one of the most unequal income distributions in the world. Much of the majority black population is poor, engaged in subsistence agriculture, and living in the Northern regions. In addition to economic challenges, HIV/AIDS is a significant factor in Namibia, with a prevalence rate of over 21 percent of the adult population.

With political independence in 1990, there was an immediate, radical and dramatic shift away from the South African apartheid system of 'bantu education' based on separation of language/ethnic groups to one based on the concepts of equality, access and democracy. The newly adopted Constitution, modeled largely on that of the United States, made the government responsible for providing access to compulsory education up through age 16 for all children. Education policy decisions were all driven by the political imperative of democratic inclusion.

In 1995, the Namibian Ministry of Education participated in the SACMEQ I Project, so as to establish post-independence benchmarks for the conditions of schooling and the quality of education in primary schools. The results from the SACMEQ I tests were very alarming, showing that the performance of Namibia's Grade 6 learners was lower than



that of the other five participating countries. The results also revealed large inequalities in educational achievement levels among learners and across schools and regions. The SACMEQ I project's results raised many questions about certain aspects of the post-independence education reforms that had been introduced into Namibia's schools. In 2000, test results from SACMEQ II provided similar results to those of SACMEQ I.

### *Characteristics of education reform in Namibia*

From the outset of the education reform movement starting in 1990, the Namibian government's goals were related to nation building and the democratization of the society, consistently guided by the overarching principles of equity, access, and quality.

As Namibia approached government targets for full enrollment and greater community and parent participation through mandated school boards, the education leadership moved toward reforms focusing on education quality. With greater public participation in decisions related to schooling, learner performance became a larger feature of the reform effort. Simultaneously, the Government and the Ministry of Education responded to pressure from donors, particularly USAID and the World Bank, to direct policy and practice toward empirical measures of effective practice, increasing the overall efficiency of the system.

The following are key characteristics of the two-decade long reform.

- Initial priority given to the 'formerly disadvantaged' regions. Especially in the early years, the government's strategy was to focus on the six 'formerly disadvantaged' regions in the north of the country where nearly 70 percent of the school age children are located. International donor-funded projects were directed to those regions and designed to support the implementation of major education policy initiatives. As progress was made, the Ministry of Education expanded implementation to the remaining regions.
- School level strategies (school improvement plans and school self-assessments) that began in the north and were subsequently adopted as national policy. The idea of school improvement plans (SIP) in 2000 came with the overall philosophy of the reforms, and was given substance through Basic Education Support (BES) II and III. Working in four northern regions (later expanded to six), the assistance project strengthened regional leadership, circuit support teams, and the protocols for SIP development. The school self assessment (SSA) tool, which became fully integrated into the SIP process as an extension of the ideology of community participation, was initiated after the Principal Secretary and other officials saw a similar approach on an official visit to the Seychelles. The SIP and SSA were adopted as national policy and incorporated into a School Self Evaluation system in 2005, and moved from project support to a Ministry function.
- Introduction of an assessment of learner achievement to be used for diagnostic purposes and to guide teacher training. Since achieving independence, Namibian leaders have been adamant that tests of student achievement would not be used to



determine a child's future. Instead, the implementation of Namibia's assessment of learner achievement, used strictly for diagnostic purposes, was a gradual process, beginning with the Grade 7 leaving exam, participation in the SACMEQ regional examinations, and gradually integrating the Learner Performance Assessment Instrument (LPAI) at the primary level for instructional improvement. The LPAI pilot was sufficiently successful that a previous ban on testing in the lower grades was abandoned, and additional assessment tools were developed and validated for Grades 5 and 8.

- Learner centered education (LCE) as a central driver of the reform. The political imperatives of democracy, respect for the individual (in this case the learner) and equal access are deeply embedded in the minds of the country's education leaders, manifested via learner-centered education (LCE). LCE relies on constructivist theories of human learning that is discovery and activity based as opposed to rote learning and assessment of factual knowledge. LCE was introduced by international donors in the SWAPO camp schools and formed the ideological basis of that instructional program.
- A major focus on teacher professional development. Important policies in the early years focused on teacher professional development, with the Basic Education Teacher Diploma (BETD) and a new curriculum taken directly from the principles that the Swedish advisors introduced in the SWAPO exile camps. A key feature of the system, which was carried out in communities where teachers work and reside, was LCE.
- Ongoing professional development of those Ministry of Education officials most directly involved with schools. A central feature of the institutional development, particularly in the period after 1995 when the Ministry of Education was consolidated, was the ongoing and supportive professional development of the cadre of Ministry officials most directly involved with schools: inspectors, advisory and resource teachers, and principals. The system was structured to put the LCE philosophy into practice. Over time, this embedded a deep sense of ownership among operational staff, school administrators, and the regional education leadership.
- Ongoing support from a major donor. The professional development program was strongly supported over a period of more than 10 years by a major donor partner, USAID. This reliable, collaborative donor-government relationship significantly contributed to the development of widespread capacity in the operational levels of the Ministry. USAID financing and technical assistance enabled the relatively intensive regional workshops that were an essential part of developing deep ownership. USAID assistance also provided the financing for Resource Teachers, an innovation that enabled circuit teams to provide the necessary level of support to schools. Ultimately, these positions were institutionalized in the regions.

- Political will and leadership at the highest levels of government, rooted in democratic ideology, along with growing support for education reform from civil society. The weak institutional capacity of the education system in the young democracy was unequal to the demands of quickly developing and implementing reform policies and absorbing the donor support. Nonetheless, the capacity constraints were offset by political will and leadership at the highest levels of government, and by growing support for education reform within civil society.
- A steering committee provided continuity and a forum for all stakeholders to work out their differences. Early on, USAID decided to establish a Steering Committee for project governance. The Steering Committee was headed by a senior Ministry official and composed of the heads of each of the departments, as well as the director of the National Institute for Education Development (NIED), the regional education officers, and USAID. As an established management structure, the Steering Committee created a forum for continuity through personnel changes, because changes in Ministry offices, regional directors, NIED, and USAID did not all happen at the same time. It also provided a forum for stakeholders to work out their differences.
- A long-term view of the development and renovation of Namibia’s education system. Namibia’s reform effort required many dedicated people working systematically and patiently for two decades on revising and implementing new curricula, making a national change in the official language of instruction, expanding and improving teacher education programs, and correcting major historical imbalances in the provision of essential resource inputs to schooling.

## **Massachusetts: a comprehensive education reform that has been ongoing since 1993**

### *Massachusetts’ performance over time on international and national tests*

The state of Massachusetts participated in TIMSS (8th grade only) in 1999 and again in 2007 (both 4th and 8th grade). In addition, Massachusetts (along with all of the remaining 49 states in the United States) has been participating in NAEP, which has been administered every two years since the early 1970s.

#### **TIMSS**

In 1999, Massachusetts’ 8th graders tied for 6th place in science and 11th place in math on TIMSS. By 2007, the state’s 8th graders had moved up to a ranking of 3rd in science achievement and 6th in mathematics. In 2007, Massachusetts’ 4th graders ranked 2nd worldwide in science achievement on TIMSS, and 4th in mathematics.

#### **NAEP**

In 1992, the year before Massachusetts major reform (MERA) was passed, Massachusetts ranked sixth of all the U.S. states in its performance on 4th grade math



on NAEP, and fourth in 4th grade reading, 8th grade math and 8th grade science. By 2009, Massachusetts ranked first of all the U.S. states in performance on all the NAEP 4th and 8th grade tests (4th grade math and reading, 8th grade math and reading). Between 2001 and 2011, performance among low income 4th graders on reading in the state achievement test, MCAS, increased by 6 points, as compared to 1 point for white students and 2 points for the state average. Over the same period, low-income eighth grade students improved by 25 points in reading as compared to 10 and 12 points, respectively, for white eighth grade students and the state average for eighth graders.

### *Setting the context*

The Commonwealth of Massachusetts in the United States is one of the original thirteen colonies that declared independence from Great Britain in 1776. It is located on the Northeastern coast of the United States and has a population of 6.5 million. As a state, Massachusetts has a long tradition of valuing the importance of education. Harvard University, founded in 1636, is the oldest institution of higher learning in the U.S. and one the most prestigious universities in the world. The Boston Latin School, established in 1635, is the oldest public school in the United States. John Adams, third President of the United States, was one of the key drafters of the constitution of the Commonwealth of Massachusetts, which was approved in 1780. Built into the constitution is the recognition of the importance of education for all citizens and the establishment of public schools and grammar schools.

### *Education reform in Massachusetts*

In the early 1990s, low-income districts in the state of Massachusetts brought and won a class action suit against the state of Massachusetts for violating a provision in the Massachusetts Constitution specifying that all citizens had the right to a quality education. The state's response was the Massachusetts Education Reform Act (MERA) of 1993. The reform act called for dramatic changes in public education between 1993 and 2000. Among the major improvements have been greater and more equitable funding to schools, accountability for student learning, and statewide standards for students, educators, schools and districts. The provisions of the Reform Act were extended in 2007 and remain applicable.

The following are specific actions taken since 1993 to meet the provisions of MERA:

- Increased state funding for public education. MERA doubled state funding of K–12 from \$1.3 billion in 1993 to \$2.6 billion in 2000.
- A 'Foundation Budget' for all districts. MERA laid out the concept of a minimum budget necessary for each district to adequately educate all of its students. Poorer communities that were spending below foundation-budget levels received more state funding than those at or above the threshold. By 2002, all districts were at or above foundation level.

- Learning standards. MERA instructed the Board of Education to develop curriculum frameworks and other standards and to support their implementation in local districts. Statewide accountability standards have also been established, which bring more focus to teaching standards. Frameworks have been developed in the arts, English language arts, foreign languages, health, mathematics, history/social science, and science, technology, and engineering. These standards have been revised twice. Standards for science and math were developed in 2003 with benchmarking information used on TIMMS.
- Student assessment. MERA required an assessment of student learning based on these frameworks and specified a competency determination as a requirement for graduation. The Massachusetts Comprehensive Assessment System (MCAS) has been developed and implemented for those purposes. MCAS tests have been administered in multiple grades in English language arts, mathematics, reading, science, technology, engineering, and history/social science. Students in the class of 2003 and beyond must perform at least at the 'Needs Improvement' level in English language arts and mathematics in order to graduate.
- Standards based math and science curricula: A framework for teaching in math and science (geared to the MCAS) has been developed and is in wide use.
- Changes in time spent on math and science: As a result of analyzing and comparing its performance on TIMSS in 1995 against other participants, Massachusetts has increased the time devoted to teaching math at elementary level from 30 minutes a day in 1997 to 60 minutes a day in 2007. Fourth grade teachers devote more time to computation with whole numbers, decimals, fractions, and fractions, which is the major focus of math internationally. The time devoted to number topics in 4th grade increased from one third to 60 percent. In 8th grade, the time devoted to Algebra has quadrupled from 11% to 44%.
- An accountability system for school and district performance. MERA required the state to hold schools and districts accountable for student performance and to provide remedies for persistent underperformance. This has proven to be quite a challenge for the state, with several changes of jurisdiction occurring. A 'performance index' process has been developed based on MCAS scores and has been judged to be in compliance with the federal No Child Left Behind Act.
- Changes in local education governance and management. MERA included significant changes in the way schools and districts are run. School Committees' power over personnel issues was reduced, with superintendents and principals given more authority. All schools were to have School Councils composed of parents, teachers, students, and administrators.
- Enhancing educator quality. A portion of state aid to local districts was earmarked for teacher professional development. Teacher licensure has been revised, and teacher tests for new teachers have been instituted.



- Accountability by putting the onus on students, not teachers, to reach performance targets. Massachusetts has instituted a stick and carrot approach to stimulate students to improve their test performance. All graduating grade students must pass the MCAS test to graduate from high school. Those that perform at a certain level or higher receive tuition waivers to attend state institutions of higher learning.
- Ensuring readiness to learn through early childhood education programs. Between 1996 and 1999, spending on early childhood education increased by 247 percent.



## **Annex 2: Individuals Interviewed**

Kate Beattie: National Assessment for Education Progress (NAEP) Coordinator, Minnesota State Department of Education

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### Annex 3: Acronyms

|        |  |
|--------|--|
| BES    | Basic Education Support Project  |
| BETD   | Basic Education Teacher Diploma  |
| EFA    | Education for All  |
| FUNDEF | Fund for Maintenance and Development of the Fundamental Education and Valorization of Teaching |
| FUNDEB | Fund for the Development of Basic Education and Appreciation of the Teaching Profession        |
| GDP    | Gross Domestic Product   |
| IDEP   | Index of Basic Education Quality   |
| IEA    | International Association for the Evaluation of Educational Achievement                        |
| GER    | Gross Enrollment Ratio   |
| LCA    | Learner Centered Education   |
| LDB    | Law of Directives and Bases for Education  |
| LPAI   | Learners Performance Assessment Instrument   |
| MCAS   | Massachusetts Comprehensive Assessment System  |
| MERA   | Massachusetts Education Reform Act   |
| NCLB   | No Child Left Behind   |
| NER    | Net Enrollment Ratio   |
| NIE    | National Institute of Education  |
| NIED   | National Institute for Education Development   |
| NAEP   | National Assessment of Education Progress  |
| NBER   | National Bureau for Economic Research  |
| NCES   | National Center for Education Statistics   |
| OECD   | Organization for Economic Cooperation and Development  |
| PASEC  | Program on the Analysis of Education Systems for West Africa                                   |
| PIRLS  | Progress in International Reading Study  |
| PISA   | Program for International Student Assessment   |
| SIP    | School Improvement Plan  |
| SACMEQ | Southern Africa Consortium for Monitoring Educational Quality                                  |
| SAEB   | National Assessment of Basic Education   |
| SSA    | School Self Improvement  |
| SWAPO  | South West Africa People's Organization  |
| TED    | Technology, Entertainment, and Design  |
| TIMSS  | Trends in Mathematics and Science Study  |
| DFID   | Department for International Development   |
| UNESCO | United Nations Educational, Scientific, and Cultural Organization                              |
| US     | United States  |
| USAID  | United States Agency for International Development   |

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