Chapter 4

Distance from the goal of basic skills for all

How far do countries have to go to achieve the goal of basic skills for all? This chapter offers a comprehensive picture of the current state of "knowledge capital" in each of the 76 countries that have relevant data. It also provides additional information about some of the countries in Latin America and sub-Saharan Africa that have not participated in either PISA or TIMSS, but have participated in regional assessments, and information concerning India and China.

To appreciate both the possibilities and the challenges that lie ahead, it is important to understand the current level of skills across countries. Previous assessments of the state of schooling around the world have relied heavily upon estimates of countries' rates of school attendance and completion.[1] While there has been growing recognition that quality and learning are not the same as school attendance, there is not yet a consistent measurement of the knowledge capital of nations.[2] This report splices together available information from international assessments to give the most comprehensive picture possible.

The starting point is comparative data for the 81 countries that have participated in the most recent mathematics and science assessments in either the Programme for International Student Assement (PISA) or the Trends in International Mathematics and Science Study (TIMSS). Most of these (65 countries) are consistently recorded in the PISA 2012 assessment of 15-year-olds. These data are combined with data for 16 additional countries that participated in the TIMSS 2011 assessment of eighth graders, but not in PISA. Combining data from the two tests is justified, since results for the two tend to be very similar. Among the 28 countries participating in both, the correlation of average achievement scores across the two tests is 0.944 in mathematics and 0.930 in science. All countries are placed on the PISA scale. (Annex B describes the methodology for combining the tests; Table B.1 lists the countries for which testing data are available and indicates whether data come from PISA or from TIMSS).[3]

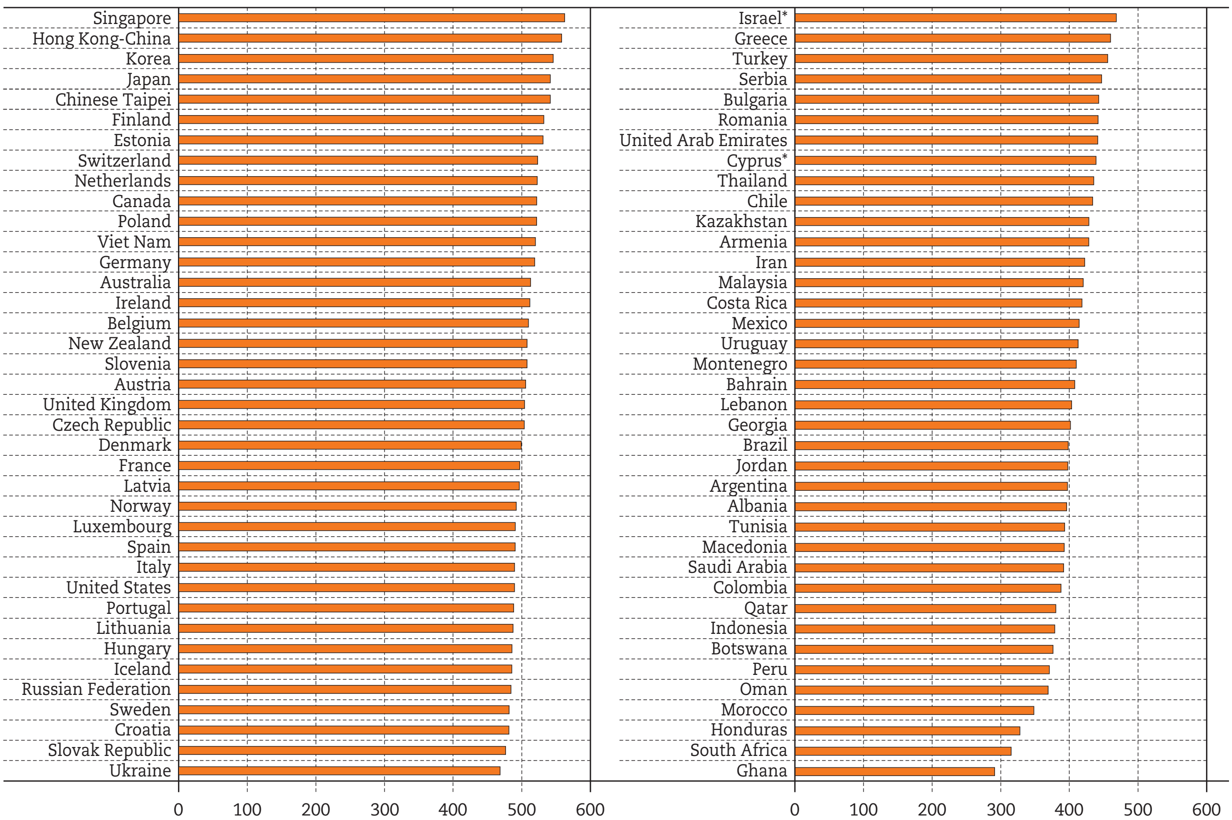
Ultimately, the analysis includes the 76 countries with both assessment information and internationally comparable data on GDP.[4] These 76 countries accounted for 68.1% of world GDP and 36.9% of the world's population in 2013, according to estimates by the International Monetary Fund (IMF).[5]

Average achievement and lack of basic skills in participating countries

The simplest view of variations in knowledge capital across the 76 countries is found in Figure 4.1, which ranks the countries by their averaged mathematics and science test scores.

Twenty-one countries have average scores above 500, the OECD average in 2000. On average, Singapore is over 0.6 standard deviation above this mean. At the other end of the spectrum, students in Ghana are over two standard deviations below it. A rough rule of thumb from high-income countries is that, on average, students' test scores increase by about one-quarter to one-third of a standard deviation per year. Thus, average country differences of such magnitude among students who have spent the same amount of time in school indicate truly enormous learning differences across students in different countries. In other words, they indicate dramatic variations in countries' knowledge capital. Interestingly, average scores for low- and high-income countries show virtually no overlap; with few exceptions, the latter are significantly higher than the former.

FIGURE 4.1 AVERAGE PERFORMANCE ON INTERNATIONAL STUDENT ACHIEVEMENT TESTS

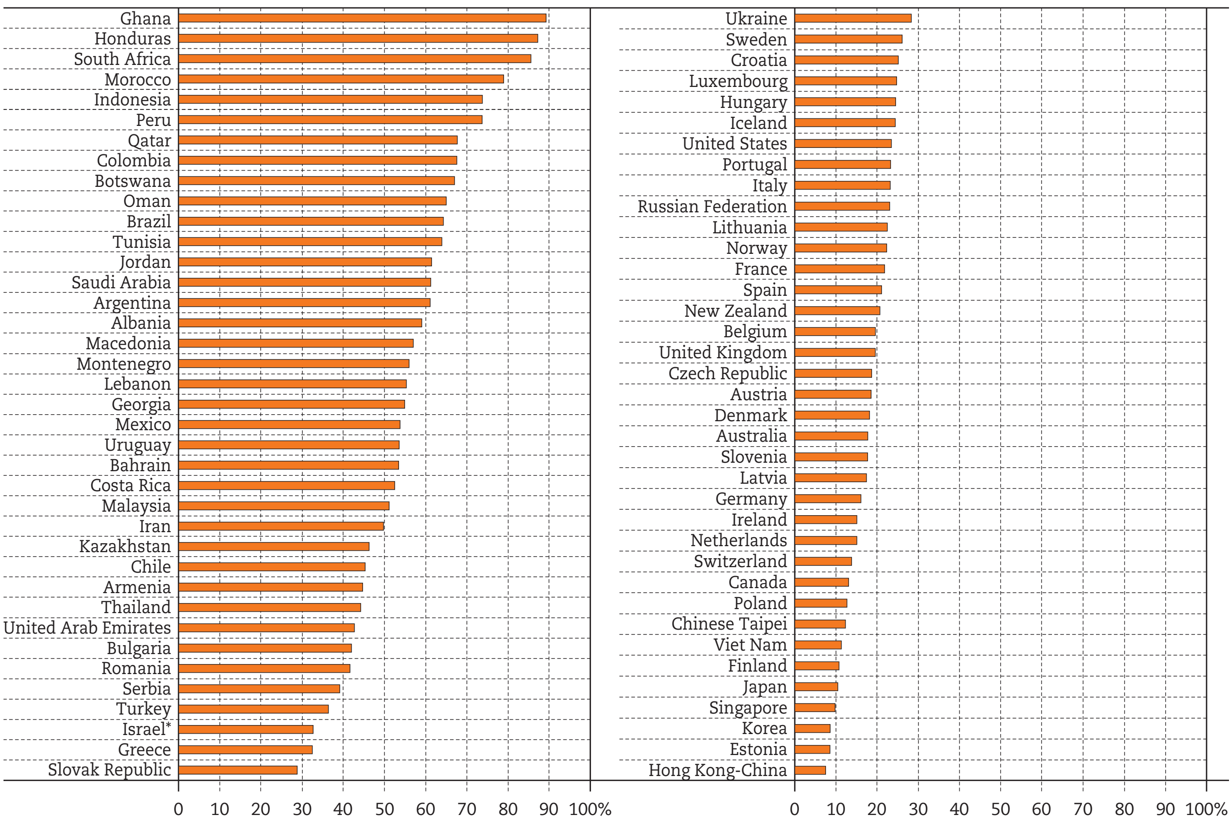


* See notes at the end of this chapter.

Notes: Average score on international student achievement tests. Average of mathematics and science. PISA participants: PISA 2012 score; TIMSS (non-PISA) participants: based on 8th-grade TIMSS 2011 micro data, transformed to PISA scale. See Annex B and Table B.1 for details.

In terms of the education development goals, of course, the interest centres on the population of each country that has not yet acquired basic skills. Figure 4.2 presents, for the 76 countries, the share of youth in school who fall below the level that indicates the acquisition of basic skills, that is, below 420 on the mathematics and science assessments. One might expect countries with higher average scores to have smaller shares of students without basic skills, and the ranking of countries in Figure 4.2 does look close to the mirror image of Figure 4.1, which shows the average scores (though in fact the rankings are slightly different). The correlation between the average score and the share of youth who score below 420 points is -0.989.

FIGURE 4.2 SHARE OF STUDENTS NOT ACQUIRING BASIC SKILLS



* See notes at the end of this chapter.

Notes: Share of students performing below 420 points on international student achievement test. Average of mathematics and science. PISA participants: based on PISA 2012 micro data; TIMSS (non-PISA) participants: based on 8th-grade TIMSS 2011 micro data, transformed to PISA scale. See Annex B and Table B.1 for details.

In 9 of the 76 countries (Ghana, Honduras, South Africa, Morocco, Indonesia, Peru, Qatar, Colombia and Botswana), more than two-thirds of students fail to meet the level of basic skills. Hong Kong-China, Estonia, Korea and Singapore lead at the other end of the distribution, but even these countries/economies face the challenge of ensuring that all youth attain basic skill levels. Even the richest countries in the world also have significant populations without basic skills: Luxembourg (25%), Norway (22%), the United States (24%) and Switzerland (14%). In other words, the development goal is significant and real for all of the countries in the world.

Improving in PISA: Korea

Korea has consistently performed at the top level in PISA, and has still improved over time. In PISA 2000, Korea performed on a par with New Zealand, Sweden, Australia, Hong Kong-China, Japan and Ireland; by 2012, Korea outperformed the first three. Performance in reading, for example, has improved by an average of almost one score point per year since 2000. As a result, Korea's average score in reading increased from 525 points in 2003 to 536 points in 2012. This improvement was concentrated at the top of the performance distribution: the percentage of students scoring at or above proficiency Level 5 in mathematics increased by more than eight percentage points since 2000 to 14% in 2012. While the mathematics scores among the top 10% of students have improved by more than 30 points during the period, no change was observed among low-achieving students. Korea's performance in science also improved consistently throughout its participation in PISA: science performance increased by an average of 2.6 points per year since 2006 so that average scores in science rose from 522 points in PISA 2006 to 538 points in PISA 2012.

Korea's improvements in reading were concentrated among high-achieving students. the average improvement of high-achieving students outpaced that of lower-achieving students. Higher standards in language literacy were put in place in the mid-2000s, and language literacy was given more weight in the competitive College Scholastic Ability Test (CSAT), the university entrance examination. This could explain the increase in the share of top-performing students in Korea, as high-achieving students have more incentives to invest in language and reading literacy. Also, and particularly since 2010, programmes for gifted students have been expanded at the primary and secondary levels, and the secondary curriculum has been strengthened to meet the needs of these students (MEST, 2010).

Education policies have been linked to macroeconomic development first through centralised planning (1962-91) then by co-ordinated and strategically oriented approaches through the National Human Resource Development Plans (one for 2001-05 and another for 2006-10, for example). They have followed a sequential approach. Prior to 1975, 65% of the education budget was spent on primary education; in the following decades, secondary education received a greater share of funding and by the late 1990s, public investment in tertiary education was expanded. In the mid-1990s, a comprehensive school reform was launched, introducing school deregulation, choice, a new curriculum and increased public expenditure. Individual schools began to assume more management responsibilities. By 2012, schools had greater autonomy, and programmes were specifically designed to assist school leaders in assuming their new roles (World Bank, 2010).

The National Assessment of Educational Achievement programme

The National Assessment of Educational Achievement (NAEA) programme was introduced in 1998. NAEA assesses educational achievement and trends among all 6th-, 9th- and 10th-grade students in Korean Language Arts, English, mathematics, social studies and science. Since 2010, the programme changed the grade coverage from 6th-, 9th- and 10th to 6th-, 9th- and 11th. The Subject Learning Diagnostic Test (SLDT) was introduced in 2008 and is implemented by the Nationwide Association of Superintendents of metropolitan/provincial offices of education. The previous Diagnostic Evaluation of Basic Academic Competence (DEBAC), which had tested primary school 3rd grades at the national level since 2002, was delegated to metropolitan/provincial offices of education. The Subject Learning Diagnostic Test measures basic competency in reading, writing and mathematics among 3rd-, 4th-, 5th-, 7th- and 8th-grade students. Through these assessment tools, the government and metropolitan/provincial offices can monitor individual student performance levels, establish achievement benchmarks, develop an accountability system for public education, and also identify students who need support. For example, in 2008, the government established the *Zero Plan for Below-Basic Students*, a national programme to ensure that all students meet basic achievement criteria. The NAEA assessment was converted from a sample-based test to a census-based test to identify and then support low-performing students. Also, MEST introduced a *Schools for Improvement* (SFI) policy in 2009 to provide support in closing education gaps and improving achievement, also with the aim of reducing the proportion of students who do not achieve basic proficiency. The SFI supports various education programmes, including providing more resources for low-income schools and schools with a high concentration of low-performing students (Kim et al., 2012).

The national curriculum was revised again in 2009, highlighting reasoning, problem solving and mathematical communication as key competencies in mathematics (MEST, 2011b). In 2012, the government announced a plan for improving mathematics education in keeping with the revised curriculum. The aim is to enhance skills in reasoning and creativity (MEST, 2012). This reform implies a profound change in the way teachers teach mathematics: up until now, teachers have largely taught to the CSAT.

Improving in PISA: Korea (continued)

Changes in the classroom

Reforms have also affected the teaching of language and reading. The focus of the Korean Language Arts Curriculum shifted from proficiency in grammar and literature to skills and strategies needed for creative and critical understanding and representation, similar to the approach underlying PISA. Diverse teaching methods and materials that reflected those changes were developed, and investments were made in related digital and Internet infrastructure. Schools were requested to spend a fixed share of their budgets on reading education. Training programmes for reading teachers were developed and disseminated. Parents were encouraged to participate more in school activities and were given information on how to support their children's schoolwork.

In both 2009 and 2012, Korea was among the OECD countries with the largest classes and, since 2003, Korean students have also been more likely to attend schools where the principal reported a teacher shortage. A concerted effort is underway to create more teaching posts. In 2010, more than 53 000 new jobs were assigned to the education-services sector, including 2 000 English conversation lecturers, 7 000 intern teachers, who support instruction, 7 000 after-school lecturers and co-ordinators, 5 500 full-day kindergarten staff, and 5 000 special education assistants. The teacher-training system has been expanded to enable outside experts to acquire teaching certificates (MEST, 2010; 2011a).

The school- and teacher-evaluation systems have also been reformed. Since 2010, the teacher-evaluation system, which was developed to improve teachers' professional capacities, was expanded to all schools. Results from the evaluation lead to customised training programmes for teachers, depending on their results. Given the greater autonomy granted to school principals, evaluation information will be made public and regional offices of education will oversee monitoring, focusing more on output-oriented criteria. Schools will use internal assessments to measure the improvement of students who do not meet the national assessment benchmarks. School-based performance-award systems were introduced in 2011 (MEST, 2011).

Fifteen-year-old students in Korea spent an average of 30 minutes less in mathematics classes in 2012 than their counterparts in 2003 did, yet a large number of Korean students participate in after-school lessons. While private lessons are common among those who can afford them, after-school group classes are often subsidised, so even disadvantaged students frequently enrol. For example, in June 2011, 99.9% of all primary and secondary schools were operating after-school programmes and about 65% of all primary and secondary students participated in after-school activities (MEST, 2011c). Many observers suspect that the high participation rates in after-school classes may be due to cultural factors and an intense focus on preparing for university entrance examinations. PISA 2006 data show that Korean students attending schools with socio-economically advantaged students are more likely to attend after-school lessons with private teachers than students in other countries; and disadvantaged students in Korea are more likely to attend after-school group lessons than disadvantaged students in other countries. In both cases, attendance in these lessons, along with other factors, is associated with better performance on PISA (OECD, 2010).

Sources:

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Achievement of other countries on regional tests

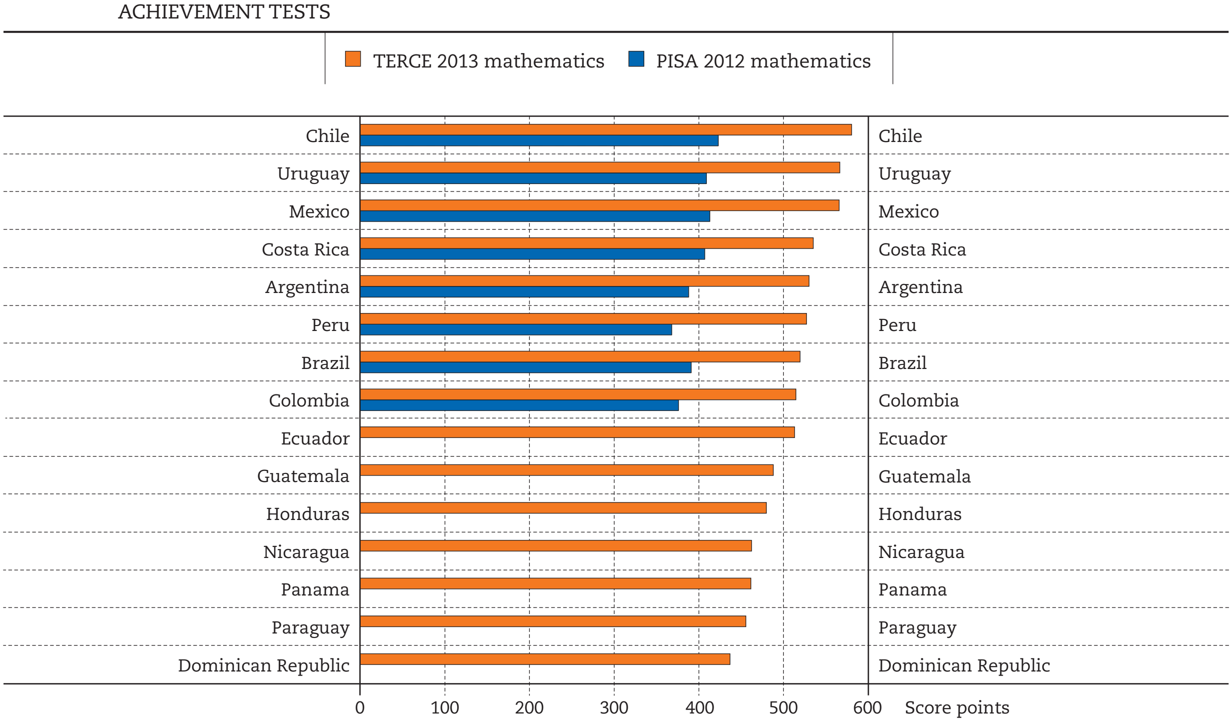
Can anything be said about the educational achievement in countries that did not participate in the PISA and TIMSS tests? It would be reasonable to suppose that participating countries have greater knowledge capital than non-participants. Indeed, there is ample evidence that in many developing countries that do not participate in international tests, a majority of students does not attain basic skills, despite spending considerable time in school (Prichett, 2013). But because they do not participate in the international assessments, it is difficult to determine the challenges these countries face. The following provides information about some of the countries in Latin America and sub-Saharan Africa that have not participated in either PISA or TIMSS as well as information concerning India and China.

LATIN AMERICA

Eight countries in Latin America participated in the PISA 2012 assessments, and only Chile (in 48th place) was among the 50 with the highest average scores. But performance in Latin American countries can also be observed through the regional testing in 2013 that included these eight countries plus an additional seven that did not participate in PISA. This regional assessment, called *Tercer Estudio Regional Comparativo y Explicativo* (TERCE), was the third for the region and provides information on mathematics performance among the slightly younger cohort of sixth graders.[6] The correlation among the eight participants in both TERCE and PISA is 0.86. In other words, the rankings of these countries based on TERCE scores are very similar to the rankings based on PISA scores. This similarity can be seen in Figure 4.3, which shows performance rankings on TERCE in sixth-grade mathematics interwoven with the PISA score (blue bars) for those countries participating in both.

None of the countries that did not participate in PISA scored above any of the participants – and the participants scored very poorly.[7] The additional information provided by the TERCE scores suggests that skill levels among all Latin American students are even lower than what the observed PISA scores suggest.

FIGURE 4.3 AVERAGE PERFORMANCE OF LATIN AMERICAN COUNTRIES ON INTERNATIONAL AND REGIONAL STUDENT ACHIEVEMENT TESTS



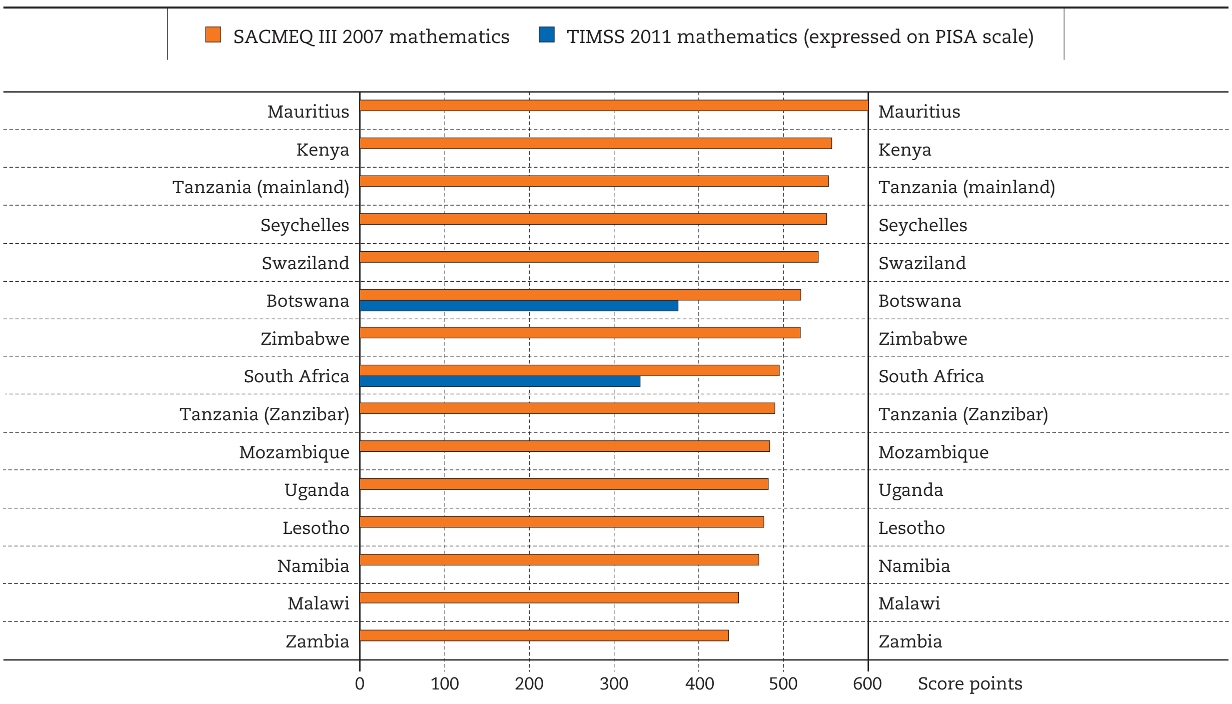
Notes: Average score on international student achievement test. TERCE: 6th-grade mathematics, 2013. PISA: 15-year-olds, mathematics, 2012.

SUB-SAHARAN AFRICA

A similar expansion of countries is possible for sub-Saharan Africa. The Southern and Eastern Africa Consortium for Monitoring Educational Quality (SACMEQ) has tested students in African countries at three different times. SACMEQ III provides information on sixth-grade mathematics in 15 African countries in 2007.[8]

Figure 4.4 ranks the SACMEQ countries by their mathematics scores in 2007. Also included in the figure is the regional ranking of Botswana and South Africa, which were 70th and 75th, respectively, on the international scale of PISA/TIMSS. Botswana and South Africa are two of the three countries, together with Honduras, that assessed ninth-graders in TIMSS because the assessment was deemed too difficult for eighth-graders. Thus, their international performance is likely to be overstated.

FIGURE 4.4 AVERAGE PERFORMANCE OF SUB-SAHARAN AFRICAN COUNTRIES ON INTERNATIONAL AND REGIONAL STUDENT ACHIEVEMENT TESTS



Notes: Average score on international student achievement test. SACMEQ III: 6th-grade mathematics, 2007. TIMSS: 9th-grade mathematics, 2011 (expressed on PISA scale, see Annex B for details).

Among the SACMEQ countries, Botswana and South Africa fall roughly in the middle, indicating that, contrary to the experience in Latin America, the countries not participating in the international tests are not uniformly on the bottom of the skills distribution. Nonetheless, the evidence does not suggest that the countries that have not participated in the international assessments are internationally competitive. While Mauritius is a full standard deviation ahead of Botswana on the SACMEQ III test, the other countries that have not participated in the international testing that outpace Botswana (Kenya, Tanzania, the Seychelles and Swaziland) are ahead by just 0.3 standard deviation. If this gain were carried over to the international scale (see Figure 4.1), these countries would fall somewhere between 55th and 60th in the world rankings.

The regional picture from just the participating countries' performance does not seem to have significantly biased the picture of African performance. But the key for development prospects is that participating countries are virtually at the bottom of the international achievement picture – and 7 of the 13 other participants on the regional test fall even below them.

INDIA

Comprehensive data for India are not available, but two Indian states participated in PISA in 2009:

Himachal Pradesh and Tamil Nadu.[9] The average mathematics and science performance of Himachal Pradesh is 331.8 points and that of Tamil Nadu is 349.6 points.[10] These scores place them (just) ahead of Kyrgyzstan (330.5 points), but below the other 63 PISA participants in 2009 – and below every one of the 64 PISA participants in 2012, when Peru scored the lowest (370.6 points).

The question, however, is where these states fall in the distribution of skills for India – that is, how representative they are for the country as a whole. Comprehensive data are not readily available, but the 2011 Census of India ranked Himachal Pradesh 11th and Tamil Nadu 14th in literacy among the country's 35 states and union territories.[11] In terms of poverty, Himachal Pradesh has the fourth lowest poverty rate and Tamil Nadu the tenth lowest. Thus, these states do not appear to be at the bottom of the education distribution in India.

Two other studies also show poor student performance in India. The first, by Das and Zajonc (2010), estimates rankings for two states (Orissa and Rajasthan) using released items from the TIMSS assessments. It concludes that "these two states fall below 43 of the 51 countries for which data exist. The bottom 5% of children rank higher than the bottom 5% in only three countries – South Africa, Ghana and Saudi Arabia."

The second study, the 2014 Annual Status of Education Report (Rural) for India, calls the results for basic reading "extremely disheartening." The report notes that in 2014, a quarter of third-graders, half of fifth-graders, and about three-quarters of eighth-graders could read at a second-grade level.[12] Judging from the eighth-grade results, the goal of having all students reach basic skills (Level 1) is a very distant one.[13]

CHINA

China has not participated in PISA or TIMSS, although there are PISA 2012 results available for Shanghai-China.[14] Shanghai's scores – 613 points in mathematics and 580 points in science – were higher than those of Singapore, the country ranked first among the 76 countries shown in Figure 4.1.

It is difficult to know how to generalise from these results. Shanghai is the wealthiest city in China and has attracted a very skilled labour force.

While a larger sample of other provinces have carried out PISA assessments on their own, their results have not been made public. Thus, it is not possible to generalise about the achievement levels for China as a whole.

School enrolment in participating countries

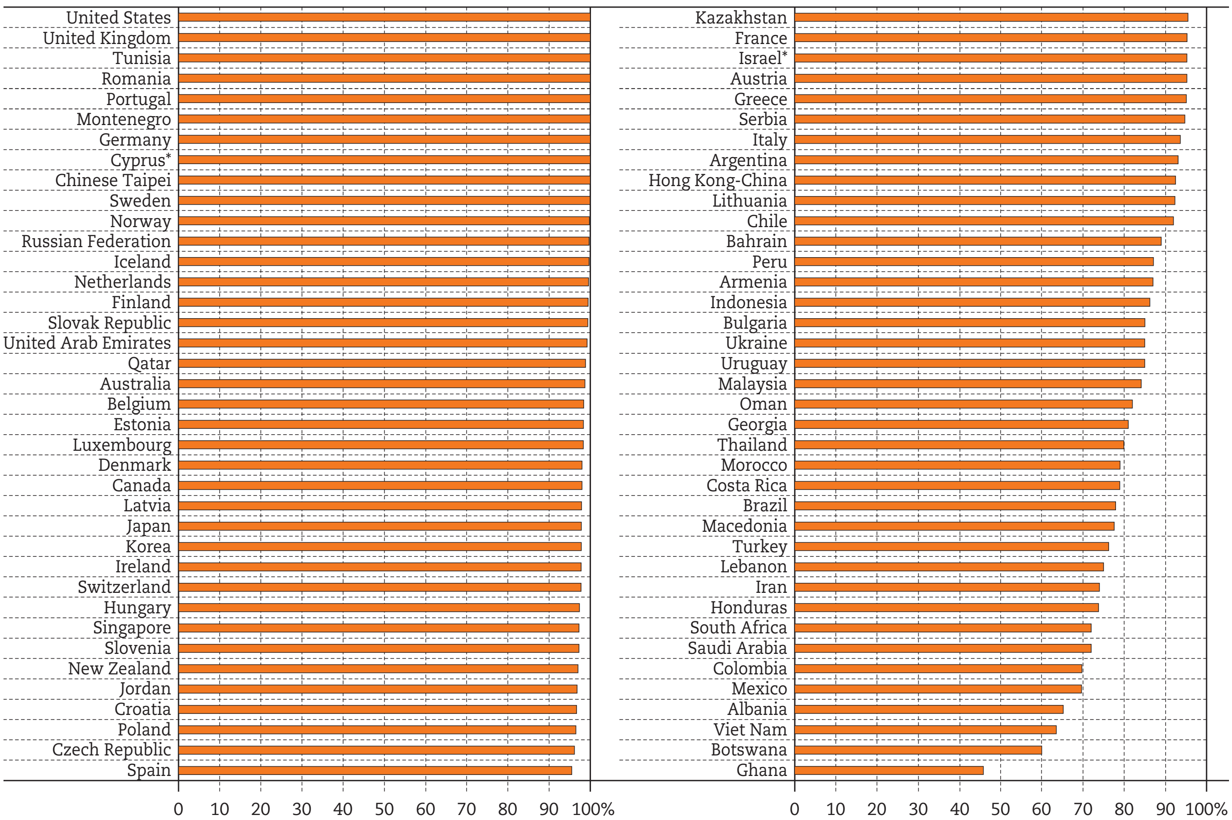
The provided score distributions, however, do not give the entire picture of countries' knowledge capital, since significant numbers of youth – particularly in lower-income countries – are not enrolled in school, and thus are not being tested. There is reason to be concerned about the number of countries that have yet to ensure broad access to and enrolment in secondary schools.

Figure 4.5 displays net enrolment rates at the tested age for each of the 76 countries in the test sample.[15] While 44 of the countries have over 95% participation of their 15-year-olds, the participation rates begin to fall significantly after this point. In the bottom 17 countries, less than 80% of 15-year-olds are enrolled.

The concern about low enrolment and its effect on knowledge capital is probably best illustrated by Viet Nam. On the 2012 PISA test, Viet Nam ranked 12th; moreover, less than 12% of tested Vietnamese students fell below the basic skills level of 420 points. Yet only 64% of Viet Nam's 15-year-olds were enrolled in school in 2012. Its enrolment rate is 74th among the 76 countries; only Botswana and Ghana have lower rates. Given its highly selected school population, it is impossible to conclude that Viet Nam is approaching the goal of basic skills for all.

Admittedly, Viet Nam is an exception. Most countries near the bottom on enrolment also tend to have low achievement. Ghana, for example, has the lowest achievement among young people in school of all 76 countries, while Botswana is 70th in the achievement rankings. In fact, the correlation between the average score and the enrolment rate in the 76-country sample is 0.659. Enrolment rates and achievement levels appear to be strongly and positively related, in general (Hanushek and Woessmann, 2011).

FIGURE 4.5 SECONDARY SCHOOL ENROLMENT RATES



* See notes at the end of this chapter.

Notes: PISA participants: share of 15-year-olds enrolled in school; TIMSS (non-PISA) participants: net enrolment ratio in secondary education (% of relevant group).

The development challenge

Historically, development policy has sought to ensure access to school in developing countries. But this focus has proved to be too limited; countries that have managed to increase their enrolment rates have frequently not seen the economic gains that were expected (Pritchett, 2006).

Three important conclusions can be drawn from the analysis of the knowledge capital of nations. First, low-income countries are even farther behind high-income countries than most people realised. There is virtually no overlap in learning in high- and low-income countries. Second, the problem of inclusion is not only faced by developing countries. High-income countries all have significant percentages of youth who do not have the basic skills required by the modern, information-based markets of the world. Third, many countries – usually poor countries – have never participated in international assessments, and for many of them, achievement would likely measure very low if they did. The available evidence that can be pieced together from regional tests generally supports this notion. On the other hand, the performance of Shanghai-China on PISA 2012 and of Mauritius on SACMEQ III does suggest some important heterogeneity among the countries that have not participated in the international tests.

NOTES

1. See, for example, the annual reports for the Education for All initiative, UNESCO (2014).

2. There have been previous attempts to catalogue available assessment data (e.g. Greaney and Kellaghan, 2008), but these have not combined different instruments and have not assessed basic skills. Filmer, Hasan and Pritchett (2006) use a PISA Level 1 standard and estimate values for those young people not in school for their sample of 11 countries that are intensively analysed.

3. TIMSS has broader coverage in the developing world. The 16 countries considered where achievement data come from TIMSS rather than PISA are Armenia, Bahrain, Botswana, Georgia, Ghana, Honduras, Iran, Lebanon, Macedonia, Morocco, Oman, Palestine, Saudi Arabia, South Africa, Syria and Ukraine.

4. The five countries with test-score information but without internationally comparable GDP data are Liechtenstein (average score 530 points; share below basic skills 0.137), Macao (529 points; 0.107), Palestine (388 points; 0.599), Shanghai-China (596 points; 0.036), and Syria (379 points; 0.646).

5. The GDP estimate is based on the purchasing-power-parity (PPP) share of the world total. Note that this is 58.6% of the world population outside China and India (which, by themselves, constitute 37.1% of the world population); see below for more on China and India.

6. Information on TERCE can be found in *Laboratorio Latinoamericano de Evaluación de la Calidad de la Educación* (2014). In other work, Hanushek and Woessmann (2012) linked the two earlier assessments (LLECE and SERCE) to the worldwide tests, allowing for a substantial expansion of the information on Latin America.

7. Honduras did not participate in PISA but did participate in TIMSS (although at ninth grade rather than the usually required eighth grade, thus with likely overstated performance). It is ranked 74 in the world rankings of 76 countries, and it is eclipsed in TERCE by Ecuador and Guatemala.

8. See Hungi et al. (2010) on SACMEQ. A second regional test in Africa (*Programme d'Analyse des Systèmes Éducatifs de la CONFEMEN*, or PASEC) provided achievement tests for a set of French-speaking countries, but there was no direct way to link these tests to the international testing.

9. Note that India participated in the First International Science Study (FISS) in 1971. Its combined score across the three age groups tested was 428, although this score was greatly affected by the score of 475 in the highly selected last year of school. It has not subsequently participated as a country in any of the international assessments.

10. Note that results for these two states are not included in the PISA 2009 report, but are available in the PISA online database.

11. *http://en.wikipedia.org/wiki/Indian_states_ranking_by_literacy_rate* [accessed February 24, 2015].

12. See *http://img.asercentre.org/docs/Publications/ASER%20Reports/ASER%202014/ fullaser2014mainreport_1.pdf* (accessed February 24, 2015).

13. See also the illustrations and the broader analysis of the ASER survey results in Pritchett (2013).

14. Results are reported separately for Hong Kong-China and Chinese Taipei (Taiwan), which have participated in testing and which enter into the growth analysis in Chapter 2 because of historically available economic data. Macao, which also participated, had scores of 538 points in mathematics and 521 points in science, which would place it eighth in the ranking, but it does not enter into the economic analysis.

15. For PISA participants, the enrolment rate is the total enrolled population of 15-year-olds at grade 7 or above divided by the total population of 15-year-olds. This is capped at 100% for three countries where it exceeds 100% due to differing data sources: Portugal 1.173, the United States 1.022, and the United Kingdom 1.010; see OECD (2013), Table A2.1. For TIMSS participants who did not participate in PISA, it is the net enrolment ratio in secondary education (as a percentage of the relevant group); see Mullis et al. (2012), based on World Development Indicators (WDI) 2011 and additional sources. Macedonia refers to the net enrolment ratio in 2005, the latest available from the WDI (where subsequent gross enrolment ratios indicate stability over time); Honduras refers to the gross enrolment ratio in 2011 from the WDI.

Notes regarding Cyprus

Readers should note the following information provided by Turkey and by the European Union Member States of the OECD and the European Union regarding the status of Cyprus:

Note by Turkey

The information in this document with reference to “Cyprus” relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Turkey recognises the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of the United Nations, Turkey shall preserve its position concerning the “Cyprus issue”.

Note by all the European Union member States of the OECD and the European Union

The Republic of Cyprus is recognised by all members of the United Nations with the exception of Turkey. The information in this document relates to the area under the effective control of the Government of the Republic of Cyprus.

Note regarding Israel

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

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