Policy Implications

Evidence of the importance of *reading literacy* for the success of individuals, economies and societies has never been stronger. After nearly a decade of PISA studies, those participating countries that have conducted longitudinal studies have shown that the reading skills which PISA measures are a strong predictor of positive outcomes for young adults, influencing the chance that they will participate in post-secondary education and their expected future earnings. Assessments of adult literacy have also found that the adult population's measured literacy levels can do far more to explain a country's economic success than the length of time that they have spent in education.

Not surprisingly, the percentages of young people who display very low and very high levels of literacy and the gap between them, which reflects the amount of inequality among populations or subgroups, have profound implications for a nation's prospective economic and social development.

The results of PISA 2009 show wide differences between countries in the knowledge and skills of 15-year-olds in *reading literacy*. The equivalent of an average of six years of schooling, 242 score points, separates the highest and lowest average performances of the countries that took part in the PISA 2009 reading assessment. Differences *between* countries, however, represent only a fraction of overall variation in student performance. The difference in reading performances *within* countries is generally even greater, with often over 300 point separating the highest and lowest performers in a country. Addressing the educational needs of such diverse populations and narrowing the observed gaps in student performance remains a formidable challenge for all countries.

To what extent is the observed variation in student performance on the PISA 2009 assessments a reflection of a possible innate distribution of students' abilities, and thus a challenge for education systems that cannot be influenced directly by education policy? The analysis in this volume shows that not only do the magnitude of within-country disparities in reading performance vary widely between countries, but also that large disparities in performance are not necessary for a country to attain a high level of overall performance. Although more general contextual factors need to be considered when such disparities are compared between countries, public policy has the potential to make an important contribution to providing equal opportunities and equitable learning outcomes for all students. Countries differ not just in their mean performance, but also in the extent to which they are able to close the gap between the students with the lowest and the highest levels of performance, and to reduce some of the barriers to equitable distribution of learning outcomes. These findings are relevant to policy makers.

Many factors contribute to variation in student performance. Disparities can result from the socio-economic backgrounds of students and schools, from the human and financial resources available to schools, from curricular differences, and from the way in which teaching is organised and delivered. As the causes of variation in student performance differ, so too do the approaches chosen by different countries to address the challenge. Some countries have non-selective school systems that seek to provide all students with the same opportunities for learning and require each school to cater to a full range of student performances. Other countries respond to diversity by forming groups of students with similar levels of performance through selection either within or between schools, with the aim of serving students according to their specific needs. Volume IV examines in greater detail how such policies and practices relate to the performance of students and schools in reading.

TACKLING LOW PERFORMANCE

Countries with large numbers of students who struggle to master basic reading literacy skills at age 15 are likely to be held back in the future due to substantial proportions of the adult population lacking skills that are needed in the modern workplace and society. Among those who fail to reach Level 2 on the PISA reading scale, the majority can be expected not to continue with education beyond school age, and therefore risk facing difficulties using reading for learning throughout their lives. Level 2 can be considered a baseline level of proficiency, at which students begin to demonstrate the reading skills that will enable them to participate effectively and productively in life. Students who do not reach Level 2 have difficulties locating basic information that meets several conditions, making comparisons or contrasts around a single feature, working out what a well-defined part of a text means when the information is not prominent, or making connections between the text and outside knowledge by drawing on personal experience and attitudes. The proportion of 15-year-olds in this situation varies widely across countries, from fewer than one student out of ten in four countries and economies to the majority of students in ten countries. Even in the average OECD country, where nearly one student out of five does not reach Level 2, tackling such low performance remains a major challenge.

The 2009 PISA assessment improved the measurement of low performance by separating performance below Level 2 into two sub-levels. Some low-performing students show the ability to find and process simple information at proficiency Level 1a. Among those unable even to do these tasks, the majority nevertheless still demonstrate technical reading skills, by solving easier tasks at the lower Level 1b, which only require students to retrieve very simple and explicit information from texts. In all but six countries in PISA 2009, over 90% of students can read at least to this level. This shows that while countries hoping to compete in the world economy need to reduce the number of students who do not reach Level 2, in most cases they have at least something to build on. The policy challenge is to improve students' proficiency by raising their ability to find, interpret and reflect on information in different kinds of text. Those countries that have achieved marked improvements among their lowest performers in reading over the last decade demonstrate that this can be done. Volume V shows, for example, that in Chile the proportion of students performing below Level 2 fell from nearly half in 2000 to below one third in 2009.

Reducing the proportion of students performing below Level 2 also has an important economic dimension. The magnitude of this gain is illustrated by a model which estimates that bringing all students to Level 2 could boost the combined economic output of OECD countries by around USD 200 trillion. While such estimates will always be associated with considerable uncertainty, they suggest that the cost of educational improvement is just a fraction of the high cost of low educational performance.

In tackling low performance, countries need to look at a range of associated factors identified by PISA. The significance of social background is examined in Volume II of this series, of attitudes to learning in Volume III and of school policies, practices and resources in Volume IV. Another important factor is gender: on average in OECD countries, one girl in eight and one boy in four failed to reach Level 2 in PISA 2009. This significant gender gap in underperformance is particularly large in some high-performing countries where almost all remaining underperformance exists among boys. In Finland, for example, only 3% of girls do not reach Level 2, but among boys it is 13%. Some other countries with performance slightly below the OECD average still have very few girls performing poorly, but overall performance is brought down by the large number of boys at low proficiency levels: in Latvia, 9% of girls and 27% of boys do not reach Level 2, and in the Slovak Republic that proportionately is 13% and 32%, respectively. While the situation is less extreme elsewhere, in many OECD countries it is clear that a focus on underperformance needs to target boys. This is particularly so as the gender gap has significantly widened over the last decade.

The fact that performance differences within the genders are significantly larger than between the genders suggests that this challenge can be successfully addressed.

PURSUING EXCELLENCE

At the other end of the proficiency spectrum, a small proportion of students attains Level 5 or higher. These students will be at the forefront of a competitive, knowledge-based global economy, and in each country their numbers will be important. They are able to retrieve information by locating and organising several pieces of deeply embedded information, inferring which information in the text is relevant; critically evaluate information and build hypotheses drawing on specialised knowledge; develop a full and detailed understanding of a text whose content or form is unfamiliar; and deal with concepts that are contrary to expectations.

Results from the PISA 2009 assessment show that nurturing high performance and tackling low performance need not be mutually exclusive. The countries with the very highest overall reading performance in PISA 2009, Finland and Korea, as well as the partner economies Hong Kong-China and Shanghai-China, also have among the lowest variation in student scores. Equally importantly, since 2009, Korea has been able to raise its already high reading performance by more than doubling the percentage of students reaching Level 5 or higher.

On average across OECD countries, 7.6% of students attain at least Level 5, but in Singapore, New Zealand and Shanghai-China this percentage is around twice the OECD average. For some countries, developing even a small corps of high-performing students remains an aspiration; in 16 countries, fewer than 1% of students reach Level 5.

STRENGTHS AND WEAKNESSES IN DIFFERENT KINDS OF READING

To read with understanding, students need to be able to retrieve, interpret and reflect on written information. This is true not just of advanced reading, but is evident at every developmental level, more so than ever in the age of the Internet. Faced with what seems like an infinite amount of online information in their future adult lives, they will need the skills necessary to find the information that they want, critically evaluate its reliability and relevance, and integrate and apply this information to solve their information needs. Only with a combination of these skills will they be able to use reading to function effectively across the different aspects of their lives.

In some countries, student performance varies between different aspects of reading in significant ways. Such variation may be related to differences in the ways in which reading skills are taught and learned in different cultures, to variations in curriculum emphasis or to the effectiveness with which different aspects of the school curriculum is delivered.

One reason for thinking that these differences could be linked to some deep-seated features of national cultures or curricula is that there are marked patterns of variation across different groups of countries. This is true in particular of the relative performance shown by students, on the one hand, on the *reflect and evaluate* subscale and, on the other, on the other two reading subscales – *access and retrieve* and *integrate and interpret*. In all predominantly English-speaking countries and in eight out of nine Latin American countries in PISA, the subscale where students showed the greatest strength was *reflect and evaluate*, and in most of these cases the difference with other subscales was substantial. In contrast, among 19 PISA countries in Eastern Europe, Southeast Europe and Central Asia, there were some significant differences in subscale results in 17 countries, and in all but 2 of these, the *reflect and evaluate* subscale was the weakest. This suggests that in some cultures, students are better at getting to grips with more direct reading tasks requiring them to obtain information from a text and work out what it means, while in others, they are relatively better at reflecting on the implications of its content. Since both types of skill are needed to be a good reader, these differences should help inform education systems in different cultures where extra effort may be needed.

Similarly, there are marked differences between countries in their performance in reading texts in different formats. In the 17 countries with substantially better performance in reading *continuous texts* than *non-continuous texts*, it may be that there is a more traditional language-of-instruction curriculum, in which little attention is paid to analysing and reflecting on non-prose material. It is noteworthy that the six countries in which performance on *non-continuous texts* was stronger than on *continuous texts* were all relatively high-performing countries over all. Moreover, given the association between the relatively strong performance of boys on *non-continuous texts,* and their propensity (explored in Volume III) to engage with texts of diverse formats, it would appear that exposure to a variety of texts in different formats is likely to raise reading proficiency as a whole. And taking into account the importance of understanding and using *non-continuous texts* in adult life, a pedagogical implication of these findings is that, in the classroom, young people should be exposed to and learn to negotiate a variety of texts in different formats.

STUDENT PERFORMANCE IN MATHEMATICS AND SCIENCE

As in reading, PISA 2009 shows large contrasts between some countries with outstanding performance in mathematics and science, and others with very large numbers of students who have limited proficiency in these domains. In both mathematics and science, students in some East Asian countries and economies did particularly well in 2009. The highest average performance in mathematics was seen in five countries and economies in this region, Shanghai-China, Singapore, Hong Kong-China, Korea and Chinese Taipei. Students in Shanghai-China had a mean performance of 600 points, equivalent to nearly the top of Level 4. In contrast, the mean performance in the highest country outside

this region, Finland, was at the top of Level 3, and the OECD average was near the bottom of Level 3. Similarly, in science, five of the best-performing six countries and economies, Shanghai-China, Hong Kong-China, Singapore, Japan and Korea, were from East Asia. On the other hand, in both mathematics and science, the lowest-performing countries were up to two proficiency levels below the OECD average, with 11 partner countries in mathematics and 7 in science at average scores below 400.

One feature of these wide differences in performance is a wide divide across countries in the proportion of students who lack basic skills in mathematics and science, which they will require to operate effectively in today's world. In both subjects, about one student in five in OECD countries does not progress beyond a very basic level of understanding at Level 1. This means for example that they can only perform mathematical tasks in very familiar contexts and can only show understanding of science at a very basic level in a limited range of situations. Such students will have difficulties thinking mathematically and scientifically in a world that demands this of them in their working lives and as active citizens. While in all but five OECD countries, at least three-quarters of students get above this level in mathematics, in Chile and Mexico half are below it; this is also the case in 15 partner countries. In science, 13 partner countries and economies (but no OECD countries) have a majority of students below Level 2. These countries still need to work hard to enable the majority of their population to understand a world in which scientific issues are part of public debate.

At the other end of the proficiency scale, the number of students reaching Level 5 or 6 in mathematics and science will be particularly important for countries wishing to create a pool of workers able to advance the frontiers of scientific and technological knowledge in the future and compete in the global economy. Here again, the contrasts are stark. In Chile and Mexico, and 16 partner countries and economies, fewer than one in 50 students reach this high level of mathematics proficiency. In all other OECD countries it is at least 1 student in 20, on average in OECD countries it is 1 in 8, and in Korea and Switzerland, the OECD countries with the highest proportion of students proficient in mathematics at least at Level 5, it is 1 in 4. While the last two countries are clearly at an advantage with twice the proportion of students highly proficient in mathematics than the average for the OECD, several East Asian countries and economies show that this is by no means an upper limit. Around one in three students in Hong Kong-China and Singapore, and a half of those in Shanghai-China are at Level 5 or 6 in mathematics. This creates a challenge to all OECD countries, showing that it is possible to develop a population where high mathematical proficiency becomes the norm, allowing broadly-based participation at the high end of the knowledge economy. In the case of science, there are similar patterns but the differences are not as wide: Shanghai-China has 24% of students at Level 5 or 6, compared to 19% in Finland, the highest OECD country.

In mathematics and science, gender differences are less important than in reading. In most countries, there is no difference in science, and while boys are ahead in mathematics, in 37 out of 65 PISA countries, most differences are relatively small. The exceptions are in Belgium, Chile, the United Kingdom, the United States and partner countries and economies Colombia and Liechtenstein, where boys are at least 20 score points ahead of girls. It is noticeable that in none of the highest-performing countries in mathematics are there large gender differences, and in Finland, Korea and partner countries and economies Chinese Taipei and Shanghai-China, all among the highest performers, gender differences are not significant.

These results show countries where boys are still more likely than girls to perform well overall in mathematics that there is no absolute barrier preventing girls from performing well. The picture for high performance is less clear-cut. In OECD countries most of those reaching the very highest proficiency level, Level 6, are boys: on average 4% of boys reach this level, compared to 2% of girls. However, in the partner countries and economies Chinese Taipei and Shanghai-China, similarly high numbers of boys and girls reach Level 6. Indeed, in these countries and in Singapore, at least 10% of girls reach Level 6. Even among boys, there is only one OECD country – Switzerland – where one in ten reaches Level 6. Thus, there is no "ceiling" of mathematical performance above which girls are bound to do worse than boys, and the barriers that exist appear to be related to cultural factors rather than the distribution of natural ability.

THE POTENTIAL TO IMPROVE PERFORMANCE ACROSS THE WORLD

The balance of proficiency in some of the richer countries in PISA looks very different from that of some of the poorer countries. In reading, for example, the ten countries for which the majority of students are at Level 1 or below, all in poorer parts of the world, contrast starkly in profile with the 34 OECD countries, where on average a majority reach at least Level 3. However, the fact that the best-performing country or economy in the 2009 assessment is Shanghai-China, with a GDP per capita well below the OECD average, underlines that low national income is

not incompatible with strong educational performance. Indeed, while there is a correlation between GDP per capita and educational performance, this correlation only predicts 6% of the differences between average student performance across countries. The other 94% of differences reflect the fact that two countries of similar prosperity can produce very different educational results. The results are similarly variable when substituting spending per student, relative poverty or the share of students with an immigrant background for GDP per capita.

This finding represents both a warning and an opportunity. It is a warning to countries in the "developed" world that they cannot take for granted that they will forever have "human capital" superior to other parts of the world. At a time of intensified global competition, these countries will need to work hard to maintain a knowledge and skill base that keeps up with changing demands. In particular, PISA underlines the extent to which these countries need to tackle underperformance among some students, to ensure that as many as possible of their future workforces are equipped with at least the levels of proficiency that enables them to participate in social and economic development. The high social and economic cost of poor educational performance in advanced economies risks becoming a significant drag on economic development in high-wage countries.

At the same time, the findings show that poor literacy skills are not an inevitable consequence of relatively low national income – an encouraging outcome for less developed countries that currently have large numbers of students performing at low levels. Indeed, Volume V, looks at trends in PISA and identifies a number of poorer countries that have made substantial inroads into educational performance in a relatively short space of time. Overall, PISA shows that an image of a world divided neatly into rich and well-educated countries and poor and badly-educated countries is well out-of-date.