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Some Features Shared by High-Performing School Systems

How do resources for education, and education policies and practices relate to reading performance? And what is their relationship with the socio-economic background of countries, schools and students? This chapter presents a summary of selected features shared by "successful" school systems, defined by relatively high-achieving students and greater equity in learning outcomes, because socio-economic background has only a moderate impact on performance.

Since school is where most learning takes place, what happens in school has a direct impact on learning. In turn, what happens in school is influenced by the resources, policies and practices at higher administrative levels within a country's education system.

Volume I, *What Students Know and Can Do*, shows that student performance in PISA varies widely in every subject assessed by PISA. In searching for effective policies to improve learning outcomes, policy makers and educators need to understand to what extent variation lies between countries, stems from performance differences among schools within countries, and results from variations in performance among individual students within schools.

This in turn leads to the question of how resources, policies and practices relate to those performance differences at the level of the education system, at the school level and among individual students; and how those resources, policies and practices affect the relationship between student performance and the economic and social background of countries, schools and students. This volume addresses these questions.

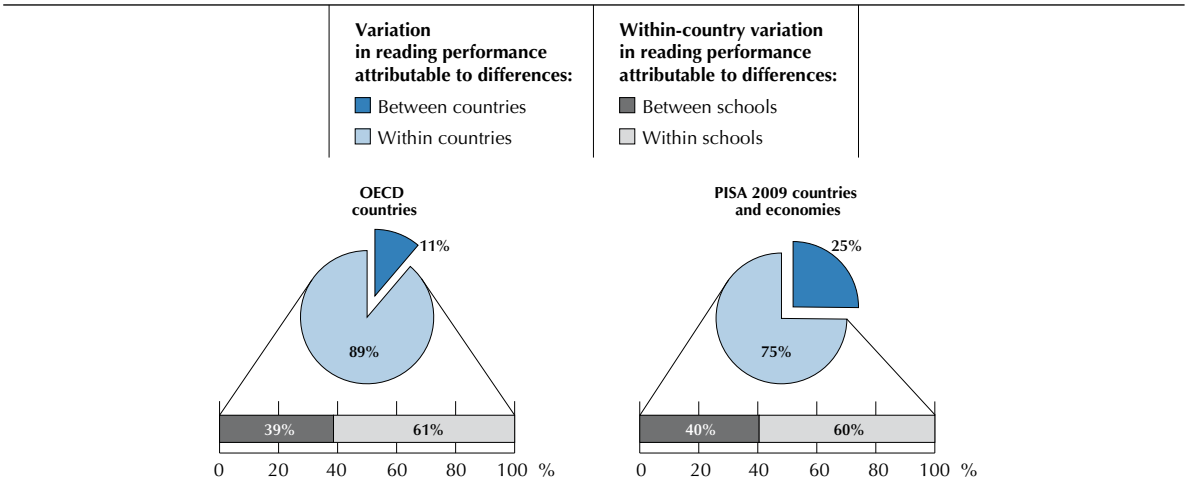
This chapter begins with a summary of selected features shared by those education systems that show relatively high performance levels among their students and a moderate impact of socio-economic background on learning outcomes. The impact of socio-economic background on performance is used throughout this volume as a measure of equity in the distribution of learning opportunities within a school system: the less learning outcomes depend on students' family context and socio-economic background, the greater the equity.[1] Chapter 2 examines in greater detail how resources, policies and practices relate to student performance and to what extent positive relationships observed at the school level translate into positive relationships at the level of the education system. Chapter 3 discusses how PISA describes and measures education resources, policies and practices, and shows where countries stand on these issues. Chapter 4 then describes the learning environment in schools.

PERFORMANCE DIFFERENCES AMONG COUNTRIES, SCHOOLS AND STUDENTS

In the PISA 2009 assessment of reading literacy, 25% of the performance variation observed among students in the participating countries results from performance differences among countries (see Chapter 2 of Volume I, *What Students Know and Can Do*). Among OECD countries, the corresponding proportion is 11%. Countries with higher national incomes tend to perform better: some 6% of the performance differences among OECD countries can be predicted on the basis of the countries' national income (see Figure I.2.1 in Volume I); this rises to 30% when the partner countries and economies that participated in PISA are included. The analysis of the policies and practices at the level of education systems seeks to explain the performance variation among countries.[2]

■ Figure IV.1.1 ■

How much of the variation in reading performance lies between countries, schools and students



Source: OECD, *PISA 2009 Database*.
StatLink http://dx.doi.org/10.1787/888932343361

On average across all participating countries, 40% of the performance variation observed within countries lies between schools,[3] of which 23 percentage points are attributable to differences in schools' socio-economic intake (Table II.5.1 in Volume II). Among OECD countries, the corresponding proportions are 39% and 24 percentage points. Differences in the policies and practices applied by schools contribute to this portion of the overall variation in student performance.

The remaining 60% of the performance variation in the participating countries, and 61% among OECD countries, results from differences in the performance of individual students within schools (Figure IV.1.1).

COMMON CHARACTERISTICS OF SUCCESSFUL SCHOOL SYSTEMS

Among the features of schools and school systems that were measured by PISA, some are common to successful school systems. "Successful school systems" are defined here as those that perform above the OECD average in reading (493 points) and in which students' socio-economic background has a smaller impact on reading performance than is the case in a typical OECD country (on average across OECD countries, 14% of the variation in reading scores is explained by socio-economic background). As shown in Volume II, *Overcoming Social Background*, Korea, Finland, Canada, Japan, Norway, Estonia, Iceland and the partner economy Hong Kong-China performed at higher levels than the OECD average and also showed a weaker relationship between socio-economic background and performance.

This volume shows that three of the four features of school systems examined by PISA 2009 relate to student performance and equity in education: first, how students are selected for entry into schools and classrooms; second, the extent to which individual schools are granted autonomy to make decisions on curricula and assessments, and whether schools are allowed to compete for student enrolment; and third, where spending on education is directed. The existence of standards-based external examinations also relates positively to student performance, but regarding the use of student assessments, which is the fourth feature examined by PISA, high-performing school systems tend to use the data resulting from these assessments differently.

As shown in subsequent chapters of this volume, school systems with low levels of vertical and horizontal differentiation – that is, school systems in which: all students, regardless of their background, are offered similar opportunities to learn; socio-economically advantaged and disadvantaged students attend the same schools; and students rarely repeat grades or are transferred out of schools because of behavioural problems, low academic achievement or special learning needs – are more likely to perform above the OECD average and show below-average socio-economic inequalities. Of the 13 OECD countries that have low levels of student differentiation (Figure IV.3.2), Canada, Estonia, Finland, Iceland and Norway perform above the OECD average and show only a moderate impact of socio-economic background on student performance. Among the school systems with above-average performance and below-average socio-economic inequalities, none show high levels of student differentiation. However, among the school systems with high average performance but comparatively large socio-economic inequalities, Belgium, the Netherlands and Switzerland routinely select and sort students into schools, programmes or grades. This suggests that the level of differentiation is not closely related to average performance, but does relate to socio-economic inequalities in education (see Chapter 2).

The results from PISA 2009 also show that those school systems that grant individual schools authority to make decisions about curricula and assessments while limiting school competition are more likely to be performing above the OECD average and show below-average socio-economic inequalities. Many school systems with high average performance but comparatively large socio-economic inequalities tend to allow higher levels of school competition. Results from PISA also suggest that giving parents and students a choice of schools (as indicated by whether schools compete for students) does not relate positively to equity in education if their choice is constrained by financial or logistical considerations, such as additional tuition fees or transportation to and from schools. For example, on average, across the 14 countries that administered the PISA parent questionnaire, socio-economically disadvantaged parents are over 13 percentage points more likely than advantaged parents to report that they consider "low expenses" and "financial aid" to be very important determining factors in choosing a school (see Chapter 2). Of the 38 school systems that offer schools greater autonomy in determining their curricula, but offer limited school choice to parents and students, Canada, Estonia, Finland, Iceland, Japan and Norway show above-average performance and below-average socio-economic inequalities (Figure IV.3.5).

Two school systems show comparatively high levels of spending by educational institutions that prioritise teachers' salaries over class size (Figure IV.3.7). Both Japan and Korea show above-average performance and below-average socio-economic inequalities. This is consistent with the finding that high levels of investment in higher teachers' salaries tend to concur with higher performance in education systems (see Chapter 2).

■ Figure IV.1.2 ■

Selected characteristics of school systems with reading performance above the OECD average

Four areas		
1. Selecting and grouping students (Figure IV.3.2)	V	High vertical differentiation
	v	Low vertical differentiation
	H	High horizontal differentiation at the system level
	h	Medium horizontal differentiation at the system level
	h	Low horizontal differentiation at the system level
	Hsc	High horizontal differentiation at the school level
	hsc	Low horizontal differentiation at the school level
2. Governance of schools (Figure IV.3.5)	A	More school autonomy for curriculum and assessment
	a	Less school autonomy for curriculum and assessment
	C	More school competition
	c	Less school competition
3. Assessment and accountability policies (Figure IV.3.6)	B	Frequent use of assessment or achievement data for benchmarking and information purposes
	b	Infrequent use of assessment or achievement data for benchmarking and information purposes
	D	Frequent use of assessment or achievement data for decision making
	d	Infrequent use of assessment or achievement data for decision making
4. Resources invested in education (Figure IV.3.7)	E	High cumulative expenditure by educational institutions per student aged 6 to 15
	e	Low cumulative expenditure by educational institutions per student aged 6 to 15
	S	Large class size and high teachers' salaries
	s	Small class size and/or low teachers' salaries

	Reading performance (score points)	Strength of relationship between students' socio-economic background and reading performance (% variance explained)		Four areas: 1. Selecting and grouping students (Figure IV.3.2)	2. Governance of schools (Figure IV.3.5)	3. Assessment and accountability policies (Figure IV.3.6)	4. Resources invested in education (Figure IV.3.7)	Countries with similar system characteristics in the four areas
Hong Kong-China	533	Below-average impact of socio-economic background on reading performance	4.5	v + ***h*** + hsc	A + C	B + D	e + S	—
Iceland	500		6.2	v + h + hsc	A + c	B + D	E + s	Australia, Canada, Sweden, United Kingdom, United States
Estonia	501		7.6	v + h + hsc	A + c	B + D	e + s	New Zealand, Poland, Latvia, Lithuania, Russian Federation
Finland	536		7.8	v + h + hsc	A + c	b + d	E + s	—
Japan	520		8.6	v + ***h*** + hsc	A + c	b + D	E + S	—
Canada	524		8.6	v + h + hsc	A + c	B + D	E + s	Australia, Iceland, Sweden, United Kingdom, United States
Norway	503		8.6	v + h + hsc	A + c	B + d	E + s	—
Korea	539		11.0	v + ***h*** + hsc	A + C	B + D	E + S	—
Shanghai-China	556	Average impact of socio-economic background on reading performance	12.3	v + ***h*** + hsc	A + c	B + D	e + S	Thailand
Australia	515		12.7	v + h + hsc	A + C	B + D	E + s	—
Netherlands	508		12.8	V + H + Hsc	A + C	b + d	E + s	—
Switzerland	501		14.1	V + H + Hsc	A + c	b + d	E + s	—
Poland	500		14.8	v + h + hsc	A + c	B + D	e + s	Estonia, New Zealand, Latvia, Lithuania, Russian Federation
Singapore	526		15.3	v + H + hsc	A + c	B + D	e + S	—
New Zealand	521	Above-average impact of socio-economic background on reading performance	16.6	v + h + hsc	A + c	B + D	e + s	Estonia, Poland, Latvia, Lithuania, Russian Federation
Belgium	506		19.3	V + H + hsc	A + C	b + d	E + s	—

Note: Cells shaded in grey are the most prevailing patterns among school systems with above-average reading performance and below-average impact of socio-economic background on reading performance within each of the four areas. For other countries and economies, see Tables IV.1.1a and IV.1.1b.
StatLink http://dx.doi.org/10.1787/888932343361

Among systems with comparatively high levels of spending on education that prioritise small class size, performance patterns are mixed. There are also a number of lower-performing systems with similar spending choices.

In short, many successful school systems share some common features: low levels of student differentiation; high levels of school autonomy in formulating curricula and using assessments with low levels of school competition; and spending in education that prioritises teachers' salaries over smaller classes. However, the fact that such characteristics are more likely to be found among successful school systems does not mean that they are necessary or sufficient for success. Not all successful school systems share the same organisational characteristics, and not all school systems that are organised in this way achieve high levels of performance and a moderate impact of socio-economic background on student performance.

THE LEARNING ENVIRONMENT INSIDE SCHOOLS AND CLASSROOMS

Research on what makes schools effective finds that learning requires an orderly and co-operative environment, both in and outside the classroom (Jennings and Greenberg, 2009). Effective schools are characterised by amiable and supportive teacher-student relations that extend beyond the walls of the classroom. In such schools, academic activities and high student performance are valued by both students and teachers (Scheerens and Bosker, 1997; Sammons, 1999; Taylor, Pressley and Pearson, 2002).

Because of difficulties in comparing such data across countries (see Box IV.1.1 below), the discussion on learning environments in this volume focuses on how certain features of these environments relate to reading performance *within* each country. Results from PISA 2009 show that, in general, students perform better in schools with more disciplined classrooms, partly because such schools tend to have more students from advantaged socio-economic backgrounds, who generally perform better, partly because the favourable socio-economic background of students relates to a climate that is conducive to learning, and partly for reasons unrelated to socio-economic factors. Results from PISA 2009 also show that even though the learning environment in schools and classrooms is partially shaped by the resources, policies and practices of the systems and schools, disciplined classrooms themselves tend to go hand in hand with higher performance. Chapters 2 and 4 provide more detailed definitions and analyses of the individual indicators that describe the learning environment.

THE PISA 2009 EVIDENCE BASE

The resources, policies and practices of schools and school systems discussed in this volume are mainly based on students' and school principals' responses to the PISA background questionnaires. Responses from parents are used for the countries that administered the optional PISA questionnaire to parents. However, caution is required when interpreting the data collected from students, parents and school principals (see Box IV.1.1 below).

For some of the system-level features, PISA results are complemented by data about school systems from OECD's Education Database (OECD, 2010a).[4]

Box IV.1.1 Interpreting the data from students, parents and schools

PISA 2009 asked students and school principals (and parents, for some countries) to answer questions about the learning environment and organisation of schools, and social and economic contexts in which learning takes place. These are self-reports rather than external observations and may be influenced by cross-cultural differences in how individuals respond. For example, students' self-perceptions of classroom situations may reflect the actual classroom situation imperfectly, or students may choose to respond in a way that does not accurately reflect their observations because certain responses may be more socially desirable than others.

Several of the indices presented in this volume summarise the responses of students, parents or school principals to a series of related questions. The questions were selected from larger constructs on the basis of theoretical considerations and previous research. Structural equation modelling was used to confirm the theoretically expected dimensions of the indices and validate their comparability across countries. For this purpose, a model was estimated separately for each country and collectively for all OECD countries. For detailed information on the construction of these indices, see Annex A1.

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In addition to the general limitation of self-reported data, there are other limitations, particularly those concerning the information collected from principals, that should be taken into account when interpreting the data:

- An average of only 264 principals were surveyed in each OECD country, and in 6 countries and economies, fewer than 150 principals were surveyed. In 5 of these 6 countries, this was because fewer than 150 schools were attended by 15-year-old students.
- Although principals can provide information about their schools, generalising from a single source of information for each school and then matching that information with students' reports is not straightforward. Students' opinions and performance in each subject depend on many factors, including all the education that they have acquired in earlier years and their experiences outside the school setting, rather than just the period in which they have interacted with their current teachers.
- Principals may not be the most appropriate sources of some information related to teachers, such as teachers' morale and commitment (see Box IV.1.2).
- The learning environment examined by PISA may only partially reflect the learning environment that shaped students' educational experiences earlier in their school careers, particularly in education systems where students progress through different types of educational institutions at the pre-primary, primary, lower secondary and upper secondary levels. To the extent that students' current learning environment differs from that of their earlier school years, the contextual data collected by PISA are an imperfect proxy for students' cumulative learning environments, and the effects of those environments on learning outcomes is likely to be underestimated.
- In most cases, 15-year-old students have been in the present school for only two to three years. This means that much of their reading development took place earlier, in other schools, which may have little or no connection with the present school.
- In some countries, the definition of the school in which students are taught is not straightforward because schools vary in the level and purpose of education. For example, in some countries, sub-units within schools (*e.g.* study programmes, shifts and campuses) were sampled instead of schools as administrative units. Despite these caveats, information from the school questionnaire provides unique insights into the ways in which national and sub-national authorities seek to realise their educational objectives.

In using results from non-experimental data on school performance, such as the PISA Database, it is also important to bear in mind the distinction between school effects and the effects of schooling, particularly when interpreting the modest association between factors such as school resources, policies and institutional characteristics and student performance. The effect of schooling is the influence on performance of not being schooled *versus* being schooled. As a set of well-controlled studies has shown, this can have significant impact not only on knowledge but also on fundamental cognitive skills (*e.g.* Ceci, 1991; Blair *et al.,* 2005). School effects are education researchers' shorthand way of referring to the effect on academic performance of attending one school or another, usually schools that differ in resources or policies and institutional characteristics. Where schools and school systems do not vary in fundamental ways, the school effect can be modest. Nevertheless, modest school effects should not be confused with a lack of an effect by schooling.

The analyses that relate the performance and equity levels of school systems to educational policies and practices are carried out through a correlation analysis. A correlation is a simple statistic that measures the degree to which two variables are associated with each other. Given the nested nature of the PISA sample (students nested in schools that, in turn, are nested in countries), other statistical techniques, such as Hierarchical Linear Models, Structural Equation Modeling or Meta-Analytical Techniques, may seem more appropriate. Yet, even these sophisticated statistical techniques cannot adequately take into account the nature of the PISA sample because participating countries are not a random sample of countries. The system-level correlations presented here are consistent with results from PISA 2006, which use more sophisticated statistical techniques. Given that the limitations of a correlation analysis using PISA data are not completely overcome by using more sophisticated statistical tools, the simplest method was used. The robustness and sensitivity of the findings are checked against other specifications (see Annex A6). Cautionary notes are provided to help the reader interpret the results presented in this volume correctly.

In contrast, the within-country analyses are based on mixed-effects models appropriate for the random sampling of schools and the random sampling of students within these schools.

Information based on reports from school principals or parents has been weighted so that it reflects the number of 15-year-olds enrolled in each school.

Unless otherwise noted, comparisons of student performance refer to the performance of students on the reading scale.

PISA did not collect data from teachers, so inferences about teaching and learning are made indirectly, from the perspective of students and school principals. Since students learn from a variety of teachers throughout their school careers, it is difficult to establish direct links between teachers' characteristics and students' performance in PISA. It has not yet been possible to formulate a reliable methodology to link students and teachers in large-scale, cross-sectional surveys like PISA so that meaningful inferences can be made regarding the influence of teachers' characteristics and behaviour on learning outcomes. Although teachers' reports on their attitudes and experiences are missing in PISA, the OECD's Teacher and Learning International Survey (TALIS) provides a useful overview of lower secondary school teachers' professional development, their beliefs, attitudes and practices, teacher appraisal and feedback, and school leadership (see Box IV.1.2 below).

Box IV.1.2 **TALIS: Teacher and Learning International Survey**

PISA measures students' knowledge and skills in reading, mathematics and science and relates these to students' background and school experiences. But PISA does not cover the experiences and attitudes of teachers – those who have the most direct impact on student learning at school (Greenwald, Hedges and Laine, 1996; Nye, Konstantopoulos and Hedges, 2004; Rivkin, Hanushek and Kain, 2005).

The OECD's Teacher and Learning International Survey (TALIS) examines aspects of lower secondary school teachers' professional development, their beliefs, attitudes and practices, teacher appraisal and feedback, and school leadership. Its robust international indicators and analysis on teachers and teaching help countries review and develop policies to create the conditions for effective schooling. Its cross-country analyses allow countries facing similar challenges to learn about different policy approaches and their impact on the school environment.

Having surveyed over 90 000 teachers and principals in 23 OECD and partner countries,[5] TALIS results indicate that:

- A large proportion of teachers in most surveyed countries are satisfied with their jobs and feel they make an educational difference for their students.
- Teachers are often thwarted in their efforts because of a lack of qualified staff, suitable equipment and instructional support, disruptive student behaviour and/or bureaucratic procedures.
- Better and more targeted professional development can help improve teacher effectiveness. Many teachers believe that certification programmes and individual and collaborative research can help improve their work, yet these are the least common forms of professional development in which teachers engage.
- Teachers generally believe that appraisal and feedback make a big difference in their work by improving teachers' instructional and classroom management practices and teachers' self-confidence.
- On average, three-quarters of teachers in all countries report that they would receive no recognition for improving the quality of their work or for being more innovative in their teaching. Three-quarters of teachers also say that the most effective teachers in their school do not receive the most recognition, and that monetary rewards are not altered for persistently underperforming teachers.
- School leadership plays a crucial role in shaping teachers' working lives and development. Schools with strong instructional leadership are those where teachers engage in professional development to address the weaknesses identified in appraisals, where there are better student-teacher relations, where there is greater collaboration among teachers, and where greater recognition is given to innovative teachers.
- Public policy can improve conditions for effective teaching if it addresses such factors as school climate, teaching beliefs, co-operation among teachers, teacher job satisfaction, professional development and teaching techniques (OECD, 2009b).

Given that much of the variation in teaching effectiveness lies among individual teachers rather than among schools or countries, policies and individualised professional development programmes should target teachers, not just schools or school systems.

Notes

1. Volume II, *Overcoming Social Background,* considers two dimensions of equity to identify successful school systems: the strength and the slope of the socio-economic gradient (see Volume II, Chapter 3). In order to provide a simpler description of successful school systems, this volume uses only the proportion of variation in performance explained by socio-economic status (*i.e.* the strength of the socio-economic gradient) as a measure of equity.

2. In mathematics, 31% of the performance variation among participating countries is attributable to differences among countries; among OECD countries, that percentage is 14%. In science, 28% of the performance variation among participating countries is attributable to differences among countries; among OECD countries, the percentage is 13%.

3. In both mathematics and science, and across OECD countries as well as across all partner countries and economies, approximately 40% of the performance variation lies between countries and the remaining 60% lies between students within schools.

4. For the countries that do not participate in the OECD's annual data collection, these data have been collected separately.

5. Countries participating in TALIS are: Australia, Austria, Belgium (Flemish Community), Estonia, Denmark, Hungary, Iceland, Ireland, Italy, Korea, Mexico, Norway, Poland, Portugal, the Slovak Republic, Slovenia, Spain, Turkey, and partner countries Brazil, Bulgaria, Lithuania, Malaysia and Malta.