Strong Performers and Successful Reformers in Education

Lessons from PISA for Japan

OECD

Strong Performers and Successful Reformers in Education

LESSONS FROM PISA FOR JAPAN

OECD

This work is published on the responsibility of the Secretary-General of the OECD. The opinions expressed and arguments employed herein do not necessarily reflect the official views of the Organisation or of the governments of its member countries.

This document and any map included herein are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

Please cite this publication as:
OECD (2012), *Lessons from PISA for Japan,* Strong Performers and Successful Reformers in Education, OECD Publishing.
http://dx.doi.org/10.1787/9789264118539-en

ISBN 978-92-64-11851-5 (print)
ISBN 978-92-64-11853-9 (PDF)

Photo credits:
Fotolia.com © Ainoa
Getty Images © John Foxx

Corrigenda to OECD publications may be found on line at: *www.oecd.org/publishing/corrigenda*.

© OECD 2012

You can copy, download or print OECD content for your own use, and you can include excerpts from OECD publications, databases and multimedia products in your own documents, presentations, blogs, websites and teaching materials, provided that suitable acknowledgment of OECD as source and copyright owner is given. All requests for public or commercial use and translation rights should be submitted to *rights@oecd.org*. Requests for permission to photocopy portions of this material for public or commercial use shall be addressed directly to the Copyright Clearance Center (CCC) at *info@copyright.com* or the Centre français d'exploitation du droit de copie (CFC) at *contact@cfcopies.com*.

Foreword

The Great East Earthquake in March 2011 brought human tragedies and unparalleled destruction over Japan. But it also revealed the unmatched commitment and capacity of the Japanese people to address the challenges and to build a new future for the country.

Education will be the foundation for this future. The high value Japan has traditionally placed on education and the unwavering belief of its citizens that all children can succeed have fuelled Japan's rapid economic rise already over many decades. The Japanese success story is based on world class educational standards.

But as the demand for skills in Japan's society is changing, continued success will depend on moving beyond providing more of the same education. Continued reform of the curriculum will be essential, in ways that shift the focus among students from reproducing educational content towards strengthening their capacity to extrapolate from what they know and apply their knowledge in challenging situations. The latest PISA assessment shows that Japan has made a promising start, but the following challenges need to be addressed.

First, the quality of an education system cannot exceed the quality of its teachers and school leaders – and the quality of teachers and school leaders cannot exceed the quality of work organisation, professional development and support provided by and to schools and local communities. Over the last decade, Japan has prioritised reductions in class sizes over investments in teachers, seeking to bring class sizes more in line with those in other OECD countries. In the future, improvements and investments in the quality of teachers can make an additional difference.

Second, Japan's "Basic Guidelines for Reconstruction in Response to the Great East Japan Earthquake" demand that the reconstruction efforts be directed towards "creative futures" instead of reinstating the status quo and they underline the central role that local capacity and initiative play in this. As PISA shows, Japan has already seen a significant shift from one of the more centralised to one of the more decentralised education systems. However, the challenge remains to enable teachers, schools and local communities to actively assume the leadership roles and responsibilities they have been assigned.

Greater local responsibility, in turn, will demand greater attention to equity-related issues. PISA shows that Japan's traditionally high standards of equity are beginning to erode. Devolved responsibilities therefore need to be accompanied with equity-related policies that attract the most talented teachers to the most challenging classrooms and the most capable principals to the schools most in need for effective leadership.

Third, learning does not begin in school nor does it end with school. A lifetime approach to education and learning is needed. Japan's effort to integrate childcare centres and "kindergartens" and to build a coherent educational framework will be central to provide all children with the best possible start in life. Similarly, it is no longer just the school or university attended but actual performance at the workplace that are shaping the economic and social future of Japan's citizens. Thus, Japan will need to better develop and leverage the skills of its adult population.

Last but not least, while Japan can pride itself to have achieved far better educational outcomes than most other OECD countries with fewer resources, the pressure to further improve value for money must not be underestimated. In the short term, the aftermath of the Great East Earthquake is demanding an extraordinary effort from citizens and taxpayers. In the longer term, reducing the public deficit as well as the dramatically changing demographics and their demands on health and social services may even put pressure on investment in education. But education will remain the key to Japan's future.

The comparative evidence produced by the OECD underlines that the long-term economic and social returns of better learning outcomes far exceed any conceivable cost related to their improvement. The OECD stands ready to support Japan in consolidating its position as top performer in education and innovation and making the best out of its investment in education.

Angel Gurría
OECD Secretary-General

Acknowledgements

This report is the result of a collaborative effort between the OECD and international experts with extensive expertise in analysing the performance of education systems internationally. The report was prepared under the responsibility of the Indicators and Analysis Division of the OECD Directorate for Education, principally Andreas Schleicher, Francesca Borgonovi and Richard Hopper. The principal authors of the chapters in this report are: (Introduction): Richard Hopper, based on the introduction in an earlier report of this series, OECD; (Chapter 1): Frank Levy, Massachusetts Institute of Technology (MIT); Japan (Chapter 2): Francesca Borgonovi, Richard Hopper, Miyako Ikeda, OECD; Finland (Chapter 3): Pasi Sahlberg, Centre for International Mobility and Co-operation (CIMO), Finland; Singapore (Chapter 4): Vivien Stewart, Asia Society, United States; Ontario, Canada (Chapter 5): Robert Schwartz and Jal Mehta, Harvard University; Shanghai and Hong Kong, China (Chapter 6): Kai-ming Cheng, University of Hong Kong, Hong Kong, China; Robert Schwartz and Jal Mehta, Harvard University; Policy lessons from and for Japan (Chapter 7): Andreas Schleicher, building on a chapter on Japan from an earlier report of this series and with contributions from Francesca Borgonovi, Miyako Ikeda, Yasuhito Sakurai and Miho Taguma. Vanessa Shadoian-Gersing and Simone Bloem of the OECD compiled background data on each system. Marilyn Achiron edited this report while Elisabeth Villoutreix and Elizabeth Del Bourgo co-ordinated its production. The OECD PISA team provided information and diagrams to support the PISA analysis contained in this report.

Table of Contents

INTRODUCTION 15

A changing yardstick for educational success 16

About this report 16

Country comparisons 17

Framework for analysis 20

What is PISA and what can we learn from it? 21

How can PISA be used to help improve education systems? 22

Research methods employed for the country chapters 23

CHAPTER 1 **HOW IS TECHNOLOGY CHANGING DEMAND FOR HUMAN SKILLS?** 27

- Complex communication 29
- Expert thinking 30
- The educational and training implications of advanced skills 30
- Advanced skills and foundational skills 30

CHAPTER 2 **VIEWING EDUCATION IN JAPAN THROUGH THE PRISM OF PISA** 35

Consistently high mean performance among 15-year-olds 36

Relative shares of top-performing students: Above the OECD average and, in reading, an increase over time 38

Relative shares of poor-performing students: Below the OECD average and stable over time 41

- A favourable context for student achievement 43

Equity in the distribution of learning opportunities 47

- Growing differences in performance among schools 47
- Equal access to resources 47
- In Japan, students' socio-economic background has a weak impact on learning outcomes 49
- Other factors related to poor student performance that emerge from PISA 49

Has a demanding education system adversely affected students' mental health? 49

Other learning outcomes: Student engagement, strategies and practices 52

- Using effective learning strategies 54
- Digital reading 55
- A comparison of student computer use at home and at school 61

The learning environment 63

- Weak – but improving – student-teacher relations 63
- Excellent – and improving – disciplinary climate 66
- Positive attitudes and behaviour among teachers 66

How the Japanese education system is organised and education policies 66

- Moderate spending on education combined with effective spending choices 68
- Competition among schools 69
- Balance of public and private education 70
- Growing reliance on private tutoring 72
- Nearly universal pre-primary education 72
- Autonomy in curricular decisions 82

- Setting standards and accountability arrangements 83
- Low levels of differentiation and emphasis on heterogeneous classes 85

CHAPTER 3 **FINLAND: A NON-COMPETITIVE EDUCATION FOR A COMPETITIVE ECONOMY** 93

Introduction 94

Finnish education: A brief history 94
- Inauspicious beginnings: 1917-1970 94
- From backwater to watershed: Systemic reform in the 1970s 95
- A world-class education system: Finland today 96

Five drivers of successful reform 96
- A focus on equity and well-being 97
- Teachers who are highly valued and highly trained 98
- Smart accountability policies 99
- A culture of trust 100
- Sustainable leadership and political coherence 100

Education and national economic competitiveness 101
- Specific policies and desired practices for skills in a competitive knowledge economy 103

Lessons from Finland 105
- High-quality teachers 105
- Highly efficient policies 105
- Diagnosis and early intervention 105
- Creativity 106
- Deep sectoral reforms 106

The challenge ahead 106

CHAPTER 4 **SINGAPORE: THINKING AHEAD** 113

Introduction 114

Singapore's education system: The path to becoming a learning nation 115
- The survival-driven phase (1959-1978) 115
- Efficiency-driven phase (1979-1996) 115
- Ability-based, aspiration-driven phase (1997-present) 116
- Current structure 117

Singapore's success in education 117
- A forward-looking, integrated planning system 117
- Close links between policy implementers, researchers and educators 119
- Policies and the means to implement them 119
- The advantages of a small scale 119
- Commitment to equity and merit 119
- A strong focus on mathematics, science and technical skills 120
- Human resource management that matches the demands of the system 121
- A system that is continuously being improved 123

Lessons from Singapore 123

Preparing Singaporeans for the future 125
- Curriculum 2015 125
- Teacher preparation for the 21st century 127

Challenges and needs 128

CHAPTER 5 **ONTARIO: HARNESSING THE SKILLS OF TOMORROW** 133

Introduction 134

Understanding the Canadian system 134

Canadian success factors 135

Ontario: reforming for the future 136
- Focusing on a few clear goals 136
- Building support among teachers, unions, and other stakeholders 137
- Creating the structures for solid implementation 137
- Reforming literacy and numeracy in elementary schools 137
- Reducing high school dropouts 137
- Avoiding top-down mandates and clarifying roles 138
- Cultural support for universal high achievement by a diverse population 138
- A coherent system based on shared understanding and common purpose 139
- A strong focus on educator quality 139
- Strong and persistent leadership 139
- Enhanced professional accountability 140

Harnessing the skills of tomorrow, in both students and teachers 140
- Strategies for developing critical thinking 140
- Allowing children to customise their education 141
- A focus on big ideas 141
- Collaborative inquiry for teachers' professional development 143
- An emerging focus on creativity in assessment 143

Lessons from Ontario 144

CHAPTER 6 **SHANGHAI AND HONG KONG: LEARNING TO LEARN** 149

Introduction 150

The cultural context 150
- Cultural paradoxes 150

The historical context 151
- Ideology-driven systems: 1905 to 1976 151
- The reconstruction of education: the late 1970s onwards 151
- The system today 152

Shanghai: a leader in reforms 153
- How education is practised 154
- Reform strategies: from teaching to learning 156
- Achievements and challenges 161

Hong Kong's education system: one country, two systems 163
- Evolution of Hong Kong's education system 163
- The drive for reform 165
- Achievements and challenges 168

Lessons from Shanghai and Hong Kong 169
- Building legitimacy 169
- Breaking away from tradition 170
- Root and branch reform versus superficial improvement 170
- A focus on learning 170

- A holistic approach 171
- Accountability 171

Final observations: Education for economic success 171

CHAPTER 7 **POLICY LESSONS FROM AND FOR JAPAN** 179

Introduction 180

Japan's past reform trajectory 180
- The Tokugawa era: 1603 to 1868 180
- The first great education reform 180
- The second great education reform 181
- The third great education reform 181

Key strengths of education in Japan and policy challenges to maintain these strengths 190
- A commitment to education 191
- A conviction that all students can achieve at high levels 191
- An emphasis on values 192
- Ambitious educational standards that are shared across the system and aligned with high-stakes gateways and effective instructional systems 192
- Effective approaches to instruction 194
- A high-quality teaching force 195
- A centralised education system in some ways, but one that is decentralised where it matters 198
- Maintaining a balanced approach to accountability 199
- Developing accountability through social norms 199
- Investing in education from the start 200
- Effective school-home communication 201
- Balanced resource-allocation priorities 201
- Careful attention to school-to-work transition 202

Concluding remarks 203

ANNEX 205

Key features of PISA 2009 206

BOXES

Box I.1 The pace of change in educational improvement 17
Box I.2 Industrial benchmarking 24

Box 1.1 Foundation skills for the future 31

Box 2.1 PISA proficiency levels: baseline and advanced 41

Box 3.1 Becoming a teacher in Finland 98
Box 3.2 Growing autonomy for teachers 100
Box 3.3 Learning schools 103
Box 3.4 Matching curricula to the needs of the economy 104
Box 3.5 Teaching less does not mean achieving less 106

Box 4.1 Off to a good start in mathematics and science 121
Box 4.2 Singapore's education philosophy evolves 126
Box 4.3 ICT for the future 127

Box 5.1 Building the capacity for reform: the Literacy and Numeracy Secretariat 138
Box 5.2 Aligning school work with the real world 141
Box 5.3 Building critical thinking through real-world activities 142

Box 6.1 Oriental Green Ark 155
Box 6.2 The principle of multiple approaches 158
Box 6.3 Success education 160
Box 6.4 The Qibao Education Group 161
Box 6.5 Liberal studies for critical thinking and innovation 168
Box 6.6 Building support for the latest reforms 170

Box 7.1 Student learning in Japanese classrooms 195

FIGURES

Figure I.1 Change in reading performance between 2000 and 2009 19
Figure I.2 Change in mathematics performance between 2003 and 2009 19
Figure I.3 Change in science performance between 2006 and 2009 20
Figure I.4 Which policies and practices can help students develop skills for future labour markets? 20
Figure I.5 Framework of analysis for policies to nurture skills for the future 21
Figure I.6 A map of PISA countries and economies 22

Figure 1.1 Trends in routine and non-routine task input in US occupations: 1960 to 2002 32

Figure 2.1 What percentage of students are high performers in reading? 38
Figure 2.2 What percentage of students are high performers in mathematics? 38
Figure 2.3 What percentage of students are high performers in science? 39
Figure 2.4 Percentage of top performers in reading in 2000 and 2009 39
Figure 2.5 Percentage of top performers in mathematics in 2003 and 2009 40
Figure 2.6 Percentage of top performers in science in 2006 and 2009 40

Figure 2.7 Percentage of poor performers in reading in 2000 and 2009 42
Figure 2.8 Percentage of poor performers in mathematics in 2003 and 2009 42
Figure 2.9 Percentage of poor performers in science in 2006 and 2009 43
Figure 2.10 Expenditure on educational institutions as a percentage of GDP, by source of fund and level of education (2007) 44
Figure 2.11 Reading performance and spending on education 44
Figure 2.12 Educational spending in 2007 and change since 2000, by level of education and sector 45
Figure 2.13 How school systems' resources are related to educational outcomes 46
Figure 2.14 Association between awareness of effective strategies to understand and remember information and performance in reading 53
Figure 2.15 Association between awareness of effective strategies to summarise information and performance in reading 54
Figure 2.16 Percentage of students at each proficiency level on the digital print reading scales 57
Figure 2.17 Percentage of students who reported using a computer at home and at school 60
Figure 2.18 Percentage of students who reported being able to use a spreadsheet to plot a graph 62
Figure 2.19 Students' views of teacher-student relations 64
Figure 2.20 Students' views of how conducive classrooms are to learning 65
Figure 2.21 Japan's educational system organisation 67
Figure 2.22 Countries in which parents can choose schools for their children 69
Figure 2.23 Size and composition of Japan's private education 71
Figure 2.24 Participation in after-school education in 2008 71
Figure 2.25 Government system by level (as of 1 April 2010) 74
Figure 2.26 How much autonomy individual schools have over curricula and assessments 81
Figure 2.27 How school systems are governed 82
Figure 2.28 How school systems' assessment and accountability policies are related to educational outcomes 84
Figure 2.29 Japan: Profile data 87

Figure 3.1 Finland's education system 95
Figure 3.2 Finnish educational improvements compared to the approximate global average 96
Figure 3.3 Finland: Profile data 108

Figure 4.1 Singapore's education system 118
Figure 4.2 21st-century competencies and student outcomes 126
Figure 4.3 Singapore: Profile data 129

Figure 5.1 Canada's education system organisation 135
Figure 5.2 Canada: Profile data 145

Figure 6.1 China's education system and enrolment ratios, 2009 152
Figure 6.2 Hong Kong's education system and enrolment ratios 164
Figure 6.3 Shanghai-China and Hong Kong-China: Profile data 172

Figure 7.1 Japan's Reform Trajectory 182

TABLES

Table I.1 Basic data on the countries studied in this volume 18

Table 2.1 Japan's mean scores on reading, mathematics and science scales in PISA 36
Table 2.2 Comparing countries' performance in reading 36
Table 2.3 Comparing countries' performance in mathematics 37
Table 2.4 Comparing countries' performance in science 37
Table 2.5 Strength of the relationship among student performance and socio-economic background and Gini Index 48
Table 2.6a Index of enjoyment of reading and reading performance, by national quarters of this index 50
Table 2.6b Index of enjoyment of reading and reading performance, by national quarters of this index 51
Table 2.7 Similarities and differences between digital and print reading assessments in PISA 2009 55
Table 2.8 Summary descriptions for four levels of proficiency in digital reading 56
Table 2.9 Where countries rank in digital reading performance 56
Table 2.10a Index of online reading activities and performance, by national quarters of this index 58
Table 2.10b Index of online reading activities and performance, by national quarters of this index 59
Table 2.11 Percentage of students who reported using laptops at school 61
Table 2.12 Size of Japan's Education System (2009) 67
Table 2.13 Spending on out-of-school instruction Spending per student in 2007 in thousand yen 72
Table 2.14 Relationship between pre-primary school attendance and performance, by quality of pre-primary school education 73
Table 2.15 Local government employees, by type of administrative services (as of 1 April 2009) 75
Table 2.16a Index of school responsibility for resource allocation and reading performance, by national quarters of this index 76
Table 2.16b Index of school responsibility for resource allocation and reading performance, by national quarters of this index 77
Table 2.16c Index of school responsibility for resource allocation and reading performance, by national quarters of this index 78
Table 2.17a Within and between school variation in reading performance and variation explained by school governance 79
Table 2.17b Within and between school variation in reading performance and variation explained by school governance 80
Table 2.18 Ratio of schools posting achievement data publicly and the relationship between school autonomy in allocating resources and reading performance 82
Table 2.19 How school systems use student assessments 86
Table 2.20 How school systems select and group students for schools, grades and programmes 86

Table 3.1 Finland's mean scores on reading, mathematics and science scales in PISA 94
Table 3.2 Comparison of education policies and economic development policies in Finland since 1990 102

Table 4.1 Singapore's mean scores on reading, mathematics and science scales in PISA 2009 114

Table 5.1 Canada's mean scores on reading, mathematics and science scales in PISA 134

Table 6.1 Shanghai-China's mean scores on reading, mathematics and science scales in PISA 162
Table 6.2 Hong Kong-China's mean scores on reading, mathematics and science scales in PISA 167

Introduction

A CHANGING YARDSTICK FOR EDUCATIONAL SUCCESS

Rapid globalisation and modernisation are posing new and demanding challenges to individuals and societies alike. Increasingly diverse and interconnected populations, rapid technological change in the workplace and in everyday life, and the instantaneous availability of vast amounts of information are just a few of the factors contributing to these new demands. In a globalised world, people compete for jobs not just locally but internationally. In this integrated worldwide labour market, highly-paid workers in wealthier countries are competing directly with people with much the same skills in lower-wage countries. The same is true for people with low skills. The competition among countries now revolves around the quality of their human capital.

The effect of these developments is to raise wages in less-developed countries and depress wages in the most industrialised countries. But these developments do not affect all workers equally. Job automation is proceeding even faster than the integration of the job market. If the work is routine, it is increasingly likely to be automated, although some jobs will always be done by human beings. The effect of automation, and more generally of the progress of technological change, is to reduce the demand for people who are only capable of doing routine work, and to increase the demand for people who are capable of doing knowledge-based work. This means that a greater proportion of people will need to be educated as professionals. High-wage countries will find that they can only maintain their relative wage levels if they can develop a high proportion of such knowledge workers and keep them in their work force. Increasingly, such work will require very high skills levels and will demand increasing levels of creativity and innovation.

This is not a description of one possible future, but of the economic dynamics that are now in play. In the high-wage countries of the OECD, demand for highly skilled people is increasing faster than supply (which OECD indicators show in rising wage premiums for highly-skilled individuals); and demand for low-skilled workers is decreasing faster than supply (which OECD indicators reveal in growing unemployment rates or declining wages for low-skilled individuals). Jobs are moving rapidly to countries that can provide the skills needed for any particular operation at the best rates. And the rate of automation of jobs is steadily increasing in both high- and low-wage countries.

In this context, governments need to create education systems that are accessible to everyone, not just a favoured few; that are globally competitive in quality; that provide people from all classes a fair chance to get the right kind of education to succeed; and to achieve all this at a price that the nation can afford. The aim is no longer just to provide a basic education for all, but to provide an education that will make it possible for everyone to become "knowledge workers". Such education will need to build the very high skills levels required to solve complex problems never seen before, to be creative, to synthesise material from a wide variety of sources, to see patterns in the information that computers cannot see, to work with others in productive ways, and to be able to both lead and be a good team member when necessary. This is what is required in today's "flat" world – where all work that cannot be digitised, automated and outsourced can be done by the most effective and competitive individuals, enterprises or countries, regardless of their location. The implication is that the yardstick for educational success is no longer simply improvement against national standards, but against the best-performing education systems worldwide (Box I.1).

ABOUT THIS REPORT

This report is the second in a series. The first volume – *Strong Performers, Successful Reformers: Lessons from PISA for the United States* (OECD, 2010a) – highlighted insights from the education systems of a selection of top-scoring and rapidly improving countries as measured by the OECD Programme for International Student Assessment (PISA – described in the Annex). As with the first volume, this second report is likely to have resonance not only in Japan, but also in a wide range of countries and different types of education systems striving for excellence in educating their young people. The aim of this report is to focus more on how countries are reforming their education systems not only to produce better learning outcomes, but, in particular, to ensure that their students acquire the skills needed for the unpredictable labour market of the future.

At the request of the Japanese Ministry of Education, Culture, Sports, Science and Technology, this second volume builds on the first to draw lessons for the education reform agenda in Japan. It also takes advantage of some fresh information regarding Japan from *PISA 2009 Results: Students On Line: Digital Technologies and Performance* (OECD, 2010b). This recent assessment of digital reading skills among 15-year-olds investigates students' proficiency at tasks that require them to access, understand, evaluate and integrate digital texts across a wide range of reading contexts and tasks. It also examines issues surrounding access to and use of computers and the Internet at home and at school.

With this in mind, this report examines a bit more closely than the first report how policy makers are reforming their education systems to better prepare students for the technological developments that are reshaping the nature of the workplace and work in the 21st century. The largest technological force currently influencing the world of work is the computer. The premise in this second volume, highlighted in Chapter 2, is that the labour market of the 21st century requires not only foundational skills like numeracy and literacy, but also advanced problem-solving skills characterised as expert thinking and complex communication (Levy, 2010).[1]

Box I.1 **The pace of change in educational improvement**

It is no accident that Japan has been at or near the top of the international rankings on education surveys since those surveys began. The country has persistently benchmarked and regularly reformed its education system since the Meiji Restoration in the mid-19th century (see Chapter 2). The Japanese education system is grounded in a deep commitment to children, a first-rate teaching force, a judicious use of resources and a curriculum that has consistently centred on core topics with high standards. These, and many other factors, have combined to produce one of the world's best-educated and most productive workforces.

However, Japan cannot rest on its laurels. According to the OECD, a high school diploma is the baseline qualification for reasonable earnings and employment prospects. Among OECD countries, the average proportion of young adults with at least a high school diploma has now risen to 80%; in Japan this figure exceeds 95%. Yet just two generations ago, South Korea had the economic output equivalent to that of Afghanistan today, and was 23rd in terms of educational output among OECD countries. Today, South Korea is one of the top performers in terms of the proportion of successful school-leavers, with 94% obtaining a high school diploma. Similarly, Chile moved up by nine rank order positions, Ireland by eight and Belgium and Finland by four.

Changes are not just seen in the quantitative output of education systems; many countries have also shown impressive improvements in the quality of learning outcomes. A major overhaul of Poland's school system helped to dramatically reduce performance variation among schools, reduce the share of poorly performing students, and raise overall performance by the equivalent of more than half a school year. Germany was jolted into action when PISA 2000 revealed below-average performance and large social disparities in results. The country has subsequently made progress on both fronts. Korea's average performance was already high in 2000, but policy makers were concerned that it was only the elite who were achieving these levels of excellence in PISA. Within less than a decade, Korea was able to double the share of students demonstrating excellence in reading literacy.

The remainder of this chapter describes the framework of analysis for this report, the PISA measures used, the methodology for developing the country chapters, and the conceptual framework for viewing policies for skills of the 21st century.

Chapter 2 sets the stage by analysing in detail Japan's performance in PISA, contrasting its relative strengths and weaknesses with those of other countries, and offering new insights provided through the results of the PISA 2009 digital reading assessment.

The subsequent chapters present detailed analyses of high-performing education systems – Canada (Ontario), Finland, Singapore, and China (Hong Kong and Shanghai). For each country, desk reviews and interviews with a range of experts in the field of education were conducted. Each chapter briefly reviews the country's history and culture as context for understanding its education system. The chapters then go on to outline the main elements of the country's education system and reforms intended to develop the skills needed for the unpredictable labour market of the future. These elements vary across the education systems described, but generally include standards, examination systems, instructional systems, school finance, teacher quality, accountability, student motivation, the use of Information and Communication Technologies (ICT), and innovations in pedagogical practices. Recent policy developments are highlighted in the context of past reforms. Each chapter concludes by drawing wider lessons.

The final chapter draws together the threads of the preceding chapters to present some policy lessons for Japan's education systems, and for other countries too.

COUNTRY COMPARISONS

Table I.1 compares the countries covered in this report according to learning outcomes, equity in the distribution of learning opportunities, spending on education and the economic context. These countries were chosen not only to provide a variety of relevant policies and practices, and to illustrate a range of education structures and models, but also to build on the analyses begun in the first volume:

- Japan ranked high on the initial PISA assessment in 2000 and has maintained its standing on subsequent assessments. However, the government constantly designs reforms to improve its already impressive level of system performance – particularly in light of future skills needs.

- Canada has been among the top performers in PISA over the past decade. Given its decentralised education system, it is methodologically prudent to look at provincial education policies. Ontario, the most populous province, provides a window onto some key reforms.
- Finland was the highest-performing country in the first PISA assessment in 2000 and has performed consistently well in subsequent assessments.
- Singapore conducted its first PISA assessment in 2009, where it scored near the top, having improved its education system in dramatic ways since its independence in 1965.
- China is a country newly covered in PISA. This report focuses on the performance of Hong Kong and Shanghai, two cities each with a population as large as or larger than some OECD countries. Hong Kong has long been a top performer on the PISA league tables; Shanghai was only assessed for the first time in PISA 2009, yet it is already among the star performers. These two cities, despite being in the same country, have markedly different histories and school systems with very different governance arrangements. Contrasting them provides valuable insights into the impressive accomplishments in education in a country now taking a prominent position on the world stage.

Table I.1 Basic data on the countries studied in this volume

	Quality										Equity	Coherence	Efficiency	Income	Equality
	Mean PISA score on the reading scale 2009		Mean PISA score on the reading scale 2000		PISA score difference in reading between 2000 and 2009		Mean PISA score on the mathematics scale 2009		Mean PISA score on the science scale 2009		Percentage of the variance in student performance explained by student socio-economic background	Total variance between schools expressed as a percentage of the total variance within the country	Annual expenditure per student on educational core services (below tertiary) 2007	GDP per capita	Gini Index
	Score	S.E.[1]	Score	S.E.[1]	Score	S.E.[1]	Score	S.E.[1]	Score	S.E.[1]	%	%	USD PPP	Value	Value
Canada	524	1.5	534	1.6	-10	3.4	527	1.6	529	1.6	8.6	22	7 609	36 397	0.30
Shanghai-China	556	2.4	m	m	m	m	600	2.8	575	2.3	12.3	38	42 064[3]	5 340	0.42
Hong Kong-China	533	2.1	m	m	m	m	555	2.7	549	2.8	4.5	42	32 896[4]	42 178	0.43
Finland	536	2.3	546	2.6	-11	4.3	541	2.2	554	2.3	7.8	9	6 430	35 322	0.26
Japan	520	3.5	522	5.2	-2	6.8	529	3.4	539	3.4	8.6	49	8 012[2]	33 635	0.34
Singapore	526	1.1	m	m	m	m	562	1.4	542	1.4	15.3	35	23 699[5]	51 462	0.42
OECD average	494	0.5	497	0.6	- 2	2.7	497	0.5	501	0.5	14	39	6 675	32 962	0.31

1. Standard error.
2. Value for core and ancillary services.
3. Cumulative expenditure per student over the theoretical duration of primary studies (OECD, 2010a).
4. Recurrent government expenditure on education, including primary, secondary and special education and departmental support (Hong Kong Annual Digest of Statistics 2010).
5. Cumulative expenditure per student for 6 to 15-year-olds (OECD, 2010a).

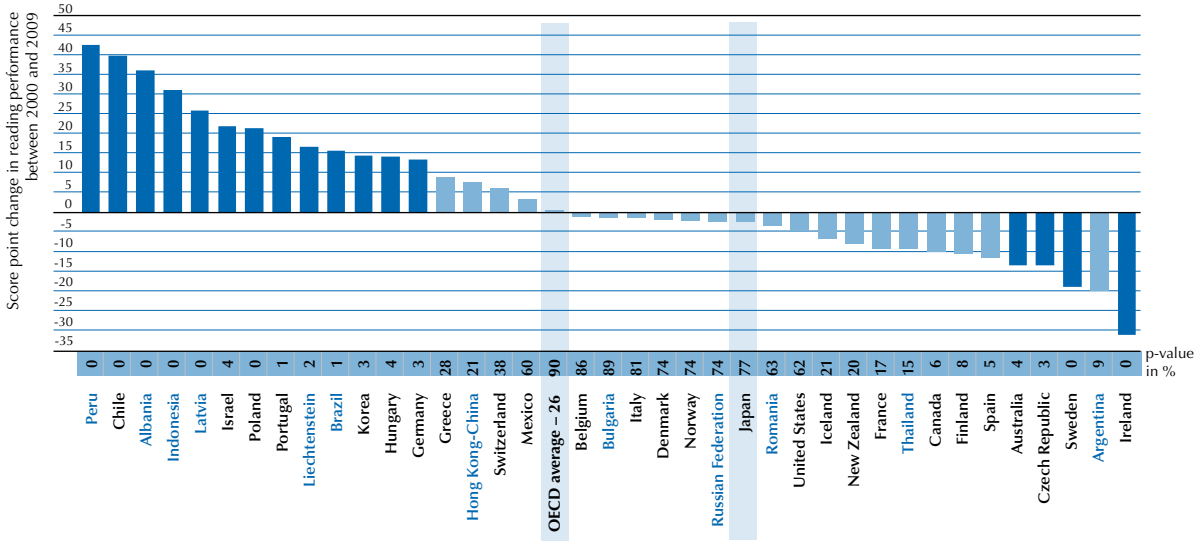
Source: OECD, *PISA 2009 Database,* and OECD (2010d).

Comparing the OECD averages across the various PISA assessments must be made with great care. Not all the OECD members participated in every PISA assessment and the list of participating partner countries and economies has widened substantially since 2000, as has the number of OECD member states. The group of OECD countries for which the OECD average can be compared across time differs between assessment areas (reading, mathematics, and science). For methodological reasons, some countries have not been included in comparisons between 2000, 2003, 2006 and 2009. This is explained in Chapter 1 and Annex A5 in OECD (2010c).

The most appropriate way to compare trends in reading, mathematics and science performance is shown in Figures 1.1, 1.2 and 1.3.

■ Figure I.1 ■

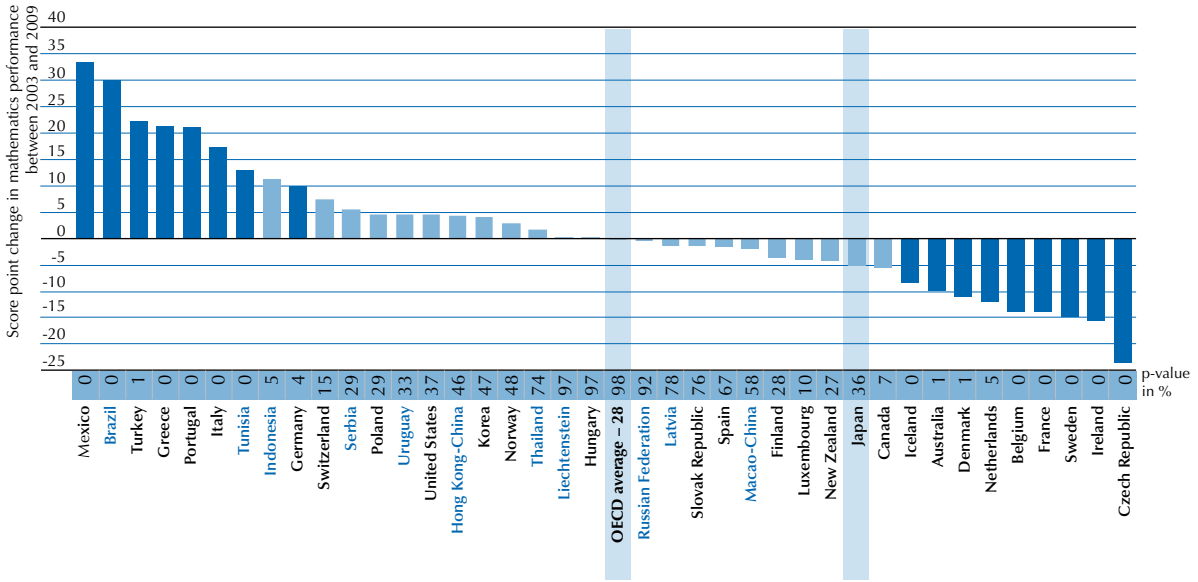
Change in reading performance between 2000 and 2009



Note: Statistically significant score point changes are marked in a darker tone.
Countries are ranked in descending order of the score point change in reading performance between 2000 and 2009.
Source: OECD, *PISA 2009 Database*.

■ Figure I.2 ■

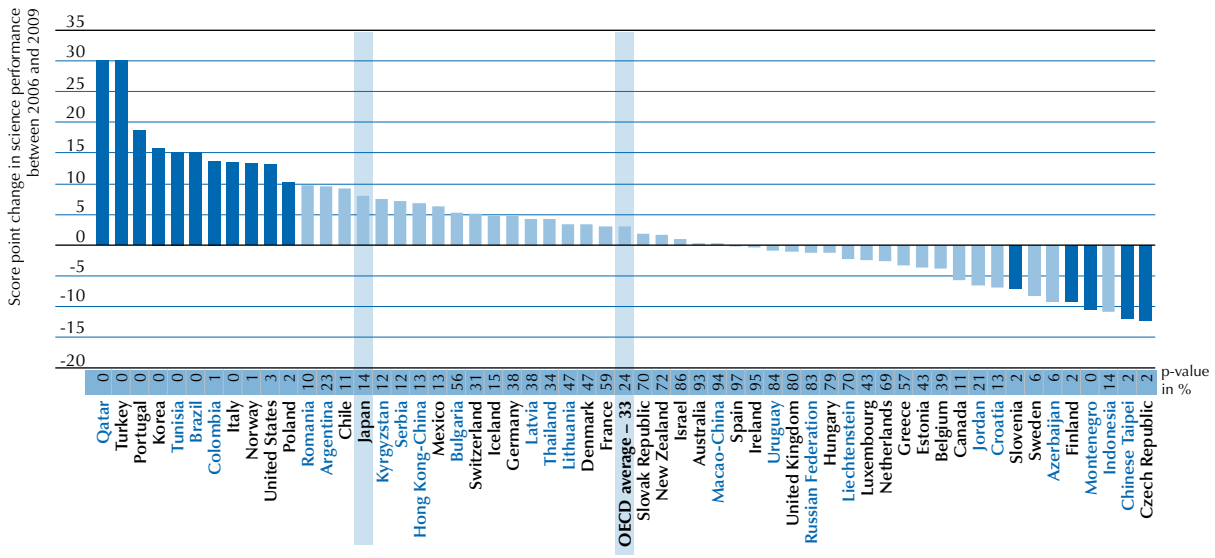
Change in mathematics performance between 2003 and 2009



Note: Statistically significant score point changes are marked in a darker tone.
Countries are ranked in descending order of the score point change on the mathematical scale between 2003 and 2009.
Source: OECD, *PISA 2009 Database*.

■ Figure I.3 ■

Change in science performance between 2006 and 2009



Note: Statistically significant score point changes are marked in a darker tone.
Countries are ranked in descending order of the score point change in science performance between 2006 and 2009.
Source: OECD, *PISA 2009 Database*.

FRAMEWORK FOR ANALYSIS

This report builds on the framework for analysis applied in the first volume (OECD, 2010a), which suggests a continuum of approaches to education reform linked, in part, to a country's economic advancement. Developing countries with few resources to invest in education are likely to invest more heavily in educating a small elite well to lead the country's industries and government operations. As economies become more industrialised, citizens and policy makers tend to converge around a different philosophy: that the best way to compete in the global economy is to provide all citizens with the type and quality of education formerly provided only to the elite. To provide high-quality education to the broader population, education systems must recruit their teachers from the top of the higher education pool.

More recently policy efforts have emerged to develop education systems that are intended also to inculcate students with a range of higher-order capacities that encompass the notions of expert thinking and complex communication skills. Each education system and cultural context has developed unique ways to achieve this, such as nurturing student creativity, critical thinking, and networking skills that are considered important to knowledge-based economies and innovation. Governments have used many approaches, but policies and practices intended to develop in students the skills needed for the unpredictable labour market of the future tend to fall into three categories:

Over time, governments, education systems and schools develop a unique blend of these mechanisms to help students acquire the habits of the mind for performing well in the knowledge economy. Nations that try to emphasise one mechanism over another will likely face challenges. In this framework, there is no ideal balance, so policy makers will see the need for coherence in the policies and relative investment of resources.

■ Figure I.4 ■

Which policies and practices can help students develop skills for future labour markets?

1
Indirect mechanisms to create greater space for multiple methods of learning, understanding, and interpretation of concepts, whether by providing more free time to students or reducing rigidity in their learning environments.
2
Incentive mechanisms for reducing the use of rote learning, encouraging teachers, students, schools, and systems to move away from a focus on factual recall and high-stakes testing toward an emphasis on learning to learn.
3
Direct mechanisms that have an explicit focus on pedagogical practices to promote problem solving, integrative learning and collaboration.

■ Figure I.5 ■

Framework of analysis for policies to nurture skills for the future

Economic development		
Impoverished, preindustrial low-wage	← →	High value-added, high wage
Teacher quality		
Few years more than lower secondary	← →	High level professional knowledge workers
Curriculum, instruction and assessment		
Basic literacy, rote learning	← →	Complex skills, creativity
Work organisation		
Hierarchical, authoritarian	← →	Flat, collegial
Accountability		
Primary accountability to authorities	← →	Primary accountability to peers and stakeholders
Student inclusion		
The best students must learn at high levels	← →	All students must learn at high levels
Development of skills for the future		
Indirect mechanisms	← →	Direct mechanisms

WHAT IS PISA AND WHAT CAN WE LEARN FROM IT?

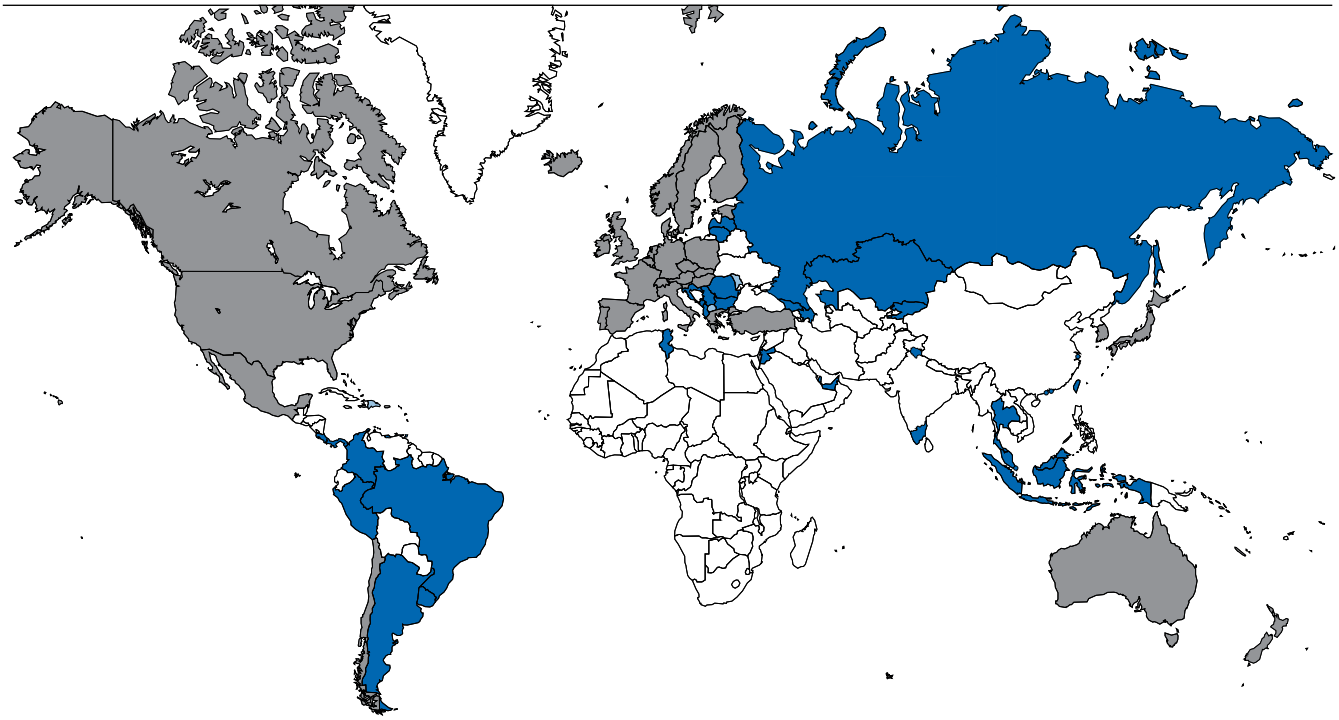
Parents, students, teachers and those who run education systems are looking for sound information on how well their education systems prepare students for life. Most countries monitor their own students' learning outcomes in order to provide answers to this question. Comparative international assessments can extend and enrich the national picture by providing a larger context within which to interpret national performance. Countries inevitably want to know how they are doing relative to others, and, if other countries are outperforming them, they want to know how they do it. Such assessments have gained prominence in recent years partly due to pressures from an increasingly competitive global economy that is more than ever driven by the quality of human capital. As a result, the yardstick for judging public policy in education is no longer improvement against national educational standards, but also improvement against the most successful education systems in the world.

The OECD's PISA , which assesses the knowledge and skills of 15-year-old students around the world, is the result of collaboration among 70 countries interested in comparing their own students' achievement with that in other countries (Figure I.6). Every three years since 2000, PISA compares student performance in reading, mathematics and science (Annex). PISA's assessments are designed not only to find out whether students have mastered a particular curriculum, but also whether they can apply the knowledge and skills they have acquired in real-life situations. Decisions about the scope and nature of the PISA assessments and the background information to be collected are made by leading experts in participating countries. Considerable efforts and resources are devoted to achieving cultural and linguistic breadth and balance in the assessment materials. Stringent quality-assurance mechanisms are applied in designing the test, in translation, sampling and data collection. As a result, PISA findings have a high degree of validity and reliability.

Because PISA reports on the achievements of many countries against a common set of benchmarks, it inevitably prompts discussion within participating countries about their education policies. Citizens recognise that their countries' educational performance will not simply need to match average performance, but that they will need to do better if their children want to ensure above-average wages and competitive standards of living. PISA assists this discussion by collecting a wide range of background information about each country's education system and about the perspectives of various stakeholders. This makes it possible to relate aspects of performance with important features of those systems.

■ Figure I.6 ■

A map of PISA countries and economies



OECD countries

Australia
Austria
Belgium
Canada
Chile
Czech Republic
Denmark
Estonia
Finland
France
Germany
Greece
Hungary
Iceland
Ireland
Israel
Italy
Japan
Korea
Luxembourg
Mexico
Netherlands
New Zealand
Norway
Poland
Portugal
Slovak Republic
Slovenia
Spain
Sweden
Switzerland
Turkey
United Kingdom
United States

Partner countries and economies in PISA 2009

Albania
Argentina
Azerbaijan
Brazil
Bulgaria
Colombia
Costa Rica*
Croatia
Georgia*
Himachal Pradesh-India*
Hong Kong-China
Indonesia
Jordan
Kazakhstan
Kyrgyzstan
Latvia
Liechtenstein
Lithuania
Macao-China
Malaysia*
Malta*
Mauritius*
Miranda-Venezuela*
Moldova*
Montenegro
Netherlands-Antilles*
Panama
Peru
Qatar
Romania
Russian Federation
Serbia
Shanghai-China
Singapore
Tamil Nadu-India*
Chinese Taipei
Thailand
Trinidad and Tobago
Tunisia
Uruguay
United Arab Emirates*

Partner country in previous PISA surveys

Macedonia

* These partner countries and economies carried out the assessment in 2010 instead of 2009.

HOW CAN PISA BE USED TO HELP IMPROVE EDUCATION SYSTEMS?

On their own, cross-sectional international comparisons such as PISA cannot identify cause-and-effect relationships between certain factors and educational outcomes, especially in relation to the classroom and the processes of teaching and learning that take place there. However, they are an important tool to assess and drive educational change in several ways:

- PISA shows what achievements are possible in education. For example, PISA shows that Canadian 15-year-olds, on average, are over one school year ahead of 15-year-olds in the United States in mathematics and more than half a school year ahead in reading and science.[6] They also show that socio-economically disadvantaged Canadians are much less at risk of poor educational performance than their counterparts in the United States. More generally, whether in Asia (e.g. Japan or Korea), Europe (e.g. Finland) or North America (e.g. Canada), many OECD countries display strong overall performance in international assessments and, equally important, some of these countries also show that poor performance in school does not automatically follow from a disadvantaged socio-economic background. Some countries also show a consistent and predictable educational outcome for their children regardless of where they send their children to school. In Finland, for example, which has some of the strongest overall PISA results, there is hardly any variation in average performance between schools.

- PISA is also used to ***set policy targets in terms of measurable goals achieved by other systems and to establish trajectories for educational reform***. For example, Japan's 2010 Growth Strategy sets the goal for Japan to achieve by 2020 a reduction in the proportion of low achievers and an increase of that of high achievers to the level of the highest performing PISA country and to increase the proportion of students with an interest in reading, mathematics and science to a level above the OECD average (Ministry of Economy, Trade and Industry, 2010). Similarly, in 2010 the Prime Minister of the United Kingdom set the goal of raising the country's average student performance to Rank 3 on the PISA mathematics assessment and to Rank 6 on the PISA science assessment (Chapter 7). This announcement was accompanied by a range of policies to achieve these targets. The Mexican President established a "PISA performance target" in 2006, to be achieved by 2012, which highlights the gap between national performance and international standards and allows monitoring of how educational strategies succeed in closing this gap. The reform trajectory includes a delivery chain of support systems, incentive structures as well as improved access to professional development to assist school leaders and teachers in meeting the target.
- Some countries have systematically ***related national performance to international assessments***, for example by embedding components of the PISA assessments into their national assessments. For example, by linking its national assessment with PISA, Brazil is providing each secondary school with information on the progress it must make to match the average PISA performance level by 2021. Germany, Japan and the US state of Oregon have embedded PISA items in their national/state assessments.
- PISA can help countries ***gauge the pace of their educational progress***. Educators are often faced with a dilemma: if, at the national level, the percentage of students obtaining high scores increases, some will claim that the school system has improved. Others will claim that standards must have been lowered, and behind the suspicion that better results reflect lowered standards is often a belief that overall performance in education cannot be raised. International assessments allow improvements to be validated internationally. Poland raised the performance of its 15-year-olds in PISA reading by the equivalent of well over half a school year's progress within six years, catching up with United States performance in 2009 from levels well below United States performance in 2000. It also reduced the proportion of students performing below the baseline level of reading performance from 23% in 2000 to 15% in 2009 (the proportion of bottom performers remained unchanged at 18% in the US during this time). Last but not least, Poland succeeded in halving performance differences between schools.
- PISA can help governments to optimise existing policies or consider more fundamental alternatives when researchers combine ***advanced forms of educational assessment with sophisticated survey research methods***. For example, PISA collects reliable data on students' ability to apply high levels of knowledge and highly complex thinking to real-world problems. PISA's survey research also gathers a wide range of background data surrounding the education of the students being assessed. By linking these two bodies of data one can associate certain patterns of student performance with a multitude of background data such as the qualifications of their teachers, how much those teachers are paid, the degree to which decisions are devolved from higher authorities to the school faculty, the socio-economic or minority status of the students, the nature of the assessments that students must take, the nature of the qualifications they might earn and so on, in great detail. In this way, while the causal nature of such relationships might not be established, an extensive web of correlations can be drawn between certain dimensions of student performance and a large range of factors that could conceivably affect that performance.

RESEARCH METHODS EMPLOYED FOR THE COUNTRY CHAPTERS

The research undertaken for this report entailed an enquiry of historians, policy makers, economists, education experts, ordinary citizens, journalists, industrialists, and educators that have allowed for an alternative benchmarking. The research began with a document review and was enriched by interviews with current and former leading policy makers and other education stakeholders in the countries and education systems concerned. The PISA data provided the basis for country selection as well as important clues for the points of investigation.

This report complements the uses of PISA just described with a form of industrial benchmarking (Box I.2). The aim of the research presented in this report is to relate differences in student achievement between one country and another to certain features of those countries' education systems. Education is highly value-laden. Systems develop for historical reasons that reflect the values and preferences of parents, students, administrators, politicians and many others. Yet such values and preferences evolve and education systems must change to accommodate them. Decision makers in the education arena can benefit from benchmarking research in the same way as heads of firms. This involves learning about the range of factors that lead to success, taking inspiration from the lessons of others, and then adapting the operational elements to the local context while adding unique elements that make their own education system one of a kind.

The intent of this report is not to specify a formula for success – this report contains no policy prescriptions. Rather the objective is to describe the experience of countries whose education systems have proven exceptionally successful to help identify policy options for consideration. It is intended as a resource for decision making.

While quantitative analysis can be used to apportion the relative influence of a variety of factors in determining variations in student performance in PISA, the data collected by PISA alone leave many questions unanswered. For instance, it is not possible to

determine from PISA results whether teachers in the schools of a particular country are using a very powerful instructional system that would be equally effective in another country with very different class sizes. PISA data do not reveal whether new political leadership reframed the issues in education policy in such a way that facilitated the introduction of new reforms. PISA data do not show how awareness of weak education performance can mobilise a country's education establishment to reform and radically improve its education outcomes. Nor do PISA data reveal how a country's industrial and educational institutions are able to work together to leverage a qualifications structure that produces incentives for high-level student performance.

Box I.2 **Industrial benchmarking**

Industrial benchmarking gained currency at the close of the 1970s and the early 1980s when Japanese firms began to challenge large multi-national American firms globally. Many American firms did not survive that challenge. But those that did owe their survival to their use of benchmarking techniques.

The aim of the American firms was to learn enough from their competitors to beat them at their own game. To do this, they identified their most successful competitors. But they also identified the companies that led the league tables in each of their major business process areas (e.g. accounting, sales, inventory). They collected all the information they could possibly find concerning their direct competitors and the companies that led the league tables in the relevant business processes. Some of this information appeared in the business press, some in major academic studies usually conducted and published by business school faculty, some through papers presented by staff members of their competitors in industry journals. After they had learned everything they could possibly learn in this way, they did their best to visit their competitors' work sites, sending their own leading experts to examine product designs, manufacturing techniques, forms of work organisation, training methods, anything they thought might contribute to their competitor's success.

When this research was complete, they would analyse all the information and research they had gathered. Their aim was not to replicate anything they had seen, but to combine the best they had seen in one place with the best they had seen in another, added with their own ideas, to make something that would be superior to anything they had seen anywhere, and which would be adapted to their own specific needs and circumstances.

The lessons suggested in this report emerge from instances in which PISA data and country analysis tend to converge. The report provides complementary qualitative analysis of high-performing and rapidly-reforming improving education systems to reveal possible contextual influences on education performance. The country studies have not only suggested some possible answers to interesting questions, but have also uncovered some new questions for consideration in future PISA assessments.

Notes

1. *OECD Working Paper No. 45* (2010) is based on ideas that first appeared in Autor, Levy and Murnane (2003); and Levy and Murnane (2005).

2. The progress students typically achieve over a school year was estimated as follows. Data on the grade in which students are enrolled were obtained both from the Student Questionnaire and from the Student Tracking Forms. The relationship between the grade and student performance was estimated through a multilevel model accounting for the following background variables: *1)* the *PISA index of economic, social and cultural status*; *2)* the *PISA index of economic, social and cultural status* squared; *3)* the school mean of the *PISA index of economic, social and cultural status*; *4)* an indicator as to whether students were foreign born (first-generation students); *5)* the percentage of first-generation students in the school; and *6)* students' gender. Table A2.1 in the PISA 2009 report (OECD, 2010c) presents the results of the multilevel model, which are fairly consistent across countries. Column 1 in Table A2.1 estimates the score point difference that is associated with one grade level (or school year). This difference can be estimated for the 28 OECD countries in which a sizeable number of 15-year-olds in the PISA samples were enrolled in at least two different grades. Since 15-year-olds cannot be assumed to be distributed at random across the grade levels, adjustments had to be made for the above-mentioned contextual factors that may relate to the assignment of students to the different grade levels. These adjustments are documented in columns 2 to 7 of the table. While it is possible to estimate the typical performance difference among students in two adjacent grades net of the effects of selection and contextual factors, this difference cannot automatically be equated with the progress that students have made over the past school year but should be interpreted as a lower boundary of the progress achieved. This is not only because different students were assessed, but also because the content of the PISA assessment was not expressly designed to match what students had learned in the preceding school year but rather broadly to assess the cumulative outcome of learning in school up to age 15.

References and further reading

Autor, D., F. Levy and **R.J. Murnane** (2003), *"The Skill Content of Recent Technical Change: An Empirical Investigation"*, Quarterly Journal of Economics, 118, 4 (November 2003): 1279-1334.

Levy, F. (2010), *"How Technology Changes Demand for Human Skills"*, OECD Education Working Papers No. 45, OECD Publishing.

Levy, F. and **R.J. Murnane**, (2005), *The New Division of Labor: How Computers are Creating the Next Job Market*, Princeton University Press, Princeton.

Ministry of Economy, Trade and Industry (2010), *The New Growth Strategy: Blueprint for Revitalizing Japan*, METI Cabinet Decision, 18 June, Tokyo, Japan.

OECD (2010a), *Strong Performers, Successful Reformers: Lessons from PISA for the United States,* OECD Publishing.

OECD (2010b), *PISA 2009 Results: Students On Line: Digital Technologies and Performance (Volume VI),* OECD Publishing.

OECD (2010c), *PISA 2009 Results: Learning Trends: Changes in Student Performance Since 2000 (Volume V),* OECD Publishing.

OECD (2010d), *Education at a Glance 2010: OECD Indicators,* OECD Publishing.

1

How is Technology Changing Demand for Human Skills?

This chapter examines the concepts of complex communication and expert thinking, and discusses the importance of foundation skills in the workplace and in individuals' personal and civic lives. It also discusses how the labour market is evolving and raises the question: How well are national populations prepared for today's – and tomorrow's – jobs?

It is a characteristic of labour markets that technology can change the nature of work faster than people can change their skills. Innovation is central to market economies and it is impossible to imagine many of the new occupations that are likely to exist in a decade's time. But while we don't know everything about future occupations, we do know something about the skills these future occupations will require.

The largest technological force now shaping work is the computer. Computers are faster and less expensive than people in performing some workplace tasks, but much weaker than people in performing other tasks. It is important to remember that computers substitute for some work (issuing metro tickets, for instance), and complement other types of work (providing computerised images that assist in medical diagnoses). By characterising the kinds of work computers do well, we can begin to describe the work that will remain for people in the future, the skills that work requires and the way that computers can assist people in performing that work.

We can get a picture of what computers do by considering three workplace tasks:

- In railroad stations, the task of selling tickets to particular destinations, a moderately skilled task, is increasingly performed by self-service kiosks rather than by desk agents.
- In industrial seaports, the task of recording and tracking the movement of sealed cargo containers is increasingly done automatically using signals emitted from radio frequency identification (RFID) tags. The task used to be done by clerks who inspected containers visually.
- In a doctor's office, the doctor makes a diagnosis using a computer to access a patient's electronic medical records, which contain the patient's medical history, including procedures performed by other doctors. The doctor then uses a computerised search to look for potential treatments for the patient's condition. In the past, the doctor would have worked from paper medical records that might have omitted other doctors' procedures, and he would have searched for potential treatments in his reference books, some of which might have been out of date.

Why do we see this particular mix of outcomes? How do we explain the fact that computers *substituted* for human work in issuing tickets and tracking cargo containers while they *complemented* the doctor's diagnostic skills?

The answer begins with two ideas:

- All human work involves the cognitive processing of information. The financial analyst who reads numbers in a spreadsheet, the farmer who looks to the sky for signs of rain, the chef who tastes a sauce, the carpenter who feels his hammer as it hits a nail – all of these men and women are processing information to decide what to do next or to update their picture of the world.
- We can think of a properly running computer programme as a series of rules that specify an action for each contingency. Computers execute rules. Some of the rules involve arithmetic (6 x 9 = 54). Other rules involve logical conditions (If [AGE > 35] Go to Statement 13).

When these two ideas are combined with common sense, they say that a computer can substitute for a human in processing information when two conditions are present:

- The information to be processed can be represented in a form that is suitable for use by a computer.
- The processing itself can be expressed in a series of rules.

The first condition is common sense. The information-processing rules in the second condition can be either deductive or inductive. Deductive rules arise from the logical structure of the process. For example, in the case of the railroad ticket kiosk, some deductive rules might be:

- "If the destination is Kyoto, the ticket price is JPY 5000."
- "Read the person's credit card number."
- "Send the person's credit card number to the issuing bank to authorise the charge."

Information-processing based on deductive rules is often described as rules-based logic.

Inductive rules – involving a more complicated situation – typically refer to equations based on regressions, neural nets and other statistical models, where the parameters of the model have been estimated on "training samples" of historical cases. The equations with their estimated parameters are then used to process new cases. Information-processing based on inductive rules is usually described as pattern recognition. It is this pattern recognition that permits a radio receiver to identify the signal from the RFID tag on the cargo container. Other pattern-recognition software is used to recognise words in voice-recognition devices and to recognise potential fraud in credit card-purchasing data.

The third example is different. A computer can *complement* the doctor's diagnostic skills by providing a full patient history and searching for potential treatments that the physician might not otherwise find. At the same time, a computer cannot *substitute* for diagnostic skills, *per se*.

More precisely, the doctor performs two tasks that cannot be easily computerised. The first involves eliciting information from the patient. As any doctor will testify, this is not a simple process. It involves listening to the patient's words. It also means reading the patient's body language – the tone of voice, the avoidance of eye contact or the broken-off sentence that indicates the patient is holding something back. The doctor must be particularly alert for the famous "last minute" of an appointment, when the patient, on his way out the door, looks over his shoulder and says "By the way, my wife says I should tell you about this pain I have in my stomach."

Many other jobs today involve similarly complicated human interaction. We can call these interactions "complex communication".

The doctor's other non-computerised task involves constructing a diagnosis from multiple sources of information: what the patient has told him, the patient's medical history, his knowledge of the medical literature, his experience with past cases, and so on. This task has not been computerised because it cannot be expressed in a set of step-by-step rules (see also Schultz, 1964). Many other jobs today also involve solving problems that lack rules-based solutions. We can call this style of problem-solving "expert thinking".

Computerised information-processing tends to use rules-based logic and pattern recognition that can sometimes replace the need for human input in solving known or anticipated problems. However, solving new or unanticipated problems, or solving problems that lack rules-based solutions and require non-linear, case-based reasoning demand expert-thinking skills. In technology-rich environments, where information is abundant and circumstances can change rapidly, the ability to establish a common understanding of information is highly valuable and requires complex communication skills to elicit information and draw connections.

A technology-rich workplace still requires solid foundational skills, including numeracy, literacy and reading ability, which are all tested by PISA. But such workplaces also require advanced problem-solving and advanced communication skills. The educational and training implications of complex communication and expert thinking cannot be reduced to rules, making them relatively difficult to both teach and assess.

But what exactly are complex communication and expert thinking skills? And what opportunities and challenges do they raise for education and training programmes?

Complex communication

A dozen years ago, at the height of the dot.com mania, experts predicted that the Internet would eliminate millions of jobs in management, teaching and sales – jobs that involved communicating information. Networked computers, people assumed, could communicate the information at much lower cost than traditional modes of person-to-person communication.

In practice, these jobs are as important as they ever were. The reason why lies in a basic cognitive principle: information is inherently ambiguous, and we give information meaning by imposing a context. Without a shared context, there is no guarantee that the recipient of information will interpret it as the author intended. A good example of this principle comes from what may still be the shortest correspondence on record.

The correspondence began with a telegraph consisting of a single character "?"and the reply was a telegraph consisting only of "!".[1]

We don't send many telegraphs these days, but what would you think if you received a letter consisting only of "?". If you had a child away at school you might assume the letter was about money. If you hadn't called your mother recently, you might assume the letter was a pointed reminder. Read by itself – taken out of context – the question mark tells you little.

In fact, this particular question mark was written by Victor Hugo. In 1862, Hugo finished *Les Misérables*. Exhausted, he dropped the manuscript off with the publisher and left for vacation. Though Hugo wanted to relax, he also wanted to know how the book was selling and so he telegraphed "?" to his publisher. The book was a smash hit and so the publisher could telegraph back "!".

Hugo and his publisher each knew what was on the other's mind – they shared a context.

This was the point the dot.com forecasts missed: the work of managers, teachers, sales people and others is not to convey information *per se* but to establish a context in order to convey a *particular interpretation* of information. When a salesperson says you look perfect in lime-green pants, you cannot know, based on the verbal information alone, whether the salesperson is being honest. The other things the salesperson does – reading your body language, quickly correcting misunderstandings, smiling at appropriate times – are designed to establish a context in which you assume you are hearing the truth.

In the same way, writing down formulas on a blackboard is a small part of a calculus teacher's job. The teacher must use examples and back-and-forth conversation to create a context in which students can understand what the formulas mean. And asking "What seems to be the problem?" is only the start of the doctor's work to discover and diagnose the patient's symptoms.

Mastering complex communication – the ability to establish a common understanding of information – is a highly valuable skill, particularly in technology-rich environments where information is abundant and circumstances can change rapidly.

Expert thinking

When a problem can't be solved by rules, it is necessary to look for other ways of solving the dilemma – what can be called expert thinking. Expert thinking is a collection of specific solution methods that vary according to the problem at hand. One frequently used method is what cognitive scientists call case-based reasoning. The method is illustrated by an example from automobile repair.

A customer brings in a recently purchased Fiat® – a new model – with a non-functioning power seat. A technician uses a computerised diagnostic tool to search for problems. We noted earlier that any software programme, including the software in the diagnostic tool, is a set of rules specifying actions for various contingencies. But automotive engineers who write the software can only write rules for the contingencies they have anticipated: a faulty switch, a break in the wire connecting the switch to the seat motor, a faulty seat motor, and so on.

In other words, the diagnostic tool can solve "known" problems, but solving "new" problems remains something for humans to do. In a new car, the many new electronic components can interact in ways engineers have not foreseen. If the seat problem is caused by one of these unanticipated interactions, the factory-programmed rules will detect no error and the technician must solve the problem another way.

In case-based reasoning, the mechanic begins with a kind of pattern recognition in which he recognises points of similarity between the current problem and other problems he has solved in the past. He uses his previous solutions as a starting point for constructing a new solution – for example, looking for failure points that he had seen in analogous problems but that the diagnostic tool did not cover. It is likely that the doctor, diagnosing a patient, uses case-based reasoning in a similar way to start constructing a diagnosis, comparing points of similarity between this patient and other patients he had treated in the past.

What stands out about this problem is that there is no straightforward solution path. That is no accident. Problems with straightforward solution paths are increasingly solved by computers; meanwhile complex problems like this will comprise an increasing share of human work. It is that fact that makes expert thinking important.

The educational and training implications of advanced skills

It is useful to step away from the argument for a moment to see the educational and training implications of these advanced skills. Every teacher knows that rules-based skills are relatively easy both to teach and to test. The problem, as we have seen, is that skills that can be codified in rules can also be performed by a computer. By their nature, complex communication and expert thinking cannot be reduced to rules and so they are relatively difficult to both teach and assess.

With respect to expert thinking, begin with the fact that everyone agrees that children need "problem-solving" skills. In practice, however, problem-solving skills have often meant focusing only on rules-based solutions, like the rules of algebra. The rules of algebra are very important, but applying algebraic rules is just the second step of a two step problem-solving process. The first step – the step computers can't do – involves examining the messy set of facts in a real-world problem to determine which set of algebraic rules to apply – the expert thinking.

Today, the labour market values a mechanical engineer's ability to formulate a problem as a particular mathematical model. Once the model is formulated, a computer – not the engineer – will apply rules to calculate the actual solution. How does the engineer choose the correct mathematical model? As with the earlier cases of the auto mechanic and the doctor, she likely relies on analogies with problems she has solved in the past. It follows that her education must include numerous real-world problems to give her experience on which to draw – a relatively time-intensive process.[2]

Similarly, the skill of complex communication cannot be learned simply by reading the right book. It requires extensive practice and teacher-student interaction. Similarly, because formulating good communication is not a rules-based process, assessments are not easily reduced to multiple-choice, machine-graded tests.

Advanced skills and foundational skills

Common sense says that advanced skills like expert thinking and complex communication must be preceded by a strong foundation in literacy, numeracy and reading. Nonetheless, it is useful to review several mechanisms through which computerisation makes foundational skills particularly important.

There is, first, today's rapid pace of change. An example of the relationship between literacy and the rate of change occurred some years ago in a plant assembling electronic controls for missiles. The plant was located in the southern US and much of the assembly was performed by men and women who had worked as agricultural labourers. Many were illiterate and so they could not read assembly diagrams but they learned to assemble specific components by watching their neighbours. This method of learning broke down because engineers were constantly changing components to address performance problems. The result was a stream of change orders from the engineering division to the assembly line. The illiterate workers were lost because they could not read change orders. Today, as computers accelerate workplace change, being able to understand descriptions of new procedures becomes essential.[3]

A second mechanism linking computerisation and foundational skills involves the way computers have transformed concrete processes into numerical abstractions. Some years ago, the Ford Motor Company experienced this problem in the course of changing from mechanical carburettors to computer-controlled fuel injection. Repairing the computerised modules required an ability to read manuals and mentally connect digitised read-outs on diagnostic tools with the (now invisible) processes they represent. A number of mechanics, who were quite skilled repairing physical carburettors, could not make this transition.

More generally, as computers have lowered the cost of calculation, numerical tools and models now permeate many jobs, and holding one of those jobs requires becoming a mathematics consumer. A clothing store manager uses a quantitative model to forecast dress demand. A truck dispatcher uses a mathematical algorithm to design delivery routes. A bakery worker monitors production using digital readouts rather than the smell or feel of the bread. Employees of all kinds are expected to use web-based tools to help manage their retirement plans. Each of these tasks involves some aspect of numeracy. In most cases, a computerised tool does the actual calculation, but using the model without understanding the mathematics leaves one vulnerable to potentially serious misjudgements.

Numeracy, literacy and reading skills go well beyond what might be called "basic skills". Being able to multiply and divide will always be important, but they are not sufficient to deal with the abstraction of a computerised fuel-injection module. Similarly, a typical definition of "basic reading skills" is not sufficient to absorb the pages or web views of a repair manual including searching for the parts of the manual that apply to the case at hand.

The need for foundation skills applies beyond the workplace to personal and civic life. Consider the issue of food safety. Most products that are routinely purchased in shops and supermarkets undergo several stages before reaching the shelves: production,

Box 1.1 **Foundation skills for the future**

As computers accelerate workplace change, being able to understand descriptions of new procedures becomes an ever-more frequent task. A second mechanism linking computerisation and foundational skills involves the way computers have transformed concrete processes into numerical abstractions. As computers have lowered the cost of calculation, numerical tools and models now permeate many jobs – holding one of those jobs requires mathematics skills. While a computerised tool may do the actual calculation, using the model without understanding the mathematics leaves one vulnerable to potentially serious misjudgements.

Note that the numeracy and literacy skills described in these examples go well beyond what might be called "basic skills". Being able to multiply and divide will always be important, but they are not sufficient to deal with the abstraction of many computer-generated analyses. Similarly, a typical definition of "basic reading skills" is not sufficient to absorb the pages or web views of a repair manual, including searching for the parts of the manual that apply to the case at hand.

processing and distribution. Consumers get information about the safety and nutritional value of food products through labels. Interpreting food labels requires more than the "basic" reading and mathematics skills: citizens also need to have some general understanding of food production, the effect and nature of each ingredient, the rules governing labelling, the latest information on food safety, the impact of nutritional components on certain medical conditions, etc.

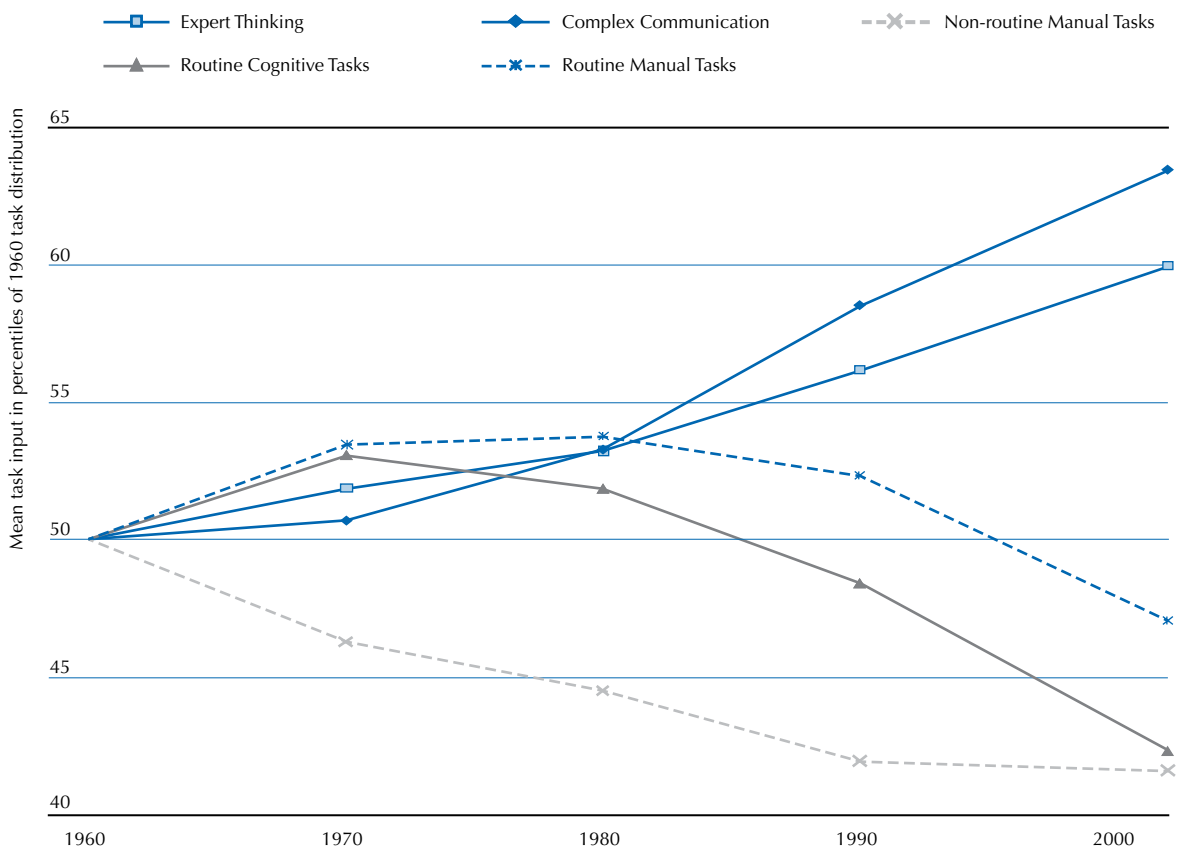
Complex communication and expert thinking are only two of the skills used in the economy but they are growing in importance. To see this, it is useful to classify all labour-force tasks into five broad categories:[4]

- Tasks requiring expert thinking: Solving problems for which there are no rule-based solutions. Examples include constructing a diagnosis of a patient's illness, repairing an automobile when the problem not addressed by diagnostic tools, and so on. While computers cannot substitute for humans in these tasks, computers can complement human skills by making information more readily available.

- Tasks requiring complex communication: Interacting with humans to acquire information, to explain it, or to persuade others of its implications for action. Examples include a manager motivating the people whose work she supervises, a sales person gauging a customer's reaction to a piece of clothing, a biology teacher explaining how cells divide, an engineer describing why a new design for a DVD player is an advance over previous designs.
- Routine cognitive tasks. Mental tasks that are well described by deductive or inductive rules. Examples include maintaining expense reports, filing new information provided by insurance customers, and evaluating applications for mortgages. Because these tasks can be accomplished by following a set of rules, they are prime candidates for computerisation.
- Routine manual tasks. Physical tasks that can be well described using deductive or inductive rules. Examples include installing windshields on new vehicles in automobile assembly plants, and counting and packaging pills into containers in pharmaceutical firms. Since these tasks can be defined in terms of a set of precise, repetitive movements, they are also candidates for computerisation.

■ Figure 1.1 ■

Trends in routine and non-routine task input in US occupations: 1960 to 2002



Source: Based on Autor, Levy and Murnane (2003), updated to 2002 by David Autor.

- Non-routine manual tasks: Physical tasks that cannot be well described as following a set of "if-then-do" rules because they require optical recognition and fine muscle control that have proven extremely difficult to programme computers to carry out. Examples include driving a truck, cleaning a building, and setting gems in engagement rings. Computers do not complement human effort in carrying out such tasks. As a result, computerisation should have little effect on the percentage of the workforce engaged in these tasks.

Figure 1.1 displays the evolution of each of these task categories in the US economy since 1960. Tasks requiring expert thinking and complex communication have grown substantially over time, while routine tasks – particularly routine cognitive tasks that are easily computerised – are declining sharply.

The task trends in Figure 1.1 correspond to a "hollowing out" of the US job structure, with the largest job losses coming among clerks, assembly-line workers, low-level accountants, customer service representatives – jobs in the lower middle of the earnings distribution that require rules-based processing of information and rules-based repetitive physical motions.[5] By contrast, jobs requiring expert thinking and complex communication – jobs with relatively higher wages – are growing at rapid rates.[6] As computers are increasingly absorbed into the labour market, these trends will almost certainly continue. Similar shifts are taking place in many industrial and developing economies, including Japan (Ikenaga, 2009).

This discussion reflects the evolution of the demand side of the labour market. A corresponding question applies to the labour market's supply side: How well are national populations prepared to meet the current job market evolution? Foundation skills are themselves important, but their application is evolving. In today's society, effective literacy often involves the ability to understand language to follow web-based instructions, assess the accuracy of information and so on. Is everyone able to effectively access, retrieve and interpret web-based content and apply information that is acquired through digital technologies to solve problems?

Technology can change the nature of work faster than people can change their skills. The problem is compounded because a nation's educational system can grow out of touch with job-market trends and effective policies to develop expert thinking and complex communication skills. PISA and the OECD series *Strong Performers, Successful Reformers* can help close this gap by describing a range of learning outcomes, policies, practices and other factors that can help inform evidence-based decision making by governments and education stakeholders. Policy analysis from several high-performing and rapidly reforming education systems will help to guide governments as they consider how best to prepare their young people for the unpredictable needs of the future labour market.

Notes

1. This example is adapted from Tor Norrestradners, *The User Illusion: Cutting Consciousness Down to Size*, Viking Penguins, 1998. The example has appeared in *The Guiness Book of Records* as the shortest correspondence.
2. Alan Lesgold argues that computer simulations can be useful in teaching subjects like electronics repair because the simulations can generate unusual problems faster than the the student would encounter them on the job. See Alan Lesgold and Martin Naherow, *Tools to Assist Learning by Doing*, working paper, Learning and Research Development Center, University of Pittsburgh, August 29, 2005.
3. See also, Theodor Schultz, *Transforming Traditional Agriculture*, Yale University Press, 1964.
4. This categorisation was initially developed by Autor, Levy and Murnane, op.cit.
5. Because repetitive physical motions can be expressed in rules, they are candidates for being performed by robots. In developed countries, their rules-based nature also makes the tasks candidates for being sent offshore to lower wage countries. See Levy and Murnane (2005) for further discussion.
6. Actual trends are likely sharper than those shown in Figure 1.1. Figure 1.1 is based on occupational shifts in the economy from 1959-99. Due to data limitations, the task content of each occupation is assumed to be constant at its 1978 level. This limitation obscures the task shifts that have occurred *within* occupations – for example, the way in which the development of the automatic teller machine has sharply reduced the amount of time a bank teller spends on cashing checks and accepting deposits and has increased the time spent on more complicated transactions.

References and further reading

Autor, D., F. Levy and **R.J. Murnane** (2003), *"The Skill Content of Recent Technical Change: An Empirical Investigation"*, Quarterly Journal of Economics, No. 118:4 (November 2003), pp.1279-1334.

Ikenaga, T. (2009), *Rōdō shijō no nikyokuka – IT no dōnyū to gyōmu naiyō no henkani tsuite,* Nihon rōdō kenkyū zasshi, No. 584, pp.73-90.

Levy, F. and **R.J. Murnane**, (2005), *The New Division of Labor: How Computers are Creating the Next Job Market*, Princeton University Press.

Schultz, T. (1964), *Transforming Traditional Agriculture*, Yale University Press.

2

Viewing Education in Japan Through the Prism of PISA

Japan has been at or near the top of the rankings on international education surveys since those surveys began. The country's education system rests on a deep commitment to children, a first-rate teaching force, family support for Japanese students, and the belief that effort, not innate ability, is what leads to success. In addition to providing an in-depth description of this system, this chapter reviews Japanese students' performance in PISA 2009. It also examines such issues as spending on education, the relationship between socio-economic background and performance, equity in learning opportunities, students' attitudes towards learning, digital literacy and the learning environment.

CONSISTENTLY HIGH MEAN PERFORMANCE AMONG 15-YEAR-OLDS

For decades Japan has remained at or near the top of international assessments of student learning. As far back as 1964, with the First International Mathematics Study, Japan has stood out as a leader in education. Forty-five years later, Japan's performance in the 2009 PISA remains as impressive as it was in the first PISA assessment in 2000 (Table 2.1).

Table 2.1 Japan's mean scores on reading, mathematics and science scales in PISA

	PISA 2000	PISA 2003	PISA 2006	PISA 2009
	Mean score	Mean score	Mean score	Mean score
Reading	522	498	498	520
Mathematics		534	523	529
Science			531	539

Source: OECD (2010a).

In the PISA 2009 assessment of 15-year-olds, Japan is among the top-performing OECD countries in reading (rank 5[1]), mathematics (rank 4[2]) and science (rank 2[3]) (see Figures I.2.15, I.3.10 and I.3.21 in OECD, 2010a). In reading, Canada, New Zealand, Australia, the Netherlands and the partner country Singapore perform at the same level as Japan; in mathematics, Switzerland, Canada, New Zealand, the partner country Liechtenstein and the partner economy Macao-China show performance levels similar to that of Japan; and in science, Korea, the Netherlands and the partner country Singapore perform at the same level as Japan.

Table 2.2 Comparing countries' performance in reading

Statistically significantly **above** *the OECD average*

Mean	Comparison country	Countries whose mean score is NOT statistically significantly different from that of the comparison country
556	Shanghai-China	
539	Korea	Finland, Hong Kong-China
536	Finland	Korea, Hong Kong-China
533	Hong Kong-China	Korea, Finland
526	Singapore	Canada, New Zealand, Japan
524	Canada	Singapore, New Zealand, Japan
521	New Zealand	Singapore, Canada, Japan, Australia
520	Japan	Singapore, Canada, New Zealand, Australia, Netherlands
515	Australia	New Zealand, Japan, Netherlands
508	Netherlands	Japan, Australia, Belgium, Norway, Estonia, Switzerland, Poland, Iceland, United States, Liechtenstein, Sweden, Germany
506	Belgium	Netherlands, Norway, Estonia, Switzerland, Poland, United States, Liechtenstein
503	Norway	Netherlands, Belgium, Estonia, Switzerland, Poland, Iceland, United States, Liechtenstein, Sweden, Germany, Ireland, France
501	Estonia	Netherlands, Belgium, Norway, Switzerland, Poland, Iceland, United States, Liechtenstein, Sweden, Germany, Ireland, France, Chinese Taipei, Denmark, United Kingdom, Hungary
501	Switzerland	Netherlands, Belgium, Norway, Estonia, Poland, Iceland, United States, Liechtenstein, Sweden, Germany, Ireland, France, Chinese Taipei, Denmark, United Kingdom, Hungary
500	Poland	Netherlands, Belgium, Norway, Estonia, Switzerland, Iceland, United States, Liechtenstein, Sweden, Germany, Ireland, France, Chinese Taipei, Denmark, United Kingdom, Hungary
500	Iceland	Netherlands, Norway, Estonia, Switzerland, Poland, United States, Liechtenstein, Sweden, Germany, Ireland, France, Chinese Taipei, Hungary
500	United States	Netherlands, Belgium, Norway, Estonia, Switzerland, Poland, Iceland, Liechtenstein, Sweden, Germany, Ireland, France, Chinese Taipei, Denmark, United Kingdom, Hungary
499	Liechtenstein	Netherlands, Belgium, Norway, Estonia, Switzerland, Poland, Iceland, United States, Sweden, Germany, Ireland, France, Chinese Taipei, Denmark, United Kingdom, Hungary

Note: The table shows country comparisons only for those countries that performed above the OECD average in reading in 2009. Figure I.2.15 in OECD, 2010a shows comparisons for all countries that took part in PISA 2009.

Source: OECD, (2010a).

Even though there is a general perception that Japan's performance has been declining, the PISA results show that Japan has maintained high performance in reading, about 20 score points above the average, since 2000 (see Table V.2.1 in OECD, 2010b). Student performance in mathematics and science has also remained broadly unchanged since 2003 and 2006, respectively, when PISA began to measure these trends. Perhaps most important, Japan's performance in reading has improved in open-ended tasks where students not only need to reproduce knowledge, but also create their own responses.

Girls outperform boys in reading by an average of 39 points, similar to the OECD average, and this gender gap has been apparent since 2000 (Tables I.2.3 and V.2.4 in OECD, 2010a and OECD, 2010b). However, there is no gender gap in performance in mathematics and science (Tables I.3.3 and I.3.6 in OECD, 2010a).

Japan has, however, seen important improvements in students' attitudes and dispositions towards learning and school, which PISA considers key outcomes of education. These are discussed in detail in later sections, but a brief summary is presented below.

Compared with 2000, more Japanese students read for enjoyment and are motivated to read. For example, compared with students' reports in 2000, in Japan, more students like talking about books with other people and cite reading as one of their favourite hobbies, while fewer students report that reading is a waste of time for them, find it hard to finish books, cannot sit still and read for more than a few minutes and/or read only to get the information that they need (Table V.5.3 in OECD, 2010b).

Table 2.3 Comparing countries' performance in mathematics

Statistically significantly above *the OECD average*

Mean	Comparison country	Countries whose mean score is NOT statistically significantly different from that of the comparison country
600	Shanghai-China	
562	Singapore	
555	Hong Kong-China	Korea
546	Korea	Hong Kong-China, Chinese Taipei, Finland, Liechtenstein
543	Chinese Taipei	Korea, Finland, Liechtenstein, Switzerland
541	Finland	Korea, Chinese Taipei, Liechtenstein, Switzerland
536	Liechtenstein	Korea, Chinese Taipei, Finland, Switzerland, Japan, Netherlands
534	Switzerland	Chinese Taipei, Finland, Liechtenstein, Japan, Canada, Netherlands
529	Japan	Liechtenstein, Switzerland, Canada, Netherlands, Macao-China
527	Canada	Switzerland, Japan, Netherlands, Macao-China
526	Netherlands	Liechtenstein, Switzerland, Japan, Canada, Macao-China, New Zealand
525	Macao-China	Japan, Canada, Netherlands
519	New Zealand	Netherlands, Belgium, Australia, Germany
515	Belgium	New Zealand, Australia, Germany, Estonia
514	Australia	New Zealand, Belgium, Germany, Estonia
513	Germany	New Zealand, Belgium, Australia, Estonia, Iceland
512	Estonia	Belgium, Australia, Germany, Iceland
507	Iceland	Germany, Estonia, Denmark
503	Denmark	Iceland, Slovenia, Norway, France, Slovak Republic
501	Slovenia	Denmark, Norway, France, Slovak Republic, Austria

Note: The table shows country comparisons only for those countries that performed above the OECD average in mathematics in 2009. Figure I.3.10 in OECD, 2010a shows comparisons for all countries that took part in PISA 2009.

Source: OECD, (2010a).

Table 2.4 Comparing countries' performance in science

Statistically significantly above *the OECD average*

Mean	Comparison country	Countries whose mean score is NOT statistically significantly different from that comparison country
575	Shanghai-China	
554	Finland	Hong Kong-China
549	Hong Kong-China	Finland
542	Singapore	Japan, Korea
539	Japan	Singapore, Korea, New Zealand
538	Korea	Singapore, Japan, New Zealand
532	New Zealand	Japan, Korea, Canada, Estonia, Australia, Netherlands
529	Canada	New Zealand, Estonia, Australia, Netherlands
528	Estonia	New Zealand, Canada, Australia, Netherlands, Germany, Liechtenstein
527	Australia	New Zealand, Canada, Estonia, Netherlands, Chinese Taipei, Germany, Liechtenstein
522	Netherlands	New Zealand, Canada, Estonia, Australia, Chinese Taipei, Germany, Liechtenstein, Switzerland, United Kingdom, Slovenia
520	Chinese Taipei	Australia, Netherlands, Germany, Liechtenstein, Switzerland, United Kingdom
520	Germany	Estonia, Australia, Netherlands, Chinese Taipei, Liechtenstein, Switzerland, United Kingdom
520	Liechtenstein	Estonia, Australia, Netherlands, Chinese Taipei, Germany, Switzerland, United Kingdom
517	Switzerland	Netherlands, Chinese Taipei, Germany, Liechtenstein, United Kingdom, Slovenia, Macao-China
514	United Kingdom	Netherlands, Chinese Taipei, Germany, Liechtenstein, Switzerland, Slovenia, Macao-China, Poland, Ireland
512	Slovenia	Netherlands, Switzerland, United Kingdom, Macao-China, Poland, Ireland, Belgium
511	Macao-China	Switzerland, United Kingdom, Slovenia, Poland, Ireland, Belgium
508	Poland	United Kingdom, Slovenia, Macao-China, Ireland, Belgium, Hungary, United States
508	Ireland	United Kingdom, Slovenia, Macao-China, Poland, Belgium, Hungary, United States, Czech Republic, Norway
507	Belgium	Slovenia, Macao-China, Poland, Ireland, Hungary, United States, Czech Republic, Norway, France

Note: The table shows country comparisons only for those countries that performed above the OECD average in science in 2009. Figure I.3.21 in OECD, 2010a shows comparisons for all countries that took part in PISA 2009.

Source: OECD, (2010a).

Disciplinary climate has also improved: fewer students in 2009 than in 2000 feel that their peers do not listen to what the teacher says, that students don't start working for a long time after the lesson begins, that they cannot work well, that noise or disorder affects learning, and that their teacher has to wait a long time before students settle down (Table V.5.12 in OECD, 2010b). Japan's success in maintaining a consistently high mean performance has been achieved thanks to a continued attempt to anticipate rather than simply react to the changing demand for skills and competencies. In 1996 the "*zest for living*" reform became a driving force for educators, teachers and families in their attempt to prepare Japanese students for the 21st century. The Japanese Course of Study is revised periodically, in 10 year cycles and the 1998 revision as well as the latest 2008 revision aim not only to identify what are the basic competencies that every student needs to master, but encourage tailored learning so that each student can develop according to his or her level of understanding of the subject taught. For underlying philosophy is that if a student does not understand basic materials well, teachers will help him learn those basics before moving to more advanced topics. Whenever students are fast-learners, however, then teachers provide advanced material to stimulate and help them progress toward more challenging materials. The Japanese Ministry of Education, Culture, Sports, Science and Technology (MEXT) also launched a project to improve the reading proficiency that are measured in PISA assessments in 2005. MEXT set three objectives for this project:

develop critical reading skills, improve writing skills on students' own thoughts, and provide support so that students reading a wider variety of texts. In addition the latest revision of the Course of Study in 2008 increased hours of class instruction in literacy and emphasised the importance for students of being able to express their thoughts in other subjects as well.

While student performance in Japan remains strong, Japan aspires to improve learning outcomes further, and a recent OECD study underlines the economic value of such reforms. Improving PISA scores by a quarter of a standard deviation could boost Japan's income by nearly USD 12 trillion (about double its GDP in 2010) over the next 80 years.

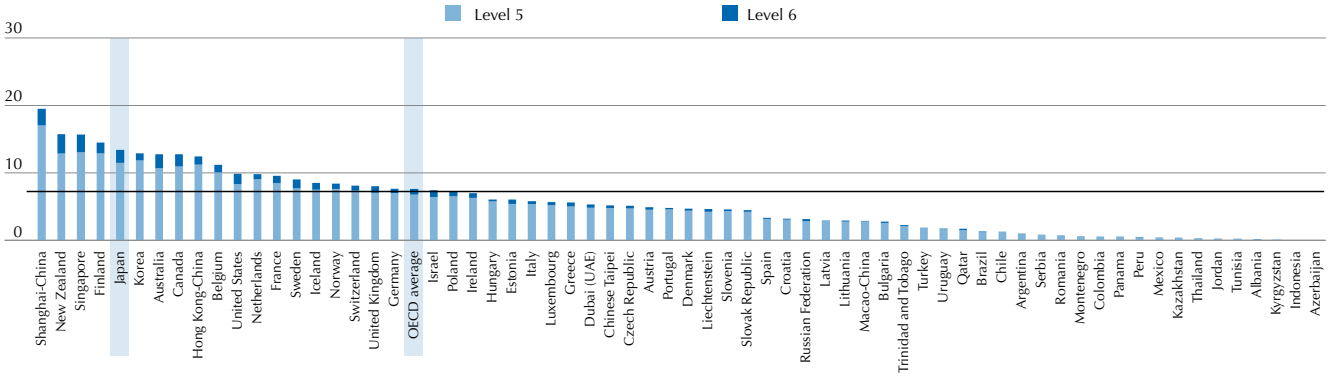
RELATIVE SHARES OF TOP-PERFORMING STUDENTS: ABOVE THE OECD AVERAGE AND, IN READING, AN INCREASE OVER TIME

Students in Japan do well at the very highest levels of reading proficiency (Levels 5 and 6). Some 13% are top performers in reading (the corresponding OECD average is 8%), 21% are top performers in mathematics (OECD average is 13%) and 17% are top performers in science (OECD average is 9%) (Figures 2.1, 2.2 and 2.3).

■ Figure 2.1 ■

What percentage of students are high performers in reading?

Percentage of students at Proficiency Levels 5 and 6

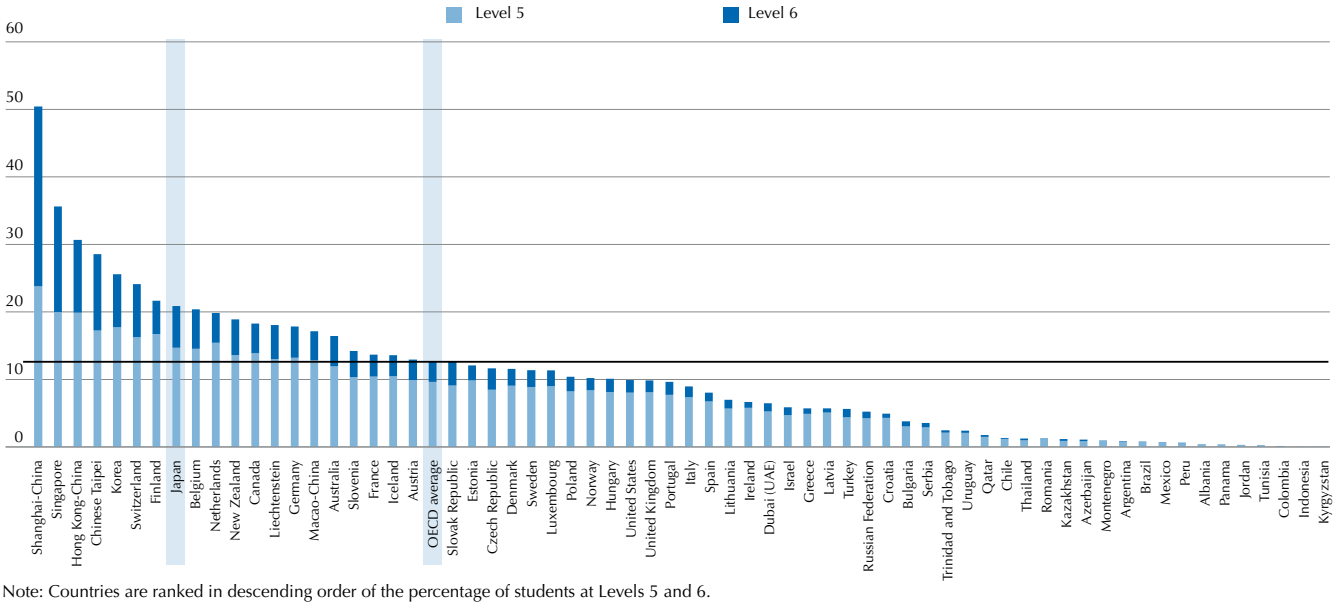


Note: Countries are ranked in descending order of the percentage of students at Levels 5 and 6.
Source: OECD, *PISA 2009 Database*, Table I.2.1.

■ Figure 2.2 ■

What percentage of students are high performers in mathematics?

Percentage of students at Proficiency Levels 5 and 6

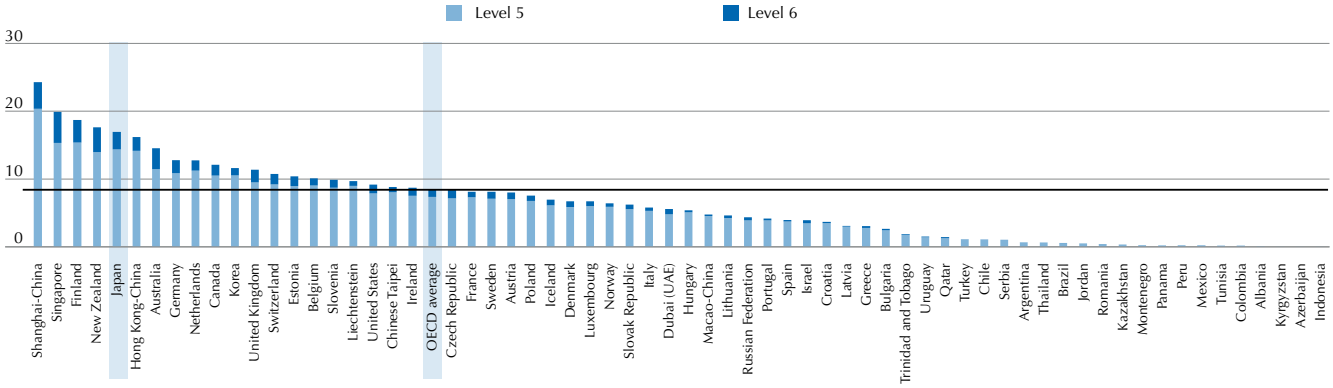


Note: Countries are ranked in descending order of the percentage of students at Levels 5 and 6.
Source: OECD, *PISA 2009 Database*, Table I.3.1.

■ Figure 2.3 ■

What percentage of students are high performers in science?

Percentage of students at Proficiency Levels 5 and 6



Note: Countries are ranked in descending order of the percentage of students at Levels 5 and 6.
Source: OECD, *PISA 2009 Database*, Table I.3.4.

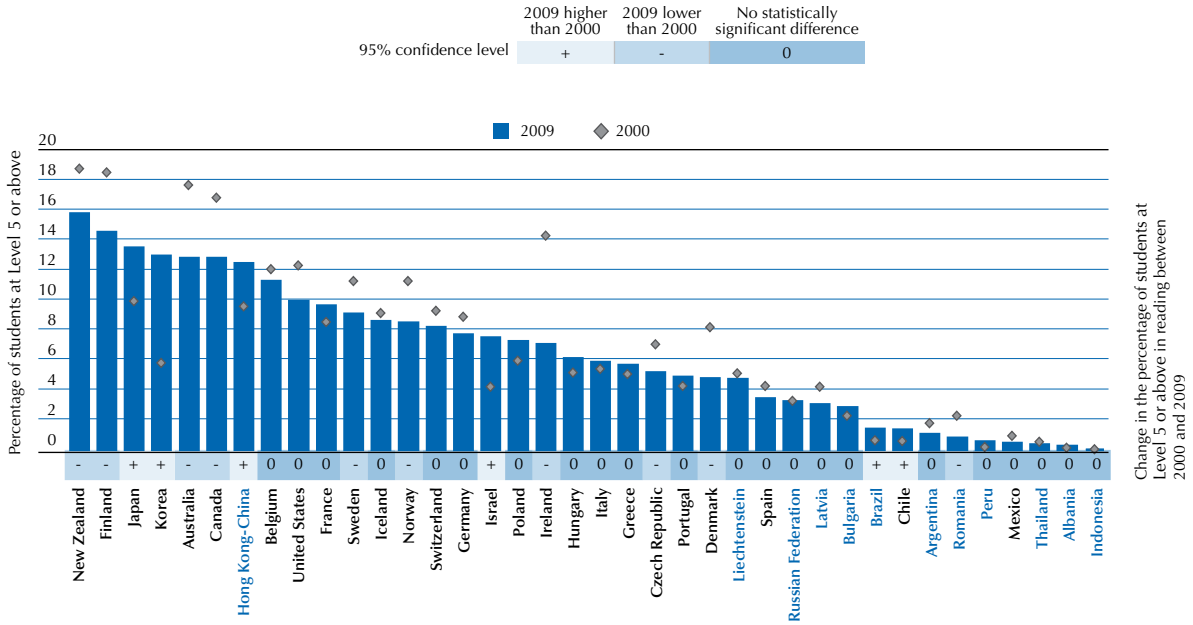
Students proficient at Level 6 on the PISA reading scale combine a capacity to absorb new information and to evaluate it, a mix that is greatly valued in knowledge economies, which depend on innovation and nuanced decision-making that draw on all the available evidence. At 1.9%, Japan has a significantly higher share of the highest-performing readers than the OECD average (0.8%). However, in Australia, New Zealand, the partner economy Shanghai-China and the partner country Singapore, the corresponding percentages are even higher – over 2%.

Around 13% of students in Japan perform at Level 5 or above, well above the average of 8%. However, the share of top performers in reading is even higher – over 14% – in New Zealand, Finland, the partner economy Shanghai-China and the partner country Singapore.

In mathematics, 6% of students in Japan reach the highest level of performance – Level 6 – compared with an OECD average of 3%. In comparison, 27% of students in Shanghai-China attain this level (see Figure 2.2). In Japan, 21% of students reach the PISA mathematics Level 5 or above, compared with 13% on average across OECD countries. In Shanghai-China, half of the students reach at least Level 5, in Singapore and Hong Kong-China more than 30% do, and in Chinese Taipei, Korea, Switzerland and Finland more than 21% do.

■ Figure 2.4 ■

Percentage of top performers in reading in 2000 and 2009

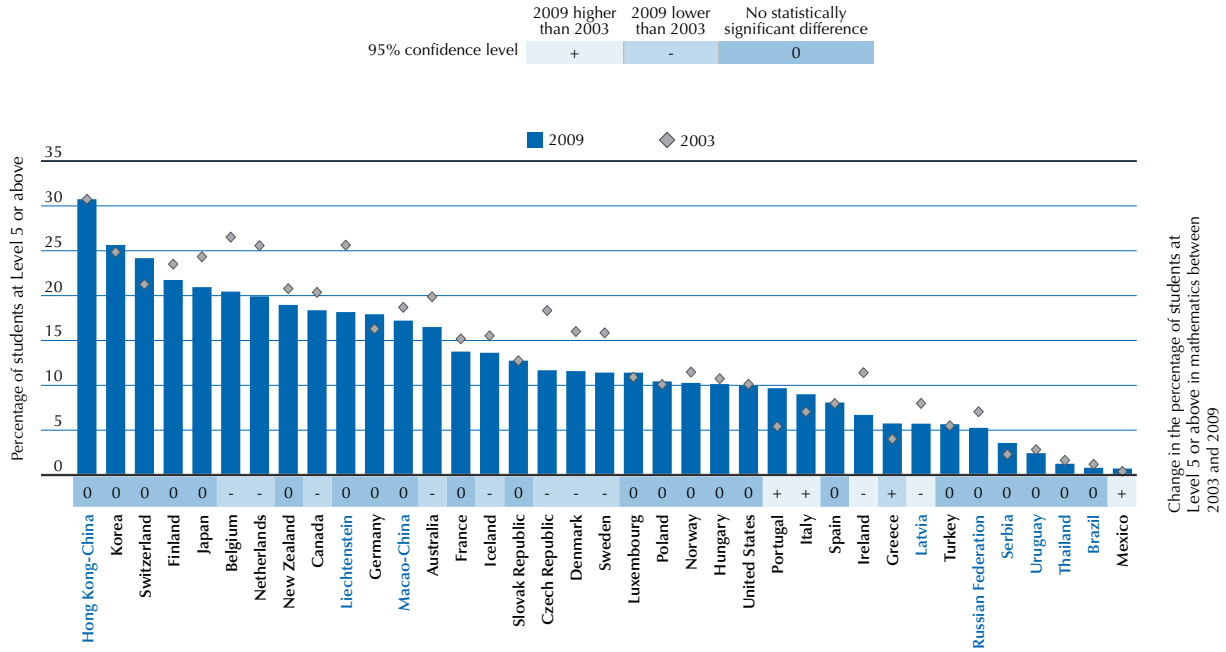


Note: Countries are ranked in descending order of students at Level 5 or above in reading in 2009.
Source: OECD, *PISA 2009 Database*, Table V.2.2.

In science, 2.6% of students in Japan reach Level 6, above the OECD average of 1.1% (Table I.3.4 in OECD, 2010a). In comparison, in Singapore, 4.6% of students attain this level, in Shanghai-China, 3.9% do, in New Zealand, 3.6% do, in Finland, 3.3% do, and in Australia, 3.1% of students do. Finally 17% of students in Japan reach Level 5, which is above the OECD average of 9%. In comparison, 24% of students in Shanghai-China attain this level, 20% of students in Singapore do, 19% in Finland do, and 18% of students in New Zealand attain this level.

■ Figure 2.5 ■

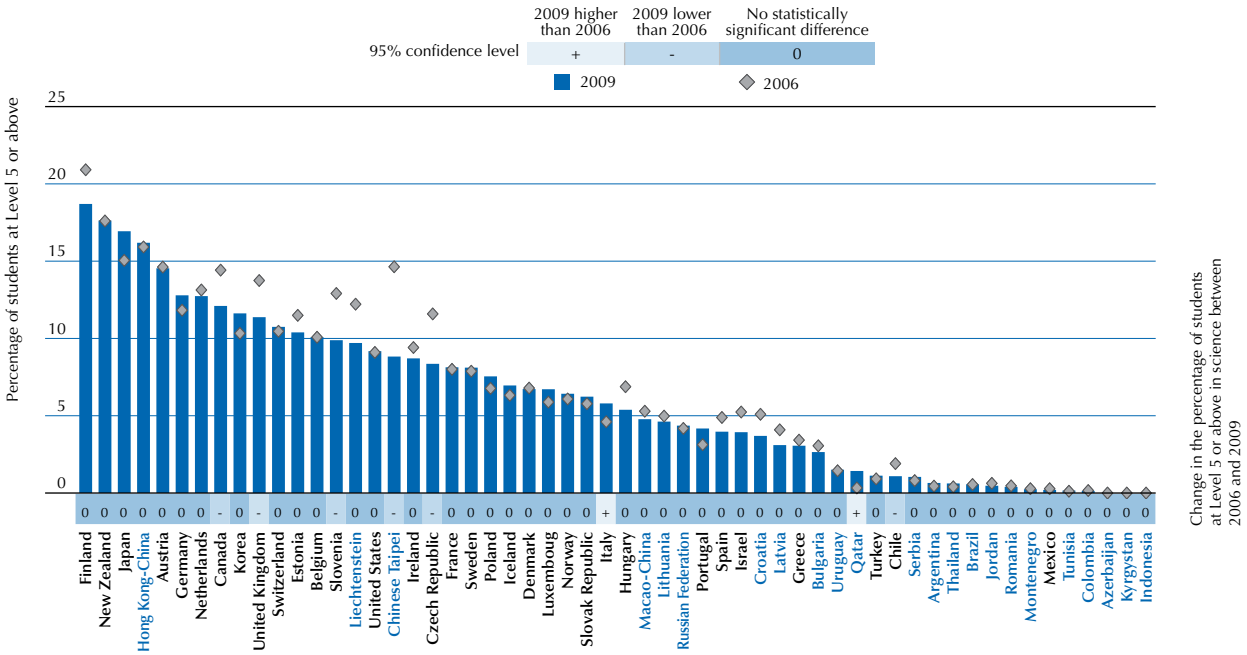
Percentage of top performers in mathematics in 2003 and 2009



Countries are ranked in ascending order of students at Level 5 or above *in mathematics in 2009.*
Source: OECD, *PISA 2009 Database*, Table V.3.2.

■ Figure 2.6 ■

Percentage of top performers in science in 2006 and 2009



Countries are ranked in descending order of students at Level 5 or above *in science in 2009.*
Source: OECD, *PISA 2009 Database*, Table V.3.5.

The proportion of top performers in reading has increased from nearly 10% to above 13% in Japan since 2000 (Figure 2.4). However, there was a gender gap in this increase, too: the percentage of top performers increased by almost 4.8 percentage points (statistically significant) among girls, while the percentage of top performers increased by 2.6 percentage points (not statistically significant) among boys. Effectively, the gender gap in top performers widened (see Table V.2.7 in OECD, 2010b for a detailed breakdown of changes in performance by gender). The proportions of top performers in mathematics and in science have remained unchanged since 2003 and 2006, respectively (see Figures 2.5, 2.6).

Just as an impressive high mean performance is the result of the continued attention that policy makers, educators, teachers and families in Japan give to how best the education system can meet students' learning needs, so Japan's performance in terms of top-performing students can be traced to continued policy efforts aimed to improve the skill based of high achieving students. The "*Exhortation toward Learning*" project was presented by MEXT in January 2002 as a way to help implement the 1998 Course of Study and encouraging advanced learning for fast-learning students. In addition, the 1998 Course of Study was revised in 2003 to emphasise that while it described minimum standards of competencies all students had to achieve, advanced learning is to be encouraged and supported for able students. This revision was maintained and made even clearer in the 2008 revision which was implemented from 2011 for primary schools and will be implemented from 2012 for lower secondary schools.

Box 2.1 **PISA proficiency levels: baseline and advanced**

LEVEL 2 - Baseline proficiency level

- READING: Students can locate information that meets several conditions, make comparisons or contrasts around a single feature, and make connections between the text and personal experience. MATHEMATICS: Students can employ basic algorithms, formulae, procedures or conventions and can interpret and recognise mathematical problems in contexts that require no more than direct inference. SCIENCE: Students can identify key features of a scientific investigation, recall single scientific concepts and information relating to a situation, and use the results of a scientific experiment represented in a data table to support a personal decision.

LEVEL 5 - Advanced level of proficiency

- READING: Students can handle texts that are unfamiliar in either form or content. They can find information in such texts, demonstrate detailed understanding, and infer which information is relevant to the task. MATHEMATICS: Students can select, compare, and evaluate appropriate problem-solving strategies for dealing with complex problems. SCIENCE: Students can identify the scientific components of many complex life situations, apply both scientific concepts and knowledge about science to these situations, and can compare, select and evaluate appropriate scientific evidence for responding to life situations.

LEVEL 6 - Top level of proficiency

- READING: Students can conduct fine-grained analysis of texts, which requires detailed comprehension of both explicit information and unstated implications. MATHEMATICS: Students can apply insight and understanding, along with a mastery of symbolic and formal mathematical operations and relationships, to develop new approaches and strategies for addressing novel situations. SCIENCE: Students can use advanced scientific thinking and reasoning to solve unfamiliar scientific and technological problems.

For more detailed definitions of PISA proficiency levels, see OECD (2010a), pp. 49-53, 130-133, 147-150.

RELATIVE SHARES OF POOR-PERFORMING STUDENTS: BELOW THE OECD AVERAGE AND STABLE OVER TIME

In Japan, 14% of 15-year-olds do not reach the PISA baseline Level 2 of reading proficiency, less than the OECD average of 19%. This proportion, which has remained unchanged since 2000, is larger than that in Korea, Finland, Canada and the partner economies Shanghai-China and Hong Kong-China, where 10% of students or less are lowest performers (Figure 2.7).

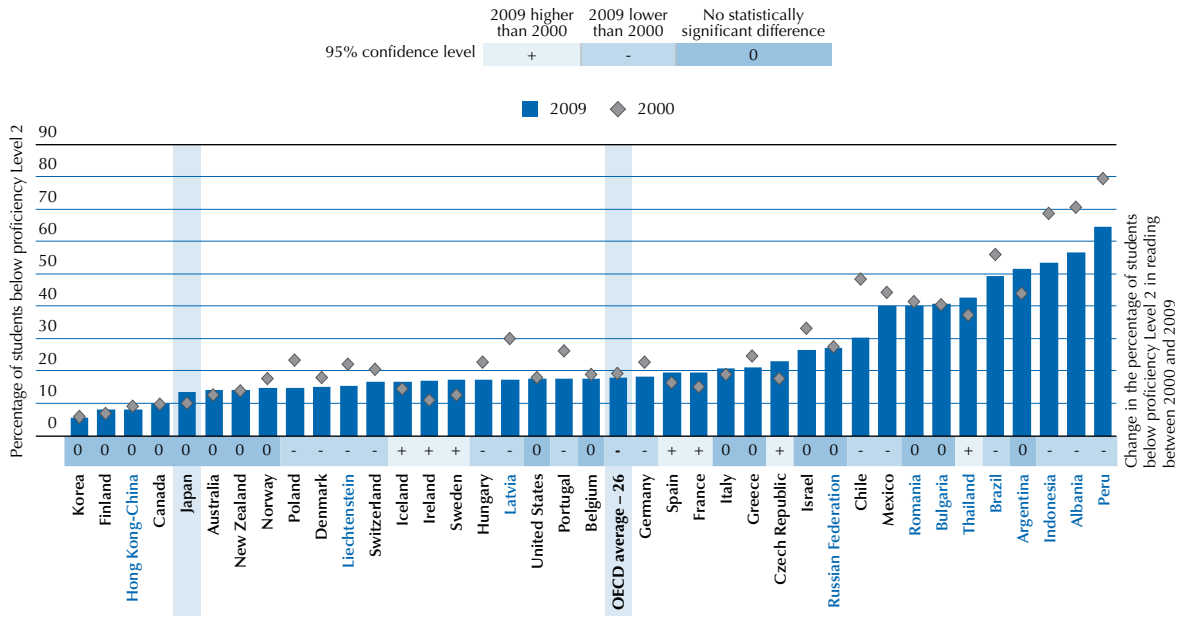
A follow-up of students who were assessed by PISA in 2000 as part of the Canadian Youth in Transitions Survey shows that students scoring below Level 2 face a disproportionately higher risk of poor post-secondary participation or low labour-market outcomes at age 19, and even more so at age 21, the latest age for which data are currently available. For example, the odds that Canadian students who had reached PISA Level 5 in reading at age 15 would achieve a successful transition to post-secondary education by age 21 were 20 times higher than for those who had not achieved the baseline Level 2, even after adjustments for socio-economic

differences are made (OECD, 2010j).[4] Similarly, of the Canadian students who performed below Level 2 in 2000, over 60% had not gone on to any post-school education by the age of 21; by contrast, more than half of the students (55%) who had performed at Level 2 as their highest level were at college or university.

In mathematics, 13% of students perform below Level 2 on the PISA scale. This is below the OECD average of 22% and has remained unchanged since 2003 (Figure 2.8). In science, 11% of students perform below Level 2 on the PISA scale. This is below the OECD average of 18% and has remained unchanged since 2006 (Figure 2.9).

■ Figure 2.7 ■

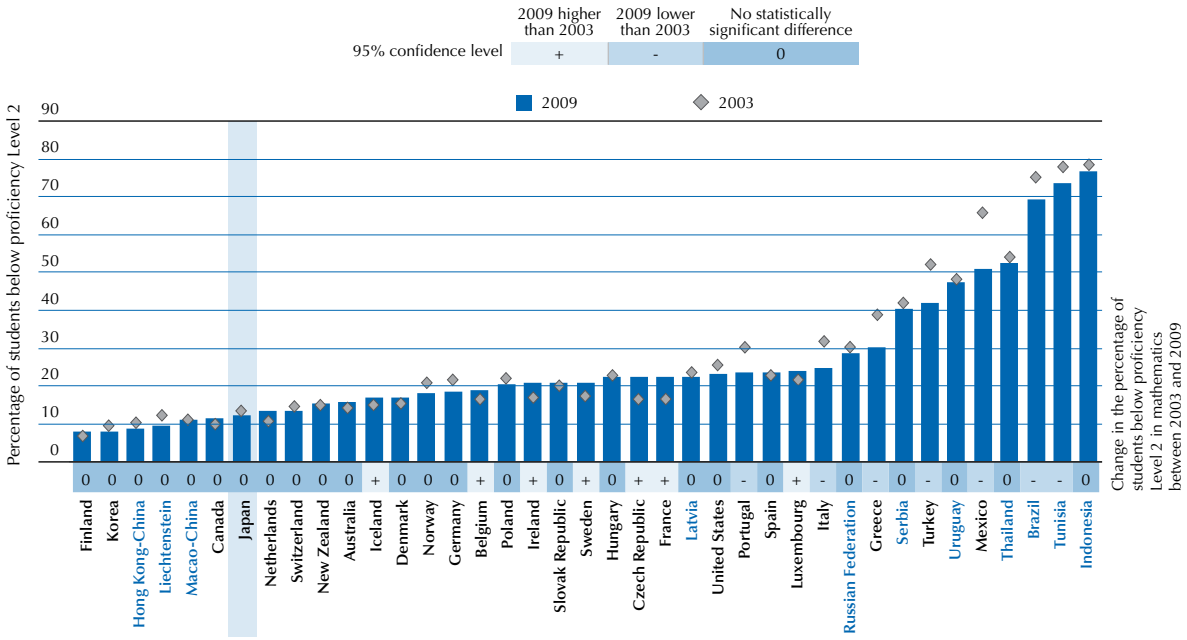
Percentage of poor performers in reading in 2000 and 2009



Countries are ranked in ascending order of the percentage of students below proficiency Level 2 in reading in 2009.
Source: OECD, *PISA 2009 Database*, Table V.2.2.

■ Figure 2.8 ■

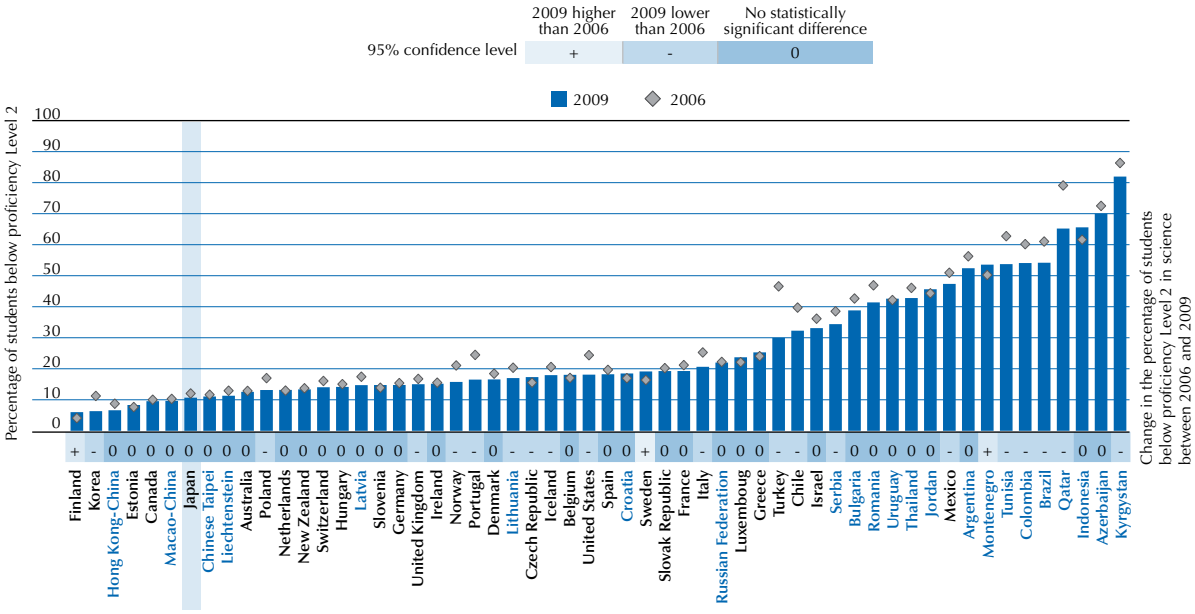
Percentage of poor performers in mathematics in 2003 and 2009



Countries are ranked in ascending order of the percentage of students below proficiency Level 2 in mathematics in 2009.
Source: OECD, *PISA 2009 Database*, Table V.3.2

■ Figure 2.9 ■

Percentage of poor performers in science in 2006 and 2009



Countries are ranked in ascending order of the percentage of students below proficiency Level 2 in science in 2009.
Source: OECD, *PISA 2009 Database*, Table V.3.5.

The 1998 Course of Study encouraged supplemental learning after school or small-group guidance and/or class assignments according to each student's mastery and proficiency in each subject. Evidence emerging from the national assessment of academic ability appears to suggest that such efforts can be successful in helping struggling students catch up with the rest. This revision is also maintained in the latest revision. In addition, the 2008 Course of Study increased hours of class instruction in mathematics and in science aiming to ensure the comprehension of students on specific concepts and to provide the opportunity to apply the knowledge students have learned.

A favourable context for student achievement

Countries vary in their demographic, social and economic contexts. These differences need to be taken into account when interpreting Japan's performance against that of other countries.

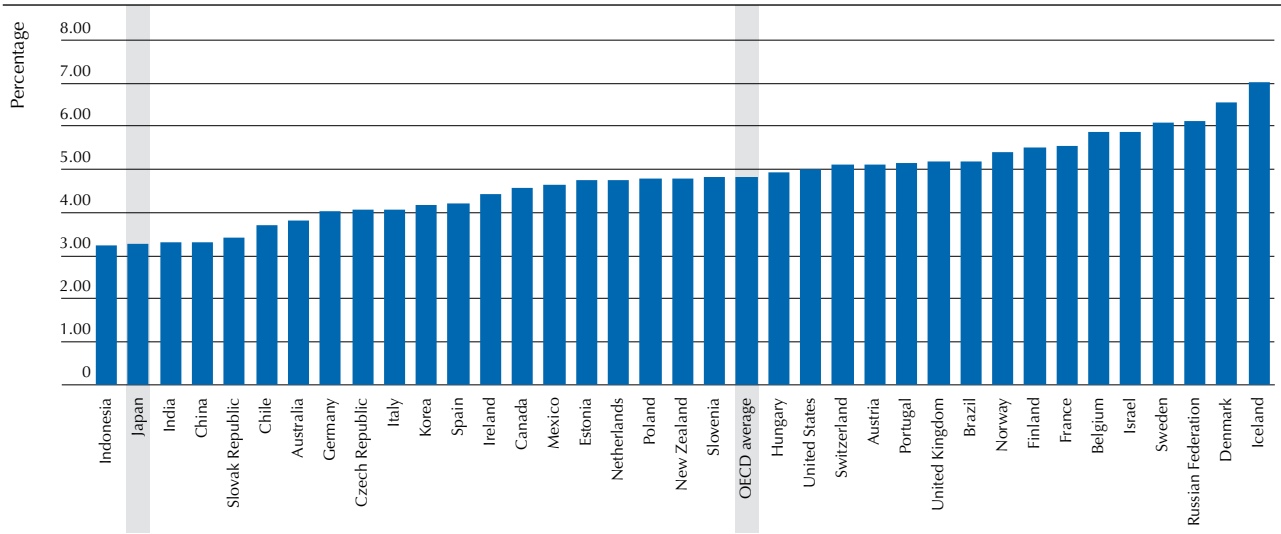
In terms of national income level, ***Japan ranks 17th among 34 OECD countries on GDP per capita*** (Table I.1.20 and Figure I.2.1 in OECD, 2010a) but performs better in reading than would be expected from its level of GDP per capita. This is because only 6% of the variation among OECD countries' mean scores is predicted by their GDP per capita. While GDP per capita reflects the potential resources available for education in each country, it does not directly measure the financial resources actually invested in education.

Results from PISA suggest that Japan's education system has produced strong results despite the fact that total spending on education, both public and private is well below the OECD average as a share of GDP. Japan invests 3.3% of its GDP in education, compared to the OECD average of 4.9%, representing 9.4% of overall public expenditure, compared to an OECD average of 13.3% .

In a comparison of countries' average actual spending per student from the age of 6 to the age of 15, Japan ranks 14th among 34 OECD countries. Across OECD countries, however, expenditure per student explains only around 9% of the variation between countries in PISA mean performance (Figure 2.11). Japan's deviation upwards from the trend line suggests that it performs better than would be expected from its spending on education per student. Italy and Slovenia, which spend similar levels on education per student as Japan, perform at least 34 score points lower than Japan – around a year's worth of schooling (Table I.2.20 in OECD, 2010a). Total outlays for educational institutions in Japan rose 7% (adjusted for inflation) between 1995 and 2007, compared to an OECD average rise of 31%. However, spending differences should take into account demographic trends, which show that the number of students in Japan fell by 17% over that period, in contrast to an average increase of 6% in the OECD area. The result is that the increase in total spending per student in Japan during that period was close to the OECD average of 17%. This conclusion holds when limited to public spending (Figure 2.12).

■ Figure 2.10 ■

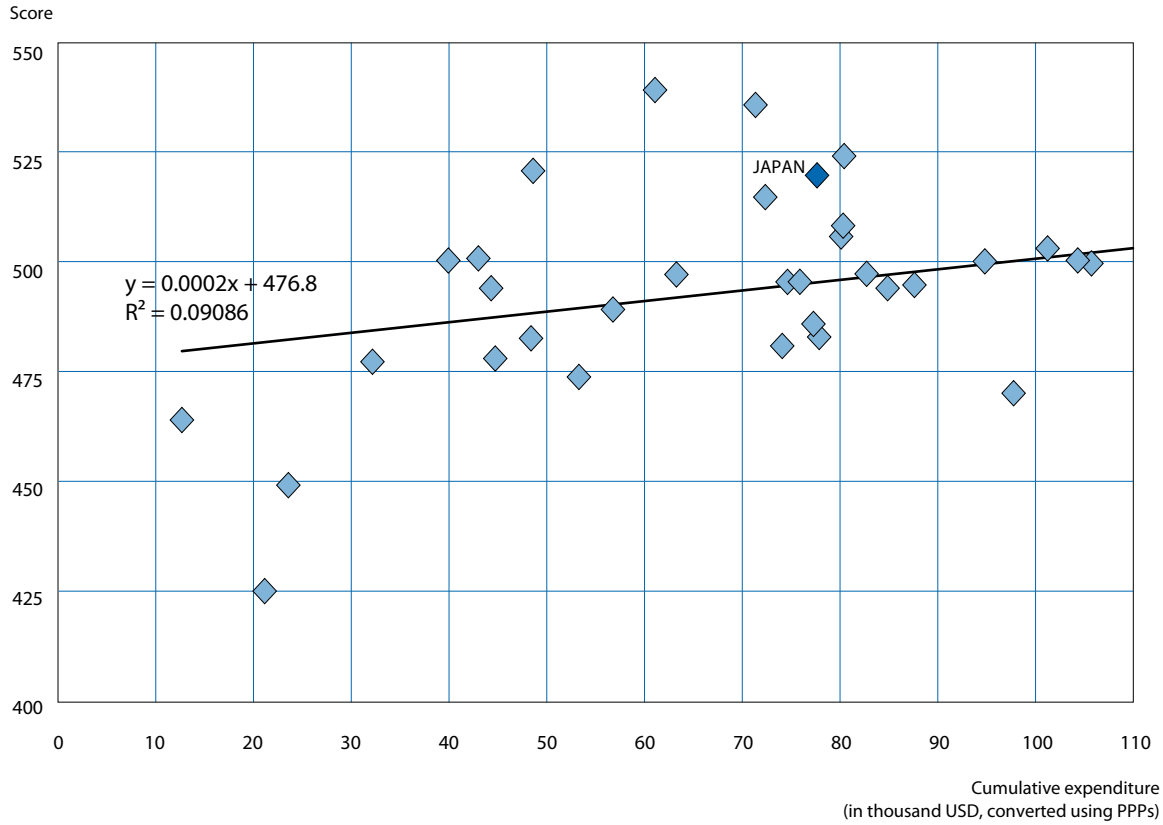
Public expenditure on educational institutions as a percentage of GDP, by source of fund and level of education (2007)



Source: OECD, 2010c. India, Indonesia: UNESCO Institute for Statistics (World Education Indicators Programme). China: The national Statistics Bulletin on Educational Expenditure 2007, *(www.oecd.org/edu/eag2010)*.

■ Figure 2.11 ■

Reading performance and spending on education

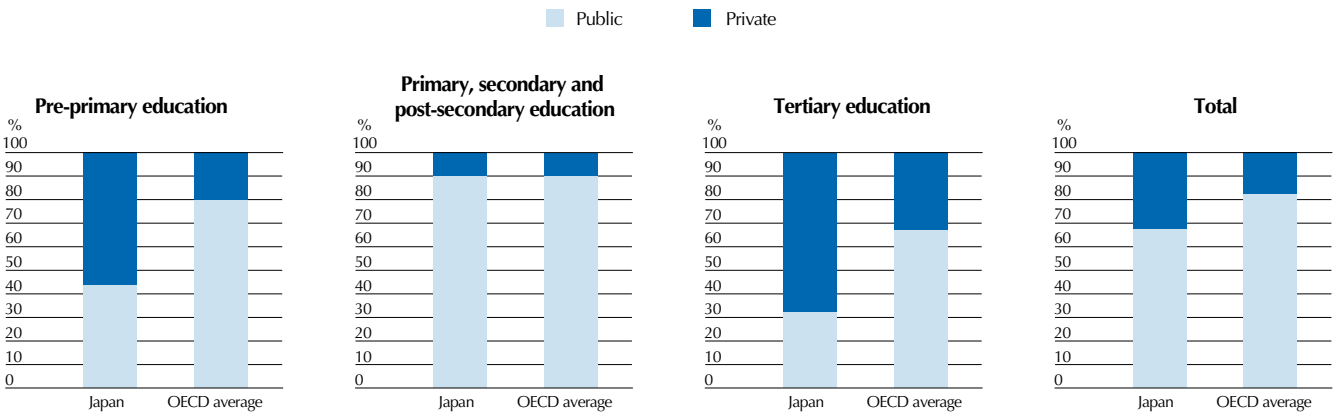


Source: OECD, *PISA 2009 Database*, Table I.2.20.

■ Figure 2.12 ■

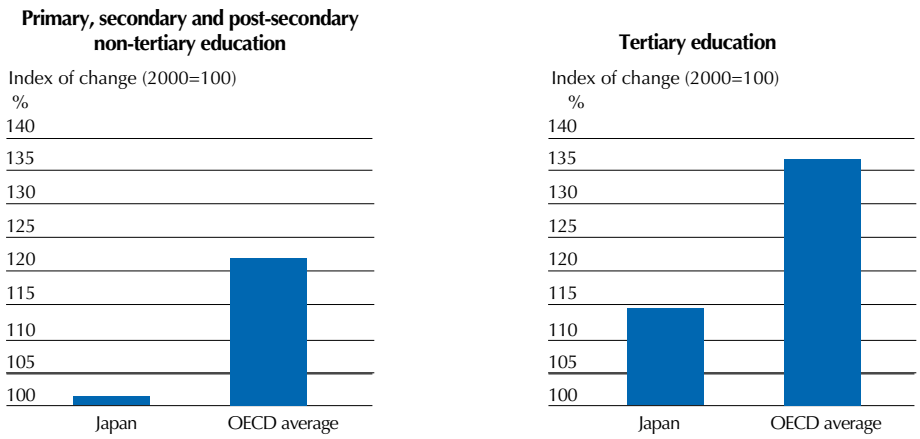
Educational spending in 2007 and change since 2000, by level of education and sector

Public and private expenditure on educational institutions, as a percentage, by level of education in 2007

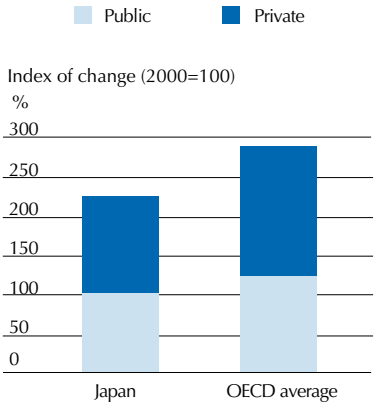


Source: OECD (2010c), Tables B3.1 and B3.2a-b.

Change in expenditure between 2000 and 2007, by level of education
Adjusted for inflation by the GDP deflator; 2000=100



Change in expenditure between 2000 and 2007, by sector
Adjusted for inflation by the GDP deflator; 2000=100



Source: OECD (2010c), Tables B1.5 and B3.1.

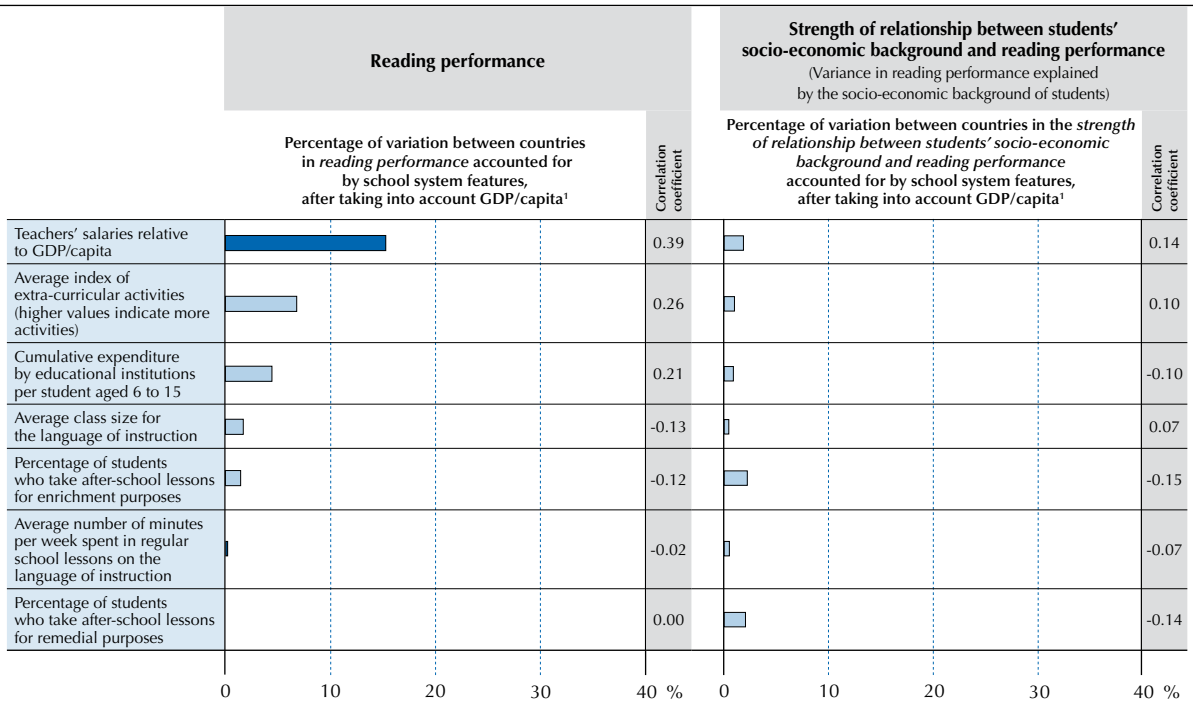
In general, PISA shows that it is not just the volume of resources that matters but how those resources are invested, and how well countries succeed in ***directing the money where it can make the most difference***. Japan is one of 16 OECD countries in which socio-economically disadvantaged schools have more favourable student-teacher ratios than socio-economically advantaged schools, which implies that students from disadvantaged backgrounds may benefit from considerably more spending per student than the Japanese average.[5] **Japan has tended to prioritise the quality of teachers over smaller classes**. Research usually shows a weak relationship between educational resources and student performance, with more variation explained by the quality of human resources (i.e. teachers and school principals) than by material and financial resources, particularly among industrialised nations. The generally weak relationship between resources and performance observed in past research is also seen in PISA. At the level of the education system, and net of the level of national income, the only type of resource that PISA shows to be correlated with student performance is the level of teachers' salaries relative to national income. Teachers' salaries are related to class size in that if spending levels are similar, school systems often make trade-offs between smaller classes and higher salaries for teachers. The findings from PISA suggest that systems prioritising higher teachers' salaries over smaller classes tend to perform better (Figure 2.13).

Parents in Japan are better educated than those in most other countries. Given the close interrelationship between a student's performance and his or her parents' level of education (OECD, 2010), it is also important to bear in mind the educational attainment of adult populations when comparing the performance of OECD countries, since countries with more highly educated adults are at an advantage over countries in which parents have less education. The percentage of 35-44 year-olds who have attained tertiary levels of education, which roughly corresponds to the age group of parents of the 15-year-olds assessed in PISA, is 48% in Japan, which ranks 2nd after Canada in this comparison among the 34 OECD countries (Table I.2.20 in OECD, 2010a).

The share of students from disadvantaged backgrounds in Japan is below average. Socio-economic disadvantage and heterogeneity in student populations pose other challenges for teachers and education systems. As shown in Volume II of *PISA 2009 Results*, teachers instructing socio-economically disadvantaged children are likely to face greater challenges than those with students from more privileged socio-economic backgrounds. A comparison of the socio-economic backgrounds of the most disadvantaged quarter of students puts Japan above the OECD average, while the socio-economic background of the student population as a whole ranks around the OECD average (Table II.3.1 in OECD, 2010).[6] In other words, while the overall socio-economic context of students in Japan is that of a typical OECD country, the proportion of disadvantaged students in Japan is below that of OECD countries in general (Table I.2.20 in OECD, 2010a).

■ Figure 2.13 ■

How school systems' resources are related to educational outcomes



Note: Correlations that are statistically significant at the 5% level ($p<0.05$) are marked in a darker tone.
1. The percentage is obtained by squaring the correlation coefficient and then multiplying it by 100.
Source: OECD, *PISA 2009 Database*, Table IV.2.1.

Among OECD countries, Japan has the 3rd smallest proportion of students with an immigrant background. On average across OECD countries, 10% of students are from an immigrant background, while in 14 OECD countries, more than 10% of students are from an immigrant background (Table II.4.1 in OECD, 2010d). However, the share of students with an immigrant background explains just 1% of the performance variation between countries (Figure I.2.5 in OECD, 2010a). The performance of these students in PISA can only be partially attributed to the education system of their host country. Much of the performance difference between these students and native students stems from socio-economic background, the language spoken at home and prior education in their country of origin.

EQUITY IN THE DISTRIBUTION OF LEARNING OPPORTUNITIES

Japan strives to distribute resources equitably among all schools by providing extra support to disadvantaged schools and students. The Japanese Constitution and the Basic Education Act emphasise equity in education as key for a thriving society. MEXT ensures that education delivered at the front line meets high minimum standards everywhere in Japan and the periodic reforms of the national curriculum that are implemented through the decennial revisions in the Course of Study ensure that such minimum standards develop on the basis of changing needs but also changing evidence on what students can achieve and how best schools can help them achieve their potential. Moreover, both the central and local governments provide subsidies to student with financial difficulties or for those students for whom education can be more taxing on family resources because of disability or because they live in remote areas but want to continue high quality learning. However, students who did not attain the basic performance level on PISA were not a random group. While PISA results show that socio-economic disadvantage does not have as strong an impact on student performance in Japan as it does in other countries, socio-economic differences among schools are significant. Some 9% of the variation in student performance in Japan is explained by students' socio-economic background (the OECD average is 14%) (Table 2.5).

PISA explores equity in education from three perspectives: first, it examines differences in the distribution of learning outcomes of students and schools; second, it studies the extent to which students and schools of different socio-economic backgrounds have access to similar educational resources, both in terms of quantity and quality; and third, it looks at the impact of students' family background and school location on learning outcomes.

Growing differences in performance among schools

The difference between high and low performers in reading (i.e. variation in students' performance in reading) is greater in Japan than the OECD average, and around a half of this performance variation is attributable to the performance difference between schools (Table II.5.1 in OECD, 2010d). In Japan, this difference is greater than the OECD average of 39%. Japan's large performance difference between schools is mainly accounted for by the fact that the students took the PISA assessment only a few months after the high school entrance examinations, which has routed students to different schools depending on their prior achievement.

The difference between high and low performers in reading grew since 2000, particularly that between schools (Table V.4.1 in OECD, 2010b).

Equal access to resources

In a school system characterised by an equitable distribution of educational resources, the quality or quantity of school resources would not be related to a school's average socio-economic background, as all schools would enjoy similar resources. Therefore, if there is a positive relationship between the socio-economic background of students and schools and the quantity or quality of resources, this signals that more advantaged schools enjoy more or better resources. A negative relationship implies that more or better resources are devoted to disadvantaged schools. No relationship implies that resources are distributed similarly among schools attended by socio-economically advantaged and disadvantaged students.

In around half of OECD countries, the student-teacher ratio relates positively to the socio-economic background of schools, in other words, disadvantaged schools tend to have more teachers per student. Japan is one of these countries (Table II.2.3 in OECD, 2010d). This positive relationship is also particularly pronounced in Belgium, Italy, Ireland, Spain, Estonia, Portugal and the Netherlands. This important measure of resource allocation indicates that these countries use the student-teacher ratio to reduce disadvantage. Among OECD countries, only Turkey, Slovenia, Israel and Austria favour socio-economically advantaged students and schools with access to more teachers.

In the majority of OECD countries, more advantaged students also enjoy a higher proportion of better-qualified full-time teachers (Table II.2.2 in OECD, 2010d). The picture is similar when examining schools whose principals reported that the lack of qualified teachers hinders learning. In Japan, however, disadvantaged students enjoy qualified teachers at the same level as advantaged students. All of these findings suggest that Japan ensures an equitable distribution of human resources, both in the quantity of resources and in their quality.

Strength of the relationship among student performance and socio-economic background and Gini Index

Table 2.5 *Results based on students' self-reports*

		Strength of the relationship between student performance and the PISA index of economic, social and cultural status (ESCS)[1]			Slope of the socio-economic gradient[1, 2]		Length of the projection of the gradient line					
		Percentage of explained variance in student performance	S.E.	Gini Index	Score point difference associated with one unit increase in the ESCS	S.E.	5th percentile of the ESCS	S.E.	95th percentile of the ESCS	S.E.	Difference between 95th and 5th percentile of the ESCS	S.E.
OECD	Australia	12.7	(0.85)	0.30	**46**	(1.8)	-0.87	(0.02)	1.51	(0.01)	2.38	(0.02)
	Austria	16.6	(1.39)	0.27	**48**	(2.3)	-1.23	(0.04)	1.49	(0.04)	2.73	(0.06)
	Belgium	**19.3**	(1.01)	0.27	**47**	(1.5)	-1.29	(0.03)	1.64	(0.04)	2.93	(0.06)
	Canada	**8.6**	(0.74)	0.32	**32**	(1.4)	-0.88	(0.03)	1.76	(0.02)	2.63	(0.04)
	Chile	**18.7**	(1.56)	0.54	**31**	(1.5)	-2.37	(0.04)	1.36	(0.04)	3.73	(0.05)
	Czech Republic	12.4	(1.09)	0.27	**46**	(2.3)	-1.17	(0.02)	1.13	(0.02)	2.30	(0.03)
	Denmark	14.5	(1.02)	0.23	36	(1.4)	-1.14	(0.02)	1.67	(0.02)	2.81	(0.03)
	Estonia	**7.6**	(1.11)	0.36	**29**	(2.3)	-1.10	(0.04)	1.43	(0.03)	2.53	(0.04)
	Finland	**7.8**	(0.82)	0.27	**31**	(1.7)	-0.91	(0.04)	1.54	(0.04)	2.45	(0.05)
	France	16.7	(1.97)	0.27	**51**	(2.9)	-1.50	(0.03)	1.25	(0.06)	2.74	(0.06)
	Germany	**17.9**	(1.29)	0.30	**44**	(1.9)	-1.24	(0.04)	1.70	(0.03)	2.94	(0.04)
	Greece	12.5	(1.43)	0.32	34	(2.4)	-1.63	(0.04)	1.58	(0.02)	3.21	(0.04)
	Hungary	**26.0**	(2.17)	0.29	**48**	(2.2)	-1.71	(0.06)	1.43	(0.03)	3.14	(0.06)
	Iceland	**6.2**	(0.81)	0.28	**27**	(1.8)	-0.83	(0.03)	2.06	(0.02)	2.88	(0.04)
	Ireland	12.6	(1.17)	0.33	39	(2.0)	-1.28	(0.03)	1.44	(0.04)	2.72	(0.04)
	Israel	12.5	(1.14)	0.39	**43**	(2.4)	-1.53	(0.05)	1.22	(0.03)	2.75	(0.06)
	Italy	**11.8**	(0.74)	0.35	**32**	(1.3)	-1.70	(0.02)	1.62	(0.03)	3.32	(0.04)
	Japan	**8.6**	**(0.96)**	**0.32**	**40**	**(2.8)**	**-1.16**	**(0.02)**	**1.16**	**(0.01)**	**2.32**	**(0.02)**
	Korea	**11.0**	(1.51)	0.31	**32**	(2.5)	-1.53	(0.03)	1.18	(0.04)	2.71	(0.05)
	Luxembourg	**18.0**	(1.06)	0.26	40	(1.3)	-1.82	(0.03)	1.81	(0.04)	3.63	(0.05)
	Mexico	14.5	(0.99)	0.47	**25**	(1.0)	-3.18	(0.03)	1.00	(0.06)	4.18	(0.06)
	Netherlands	12.8	(1.20)	0.27	37	(1.9)	-1.12	(0.09)	1.54	(0.02)	2.66	(0.08)
	New Zealand	**16.6**	(1.08)	0.34	**52**	(1.9)	-1.20	(0.02)	1.33	(0.02)	2.53	(0.03)
	Norway	**8.6**	(0.96)	0.28	36	(2.1)	-0.72	(0.02)	1.64	(0.02)	2.36	(0.03)
	Poland	14.8	(1.38)	0.37	39	(1.9)	-1.50	(0.03)	1.35	(0.02)	2.86	(0.03)
	Portugal	16.5	(1.60)	0.38	**30**	(1.6)	-1.98	(0.03)	1.81	(0.03)	3.79	(0.04)
	Slovak Republic[5]	14.6	(1.48)	0.26	41	(2.3)	-1.24	(0.03)	1.46	(0.04)	2.70	(0.05)
	Slovenia	14.3	(1.06)	0.30	39	(1.5)	-1.25	(0.02)	1.53	(0.02)	2.78	(0.03)
	Spain	13.6	(1.30)	0.32	**29**	(1.5)	-2.04	(0.04)	1.54	(0.03)	3.58	(0.04)
	Sweden	13.4	(1.33)	0.23	**43**	(2.2)	-1.01	(0.04)	1.55	(0.04)	2.57	(0.05)
	Switzerland	14.1	(1.38)	0.28	40	(2.1)	-1.38	(0.03)	1.52	(0.03)	2.90	(0.03)
	Turkey	**19.0**	(1.91)	0.43	**29**	(1.5)	-2.99	(0.04)	1.03	(0.07)	4.02	(0.07)
	United Kingdom	13.7	(1.03)	0.34	**44**	(1.9)	-1.05	(0.04)	1.48	(0.02)	2.52	(0.04)
	United States	16.8	(1.65)	0.38	42	(2.3)	-1.40	(0.08)	1.61	(0.03)	3.01	(0.08)
	OECD average	14.0	(0.22)	0.31	38	(0.3)	-1.44	(0.01)	1.48	(0.01)	2.92	(0.01)
Partners	Albania	10.7	(1.79)	0.31	**31**	(2.6)	-2.61	(0.05)	0.84	(0.05)	3.44	(0.06)
	Argentina	**19.6**	(2.23)	0.51	40	(2.3)	-2.54	(0.06)	1.36	(0.05)	3.90	(0.08)
	Azerbaijan	**7.4**	(1.57)	0.27	**21**	(2.3)	-2.17	(0.03)	1.01	(0.04)	3.18	(0.04)
	Brazil	13.0	(1.27)	0.57	**28**	(1.4)	-3.05	(0.03)	0.89	(0.06)	3.94	(0.06)
	Bulgaria	**20.2**	(2.19)	0.32	**51**	(2.8)	-1.59	(0.09)	1.49	(0.04)	3.08	(0.09)
	Colombia	16.6	(1.90)	0.58	**28**	(1.8)	-3.21	(0.05)	0.95	(0.06)	4.15	(0.07)
	Croatia	**11.0**	(1.34)	0.30	**32**	(2.0)	-1.61	(0.04)	1.43	(0.04)	3.04	(0.06)
	Dubai (UAE)	14.2	(0.80)	m	**51**	(1.4)	-1.11	(0.04)	1.50	(0.02)	2.61	(0.04)
	Hong Kong-China[5]	**4.5**	(1.08)	0.43	**17**	(2.2)	-2.42	(0.04)	1.00	(0.07)	3.42	(0.08)
	Indonesia	**7.8**	(2.23)	0.38	**17**	(2.4)	-3.11	(0.03)	0.43	(0.06)	3.55	(0.06)
	Jordan	**7.9**	(1.35)	0.38	**24**	(2.1)	-2.23	(0.06)	1.07	(0.04)	3.30	(0.07)
	Kazakhstan	12.0	(1.73)	0.33	38	(2.8)	-1.79	(0.06)	0.87	(0.05)	2.66	(0.06)
	Kyrgyzstan	14.6	(1.83)	0.33	40	(2.9)	-2.13	(0.02)	0.89	(0.05)	3.02	(0.05)
	Latvia	**10.3**	(1.69)	0.36	**29**	(2.6)	-1.47	(0.03)	1.29	(0.03)	2.75	(0.03)
	Liechtenstein	8.4	(2.89)	m	**26**	(5.0)	-1.42	(0.13)	1.51	(0.06)	2.93	(0.13)
	Lithuania	13.6	(1.44)	0.33	**33**	(1.9)	-1.52	(0.03)	1.47	(0.01)	2.99	(0.03)
	Macao-China[3]	**1.8**	(0.35)	0.37	**12**	(1.2)	-2.09	(0.02)	0.83	(0.04)	2.92	(0.04)
	Montenegro	**10.0**	(0.84)	0.37	31	(1.4)	-1.74	(0.04)	1.35	(0.03)	3.09	(0.05)
	Panama	18.1	(3.86)	0.56	31	(3.6)	-3.08	(0.10)	1.16	(0.11)	4.23	(0.14)
	Peru	**27.4**	(2.62)	0.52	**41**	(2.0)	-3.33	(0.05)	0.85	(0.09)	4.18	(0.10)
	Qatar	**4.0**	(0.36)	0.41	**25**	(1.2)	-1.28	(0.03)	1.73	(0.02)	3.00	(0.03)
	Romania	13.6	(2.12)	0.31	36	(2.8)	-1.70	(0.08)	1.23	(0.06)	2.93	(0.09)
	Russian Federation	**11.3**	(1.35)	0.39	37	(2.5)	-1.43	(0.03)	1.08	(0.03)	2.51	(0.04)
	Serbia	**9.8**	(1.02)	0.28	**27**	(1.6)	-1.42	(0.03)	1.75	(0.04)	3.17	(0.05)
	Shanghai-China	12.3	(1.77)	m	**27**	(2.1)	-2.16	(0.03)	1.19	(0.03)	3.35	(0.04)
	Singapore[4]	15.3	(1.11)	0.43	**47**	(1.7)	-1.82	(0.03)	0.75	(0.00)	2.57	(0.03)
	Chinese Taipei	11.8	(1.34)	m	36	(2.4)	-1.73	(0.05)	1.02	(0.03)	2.74	(0.05)
	Thailand	13.3	(1.94)	0.43	**22**	(1.8)	-2.84	(0.03)	0.88	(0.04)	3.72	(0.05)
	Trinidad and Tobago[6]	**9.7**	(0.86)	0.40	38	(1.7)	-2.20	(0.05)	0.92	(0.03)	3.11	(0.06)
	Tunisia	**8.1**	(1.47)	0.41	**19**	(1.8)	-3.15	(0.06)	1.03	(0.05)	4.18	(0.06)
	Uruguay	**20.7**	(1.47)	0.45	37	(1.5)	-2.49	(0.02)	1.51	(0.03)	4.00	(0.03)

Note: The Gini coefficient measures the extent to which the distribution of income among individuals or households within an economy deviates from a perfectly equal distribution. The Gini index measures the area between the Lorenz curve and the hypothetical line of absolute equality, expressed as a percentage of the maximum area under the line. A Gini index of zero represents perfect equality and 1, perfect inequality.
1. In these columns values that are statistically significantly different from the OECD average are indicated in bold.
2. Single-level bivariate regression of reading performance on the ESCS, the slope is the regression coefficient for the ESCS.
3. Gini index from City's Statistics and Census Service (DSEC). Year 2007/2008.
4. Gini index from World Bank 1998.
5. Gini index from World Bank 1996.
6. Gini index from World Bank 1992.
Source: Gini indexes for OECD countries come from the OECD, 2008 publication: *Growing Unequal? Income Distribution and Poverty in OECD Countries* and refer to mid-2000. The OECD average refers to the average of 24 OECD countries. Gini indexes of partner countries and economies come from the World Bank database, as the average index between the years 2000 and 2007.

In Japan, students' socio-economic background has a weak impact on learning outcomes

In Japan, only about 9% of the variation in student performance is explained by students' socio-economic background while the OECD average is 14%. Other OECD countries where students' socio-economic backgrounds have a below-average impact on performance are Iceland, Estonia, Finland, Norway, Canada, Korea and Italy. In contrast, Hungary, Belgium, Turkey, Chile, Luxembourg, Germany, the United States, France and New Zealand all show an above-average impact of socio-economic background on reading performance. In other words, in these countries two students from different socio-economic backgrounds vary much more in their learning outcomes than is normally the case in OECD countries. It is important to emphasise that these countries do not necessarily have a greater proportion of socio-economically disadvantaged students than other countries, but that socio-economic differences among students in these countries have a particularly strong impact on learning outcomes.

If inequalities in societies were always closely linked to the impact of socio-economic disadvantage on learning outcomes, the ability of public policy to improve equity in access to learning opportunities would be limited, at least in the short term. However, there is almost no relationship between income inequalities in countries and the impact of socio-economic background on learning outcomes (Figure II.1.3 in OECD, 2010d), that is, some countries succeed even under difficult conditions to mitigate the impact of socio-economic background on educational success.

In general, the accuracy with which socio-economic background predicts student performance varies considerably across countries. Most of the students who perform poorly in PISA come from challenging socio-economic backgrounds, and yet some of their disadvantaged peers excel in PISA and beat the odds against them. These students show that overcoming socio-economic barriers to achievement is possible. While the prevalence of resilience is not the same across educational systems, it is possible to identify substantial numbers of resilient students in practically all OECD countries.[7] In Japan, 11% of students can be considered resilient, in that they are among the 25% most socio-economically disadvantaged students in the country yet perform much better than what would be predicted based on their background (Table II.3.3 in OECD, 2010d). Across the OECD, an average of 7% of students are resilient, while the share of resilient students is greater in Korea, Finland and the partner country and economies Shanghai-China, Hong Kong-China, Macao-China and Singapore than in Japan. These results confirm that, in Japan, policies to improve performance should not just focus on disadvantaged students, but also on those who perform poorly because of other factors, such as family composition and concentration of social disadvantage in the school.

Other factors related to poor student performance that emerge from PISA

Family composition: In Japan, single-parent families are slightly less prevalent than the OECD average (15% of 15-year-olds come from single-parent families compared with an average of 17%). However, Japanese students from these families face a much higher risk of low performance than is the case across OECD countries (Table II.2.5 in OECD, 2010d). Two-thirds of the performance differences between students who come from single-parent families and those from other type of families are related to the differences in socio-economic background between these families.

Concentration of socio-economic disadvantage in schools: Some 30% of students in Japan attend schools with a socio-economically disadvantaged intake, where 57% of students are disadvantaged themselves (i.e. they are grossly overrepresented); 31% of students are in socio-economically privileged schools, where only 8% of students are disadvantaged themselves. Disadvantaged students in Japan tend to perform worse than expected when they attend disadvantaged schools, and such differences are larger than is the case in many other OECD countries. Advantaged students also tend to perform worse than expected when enrolled in disadvantaged schools, and this difference is also greater in Japan than that observed in other OECD countries. In contrast, advantaged students tend to perform better than expected when attending advantaged schools, and by a larger margin than in many other OECD countries, while disadvantaged students also tend to perform better than expected in these schools, and by a larger-than-average margin. In schools with a mixed socio-economic intake, disadvantaged students tend to do better than expected and advantaged students tend to perform worse than expected (Table II.5.10 in OECD, 2010d).

HAS A DEMANDING EDUCATION SYSTEM ADVERSELY AFFECTED STUDENTS' MENTAL HEALTH?

Suicide is a major social and health issue in Japan, particularly among young people. In fact, Japan has the third highest annual suicide rate among OECD countries and, most worryingly suicide rates have been increasing steadily since 1995 (OECD, 2011a). Suicide is the second leading cause of death in Japan among 15-24 year-olds (Desapriya and Iwase, 2003) Achievement-oriented pressure is often cited as a possible cause of poor mental health among the young. However, no study has indentified achievement-related stress as a major risk factor, while there is some evidence that bullying at school and low self-esteem are risk factors for attempted suicide and depression among adolescents (Hidaka, et al, 2008; Laser, et al., 2007).

Table 2.6a Index of enjoyment of reading and reading performance, by national quarters of this index

Results based on students' self-reports

		Index of enjoyment of reading															
		All students		Boys		Girls		Gender difference (B – G)		Bottom quarter		Second quarter		Third quarter		Top quarter	
		Mean index	S.E.	Mean index	S.E.	Mean index	S.E.	Dif.	S.E.	Mean index	S.E.	Mean index	S.E.	Mean index	S.E.	Mean index	S.E.
OECD	Australia	0.00	(0.02)	-0.33	(0.02)	0.31	(0.02)	**-0.64**	(0.03)	**-1.36**	(0.01)	-0.37	(0.00)	0.31	(0.00)	**1.42**	(0.01)
	Austria	-0.13	(0.03)	-0.55	(0.03)	0.26	(0.03)	**-0.81**	(0.04)	**-1.52**	(0.02)	-0.65	(0.01)	0.16	(0.01)	**1.47**	(0.02)
	Belgium	-0.20	(0.02)	-0.45	(0.02)	0.07	(0.02)	**-0.52**	(0.03)	**-1.42**	(0.01)	-0.58	(0.00)	0.11	(0.01)	**1.11**	(0.01)
	Canada	0.13	(0.01)	-0.28	(0.02)	0.55	(0.02)	**-0.83**	(0.02)	**-1.25**	(0.01)	-0.24	(0.00)	0.45	(0.00)	**1.57**	(0.01)
	Chile	-0.06	(0.01)	-0.28	(0.02)	0.16	(0.02)	**-0.44**	(0.02)	**-1.01**	(0.01)	-0.37	(0.00)	0.10	(0.00)	**1.02**	(0.02)
	Czech Republic	-0.13	(0.02)	-0.44	(0.02)	0.22	(0.02)	**-0.66**	(0.03)	**-1.21**	(0.01)	-0.46	(0.00)	0.10	(0.00)	**1.06**	(0.02)
	Denmark	-0.09	(0.02)	-0.35	(0.02)	0.17	(0.02)	**-0.52**	(0.03)	**-1.17**	(0.01)	-0.40	(0.01)	0.15	(0.01)	**1.07**	(0.02)
	Estonia	-0.03	(0.02)	-0.38	(0.02)	0.33	(0.02)	**-0.71**	(0.03)	**-1.07**	(0.01)	-0.37	(0.00)	0.20	(0.01)	**1.10**	(0.02)
	Finland	0.05	(0.02)	-0.41	(0.02)	0.50	(0.02)	**-0.91**	(0.03)	**-1.25**	(0.02)	-0.28	(0.01)	0.36	(0.01)	**1.35**	(0.02)
	France	0.01	(0.03)	-0.23	(0.03)	0.24	(0.03)	**-0.47**	(0.04)	**-1.26**	(0.01)	-0.33	(0.01)	0.34	(0.01)	**1.30**	(0.02)
	Germany	0.07	(0.02)	-0.38	(0.02)	0.52	(0.03)	**-0.89**	(0.03)	**-1.33**	(0.01)	-0.45	(0.01)	0.42	(0.01)	**1.63**	(0.02)
	Greece	0.07	(0.02)	-0.24	(0.02)	0.36	(0.02)	**-0.60**	(0.03)	**-0.95**	(0.01)	-0.22	(0.00)	0.29	(0.01)	**1.14**	(0.02)
	Hungary	0.14	(0.02)	-0.15	(0.03)	0.43	(0.02)	**-0.58**	(0.04)	**-0.94**	(0.01)	-0.19	(0.01)	0.37	(0.01)	**1.30**	(0.02)
	Iceland	-0.06	(0.02)	-0.38	(0.02)	0.25	(0.02)	**-0.63**	(0.03)	**-1.28**	(0.02)	-0.43	(0.01)	0.18	(0.01)	**1.27**	(0.02)
	Ireland	-0.08	(0.02)	-0.30	(0.03)	0.15	(0.03)	**-0.45**	(0.04)	**-1.30**	(0.02)	-0.44	(0.01)	0.19	(0.01)	**1.23**	(0.02)
	Israel	0.06	(0.02)	-0.26	(0.03)	0.35	(0.03)	**-0.60**	(0.04)	**-1.16**	(0.01)	-0.28	(0.00)	0.31	(0.01)	**1.35**	(0.02)
	Italy	0.06	(0.01)	-0.27	(0.01)	0.41	(0.01)	**-0.68**	(0.02)	**-1.10**	(0.01)	-0.28	(0.00)	0.37	(0.00)	**1.27**	(0.01)
	Japan	**0.20**	(0.02)	**0.02**	(0.03)	**0.38**	(0.02)	**-0.36**	(0.03)	**-1.07**	(0.01)	**-0.19**	(0.01)	**0.48**	(0.01)	**1.58**	(0.02)
	Korea	0.13	(0.02)	0.00	(0.02)	0.27	(0.02)	**-0.27**	(0.03)	**-0.82**	(0.01)	-0.15	(0.00)	0.31	(0.00)	**1.17**	(0.02)
	Luxembourg	-0.16	(0.02)	-0.51	(0.02)	0.20	(0.03)	**-0.71**	(0.03)	**-1.43**	(0.02)	-0.58	(0.01)	0.12	(0.01)	**1.25**	(0.02)
	Mexico	0.14	(0.01)	-0.04	(0.01)	0.32	(0.01)	**-0.35**	(0.01)	**-0.77**	(0.01)	-0.13	(0.00)	0.32	(0.00)	**1.15**	(0.01)
	Netherlands	-0.32	(0.03)	-0.66	(0.03)	0.02	(0.03)	**-0.69**	(0.03)	**-1.47**	(0.02)	-0.66	(0.01)	-0.03	(0.01)	**0.88**	(0.02)
	New Zealand	0.13	(0.02)	-0.17	(0.02)	0.44	(0.02)	**-0.61**	(0.03)	**-1.07**	(0.02)	-0.21	(0.01)	0.40	(0.01)	**1.41**	(0.02)
	Norway	-0.19	(0.02)	-0.50	(0.02)	0.13	(0.03)	**-0.63**	(0.03)	**-1.41**	(0.01)	-0.56	(0.01)	0.09	(0.01)	**1.12**	(0.02)
	Poland	0.02	(0.02)	-0.36	(0.02)	0.39	(0.03)	**-0.75**	(0.03)	**-1.21**	(0.01)	-0.43	(0.00)	0.21	(0.01)	**1.49**	(0.02)
	Portugal	0.21	(0.02)	-0.15	(0.02)	0.54	(0.02)	**-0.69**	(0.02)	**-0.87**	(0.02)	-0.09	(0.00)	0.44	(0.00)	**1.35**	(0.02)
	Slovak Republic	-0.10	(0.02)	-0.36	(0.02)	0.15	(0.02)	**-0.51**	(0.03)	**-1.07**	(0.02)	-0.41	(0.00)	0.06	(0.00)	**1.02**	(0.02)
	Slovenia	-0.20	(0.01)	-0.53	(0.02)	0.14	(0.02)	**-0.67**	(0.03)	**-1.35**	(0.01)	-0.55	(0.00)	0.06	(0.01)	**1.04**	(0.02)
	Spain	-0.01	(0.01)	-0.28	(0.02)	0.26	(0.01)	**-0.55**	(0.02)	**-1.15**	(0.01)	-0.35	(0.00)	0.23	(0.00)	**1.22**	(0.01)
	Sweden	-0.11	(0.02)	-0.47	(0.02)	0.26	(0.03)	**-0.72**	(0.03)	**-1.29**	(0.02)	-0.45	(0.01)	0.18	(0.00)	**1.14**	(0.02)
	Switzerland	-0.04	(0.02)	-0.44	(0.02)	0.37	(0.03)	**-0.80**	(0.03)	**-1.46**	(0.02)	-0.50	(0.01)	0.32	(0.01)	**1.48**	(0.02)
	Turkey	0.64	(0.02)	0.34	(0.02)	0.95	(0.02)	**-0.61**	(0.03)	**-0.34**	(0.01)	0.33	(0.00)	0.80	(0.00)	**1.77**	(0.02)
	United Kingdom	-0.12	(0.02)	-0.37	(0.02)	0.13	(0.02)	**-0.50**	(0.03)	**-1.29**	(0.02)	-0.45	(0.00)	0.14	(0.00)	**1.13**	(0.02)
	United States	-0.04	(0.03)	-0.35	(0.03)	0.28	(0.03)	**-0.63**	(0.03)	**-1.27**	(0.01)	-0.41	(0.00)	0.19	(0.01)	**1.33**	(0.02)
	OECD average	0.00	(0.00)	-0.31	(0.00)	0.31	(0.00)	**-0.62**	(0.01)	**-1.17**	(0.00)	-0.36	(0.00)	0.26	(0.00)	**1.27**	(0.00)
Partners	Albania	0.67	(0.02)	0.36	(0.02)	0.99	(0.02)	**-0.63**	(0.02)	**-0.21**	(0.01)	0.44	(0.00)	0.89	(0.00)	**1.56**	(0.01)
	Argentina	-0.16	(0.02)	-0.34	(0.02)	-0.01	(0.02)	**-0.34**	(0.03)	**-1.02**	(0.01)	-0.43	(0.00)	0.00	(0.00)	**0.81**	(0.02)
	Azerbaijan	0.39	(0.01)	0.29	(0.02)	0.50	(0.02)	**-0.22**	(0.03)	**-0.42**	(0.01)	0.16	(0.00)	0.57	(0.00)	**1.27**	(0.02)
	Brazil	0.27	(0.01)	0.05	(0.01)	0.47	(0.01)	**-0.42**	(0.02)	**-0.64**	(0.01)	-0.01	(0.00)	0.45	(0.00)	**1.28**	(0.01)
	Bulgaria	-0.02	(0.03)	-0.25	(0.03)	0.23	(0.03)	**-0.48**	(0.03)	**-1.01**	(0.02)	-0.31	(0.00)	0.17	(0.01)	**1.08**	(0.02)
	Colombia	0.14	(0.02)	-0.02	(0.02)	0.28	(0.02)	**-0.29**	(0.03)	**-0.68**	(0.02)	-0.12	(0.00)	0.31	(0.00)	**1.05**	(0.01)
	Croatia	-0.13	(0.02)	-0.44	(0.02)	0.22	(0.02)	**-0.66**	(0.03)	**-1.16**	(0.01)	-0.44	(0.00)	0.09	(0.00)	**1.00**	(0.02)
	Dubai (UAE)	0.28	(0.01)	0.04	(0.02)	0.52	(0.02)	**-0.49**	(0.03)	**-0.80**	(0.01)	-0.05	(0.00)	0.52	(0.00)	**1.45**	(0.02)
	Hong Kong-China	0.32	(0.01)	0.16	(0.02)	0.51	(0.02)	**-0.35**	(0.02)	**-0.54**	(0.01)	0.08	(0.00)	0.49	(0.00)	**1.27**	(0.01)
	Indonesia	0.43	(0.01)	0.32	(0.01)	0.55	(0.01)	**-0.22**	(0.02)	**-0.16**	(0.01)	0.27	(0.00)	0.55	(0.00)	**1.07**	(0.01)
	Jordan	0.37	(0.02)	0.22	(0.02)	0.52	(0.02)	**-0.30**	(0.03)	**-0.50**	(0.01)	0.12	(0.00)	0.56	(0.00)	**1.31**	(0.01)
	Kazakhstan	0.54	(0.02)	0.39	(0.02)	0.70	(0.02)	**-0.30**	(0.02)	**-0.28**	(0.01)	0.31	(0.00)	0.72	(0.00)	**1.42**	(0.02)
	Kyrgyzstan	0.39	(0.01)	0.19	(0.02)	0.57	(0.02)	**-0.38**	(0.02)	**-0.35**	(0.01)	0.14	(0.00)	0.52	(0.00)	**1.23**	(0.01)
	Latvia	-0.04	(0.02)	-0.39	(0.02)	0.30	(0.02)	**-0.68**	(0.03)	**-0.98**	(0.01)	-0.34	(0.00)	0.18	(0.01)	**0.98**	(0.02)
	Liechtenstein	-0.20	(0.05)	-0.57	(0.07)	0.21	(0.08)	**-0.78**	(0.11)	**-1.56**	(0.06)	-0.66	(0.02)	0.06	(0.03)	**1.34**	(0.07)
	Lithuania	0.06	(0.02)	-0.44	(0.02)	0.57	(0.03)	**-1.00**	(0.03)	**-1.22**	(0.01)	-0.38	(0.01)	0.36	(0.01)	**1.48**	(0.02)
	Macao-China	0.08	(0.01)	-0.13	(0.01)	0.28	(0.01)	**-0.41**	(0.02)	**-0.76**	(0.01)	-0.16	(0.00)	0.25	(0.00)	**0.97**	(0.01)
	Montenegro	0.21	(0.01)	-0.04	(0.02)	0.47	(0.01)	**-0.52**	(0.02)	**-0.77**	(0.01)	-0.07	(0.00)	0.44	(0.01)	**1.25**	(0.01)
	Panama	0.18	(0.02)	0.03	(0.03)	0.32	(0.03)	**-0.29**	(0.04)	**-0.71**	(0.02)	-0.12	(0.01)	0.34	(0.01)	**1.21**	(0.03)
	Peru	0.35	(0.01)	0.21	(0.02)	0.48	(0.02)	**-0.27**	(0.02)	**-0.44**	(0.01)	0.11	(0.00)	0.50	(0.00)	**1.20**	(0.01)
	Qatar	0.20	(0.01)	0.04	(0.01)	0.36	(0.01)	**-0.31**	(0.02)	**-0.74**	(0.01)	-0.08	(0.00)	0.37	(0.00)	**1.27**	(0.01)
	Romania	0.10	(0.02)	-0.13	(0.02)	0.32	(0.03)	**-0.45**	(0.02)	**-0.73**	(0.01)	-0.16	(0.00)	0.27	(0.00)	**1.03**	(0.01)
	Russian Federation	0.07	(0.01)	-0.15	(0.02)	0.29	(0.02)	**-0.44**	(0.02)	**-0.73**	(0.01)	-0.19	(0.00)	0.23	(0.00)	**0.99**	(0.01)
	Serbia	0.04	(0.02)	-0.26	(0.02)	0.33	(0.03)	**-0.60**	(0.03)	**-0.97**	(0.01)	-0.26	(0.00)	0.24	(0.00)	**1.14**	(0.02)
	Shanghai-China	0.57	(0.01)	0.39	(0.02)	0.75	(0.01)	**-0.35**	(0.02)	**-0.29**	(0.01)	0.36	(0.00)	0.78	(0.00)	**1.43**	(0.01)
	Singapore	0.29	(0.01)	0.00	(0.02)	0.58	(0.02)	**-0.58**	(0.02)	**-0.81**	(0.01)	-0.03	(0.00)	0.51	(0.00)	**1.48**	(0.02)
	Chinese Taipei	0.39	(0.02)	0.18	(0.02)	0.61	(0.03)	**-0.43**	(0.04)	**-0.59**	(0.01)	0.08	(0.00)	0.58	(0.00)	**1.51**	(0.02)
	Thailand	0.54	(0.01)	0.36	(0.02)	0.67	(0.01)	**-0.31**	(0.02)	**-0.19**	(0.01)	0.32	(0.00)	0.67	(0.00)	**1.35**	(0.01)
	Trinidad and Tobago	0.21	(0.01)	-0.08	(0.02)	0.49	(0.02)	**-0.57**	(0.02)	**-0.78**	(0.01)	-0.12	(0.00)	0.40	(0.01)	**1.34**	(0.02)
	Tunisia	0.37	(0.02)	0.14	(0.03)	0.58	(0.02)	**-0.44**	(0.03)	**-0.67**	(0.01)	0.10	(0.00)	0.66	(0.00)	**1.39**	(0.01)
	Uruguay	-0.14	(0.02)	-0.39	(0.02)	0.07	(0.02)	**-0.46**	(0.02)	**-1.17**	(0.01)	-0.44	(0.00)	0.08	(0.00)	**0.97**	(0.01)

Note: Values that are statistically significant are indicated in bold.
Source: OECD, *PISA 2009 Database*.

Table 2.6b Index of enjoyment of reading and reading performance, by national quarters of this index

Results based on students' self-reports

	Performance on the reading scale, by national quarters of this index								Change in the reading score per unit of this index		Increased likelihood of students in the bottom quarter of this index scoring in the bottom quarter of the national reading performance distribution		Explained variance in student performance (r-squared x 100)	
	Bottom quarter		Second quarter		Third quarter		Top quarter							
	Mean score	S.E.	Mean score	S.E.	Mean score	S.E.	Mean score	S.E.	Effect	S.E.	Ratio	S.E.	%	S.E.
OECD														
Australia	**454**	(2.4)	489	(2.7)	536	(2.7)	**588**	(2.7)	**44.9**	(1.04)	**2.7**	(0.12)	26.0	**(0.80)**
Austria	**422**	(3.5)	446	(3.8)	481	(4.2)	**536**	(4.2)	**37.2**	(1.63)	**2.0**	(0.15)	19.8	**(1.40)**
Belgium	**461**	(2.4)	482	(3.2)	514	(3.7)	**571**	(2.9)	**40.9**	(1.21)	**1.8**	(0.10)	16.7	**(0.93)**
Canada	**473**	(2.0)	506	(2.1)	542	(2.2)	**582**	(1.9)	**35.7**	(0.80)	**2.5**	(0.10)	20.1	**(0.83)**
Chile	**430**	(3.3)	433	(4.1)	450	(3.7)	**490**	(3.6)	**29.0**	(1.57)	**1.4**	(0.09)	8.4	**(0.84)**
Czech Republic	**436**	(3.3)	446	(3.7)	488	(2.8)	**547**	(3.5)	**46.0**	(1.53)	**2.0**	(0.11)	20.7	**(1.10)**
Denmark	**448**	(3.1)	477	(3.4)	509	(2.9)	**549**	(3.1)	**43.2**	(1.46)	**2.5**	(0.16)	21.4	**(1.27)**
Estonia	**456**	(3.2)	480	(3.2)	515	(3.3)	**555**	(3.4)	**43.3**	(1.71)	**2.4**	(0.17)	20.7	**(1.28)**
Finland	**475**	(2.7)	518	(2.9)	557	(3.0)	**596**	(2.7)	**43.3**	(1.17)	**3.2**	(0.16)	27.0	**(1.22)**
France	**435**	(4.9)	475	(3.7)	514	(4.0)	**562**	(4.1)	**47.1**	(2.28)	**2.5**	(0.16)	20.7	**(1.55)**
Germany	**451**	(4.0)	468	(3.5)	520	(3.1)	**562**	(3.0)	**36.6**	(1.36)	**2.3**	(0.12)	21.0	**(1.13)**
Greece	**435**	(6.2)	463	(6.0)	494	(4.6)	**540**	(3.3)	**46.8**	(2.35)	**2.3**	(0.15)	17.2	**(1.36)**
Hungary	**452**	(3.8)	468	(3.5)	500	(4.9)	**559**	(3.4)	**45.1**	(1.92)	**2.1**	(0.16)	20.1	**(1.61)**
Iceland	**444**	(2.8)	485	(2.7)	516	(3.3)	**564**	(2.5)	**43.4**	(1.37)	**2.7**	(0.18)	22.2	**(1.12)**
Ireland	**445**	(3.9)	467	(3.6)	513	(4.0)	**567**	(3.0)	**45.1**	(1.56)	**2.4**	(0.15)	23.8	**(1.36)**
Israel	**455**	(4.5)	447	(4.8)	479	(4.2)	**534**	(3.9)	**30.1**	(1.91)	**1.2**	(0.08)	7.9	**(0.90)**
Italy	**445**	(2.3)	459	(2.0)	500	(2.2)	**544**	(2.1)	**40.4**	(1.02)	**1.9**	(0.07)	16.2	**(0.71)**
Japan	471	(4.3)	505	(4.2)	540	(3.4)	573	(3.6)	35.8	(1.89)	2.3	(0.13)	15.0	(1.12)
Korea	**495**	(4.5)	526	(3.6)	555	(3.5)	**584**	(3.4)	**40.4**	(2.29)	**2.5**	(0.15)	17.6	**(1.35)**
Luxembourg	**426**	(2.7)	445	(2.9)	483	(3.4)	**537**	(2.7)	**39.9**	(1.34)	**1.9**	(0.12)	17.4	**(1.09)**
Mexico	**412**	(2.3)	411	(2.4)	427	(2.3)	**454**	(2.4)	**21.6**	(1.12)	**1.2**	(0.04)	4.0	**(0.40)**
Netherlands	**464**	(5.1)	487	(5.2)	522	(5.2)	**560**	(5.7)	**38.5**	(1.88)	**2.0**	(0.16)	16.7	**(1.46)**
New Zealand	**466**	(3.3)	489	(3.2)	541	(3.8)	**593**	(3.2)	**48.2**	(1.56)	**2.3**	(0.15)	22.3	**(1.37)**
Norway	**450**	(3.6)	484	(3.3)	518	(3.3)	**564**	(3.4)	**42.1**	(1.51)	**2.5**	(0.18)	22.2	**(1.27)**
Poland	**464**	(3.4)	472	(3.5)	508	(3.3)	**563**	(3.1)	**35.2**	(1.31)	**1.9**	(0.13)	18.7	**(1.19)**
Portugal	**453**	(3.4)	470	(3.7)	498	(3.3)	**541**	(3.3)	**35.6**	(1.59)	**1.9**	(0.11)	14.0	**(1.00)**
Slovak Republic	**451**	(3.4)	447	(3.8)	479	(3.5)	**538**	(3.9)	**39.8**	(2.42)	**1.5**	(0.09)	14.3	**(1.39)**
Slovenia	**445**	(2.3)	457	(2.4)	494	(2.4)	**543**	(2.6)	**39.0**	(1.39)	**1.9**	(0.10)	17.4	**(1.09)**
Spain	**439**	(2.6)	461	(2.5)	493	(2.3)	**537**	(1.9)	**38.4**	(0.97)	**2.2**	(0.11)	17.8	**(0.74)**
Sweden	**442**	(3.3)	474	(3.8)	515	(3.8)	**563**	(3.6)	**46.8**	(1.54)	**2.4**	(0.18)	21.7	**(1.32)**
Switzerland	**449**	(3.1)	475	(2.9)	516	(3.0)	**565**	(3.2)	**37.7**	(1.20)	**2.3**	(0.14)	22.4	**(1.13)**
Turkey	**444**	(4.3)	451	(3.8)	469	(3.6)	**498**	(4.7)	**23.5**	(2.03)	**1.5**	(0.11)	6.2	**(0.94)**
United Kingdom	**446**	(3.2)	466	(2.6)	508	(3.2)	**562**	(2.7)	**45.0**	(1.52)	**2.2**	(0.13)	21.5	**(1.34)**
United States	**454**	(2.8)	474	(4.3)	511	(4.2)	**563**	(5.0)	**38.3**	(1.81)	**2.0**	(0.12)	17.5	**(1.30)**
OECD average	**450**	(0.6)	471	(0.6)	506	(0.6)	**553**	(0.6)	**39.5**	(0.28)	**2.1**	(0.02)	18.1	(0.20)
Partners														
Albania	**340**	(5.5)	370	(5.4)	403	(4.7)	**436**	(4.3)	**47.8**	(2.83)	**2.2**	(0.22)	12.0	**(1.28)**
Argentina	**390**	(4.9)	388	(5.6)	388	(5.3)	**442**	(6.6)	**27.4**	(3.65)	1.1	(0.07)	3.6	**(0.91)**
Azerbaijan	**342**	(3.9)	357	(4.7)	373	(4.5)	**386**	(3.6)	**22.8**	(2.12)	**1.7**	(0.14)	4.5	**(0.88)**
Brazil	**397**	(2.7)	399	(3.8)	411	(3.3)	**444**	(3.8)	**25.8**	(1.87)	**1.2**	(0.06)	4.6	**(0.62)**
Bulgaria	**407**	(5.6)	407	(7.3)	432	(7.7)	**493**	(8.3)	**38.3**	(3.13)	**1.3**	(0.13)	8.7	**(1.47)**
Colombia	**407**	(4.1)	402	(4.0)	418	(5.2)	**429**	(5.5)	**14.4**	(2.62)	1.0	(0.09)	1.4	**(0.51)**
Croatia	**441**	(3.8)	454	(3.6)	484	(3.4)	**526**	(3.4)	**37.1**	(1.81)	**1.9**	(0.12)	13.8	**(1.12)**
Dubai (UAE)	**425**	(2.4)	427	(2.6)	469	(2.6)	**524**	(2.6)	**43.4**	(1.27)	**1.6**	(0.08)	13.8	**(0.86)**
Hong Kong-China	**491**	(2.9)	522	(3.6)	552	(2.7)	**574**	(3.1)	**42.3**	(2.03)	**2.4**	(0.14)	14.0	**(1.12)**
Indonesia	**393**	(4.3)	395	(3.8)	404	(4.1)	**417**	(5.1)	**21.2**	(2.89)	**1.3**	(0.09)	2.5	**(0.71)**
Jordan	**394**	(4.6)	386	(3.8)	412	(3.5)	**446**	(3.4)	**27.5**	(2.14)	**1.4**	(0.09)	5.2	**(0.73)**
Kazakhstan	**393**	(4.8)	378	(4.2)	392	(3.4)	**403**	(4.3)	5.0	(2.97)	1.0	(0.07)	0.1	**(0.18)**
Kyrgyzstan	**304**	(4.7)	300	(3.9)	322	(4.3)	**343**	(4.3)	**23.8**	(2.97)	**1.4**	(0.10)	2.5	**(0.64)**
Latvia	**450**	(4.0)	459	(3.5)	492	(3.3)	**536**	(3.4)	**42.0**	(1.96)	**1.9**	(0.16)	17.1	**(1.34)**
Liechtenstein	**448**	(8.3)	485	(8.4)	519	(7.8)	**544**	(8.4)	**31.0**	(3.45)	**2.6**	(0.52)	18.5	**(3.78)**
Lithuania	**429**	(3.3)	445	(3.2)	478	(3.0)	**526**	(2.8)	**34.3**	(1.33)	**2.0**	(0.13)	18.3	**(1.21)**
Macao-China	**456**	(2.0)	474	(1.9)	494	(1.8)	**524**	(1.7)	**35.9**	(1.32)	**1.9**	(0.09)	11.1	**(0.74)**
Montenegro	**378**	(2.3)	389	(2.9)	413	(3.2)	**457**	(3.8)	**36.7**	(1.84)	**1.5**	(0.11)	10.4	**(0.99)**
Panama	**375**	(7.1)	360	(8.4)	376	(7.2)	**401**	(7.3)	**15.0**	(3.31)	0.9	(0.14)	1.5	**(0.66)**
Peru	**373**	(4.8)	351	(4.8)	366	(4.3)	**398**	(4.8)	**18.3**	(2.45)	0.9	(0.07)	1.5	**(0.41)**
Qatar	**355**	(2.1)	348	(2.2)	377	(2.4)	**429**	(2.4)	**35.7**	(1.48)	**1.3**	(0.07)	6.7	**(0.52)**
Romania	**413**	(5.0)	407	(4.7)	421	(4.5)	**463**	(5.1)	**27.9**	(2.92)	**1.2**	(0.10)	5.1	**(1.00)**
Russian Federation	**426**	(4.0)	439	(4.5)	464	(3.2)	**514**	(4.6)	**48.6**	(2.70)	**1.8**	(0.12)	14.5	**(1.35)**
Serbia	**417**	(3.3)	422	(3.1)	447	(3.1)	**485**	(3.4)	**29.2**	(1.71)	**1.6**	(0.11)	9.1	**(1.08)**
Shanghai-China	**515**	(3.3)	550	(3.3)	570	(2.9)	**590**	(3.2)	**39.8**	(2.56)	**2.4**	(0.16)	12.2	**(1.22)**
Singapore	**473**	(2.4)	505	(2.7)	546	(2.7)	**583**	(2.2)	**43.3**	(1.57)	**2.4**	(0.11)	17.3	**(0.96)**
Chinese Taipei	**444**	(3.3)	477	(3.1)	515	(2.5)	**551**	(3.8)	**45.9**	(2.06)	**2.7**	(0.15)	21.7	**(1.39)**
Thailand	**397**	(3.0)	412	(3.2)	429	(3.2)	**451**	(3.6)	**31.8**	(2.08)	**1.8**	(0.12)	7.7	**(0.88)**
Trinidad and Tobago	**398**	(3.5)	389	(3.8)	417	(3.3)	**471**	(3.0)	**33.6**	(1.98)	**1.2**	(0.08)	6.8	**(0.75)**
Tunisia	**408**	(4.3)	389	(3.8)	403	(3.5)	**417**	(4.0)	**4.9**	(2.13)	0.9	(0.07)	0.2	**(0.21)**
Uruguay	**401**	(3.3)	409	(3.3)	430	(3.5)	**472**	(3.6)	**30.0**	(2.02)	**1.4**	(0.08)	6.9	**(0.89)**

Note: Values that are statistically significant are indicated in bold.
Source: OECD, *PISA 2009 Database*.

OTHER LEARNING OUTCOMES: STUDENT ENGAGEMENT, STRATEGIES AND PRACTICES

To become effective learners, students need to be able to figure out what they need to learn and how to achieve their learning goals. They also need to master a wide repertoire of cognitive and meta-cognitive information-processing strategies to be able to develop efficient ways of learning. At the same time, fostering effective ways of learning, including goal-setting, strategy selection and controlling and evaluating the learning process, should not come at the expense of students' enjoyment of reading and learning, since proficiency is the result of sustained practice and dedication, both of which go hand-in-hand with high levels of motivation to read and learn.

In 1996, MEXT began to apply a new philosophy to education that was intended to enhance students' ability to act autonomously and think creatively; *Ikiru chikara*, or "zest for living". It became the central feature of the 1998 revision and was given even more importance in the 2008 revision. In the release of the latest revision, fostering "zest for living" needs the balanced approach to achieve three objectives: solid academic abilities, rich humanity, health and stamina. The reform not only set clear objectives, but it also highlighted the conditions that would enable students to achieve such objectives and as a result develop both cognitive and non-cognitive competencies. An important aspect of the "zest for living reform" was therefore aimed to help students develop *learning to learn skills* and a capacity to learn on their own initiative at their own pace.

Volume III of *PISA 2009 Results* (OECD, 2010e), shows that in all OECD countries, students who enjoy reading the most perform significantly better than students who enjoy reading the least (Table 2.6). **More Japanese students reported that they do not read for enjoyment at all compared to many other OECD countries; but about the average proportion of students spends one to two hours per day reading for enjoyment.** On average across OECD countries, 37% of students reported that they do not read for enjoyment at all, while this figure reaches 44% in Japan and 44% or more in Austria, the Netherlands, Luxembourg, Switzerland and Belgium. In contrast, 10% of students in Japan reported spending one to two hours per day on reading for enjoyment, which is similar to the OECD average of 11%. **However, the percentage of Japanese students who read for enjoyment increased by 11 percentage points since 2000.** The difference in the percentage of boys and girls who read for enjoyment is smaller in Japan than it is in most OECD countries. Across OECD countries, 73% of girls read for enjoyment, while 52% of boys do. In Japan, 58% of girls read for enjoyment, while 54% of boys do – a much narrower gender gap than the OECD average. Korea is the only OECD country where similar proportions of boys and girls read for enjoyment.

Students in Japan tend to have better motivation for reading than those in many other OECD countries. Some 67% of students reported that they enjoy going to a bookstore or a library (the OECD average is 42%); 44% reported that they like talking about books with other people (the OECD average is 38%); and 42% reported that reading is one of their favourite hobbies (the OECD average is 33%). In contrast, 15% of students reported that reading is a waste of time for them (the OECD average is 24%); 21% reported that they cannot sit still and read for more than a few minutes (the OECD average is 25%); 24% reported that they read only to get the information they need (the OECD average is 46%); and 28% reported that they find it hard to finish books (the OECD average of 33%).

Japanese students' motivation for reading has improved since 2000. Compared with students' reports in 2000, fewer students find it hard to finish books (a 12 percentage-point improvement); more students like talking about books with other people (a 7 percentage-point improvement); fewer students cannot sit still and read for more than a few minutes (a 7 percentage-point improvement); fewer student read only to get the information they need (a 7 percentage-point improvement); more students reported that reading is one of their favourite hobbies (a 6 percentage-point improvement); and fewer students feel that reading is a waste of time (a 5 percentage-point improvement; OECD, 2010b).

There has been considerable debate about what types of reading may be most effective in fostering reading skills and improving reading performance. Across OECD countries, students who read fiction regularly because they want to – at least several times a month – tend to perform better in reading in all OECD countries except Mexico and Turkey. Students who regularly read magazines, non-fiction books or newspapers because they want to tend to perform better in reading in most countries. In contrast, reading comic books regularly is associated with little performance advantage in some countries, but it is associated with lower performance in other countries. **In Japan, students who read fiction tend to perform better in reading to a great extent, while student who read non-fiction books or newspapers regularly tend to perform better in reading, but to a lesser extent.** There is no performance difference between Japanese students who read comics regularly and those who do not, and between Japanese students who read magazines regularly and those who do not. **The performance advantage for Japanese students who read fiction regularly has increased since 2000**.

In Japan, 72% of students read comics regularly (the OECD average is 22%), 65% of students read magazines regularly (the OECD average is 58%), 58% of students read newspapers regularly (the OECD average is 62%), 42% of students read fiction regularly (the OECD average is 31%), and 11% of students read non-fiction books regularly (the OECD average is 19%). Boys tend to read comics more regularly than girls (the gender gap in Japan is 19 percentage points, compared to the OECD average of 10 percentage points), and tend to read newspapers more than girls do (the gender gap in Japan is 9 percentage points compared to the OECD

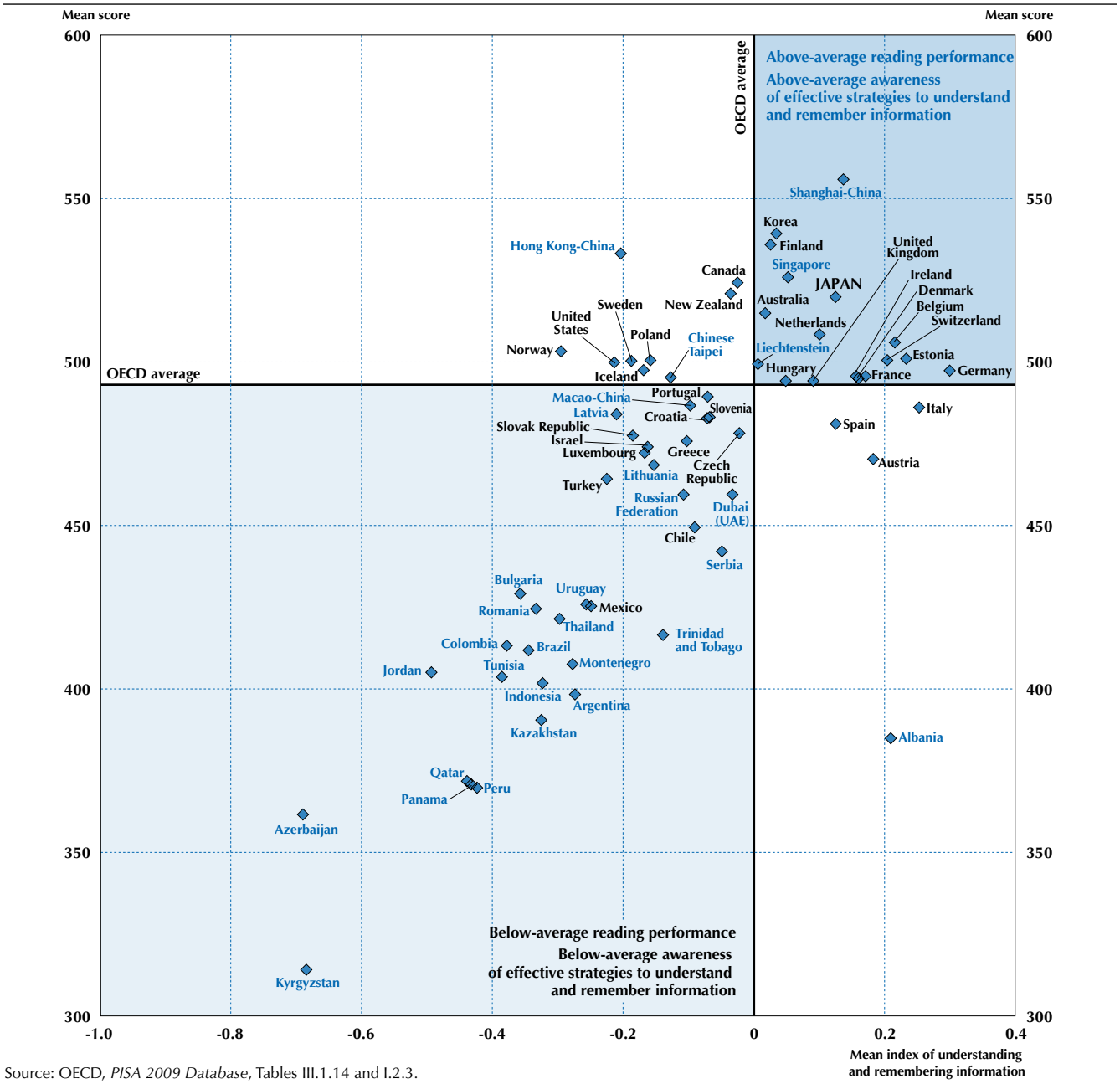
average of 7 percentage points). In contrast, more girls tend to read fiction regularly (the gender gap in Japan is 11 percentage points compared with the OECD average of 19 percentage points), and tend to read magazines more than boys (the gender gap in Japan is 8 percentage points compared with the OECD average of 14 percentage points).

Since 2000, the percentage of Japanese students who read fiction regularly increased by 15 percentage points, while the share of students who read magazines, newspapers and comic books decreased by 18 percentage points, 12 percentage points and 12 percentage points, respectively. During the same period, there was no change in the percentage of Japanese students who read non-fiction books regularly.

Although students who read fiction are more likely to achieve high scores, it is students who read a wide variety of materials who perform particularly well in reading. In Japan, students who read fiction tend to perform better; but if they also read non-fiction books and/or newspapers, their scores are even higher. **Japanese students seem to read a wider variety of materials than students in many other countries, since Japan has one of the highest scores among OECD countries in the *index of diversity of reading materials*, after Turkey and Finland** (OECD, 2010e).

■ Figure 2.14 ■

Association between awareness of effective strategies to understand and remember information and performance in reading



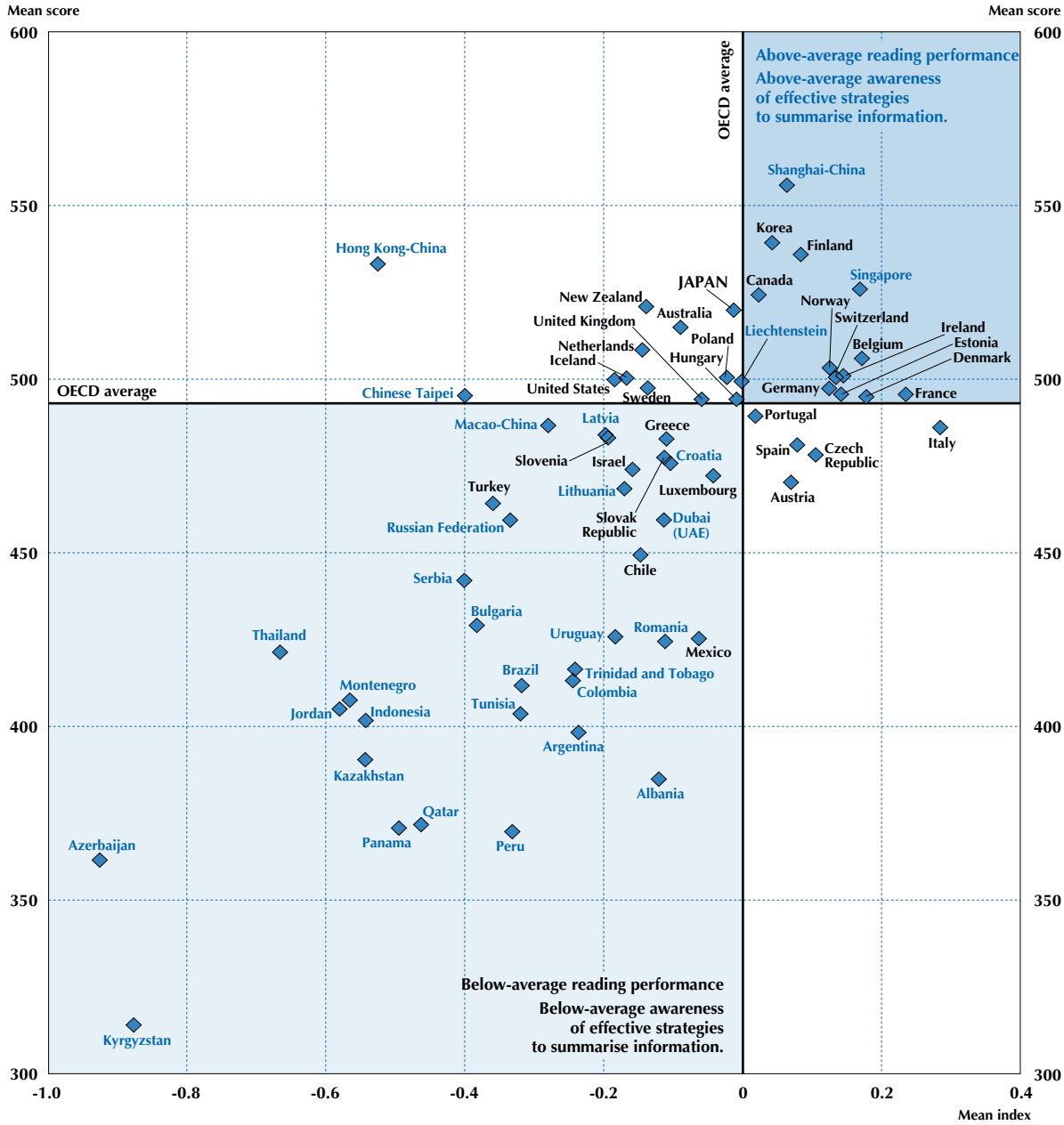
Source: OECD, *PISA 2009 Database*, Tables III.1.14 and I.2.3.

Using effective learning strategies

PISA measures approaches to learning in two ways: by examining the extent to which students reported employing certain strategies, and by looking at students' awareness of which strategies work best. The latter indicator, new to PISA 2009, is a more robust measure because it also provides for an external validation of students' knowledge of what works, rather than just their preferences. Across countries, students who are better-informed about what will help them learn tend to have substantially higher reading proficiency (Figures 2.14 and 2.15). This applies both to an awareness of strategies to understand and remember information and to strategies to summarise information. **Japanese students tend to have above-average levels of awareness of strategies to understand and remember information, while they have around the OECD average level of awareness of strategies to summarise information**. The reported use of strategies to control one's learning is also associated with higher student performance in every country, although, on average, this association is not as strong as an awareness of effective learning strategies.

■ Figure 2.15 ■

Association between awareness of effective strategies to summarise information and performance in reading



Source: OECD, *PISA 2009 Database*, Tables III.1.16 and I.2.3.

Digital reading

The advent of information and communication technologies (ICT) has sparked a revolution in the design and dissemination of texts. Online reading is becoming increasingly important in information societies. Even though the core principles of textuality and the core processes of reading and understanding text are similar across media, there are good reasons to believe that the specific features of digital texts call for specific text-processing skills. **The PISA 2009 digital reading assessment was designed to ascertain students' proficiency at tasks that require accessing, understanding, evaluating and integrating digital text across a wide range of reading contexts and tasks.**

In recent years education systems throughout the world have begun to use electronic technologies for many purposes, including communicating among schools, parents and students; allowing students to submit material to teachers; presenting concepts to students; encouraging students to use information available on the Internet; reporting results to students; and delivering assessments. Many governments have emphasised using ICT in the classroom as a policy priority, with the assumption that greater use of ICT among students, both in and outside class, will help to develop the kinds of complex communication skills needed in a global, knowledge-based economy.

The PISA 2009 digital reading assessment describes the extent to which computers are used in education, how they are used, and where they are used – at home, at school, or both. For Japan, readers need to keep in mind that students tend to use mobile phones for many applications for which students in other countries use computers. Estimates on the incidence and intensity of computer use will therefore underestimate the total use of information and technologies among Japanese youth (Table 2.7).

Table 2.7 Similarities and differences between digital and print reading assessments in PISA 2009

	Digital reading	Print reading
Mode of delivery and data collection	Computer-based delivery system	Pencil and paper
Number of countries participating in the assessment	A subset of 19 (16 OECD countries and 3 partner countries/economies)	65 (34 OECD countries and 31 partner countries/economies)
Required number of students per country	1 500	4 500
Actual average number of students per country that administered the assessment	OECD countries: 1 944 Partner countries/economies: 1 820	OECD countries: 8 800 Partner countries/economies: 5 700
Average number of students per school that administered the assessment	10	30
Number of items	29	131
Number of score points	38	140
Average test administration time per student	40 minutes	65 minutes
Average number of score points yielded per student	25	33
Scale construction	Single digital reading scale	Single print reading scale and subscales based on aspects and text formats

Source: OECD, *PISA 2009 Database*.

Of the 74 countries and partner economies that participated in PISA 2009, 19 took part in the assessment of digital reading: 16 OECD countries, including Japan, and 3 partner economies. The texts selected as the basis of the digital reading assessment were restricted to hypertext, but within that constraint, many kinds of texts were included in order to represent the medium as fully as possible. The characteristics of digital texts in PISA are specified in terms of environment, format and type. The range of difficulty of digital reading tasks allows four levels of reading proficiency to be described: Level 5 or above, Level 4, Level 3, Level 2, below Level 2. Table 2.8 provides details of the nature of the skills, knowledge and understanding required at each level of the digital reading scale.

Relatively high proficiency in digital reading

Of the 19 countries and economies that participated in the assessment, Japan is ranked as the fourth highest-performing country, with a mean score of 519 points. Korea is the top-performing country by a significant margin, with a mean score of 568. This indicates that, on average, 15-year-olds in Korea are performing at Level 4 in digital reading. New Zealand and Australia are in second and third positions, both at 537. Japan and the partner economy Hong Kong-China (515) are in the next rank, together with Iceland (512) and Sweden (510). Two European countries have mean scores significantly higher than the OECD average: Ireland (509) and Belgium (507) (Table 2.9).

Table 2.8 Summary descriptions for four levels of proficiency in digital reading

Level	Lower score limit	Percentage of students able to perform tasks at this level or above		Characteristics of tasks
		OECD average	Japan	
5 or above	626	7.8%	5.7%	Tasks at this level typically require the reader to locate, analyse and critically evaluate information, related to an unfamiliar context, in the presence of ambiguity. They require the generation of criteria to evaluate the text. Tasks may require navigation across multiple sites without explicit direction, and detailed interrogation of texts in a variety of formats.
4	553	30.3%	33.9%	Tasks at this level may require the reader to evaluate information from several sources, navigating across several sites comprising texts in a variety of formats, and generating criteria for evaluation in relation to a familiar, personal or practical context. Other tasks at this level demand that the reader construe complex information according to well-defined criteria in a scientific or technical context.
3	480	60.7%	72.8%	Tasks at this level require that the reader integrate information, either by navigating across several sites to find well-defined target information, or by generating simple categories when the task is not explicitly stated. Where evaluation is called for, only the information that is most directly accessible or only part of the available information is required.
2	407	83.1%	93.3%	Tasks at this level typically require the reader to locate and interpret information that is well-defined, usually relating to familiar contexts. They may require navigation across a limited number of sites and the application of web-based tools such as dropdown menus, where explicit directions are provided or only low-level inference is called for. Tasks may require integrating information presented in different formats, recognising examples that fit clearly defined categories.

Table 2.9 Where countries rank in digital reading performance

Statistically significantly **above** the OECD average
Not statistically significantly different from the OECD average
Statistically significantly **below** the OECD average

	Digital reading scale					
			Range of rank			
			OECD countries		All countries/economies	
	Mean score	S.E.	Upper rank	Lower rank	Upper rank	Lower rank
Korea	568	(3.0)	1	1	1	1
New Zealand	537	(2.3)	2	3	2	3
Australia	537	(2.8)	2	3	2	3
Japan	519	(2.4)	4	4	4	5
Hong Kong-China	515	(2.6)			4	7
Iceland	512	(1.4)	5	7	5	8
Sweden	510	(3.3)	5	8	5	9
Ireland	509	(2.8)	5	8	6	9
Belgium	507	(2.1)	6	8	7	9
Norway	500	(2.8)	9	10	10	11
France	494	(5.2)	9	11	10	13
Macao-China	492	(0.7)			11	13
Denmark	489	(2.6)	10	11	11	13
Spain	475	(3.8)	12	13	14	15
Hungary	468	(4.2)	12	14	14	16
Poland	464	(3.1)	13	15	15	17
Austria	459	(3.9)	14	15	16	17
Chile	435	(3.6)	16	16	18	18
Colombia	368	(3.4)			19	19

Note: See Annex A3 of OECD (2011b).
Source: OECD, *PISA 2009 Database*.

Across the 16 OECD countries that participated in the digital reading assessment in 2009, 8% of students performed at Level 5 or above (scores higher than 626) and can be regarded as "top performers" in digital reading. **In Japan, 5.7% of students were top performers in digital reading. There is considerable variation across countries.** Some 17% of students in Australia, Korea and New Zealand are top performers in digital reading, while in Austria, Chile and Poland fewer than 3% are. The partner country Colombia and partner economy Macao-China also had fewer-than-average students performing at the high level (Figure 2.16).

Differences in print versus digital reading

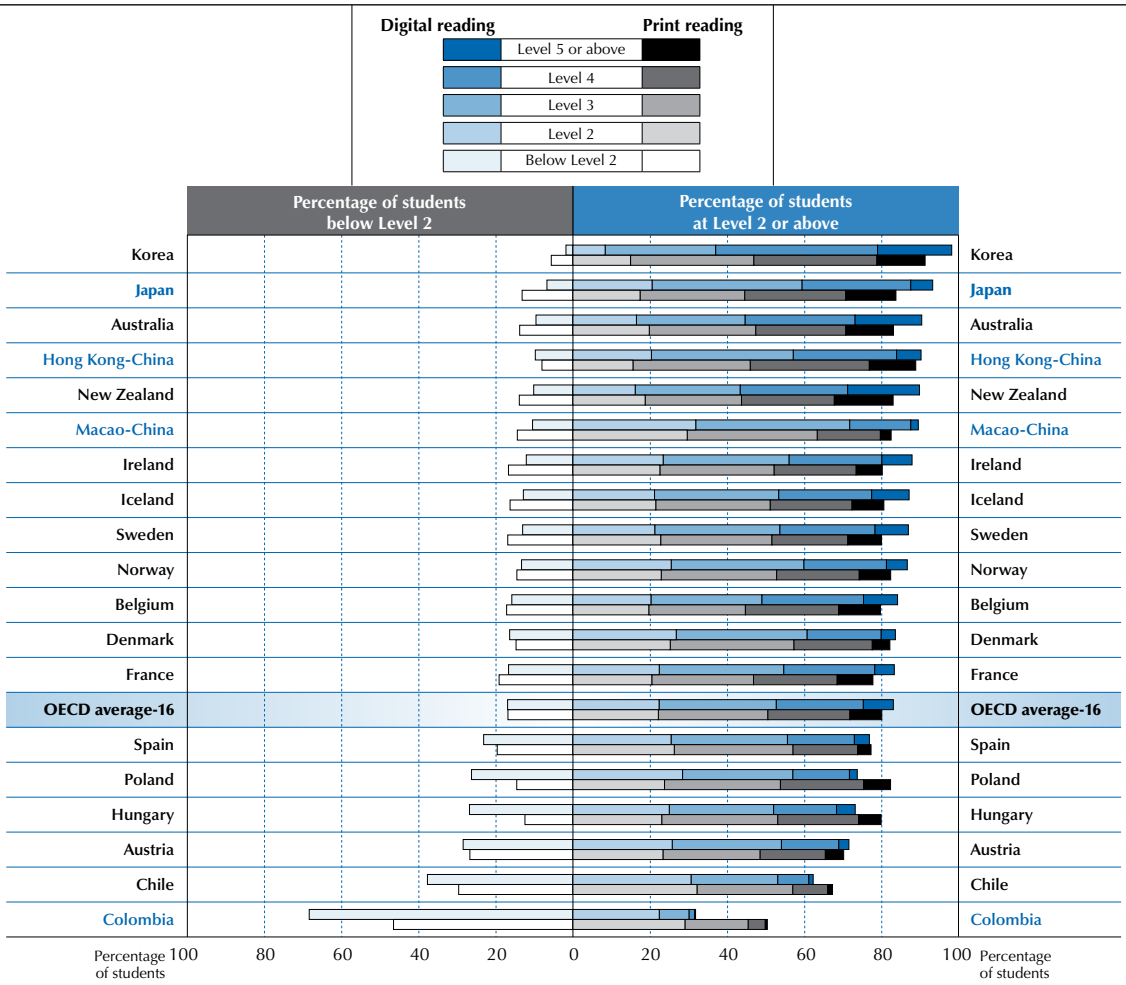
On average, 7.8% of OECD students in the participating countries perform at Level 5 or above on the digital reading scale, while a slightly higher percentage – 8.5% – perform at Level 5 or 6 in print reading. **Japan has the second highest percentage of students performing at Level 5 or 6 in print reading (13.4%).**

On average, across the 16 participating OECD countries, 16.9% of students perform below Level 2 in digital reading, while a similar percentage – 17.4% – performs below the baseline Level 2 on the print reading scale. While there is wide variation across countries, within most of them about the same percentages of students are proficient below the baseline level in digital and print reading; that is, the proportions of low-performing students in digital and print reading are within five percentage points of each

other. **In Japan, 13.6% of students perform below Level 2 in print reading compared with 6.7% who perform below the lower level in digital reading.** In Ireland, 17.2% are low-performers in print reading compared with 12.1% who are low performers in digital reading. This suggests that Japanese students at the lower levels in 2009 are likely to perform better in a digital environment than a print environment.

■ Figure 2.16 ■

Percentage of students at each proficiency level on the digital print reading scales



Countries are ranked in descending order of the percentage of students at Level 2 or above in digital reading.
Source: OECD, *PISA 2009 Database*, Table VI.2.1.

Gender and digital reading

Girls have outperformed boys in reading in every OECD and partner country and economy since PISA's first reading assessment was administered in 2000. The mean difference between boys' and girls' performance in digital reading is 24 score points in favour of girls. In all but one country the difference is statistically significant. In no participating country or economy did girls perform better in digital reading than in print reading. **Japan, Denmark, France and the partner economy Macao-China show girls performing worse in digital reading than in print reading, while boys performed better**.

Online reading practices

In addition to the question about what kinds of print material they read, the PISA 2009 student questionnaire asked students to indicate how often they were involved in the following reading activities online: reading e-mail messages, chatting on line, reading online news, using an online dictionary or encyclopaedia, searching online information to learn about a particular topic, taking part in online group discussions or forums and searching for practical information online. PISA found that students who are extensively engaged in these online reading activities are generally more proficient print readers than students who do little online reading. In Japan, the performance difference between students who are more engaged in online reading activities and those who are less engaged is greater than in many other OECD countries (Table 2.10). Japanese students engage in online reading activities less frequently than students in other OECD countries; and contrary to findings in other OECD countries, girls in Japan tend to engage more in online reading activities than boys.

Table 2.10a **Index of online reading activities and performance, by national quarters of this index**
Results based on students' self-reports

		Index of online reading activities															
		All students		Boys		Girls		Gender difference (B – G)		Bottom quarter		Second quarter		Third quarter		Top quarter	
		Mean index	S.E.	Mean index	S.E.	Mean index	S.E.	Dif.	S.E.	Mean index	S.E.	Mean index	S.E.	Mean index	S.E.	Mean index	S.E.
OECD	Australia	-0.08	(0.01)	-0.09	(0.02)	-0.07	(0.02)	-0.02	(0.02)	**-1.06**	(0.01)	-0.37	(0.00)	0.11	(0.00)	**1.02**	(0.02)
	Austria	0.06	(0.02)	0.08	(0.03)	0.04	(0.02)	0.04	(0.03)	**-0.99**	(0.02)	-0.21	(0.00)	0.28	(0.01)	**1.17**	(0.02)
	Belgium	-0.18	(0.01)	-0.14	(0.02)	-0.22	(0.01)	**0.08**	(0.02)	**-1.06**	(0.02)	-0.44	(0.00)	-0.01	(0.00)	**0.80**	(0.01)
	Canada	-0.04	(0.01)	-0.03	(0.02)	-0.04	(0.02)	0.00	(0.02)	**-1.09**	(0.01)	-0.34	(0.00)	0.16	(0.00)	**1.12**	(0.02)
	Chile	-0.22	(0.03)	-0.20	(0.04)	-0.25	(0.03)	**0.06**	(0.04)	**-1.51**	(0.03)	-0.58	(0.00)	0.05	(0.00)	**1.15**	(0.02)
	Czech Republic	0.53	(0.02)	0.61	(0.03)	0.43	(0.02)	**0.17**	(0.03)	**-0.61**	(0.02)	0.21	(0.00)	0.73	(0.01)	**1.77**	(0.02)
	Denmark	0.15	(0.01)	0.23	(0.02)	0.06	(0.02)	**0.17**	(0.02)	**-0.76**	(0.01)	-0.13	(0.00)	0.32	(0.00)	**1.14**	(0.02)
	Estonia	0.50	(0.01)	0.58	(0.03)	0.42	(0.02)	**0.17**	(0.03)	**-0.50**	(0.02)	0.20	(0.00)	0.68	(0.00)	**1.63**	(0.02)
	Finland	-0.04	(0.01)	0.01	(0.02)	-0.08	(0.02)	**0.10**	(0.03)	**-0.94**	(0.01)	-0.30	(0.00)	0.13	(0.00)	**0.96**	(0.02)
	France	-0.13	(0.02)	-0.12	(0.02)	-0.14	(0.02)	0.03	(0.03)	**-1.20**	(0.02)	-0.34	(0.00)	0.11	(0.00)	**0.91**	(0.02)
	Germany	0.12	(0.02)	0.16	(0.03)	0.08	(0.02)	**0.08**	(0.03)	**-0.94**	(0.02)	-0.12	(0.00)	0.37	(0.00)	**1.19**	(0.02)
	Greece	-0.15	(0.02)	0.00	(0.04)	-0.30	(0.03)	**0.30**	(0.05)	**-1.56**	(0.03)	-0.57	(0.01)	0.15	(0.01)	**1.37**	(0.03)
	Hungary	0.38	(0.03)	0.44	(0.03)	0.33	(0.03)	**0.11**	(0.04)	**-0.89**	(0.02)	0.09	(0.00)	0.66	(0.00)	**1.67**	(0.02)
	Iceland	0.20	(0.01)	0.33	(0.02)	0.08	(0.02)	**0.25**	(0.03)	**-0.82**	(0.02)	-0.07	(0.00)	0.42	(0.00)	**1.29**	(0.02)
	Ireland	-0.50	(0.02)	-0.52	(0.03)	-0.48	(0.03)	-0.04	(0.04)	**-1.54**	(0.02)	-0.78	(0.00)	-0.33	(0.00)	**0.64**	(0.03)
	Israel	-0.02	(0.02)	-0.07	(0.04)	0.02	(0.02)	**-0.09**	(0.04)	**-1.33**	(0.03)	-0.32	(0.00)	0.28	(0.01)	**1.28**	(0.02)
	Italy	-0.04	(0.01)	-0.02	(0.02)	-0.06	(0.01)	0.03	(0.02)	**-1.50**	(0.02)	-0.34	(0.00)	0.30	(0.00)	**1.38**	(0.01)
	Japan	**-0.49**	(0.02)	**-0.56**	(0.03)	**-0.43**	(0.02)	**-0.13**	(0.03)	**-1.64**	(0.03)	**-0.71**	(0.00)	**-0.24**	(0.00)	**0.61**	(0.02)
	Korea	-0.21	(0.02)	-0.27	(0.03)	-0.13	(0.02)	**-0.14**	(0.03)	**-1.19**	(0.02)	-0.43	(0.00)	0.02	(0.00)	**0.78**	(0.02)
	Luxembourg	0.02	(0.01)	0.05	(0.02)	-0.02	(0.01)	**0.07**	(0.03)	**-1.07**	(0.02)	-0.25	(0.00)	0.25	(0.00)	**1.15**	(0.02)
	Mexico	-0.54	(0.02)	-0.54	(0.02)	-0.54	(0.02)	0.00	(0.02)	**-1.96**	(0.03)	-0.83	(0.00)	-0.20	(0.00)	**0.83**	(0.01)
	Netherlands	0.09	(0.02)	0.12	(0.03)	0.07	(0.02)	0.05	(0.03)	**-0.75**	(0.02)	-0.17	(0.00)	0.25	(0.00)	**1.04**	(0.02)
	New Zealand	-0.29	(0.02)	-0.33	(0.02)	-0.24	(0.02)	**-0.09**	(0.03)	**-1.33**	(0.02)	-0.56	(0.00)	-0.07	(0.00)	**0.82**	(0.02)
	Norway	0.17	(0.02)	0.23	(0.03)	0.12	(0.02)	**0.11**	(0.03)	**-0.78**	(0.02)	-0.10	(0.00)	0.36	(0.00)	**1.22**	(0.02)
	Poland	0.44	(0.02)	0.51	(0.03)	0.37	(0.02)	**0.14**	(0.04)	**-0.93**	(0.03)	0.20	(0.00)	0.74	(0.00)	**1.75**	(0.02)
	Portugal	0.13	(0.01)	0.24	(0.02)	0.02	(0.02)	**0.22**	(0.03)	**-0.89**	(0.02)	-0.20	(0.00)	0.31	(0.00)	**1.29**	(0.02)
	Slovak Republic	0.06	(0.02)	0.11	(0.03)	0.00	(0.02)	**0.11**	(0.04)	**-1.21**	(0.02)	-0.26	(0.00)	0.33	(0.01)	**1.37**	(0.02)
	Slovenia	0.27	(0.01)	0.33	(0.02)	0.20	(0.02)	**0.13**	(0.03)	**-0.83**	(0.02)	-0.04	(0.00)	0.47	(0.00)	**1.46**	(0.02)
	Spain	-0.11	(0.01)	-0.07	(0.02)	-0.16	(0.01)	**0.08**	(0.02)	**-1.13**	(0.01)	-0.40	(0.00)	0.09	(0.00)	**0.98**	(0.01)
	Sweden	0.03	(0.01)	0.12	(0.02)	-0.07	(0.01)	**0.19**	(0.02)	**-0.90**	(0.02)	-0.27	(0.00)	0.20	(0.00)	**1.08**	(0.02)
	Switzerland	0.00	(0.02)	0.02	(0.02)	-0.03	(0.02)	**0.05**	(0.02)	**-1.00**	(0.02)	-0.26	(0.00)	0.20	(0.00)	**1.06**	(0.02)
	Turkey	-0.05	(0.03)	0.06	(0.03)	-0.16	(0.04)	**0.22**	(0.04)	**-1.58**	(0.04)	-0.41	(0.01)	0.32	(0.01)	**1.49**	(0.02)
	United Kingdom	0.11	(0.01)	0.13	(0.02)	0.08	(0.01)	**0.05**	(0.02)	**-0.88**	(0.02)	-0.18	(0.00)	0.29	(0.00)	**1.20**	(0.02)
	United States	-0.16	(0.02)	-0.25	(0.03)	-0.06	(0.02)	**-0.18**	(0.03)	**-1.31**	(0.02)	-0.49	(0.00)	0.06	(0.01)	**1.10**	(0.02)
	OECD average	0.00	(0.00)	0.03	(0.00)	-0.03	(0.00)	**0.07**	(0.01)	**-1.11**	(0.00)	-0.29	(0.00)	0.23	(0.00)	**1.17**	(0.00)
Partners	Albania	-0.62	(0.05)	-0.42	(0.06)	-0.83	(0.05)	**0.41**	(0.06)	**-2.22**	(0.09)	-0.97	(0.01)	-0.21	(0.01)	**0.93**	(0.03)
	Argentina	-0.52	(0.04)	-0.41	(0.04)	-0.62	(0.05)	**0.21**	(0.04)	**-1.99**	(0.04)	-0.81	(0.01)	-0.16	(0.01)	**0.88**	(0.02)
	Azerbaijan	-1.55	(0.05)	-1.36	(0.07)	-1.74	(0.06)	**0.37**	(0.07)	**-3.97**	(0.06)	-1.82	(0.00)	-1.01	(0.01)	**0.61**	(0.03)
	Brazil	-0.61	(0.03)	-0.58	(0.04)	-0.64	(0.03)	**0.07**	(0.03)	**-2.40**	(0.03)	-0.91	(0.01)	-0.17	(0.00)	**1.03**	(0.02)
	Bulgaria	0.26	(0.05)	0.23	(0.06)	0.30	(0.04)	-0.07	(0.06)	**-1.50**	(0.05)	-0.06	(0.01)	0.67	(0.01)	**1.94**	(0.03)
	Colombia	-0.39	(0.04)	-0.37	(0.04)	-0.41	(0.05)	0.04	(0.05)	**-1.86**	(0.05)	-0.63	(0.01)	-0.01	(0.01)	**0.94**	(0.02)
	Croatia	0.11	(0.02)	0.19	(0.03)	0.01	(0.03)	**0.18**	(0.04)	**-1.23**	(0.02)	-0.21	(0.00)	0.40	(0.00)	**1.48**	(0.02)
	Dubai (UAE)	0.18	(0.01)	0.22	(0.02)	0.13	(0.02)	**0.09**	(0.03)	**-1.13**	(0.03)	-0.12	(0.00)	0.45	(0.00)	**1.50**	(0.02)
	Hong Kong-China	0.38	(0.02)	0.42	(0.03)	0.33	(0.02)	**0.10**	(0.03)	**-0.65**	(0.02)	0.10	(0.00)	0.58	(0.00)	**1.48**	(0.02)
	Indonesia	-1.41	(0.06)	-1.39	(0.06)	-1.42	(0.07)	0.03	(0.06)	**-3.16**	(0.05)	-1.63	(0.01)	-0.93	(0.01)	**0.09**	(0.02)
	Jordan	-0.98	(0.04)	-0.96	(0.06)	-1.00	(0.06)	0.04	(0.08)	**-3.04**	(0.04)	-1.27	(0.01)	-0.49	(0.01)	**0.86**	(0.03)
	Kazakhstan	-1.08	(0.05)	-1.07	(0.06)	-1.09	(0.06)	0.03	(0.05)	**-2.90**	(0.04)	-1.60	(0.01)	-0.61	(0.01)	**0.78**	(0.03)
	Kyrgyzstan	-1.83	(0.05)	-1.86	(0.06)	-1.81	(0.05)	-0.05	(0.05)	**-4.22**	(0.05)	-1.98	(0.01)	-1.18	(0.01)	**0.05**	(0.02)
	Latvia	0.28	(0.02)	0.29	(0.03)	0.27	(0.03)	0.02	(0.04)	**-0.86**	(0.02)	-0.04	(0.01)	0.52	(0.01)	**1.49**	(0.02)
	Liechtenstein	-0.01	(0.05)	0.11	(0.08)	-0.15	(0.07)	**0.26**	(0.11)	**-0.99**	(0.09)	-0.22	(0.01)	0.16	(0.01)	**0.99**	(0.07)
	Lithuania	0.54	(0.02)	0.55	(0.03)	0.53	(0.02)	0.02	(0.03)	**-0.77**	(0.03)	0.27	(0.01)	0.84	(0.01)	**1.82**	(0.02)
	Macao-China	-0.02	(0.01)	-0.02	(0.02)	-0.01	(0.01)	-0.01	(0.02)	**-0.99**	(0.02)	-0.28	(0.00)	0.19	(0.00)	**1.01**	(0.02)
	Montenegro	-0.17	(0.02)	-0.04	(0.03)	-0.30	(0.03)	**0.25**	(0.04)	**-1.75**	(0.03)	-0.50	(0.01)	0.21	(0.01)	**1.38**	(0.02)
	Panama	-0.64	(0.08)	-0.63	(0.08)	-0.65	(0.09)	0.01	(0.07)	**-2.55**	(0.07)	-0.94	(0.01)	-0.14	(0.01)	**1.07**	(0.03)
	Peru	-0.75	(0.04)	-0.72	(0.05)	-0.78	(0.05)	0.05	(0.05)	**-2.59**	(0.05)	-0.89	(0.01)	-0.27	(0.00)	**0.75**	(0.02)
	Qatar	0.23	(0.02)	0.16	(0.03)	0.30	(0.02)	**-0.14**	(0.03)	**-1.53**	(0.03)	-0.08	(0.00)	0.62	(0.00)	**1.92**	(0.02)
	Romania	-0.16	(0.04)	-0.10	(0.05)	-0.21	(0.04)	**0.11**	(0.05)	**-1.97**	(0.06)	-0.43	(0.01)	0.32	(0.00)	**1.45**	(0.02)
	Russian Federation	-0.58	(0.05)	-0.48	(0.06)	-0.67	(0.04)	**0.19**	(0.04)	**-2.34**	(0.04)	-1.04	(0.01)	-0.13	(0.01)	**1.19**	(0.02)
	Serbia	-0.39	(0.03)	-0.29	(0.03)	-0.50	(0.03)	**0.22**	(0.04)	**-1.93**	(0.02)	-0.88	(0.01)	-0.02	(0.01)	**1.25**	(0.03)
	Shanghai-China	-0.35	(0.02)	-0.31	(0.03)	-0.38	(0.03)	**0.07**	(0.03)	**-1.44**	(0.02)	-0.63	(0.00)	-0.12	(0.00)	**0.80**	(0.02)
	Singapore	0.13	(0.02)	0.20	(0.02)	0.07	(0.02)	**0.13**	(0.02)	**-0.96**	(0.02)	-0.19	(0.00)	0.34	(0.00)	**1.35**	(0.02)
	Chinese Taipei	-0.19	(0.01)	-0.16	(0.02)	-0.23	(0.02)	**0.06**	(0.03)	**-1.20**	(0.02)	-0.47	(0.00)	-0.01	(0.00)	**0.90**	(0.02)
	Thailand	-0.78	(0.03)	-0.76	(0.05)	-0.79	(0.04)	0.03	(0.06)	**-2.34**	(0.04)	-1.11	(0.01)	-0.43	(0.01)	**0.76**	(0.02)
	Trinidad and Tobago	-0.65	(0.02)	-0.75	(0.03)	-0.55	(0.03)	**-0.19**	(0.04)	**-2.14**	(0.04)	-0.98	(0.01)	-0.30	(0.01)	**0.83**	(0.02)
	Tunisia	-1.14	(0.06)	-1.04	(0.07)	-1.22	(0.05)	**0.18**	(0.05)	**-3.06**	(0.08)	-1.51	(0.01)	-0.69	(0.01)	**0.71**	(0.04)
	Uruguay	-0.19	(0.02)	-0.19	(0.03)	-0.19	(0.02)	0.00	(0.03)	**-1.62**	(0.02)	-0.55	(0.00)	0.13	(0.01)	**1.27**	(0.02)

Note: Values that are statistically significant are indicated in bold.
Source: OECD, *PISA 2009 Database*.

Table 2.10b **Index of online reading activities and performance, by national quarters of this index**
Results based on students' self-reports

		Performance on the reading scale, by national quarters of this index								Change in the reading score per unit of this index		Increased likelihood of students in the bottom quarter of this index scoring in the bottom quarter of the national reading performance distribution		Explained variance in student performance (r-squared x 100)	
		Bottom quarter		Second quarter		Third quarter		Top quarter							
		Mean score	S.E.	Mean score	S.E.	Mean score	S.E.	Mean score	S.E.	Effect	S.E.	Ratio	S.E.	%	S.E.
OECD	Australia	**478**	(3.1)	516	(2.6)	534	(2.7)	**538**	(4.0)	**26.0**	(1.65)	**1.9**	(0.08)	5.5	(0.64)
	Austria	**447**	(4.5)	479	(3.6)	489	(4.3)	**486**	(4.0)	**15.9**	(2.11)	**1.7**	(0.11)	2.2	(0.57)
	Belgium	**492**	(2.8)	522	(2.8)	524	(3.5)	**511**	(3.2)	**10.5**	(1.75)	**1.5**	(0.08)	0.7	(0.24)
	Canada	**501**	(2.2)	528	(2.2)	537	(2.0)	**536**	(2.8)	**14.1**	(1.25)	**1.6**	(0.07)	2.2	(0.38)
	Chile	**414**	(3.8)	448	(3.9)	463	(3.5)	**477**	(4.1)	**20.7**	(1.49)	**2.1**	(0.14)	7.7	(1.11)
	Czech Republic	**460**	(4.2)	491	(3.4)	491	(3.7)	**485**	(3.4)	**8.2**	(1.54)	**1.6**	(0.10)	0.8	(0.31)
	Denmark	**474**	(3.1)	498	(3.4)	507	(3.1)	**505**	(2.9)	**14.0**	(1.86)	**1.6**	(0.10)	1.8	(0.47)
	Estonia	**479**	(4.2)	505	(4.2)	509	(4.1)	**512**	(3.8)	**12.1**	(2.05)	**1.6**	(0.11)	1.7	(0.53)
	Finland	**517**	(3.3)	539	(3.4)	544	(3.4)	**544**	(3.3)	**14.5**	(1.87)	**1.5**	(0.09)	1.8	(0.45)
	France	**454**	(5.6)	504	(4.4)	513	(4.1)	**515**	(4.0)	**28.3**	(2.71)	**2.1**	(0.13)	5.8	(0.94)
	Germany	**485**	(4.1)	507	(3.5)	516	(3.9)	**509**	(3.7)	**10.5**	(2.16)	**1.5**	(0.09)	1.1	(0.43)
	Greece	**470**	(5.5)	481	(5.7)	493	(5.3)	**489**	(4.7)	**6.9**	(1.72)	**1.3**	(0.10)	0.8	(0.38)
	Hungary	**457**	(5.6)	503	(4.1)	510	(4.0)	**508**	(3.8)	**20.8**	(2.08)	**2.3**	(0.20)	5.9	(1.12)
	Iceland	**483**	(3.6)	511	(3.2)	509	(2.5)	**503**	(3.2)	**8.7**	(2.03)	**1.5**	(0.10)	0.7	(0.32)
	Ireland	**468**	(4.5)	502	(4.1)	510	(3.8)	**512**	(3.9)	**18.9**	(2.39)	**1.6**	(0.11)	3.6	(0.81)
	Israel	**439**	(5.9)	487	(5.0)	497	(3.8)	**489**	(3.5)	**18.1**	(2.22)	**1.8**	(0.12)	3.4	(0.80)
	Italy	**462**	(2.3)	489	(2.2)	499	(2.0)	**497**	(2.0)	**12.6**	(0.81)	**1.6**	(0.05)	2.5	(0.34)
	Japan	484	(5.0)	521	(3.9)	538	(3.1)	539	(4.2)	21.3	(1.52)	1.8	(0.09)	4.4	(0.67)
	Korea	**519**	(4.8)	546	(3.9)	552	(3.6)	**539**	(4.5)	**13.7**	(2.15)	**1.5**	(0.09)	2.1	(0.64)
	Luxembourg	**454**	(3.6)	482	(3.4)	481	(3.1)	**476**	(3.1)	**8.1**	(2.04)	**1.4**	(0.10)	0.6	(0.29)
	Mexico	**384**	(3.0)	420	(2.3)	443	(2.3)	**455**	(2.1)	**22.3**	(1.42)	**2.2**	(0.08)	9.8	(0.99)
	Netherlands	**481**	(6.7)	517	(5.5)	521	(5.1)	**528**	(5.4)	**19.2**	(2.70)	**1.9**	(0.14)	2.8	(0.73)
	New Zealand	**486**	(3.9)	525	(3.8)	541	(3.7)	**538**	(4.2)	**23.9**	(1.99)	**1.8**	(0.10)	4.5	(0.72)
	Norway	**488**	(4.0)	511	(3.7)	510	(3.2)	**506**	(3.2)	**7.4**	(1.88)	**1.5**	(0.09)	0.5	(0.25)
	Poland	**465**	(3.6)	507	(3.4)	519	(3.5)	**514**	(3.2)	**17.0**	(1.52)	**2.0**	(0.12)	4.5	(0.76)
	Portugal	**476**	(4.8)	499	(3.9)	497	(3.8)	**489**	(3.2)	**4.2**	(1.82)	**1.4**	(0.09)	0.2	(0.16)
	Slovak Republic	**439**	(4.4)	486	(3.9)	492	(3.4)	**495**	(3.1)	**20.4**	(1.97)	**2.2**	(0.16)	5.8	(1.06)
	Slovenia	**461**	(3.1)	489	(3.2)	499	(3.1)	**493**	(2.6)	**11.9**	(1.39)	**1.6**	(0.11)	1.7	(0.40)
	Spain	**456**	(3.1)	485	(2.7)	494	(2.3)	**492**	(2.4)	**15.5**	(1.18)	**1.7**	(0.08)	2.5	(0.37)
	Sweden	**475**	(3.9)	502	(4.1)	513	(3.7)	**505**	(3.9)	**12.6**	(1.88)	**1.5**	(0.10)	1.2	(0.35)
	Switzerland	**487**	(3.3)	512	(3.4)	509	(3.1)	**496**	(3.6)	**4.9**	(1.88)	**1.4**	(0.07)	0.2	(0.17)
	Turkey	**444**	(4.5)	465	(4.2)	476	(4.2)	473	(4.5)	10.3	(1.48)	**1.5**	(0.12)	2.6	(0.78)
	United Kingdom	**467**	(2.9)	499	(2.7)	509	(3.5)	**507**	(3.7)	**16.1**	(2.07)	**1.7**	(0.09)	2.3	(0.60)
	United States	**472**	(4.3)	496	(5.2)	516	(4.8)	**518**	(4.7)	**16.5**	(1.87)	**1.6**	(0.09)	3.0	(0.65)
	OECD average	**468**	(0.7)	499	(0.6)	507	(0.6)	**505**	(0.6)	**14.9**	(0.32)	**1.7**	(0.02)	2.8	(0.11)
Partners	Albania	**358**	(5.9)	391	(5.1)	396	(5.7)	**401**	(5.8)	**14.2**	(2.18)	**1.6**	(0.16)	3.8	(1.24)
	Argentina	**344**	(4.8)	393	(4.7)	429	(5.3)	**437**	(6.0)	**28.4**	(2.15)	**2.2**	(0.17)	10.2	(1.31)
	Azerbaijan	**342**	(4.7)	363	(4.4)	370	(4.1)	**382**	(4.1)	**6.8**	(0.96)	**1.6**	(0.14)	2.8	(0.76)
	Brazil	**372**	(2.5)	406	(3.1)	434	(3.9)	**439**	(3.3)	**18.1**	(0.88)	**1.9**	(0.10)	7.7	(0.69)
	Bulgaria	**355**	(6.1)	440	(6.4)	464	(7.0)	**468**	(6.4)	**29.4**	(1.60)	**3.0**	(0.29)	14.7	(1.59)
	Colombia	**374**	(4.9)	409	(4.2)	432	(3.8)	**438**	(4.7)	21.4	(1.76)	**2.1**	(0.17)	8.6	(1.28)
	Croatia	**443**	(4.5)	482	(3.9)	491	(3.9)	**488**	(3.2)	**14.3**	(1.37)	**1.9**	(0.11)	3.4	(0.61)
	Dubai (UAE)	**434**	(3.1)	470	(2.8)	474	(3.2)	**463**	(3.0)	**12.9**	(1.30)	**1.6**	(0.09)	1.9	(0.40)
	Hong Kong-China	**517**	(3.6)	537	(3.0)	544	(3.0)	**535**	(2.9)	**8.5**	(2.07)	**1.4**	(0.08)	0.9	(0.41)
	Indonesia	**377**	(3.3)	392	(3.7)	414	(4.3)	**426**	(6.5)	**12.4**	(1.59)	**1.8**	(0.16)	6.7	(1.62)
	Jordan	**373**	(4.2)	413	(3.8)	413	(3.8)	**429**	(4.5)	**14.2**	(1.24)	**1.9**	(0.12)	6.8	(1.11)
	Kazakhstan	**370**	(3.7)	386	(3.9)	388	(4.3)	**418**	(5.9)	**12.3**	(1.49)	**1.4**	(0.09)	4.5	(1.07)
	Kyrgyzstan	**283**	(4.5)	317	(3.6)	331	(4.6)	**336**	(6.1)	**10.7**	(1.42)	**1.5**	(0.13)	3.5	(0.85)
	Latvia	**462**	(4.4)	488	(4.1)	494	(4.3)	**492**	(3.4)	**9.5**	(2.31)	**1.6**	(0.13)	1.3	(0.64)
	Liechtenstein	491	(8.8)	515	(7.7)	502	(10.2)	490	(8.5)	1.6	(4.69)	1.0	(0.24)	0.0	(0.30)
	Lithuania	**435**	(3.9)	476	(3.6)	485	(2.9)	**479**	(3.4)	**15.9**	(1.52)	**2.0**	(0.13)	3.8	(0.69)
	Macao-China	**467**	(2.0)	488	(2.0)	496	(2.1)	**496**	(2.2)	**13.2**	(1.39)	**1.6**	(0.07)	2.1	(0.44)
	Montenegro	**379**	(3.2)	415	(2.6)	427	(3.4)	**416**	(3.8)	**10.2**	(1.63)	**1.7**	(0.16)	2.1	(0.65)
	Panama	**324**	(6.7)	364	(5.2)	394	(9.2)	**421**	(7.8)	22.9	(2.43)	**2.1**	(0.24)	12.4	(2.44)
	Peru	**310**	(3.7)	370	(3.7)	394	(4.2)	**410**	(6.6)	**26.1**	(1.69)	**2.8**	(0.18)	14.7	(1.50)
	Qatar	**335**	(2.5)	387	(2.5)	396	(2.5)	**378**	(2.0)	**11.5**	(0.83)	**1.8**	(0.07)	2.2	(0.32)
	Romania	**376**	(5.6)	424	(4.9)	453	(4.3)	**448**	(4.5)	**19.1**	(1.58)	**2.4**	(0.20)	9.5	(1.45)
	Russian Federation	**429**	(5.9)	451	(3.7)	474	(4.1)	**486**	(4.6)	**14.5**	(1.69)	**1.7**	(0.13)	5.6	(1.21)
	Serbia	**409**	(3.1)	441	(3.1)	459	(3.3)	**461**	(3.3)	**14.5**	(1.10)	**1.8**	(0.11)	5.1	(0.75)
	Shanghai-China	**541**	(3.7)	562	(3.4)	562	(2.9)	**558**	(3.4)	**5.2**	(1.63)	**1.3**	(0.10)	0.4	(0.23)
	Singapore	**500**	(2.3)	529	(3.0)	537	(2.8)	**539**	(2.8)	**16.0**	(1.27)	**1.6**	(0.09)	2.5	(0.41)
	Chinese Taipei	**480**	(3.7)	503	(3.2)	507	(3.4)	**494**	(3.2)	**7.0**	(1.37)	**1.4**	(0.08)	0.5	(0.20)
	Thailand	**395**	(3.4)	415	(2.7)	428	(3.4)	**448**	(4.1)	**14.1**	(1.28)	**1.7**	(0.12)	6.6	(0.99)
	Trinidad and Tobago	**373**	(3.4)	416	(3.9)	442	(3.2)	**445**	(3.6)	**22.6**	(1.17)	**1.9**	(0.12)	6.6	(0.72)
	Tunisia	**382**	(3.5)	411	(3.1)	408	(4.2)	**416**	(5.2)	**9.2**	(1.44)	**1.5**	(0.11)	2.9	(0.97)
	Uruguay	**378**	(3.5)	426	(3.6)	452	(3.6)	**453**	(4.0)	**21.8**	(1.39)	**2.2**	(0.16)	7.1	(0.87)

Note: Values that are statistically significant are indicated in bold.
Source: OECD, *PISA 2009 Database*.

In each of the 19 countries that took part in the digital reading option, searching for information online is related to better performance on the digital reading scale. On average, the percentage of variation in the digital reading score explained by "searching for information online" is 7%. It is a little more than the percentage of variation explained by the "diversity of print reading" (5.9% of variation explained, on average), but significantly less than the amount of variation explained by the "enjoyment of reading" index (14% of variation explained, on average). The amount of time students spend in activities involving searching for information, however, is quite different from country to country. Students in Hungary, Poland, Korea and the partner economy Hong Kong-China reported that they frequently search for information online. **In Japan, however, students reported below-average frequency of searching online for information (index below - 0.20)**, as did students in Belgium, Ireland and the partner economy Macao-China.

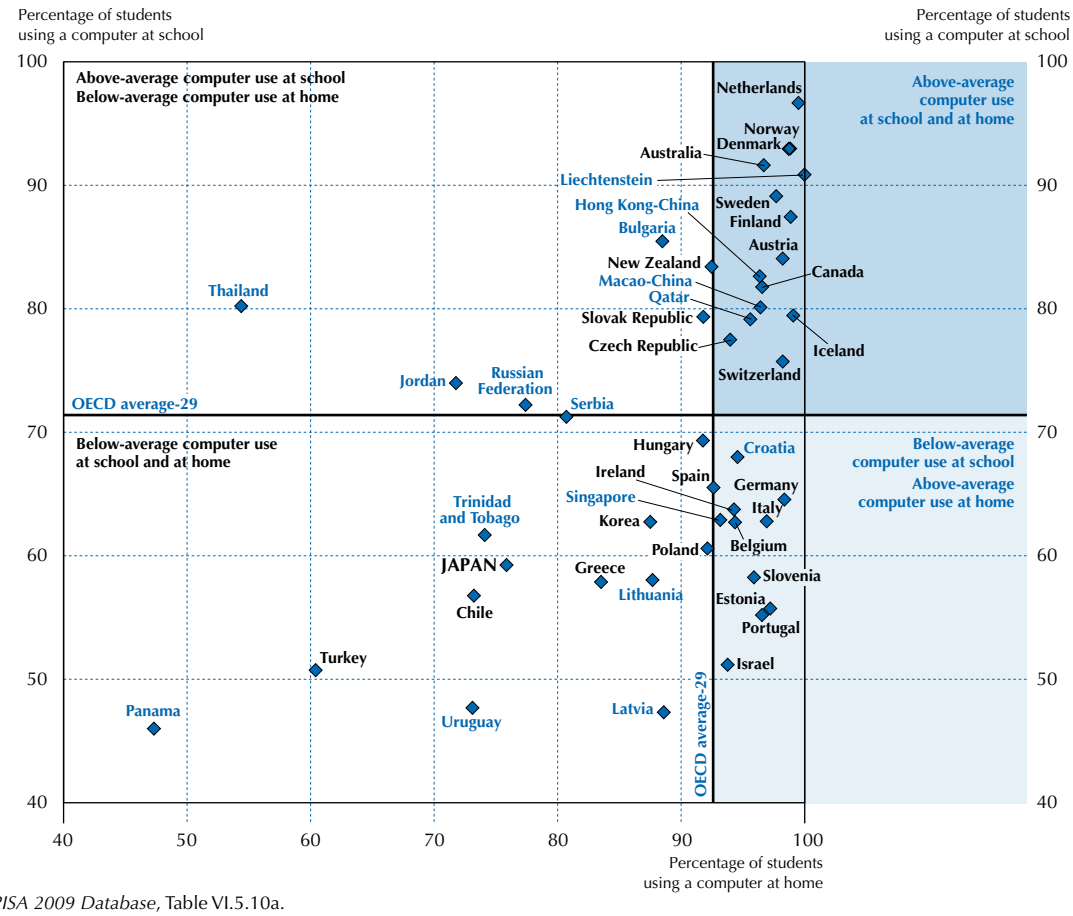
Japanese students, and those in Chile, Ireland, Korea, New Zealand and the partner country Colombia, also reported below-average online social activities. This is in contrast to students in Austria, Belgium, Denmark, Hungary, Iceland, and Norway, who reported frequent and above-average online social activities. In most of the participating countries, online social activities are weakly related to digital reading proficiency: the average amount of variation in the digital score explained by online socialising is only 1%. Nevertheless, students among the quarter of those least-engaged in online social activities are 1.35 times more likely to perform poorly (in the bottom quarter of the national distribution) than students who are in the most-engaged quarter.

Using computers and the Internet

The proportion of students who use a computer at home is greater, and varies less across countries and economies, than that of students who use a computer at school. On average across the OECD area, 93% of students reported that they use a computer at home. **Among OECD countries, Japan shows one of the lowest proportions of 15-year-olds who use a computer at home (76%), along with Chile (73%) and Turkey (60%).** This is in contrast to the 95% or more of students in 16 OECD countries, the partner country Liechtenstein and the partner economies Macao-China and Hong Kong-China who reported that they use a computer at home (Figure 2.17).

■ Figure 2.17 ■

Percentage of students who reported using a computer at home and at school



Source: OECD, *PISA 2009 Database*, Table VI.5.10a.

However, as noted before, Japanese youths tend to use mobile phones rather than computers to send and receive e-mails. Also, Japanese youth tend to search for information and look at web sites by using their mobile phones. So, often when 15-year-olds in Japan are asked to self-report on whether they use computers for certain tasks, they simply reply "no". As a result, the data on computer use among Japanese youth may not capture this substitution effect and thus tell only part of the story.

Only 59% of Japanese students reported that they use a computer at school, so the socio-economic digital divide in the use of computers at home does not appear to be bridged by access to computers at school. Among Japanese students, 5.7% of those from the bottom socio-economic quarter reported to have never used a computer, while only 1% from the top quarter reported so. This 4.7 percentage point difference is the second largest among all OECD countries apart from Turkey (Table 2.11).

Table 2.11 Percentage of students who reported using laptops at school

		Percentage of students who use laptops at school	
		%	S.E.
OECD	Australia	37.5	(2.0)
	Austria	12.1	(1.3)
	Belgium	9.7	(1.1)
	Canada	19.9	(1.0)
	Chile	5.9	(0.4)
	Czech Republic	4.8	(0.7)
	Denmark	73.2	(2.0)
	Estonia	8.8	(0.6)
	Finland	17.4	(1.8)
	Germany	14.3	(1.2)
	Greece	9.1	(0.7)
	Hungary	4.1	(0.4)
	Iceland	27.9	(0.5)
	Ireland	10.0	(1.1)
	Israel	8.3	(0.6)
	Italy	5.3	(0.3)
	Japan	12.1	(1.2)
	Korea	20.1	(1.3)
	Netherlands	26.5	(2.2)
	New Zealand	15.3	(1.3)
	Norway	73.5	(2.2)
	Poland	5.5	(0.5)
	Portugal	24.7	(1.1)
	Slovak Republic	14.1	(1.9)
	Slovenia	8.1	(0.4)
	Spain	10.2	(0.9)
	Sweden	24.0	(2.6)
	Switzerland	28.4	(1.7)
	Turkey	7.0	(0.6)
	OECD average-29	18.5	(0.2)
Partners	Bulgaria	18.9	(1.3)
	Croatia	8.9	(0.6)
	Hong Kong-China	7.4	(0.9)
	Jordan	12.1	(0.6)
	Latvia	5.5	(0.4)
	Liechtenstein	2.2	(0.8)
	Lithuania	6.2	(0.5)
	Macao-China	2.8	(0.2)
	Panama	11.4	(1.1)
	Qatar	19.2	(0.3)
	Russian Federation	20.6	(1.1)
	Serbia	5.7	(0.4)
	Singapore	17.0	(0.4)
	Thailand	13.1	(0.6)
	Trinidad and Tobago	16.9	(0.6)
	Uruguay	5.0	(0.4)

Source: OECD, *PISA 2009 Database*.

A comparison of student computer use at home and at school

On average across the OECD area, a greater proportion of students reported that they use a computer at home (93%) than at school (71%). The proportion of students who reported that they use a computer at home and at school varied substantially across countries and economies. Figure 2.17 shows the relationship between the percentage of students who use a computer at home (horizontal axis) and the percentage of students who use a computer at school (vertical axis). **While Japan consistently performs well in PISA, its students are below-average users of computers at home and at school.** Korea shares this profile, but to a less dramatic extent.

Across OECD countries, the difference between students who reported using a computer at home and those who reported using a computer at school averages 21 percentage points; in 8 OECD countries and 2 partner countries, the difference is between 30 and 43 percentage points. **This indicates that the use of computers in schools has not kept pace with the use of computers at home.**

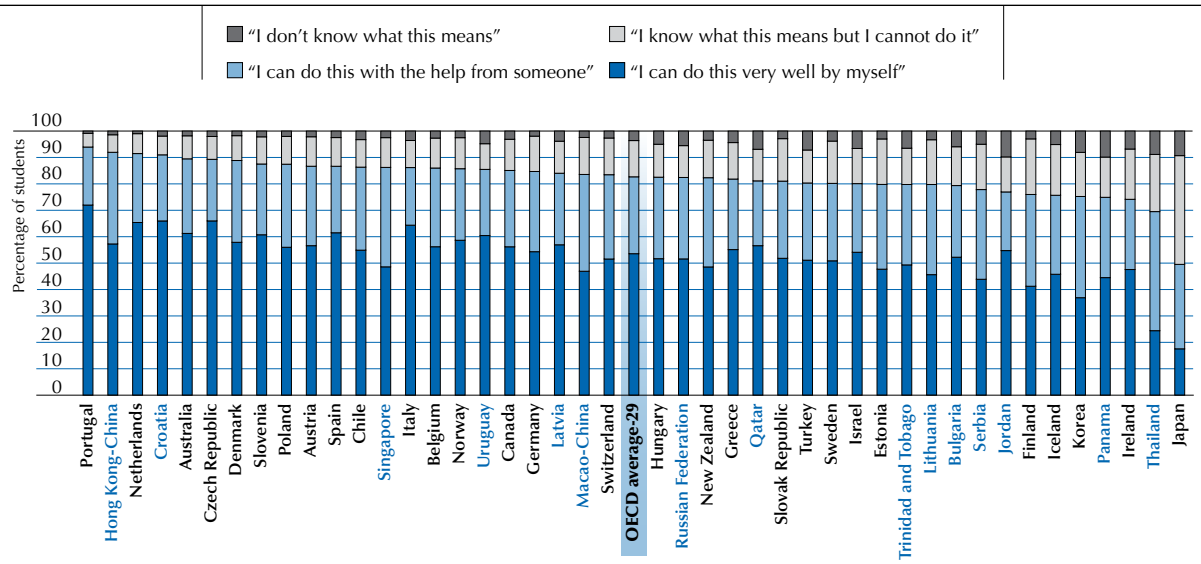
PISA 2009 also sought to determine whether students use the Internet. While students may use a computer, many ICT tasks – such as searching for information, e-mailing and engaging in a social network – require connection to the Internet. Students were asked whether they have an Internet connection available, and use it, at home and at school. Across the vast majority of countries, the proportion of students who reported that they use the Internet at home was greater than that of students who reported using the Internet at school. Across OECD countries, an average of 71% of students reported that they use the Internet at school. In the Netherlands, Denmark, Norway, Australia, Sweden, Finland and the partner country Liechtenstein, 88% or more of students reported using the Internet at school. **Among OECD countries, Japan has one of the lowest levels (47.2%) of Internet use at school**. This proportion is similar to those reported by Israel, Italy and Turkey, the partner countries Jordan, Qatar, Serbia, Uruguay and Panama, where 48% or less of students reported using the Internet at school. **The findings for Japan are striking in that Japan is the only top-performing country in PISA that shows below-average Internet use by students both at home and at school**.

Students in Japan, Korea and New Zealand all reported below-average use of computers for social activities. But while Korean students reported above-average use of computers for searching for information online, Japanese students reported below-average use of computers for that purpose. Japanese students also showed particularly infrequent use of home computers for communicating: only 20% reported using email (OECD average is 63%); 10% or less reported chatting online (OECD average is 75%) or participating in online forums or virtual communities (OECD average is 45%). This raises the question of whether Japanese students are developing the kinds of communication competencies required for collaboration and innovation in a knowledge-based economy.

Similarly, only 50% of Japanese students indicated that they could create a multi-media presentation by themselves or with help. In other high-performing countries, the proportions were greater: New Zealand (82%), Korea (75%) and Finland (76%) (Figure 2.18). There has been no improvement in the percentage of Japanese students who reported that they could create a multi-media presentation on their own since 2003.

■ Figure 2.18 ■

Percentage of students who reported being able to create a multi-media presentation



Countries are ranked in descending order of the percentage of students who reported being able to create a multi-media presentation very well by themselves or with help from someone.
Source: OECD, *PISA 2009 Database*, Table VI.5.26.

Japanese students also use the Internet far less frequently than their OECD peers. Only 60% of Japanese students reported frequently "browsing the web for fun" compared to 83% across the OECD and 74% or more in high-performing countries like Canada (88%), New Zealand (79%) and Korea (74%). Only 36% of Japanese students reported that they frequently download music, films, games or software from the Internet, compared with 66% across the OECD and substantially higher proportions in Canada (88%), New Zealand (60%) and Korea (73%). Meanwhile, among all countries that participated in the PISA 2009 digital reading assessment, Japan shows a comparatively low reported rate of computer use in schools, with high-performing Korea also reporting low use (see OECD, 2011b, Table VI.5.10a).

For the assessment of digital reading, students were asked to report how frequently computers were used as a teaching tool at school. There is substantial variation between countries and economies in when students use computers in the classroom (see Table VI.5.18 in OECD, 2011b). Just 1% of students in Japan reported using computers in the classroom in language-of-instruction lessons. Australia, Sweden, Turkey, Switzerland, Finland, the Netherlands, Iceland, and Korea show above OECD average levels of classroom computer use in at least three of the four subjects – language-of-instruction, mathematics, science and foreign language. Korean students reported some of the lowest levels of computer use in class, yet reported above-average computer use in language-of-instruction lessons. Students in nearly all participating countries and economies reported infrequent use of computers in mathematics lessons.

The use of laptops in school may help to integrate ICT into classrooms, as it obviates the need for a dedicated computer lab in school. **In Japan, 12.1% of students reported using laptops in school, below the OECD average of 18.5%, and below levels found in the high-performing countries Finland (17.4%), Singapore (17%), and New Zealand (15.3%), but well above Israel (8.3%) and Italy (5.2%).** The top users are students in Norway and Denmark, where 73% of students reported using a laptop at school (Table 2.11). Meanwhile, some 20.1% of Korean students reported using laptops in the classroom.

THE LEARNING ENVIRONMENT

The learning environment is also shaped by parents and school principals. Parents who are interested in their children's education are more likely to support their school's efforts and participate in school activities, thus adding to available resources, and school principals can define their schools' educational objectives and guide their schools towards them. These parents also tend to have an advantaged socio-economic background. PISA shows that school principals' perceptions of parents' pressure to adopt high academic standards and raise student achievement tend to be positively related to higher school performance in 19 OECD countries, including Japan, but after accounting for students' and schools' socio-economic backgrounds, they are positively related to performance in only 4 OECD countries, not including Japan.

PISA also shows that the socio-economic backgrounds of students and schools and key features of the learning environment are closely interrelated, and that both are linked to performance in important ways. This is perhaps because students from socio-economically advantaged backgrounds bring with them a higher level of discipline and more positive perceptions of school values, or perhaps because parental expectations of good classroom discipline and strong teacher commitment are higher in schools with a socio-economically advantaged intake. Conversely, disadvantaged schools may be subject to less parental pressure to reinforce effective disciplinary practices or ensure that absent or unmotivated teachers are replaced.

Weak – but improving – student-teacher relations

Positive teacher-student relations can help to establish an environment that is conducive to learning. Research finds that students, particularly disadvantaged students, tend to learn more and have fewer disciplinary problems when they feel that their teachers take them seriously. PISA asked students to agree or disagree with several statements regarding their relationships with the teachers in school. These statements include whether students get along with the teachers and whether teachers are interested in their personal well-being, whether teachers take the student seriously, whether teachers are a source of support if students need extra help, and whether teachers treat the student fairly.

Students in Japan reported one of the weakest student-teacher relations among OECD countries (Figure 2.19). Some 28% of students in Japan agree or strongly agree that their teachers are interested in their well-being (the OECD average is 66%); 63% agree or strongly agree that most teachers really listen to what the student has to say (the OECD average is 67%); 64% agree or strongly agree that teachers are a source of support if students need extra help (the OECD average is 79%); 73% agree or strongly agree that they get along with their teachers (the OECD average is 85%); and 74% agree or strongly agree that teachers treat the student fairly (the OECD average is 79%). There is a positive relationship between teacher-student relations and student performance in Japan. For example, the quarter of students in Japan who reported the poorest student-teacher relations are two times more likely to be among the quarter of the poorest performing students, which is the highest likelihood among the countries and economies that participated in PISA.[8] Differences in student-reported teacher interest in their well-being may reflect either different student expectations of their teachers' level of involvement, or different roles that teachers assume with respect to their students. A low percentage of agreement with these statements suggests a possible mismatch between student expectations and what teachers are actually doing.

These self-reported items show some important changes since PISA 2000, when students were asked similar questions. For example, in 2000, 50% of students in Japan agreed or strongly agreed that most of their teachers really listen to what the student has to say, and that proportion increased by 13 percentage points, to 63%, in 2009. Since 2000, the percentage of students who agreed or strongly agreed that most teachers treat them fairly also increased by 5 percentage points.

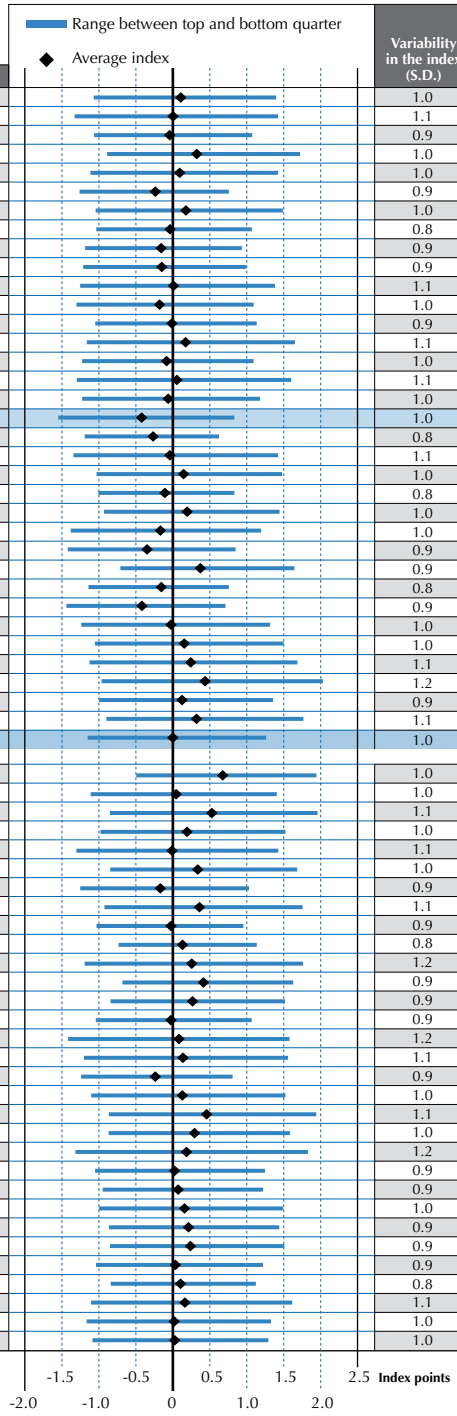
■ Figure 2.19 ■

Students' views of teacher-student relations

Index of teacher-student relations based on students' reports

A I get along well with most of my teachers.
B Most of my teachers are interested in my well-being.
C Most of my teachers really listen to what I have to say.
D If I need extra help, I will receive it from my teachers.
E Most of my teachers treat me fairly.

		Percentage of students agreeing or strongly agreeing with the statements above					Variability in the index (S.D.)	School variability in the distribution of the index (Proportion of the index variance between schools)
		A	B	C	D	E		
OECD	Australia	85	78	71	84	85	1.0	0.04
	Austria	87	59	61	67	77	1.1	0.07
	Belgium	83	63	67	84	86	0.9	0.04
	Canada	89	80	74	89	88	1.0	0.07
	Chile	85	74	72	77	71	1.0	0.06
	Czech Republic	80	67	57	78	72	0.9	0.06
	Denmark	89	79	71	79	85	1.0	0.06
	Estonia	86	76	60	85	75	0.8	0.04
	Finland	87	49	63	84	80	0.9	0.03
	France	78	53	62	80	88	0.9	0.05
	Germany	85	58	69	71	77	1.1	0.05
	Greece	87	66	62	63	65	1.0	0.06
	Hungary	86	68	79	77	74	0.9	0.05
	Iceland	88	73	74	82	80	1.1	0.09
	Ireland	82	76	63	77	81	1.0	0.03
	Israel	83	61	68	70	80	1.1	0.10
	Italy	82	72	62	77	79	1.0	0.08
	Japan	73	28	63	64	74	1.0	0.05
	Korea	79	60	57	83	75	0.8	0.06
	Luxembourg	82	59	63	72	78	1.1	0.04
	Mexico	86	77	77	78	75	1.0	0.05
	Netherlands	87	61	66	85	85	0.8	0.02
	New Zealand	88	77	73	87	86	1.0	0.04
	Norway	84	57	55	74	74	1.0	0.06
	Poland	81	35	60	73	71	0.9	0.04
	Portugal	94	89	82	90	82	0.9	0.03
	Slovak Republic	85	71	66	79	75	0.8	0.08
	Slovenia	80	30	56	74	74	0.9	0.08
	Spain	82	70	67	68	79	1.0	0.09
	Sweden	89	75	71	82	82	1.0	0.07
	Switzerland	85	69	70	82	83	1.1	0.07
	Turkey	86	88	78	87	69	1.2	0.04
	United Kingdom	86	78	69	88	83	0.9	0.04
	United States	90	81	74	88	89	1.1	0.08
	OECD average	85	66	67	79	79	1.0	0.06
Partners	Albania	89	86	89	92	94	1.0	0.06
	Argentina	83	75	73	68	80	1.0	0.08
	Azerbaijan	90	77	86	91	89	1.1	0.06
	Brazil	86	81	74	78	83	1.0	0.05
	Bulgaria	85	53	71	80	73	1.1	0.07
	Colombia	86	82	75	79	91	1.0	0.06
	Croatia	87	65	60	69	70	0.9	0.05
	Dubai (UAE)	89	83	75	87	79	1.1	0.04
	Hong Kong-China	89	71	67	89	82	0.9	0.03
	Indonesia	93	82	63	85	91	0.8	0.04
	Jordan	83	81	77	80	71	1.2	0.04
	Kazakhstan	93	83	80	93	89	0.9	0.14
	Kyrgyzstan	90	69	75	89	87	0.9	0.06
	Latvia	86	65	69	85	82	0.9	0.06
	Liechtenstein	82	66	66	78	75	1.2	0.11
	Lithuania	85	56	66	78	80	1.1	0.06
	Macao-China	83	64	53	78	71	0.9	0.03
	Montenegro	89	69	75	76	79	1.0	0.10
	Panama	90	83	77	79	89	1.1	0.04
	Peru	88	81	82	85	83	1.0	0.08
	Qatar	78	77	71	80	74	1.2	0.05
	Romania	89	62	77	74	84	0.9	0.04
	Russian Federation	88	76	73	82	80	0.9	0.07
	Serbia	89	86	69	72	80	1.0	0.03
	Shanghai-China	89	81	79	90	85	0.9	0.03
	Singapore	91	81	74	88	87	0.9	0.04
	Chinese Taipei	88	72	64	89	83	0.9	0.03
	Thailand	87	77	82	83	87	0.8	0.14
	Trinidad and Tobago	84	80	67	82	78	1.1	0.03
	Tunisia	83	51	72	77	81	1.0	0.06
	Uruguay	88	71	81	67	73	1.0	0.04



Note: Higher values on the index indicate positive teacher-student relations.
Source: OECD, *PISA 2009 Database*, Table IV.4.1.

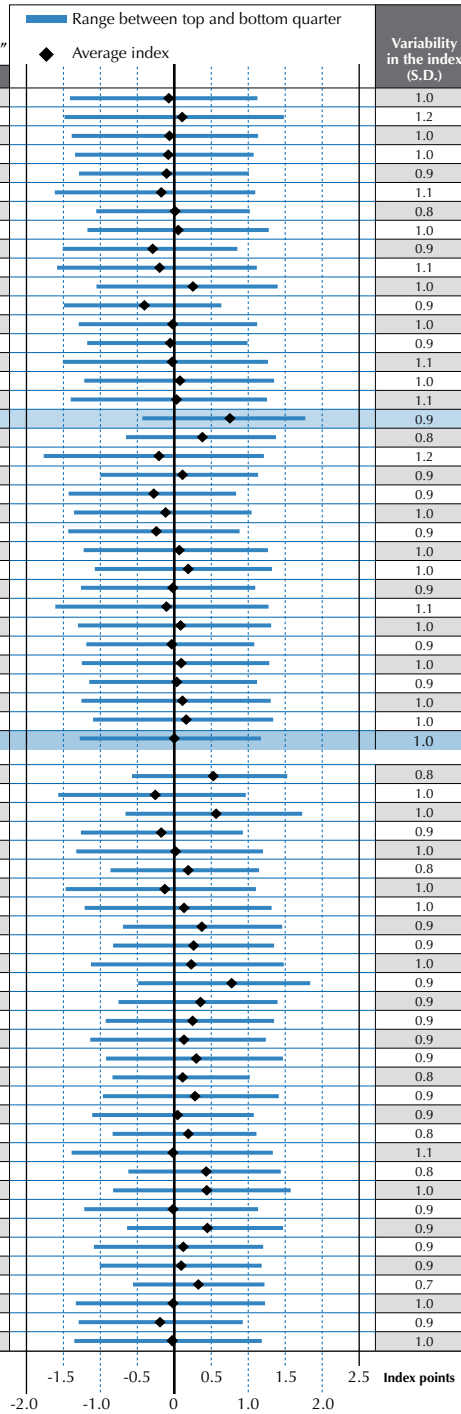
■ Figure 2.20 ■

Students' views of how conducive classrooms are to learning

Index of disciplinary climate based on students' reports

A Students don't listen to what the teacher says.
B There is noise and disorder.
C The teacher has to wait a long time for the students to quieten down.
D Students cannot work well.
E Students don't start working for a long time after the lesson begins.

		Percentage of students reporting that the phenomena above happen "never or hardly ever" or "in some lessons"					Variability in the index (S.D.)	School variability in the distribution of the index (Proportion of the index variance between schools)
		A	B	C	D	E		
OECD	Australia	68	61	71	82	76	1.0	0.12
	Austria	73	74	71	77	70	1.2	0.17
	Belgium	72	63	68	85	71	1.0	0.10
	Canada	71	61	72	82	73	1.0	0.14
	Chile	74	63	65	82	70	0.9	0.13
	Czech Republic	63	66	68	75	70	1.1	0.22
	Denmark	72	65	78	88	82	0.8	0.16
	Estonia	70	69	73	80	78	1.0	0.24
	Finland	60	52	63	80	68	0.9	0.14
	France	64	56	64	76	63	1.1	0.15
	Germany	85	84	78	82	81	1.0	0.13
	Greece	55	58	62	56	65	0.9	0.15
	Hungary	71	71	69	80	78	1.0	0.16
	Iceland	74	67	73	84	81	0.9	0.12
	Ireland	64	65	70	81	75	1.1	0.10
	Israel	78	75	73	77	74	1.0	0.19
	Italy	66	68	70	81	74	1.1	0.23
	Japan	92	90	93	87	91	0.9	0.27
	Korea	90	77	88	90	87	0.8	0.08
	Luxembourg	60	65	64	71	64	1.2	0.05
	Mexico	79	73	79	83	77	0.9	0.12
	Netherlands	68	59	63	81	55	0.9	0.08
	New Zealand	68	61	68	82	74	1.0	0.09
	Norway	67	61	66	77	67	0.9	0.17
	Poland	67	74	74	79	80	1.0	0.17
	Portugal	78	76	80	86	79	1.0	0.10
	Slovak Republic	67	74	73	81	75	0.9	0.16
	Slovenia	59	66	68	78	70	1.1	0.23
	Spain	73	74	73	83	73	1.0	0.14
	Sweden	75	67	71	83	76	0.9	0.18
	Switzerland	72	74	74	81	76	1.0	0.10
	Turkey	86	77	74	77	78	0.9	0.08
	United Kingdom	73	68	74	86	81	1.0	0.14
	United States	76	72	79	87	82	1.0	0.14
	OECD average	71	68	72	81	75	1.0	0.15
Partners	Albania	89	88	86	87	88	0.8	0.13
	Argentina	67	57	62	74	66	1.0	0.17
	Azerbaijan	90	90	88	87	86	1.0	0.12
	Brazil	75	60	67	76	63	0.9	0.12
	Bulgaria	69	72	73	75	77	1.0	0.09
	Colombia	82	78	81	88	77	0.8	0.11
	Croatia	59	68	69	75	73	1.0	0.14
	Dubai (UAE)	77	72	73	83	77	1.0	0.17
	Hong Kong-China	87	88	89	88	86	0.9	0.08
	Indonesia	84	75	79	84	84	0.9	0.12
	Jordan	81	75	74	76	74	1.0	0.14
	Kazakhstan	88	93	91	88	92	0.9	0.17
	Kyrgyzstan	86	88	84	82	86	0.9	0.05
	Latvia	78	78	79	86	86	0.9	0.21
	Liechtenstein	71	81	76	79	80	0.9	0.14
	Lithuania	78	82	84	84	84	0.9	0.13
	Macao-China	80	86	84	85	80	0.8	0.12
	Montenegro	72	82	80	82	81	0.9	0.08
	Panama	77	73	75	81	76	0.9	0.07
	Peru	83	77	85	85	82	0.8	0.06
	Qatar	72	68	66	73	70	1.1	0.09
	Romania	89	89	89	89	87	0.8	0.13
	Russian Federation	81	86	85	85	89	1.0	0.14
	Serbia	63	74	74	79	75	0.9	0.14
	Shanghai-China	85	88	90	87	89	0.9	0.18
	Singapore	78	70	77	87	83	0.9	0.07
	Chinese Taipei	78	81	80	84	78	0.9	0.08
	Thailand	91	85	86	91	91	0.7	0.07
	Trinidad and Tobago	71	69	66	81	75	1.0	0.09
	Tunisia	76	62	66	69	65	0.9	0.06
	Uruguay	74	67	69	80	74	1.0	0.13



Note: Higher values on the index indicate a better disciplinary climate.
Source: OECD, *PISA 2009 Database*, Table IV.4.2.

Excellent – and improving – disciplinary climate

Classrooms and schools with more disciplinary problems are less conducive to learning, since teachers have to spend more time creating an orderly environment before instruction can begin. More interruptions within the classroom disrupt students' engagement in and concentration on their lessons. PISA asked students to describe the frequency with which interruptions occur in reading lessons. The disciplinary climate is indicated in PISA by the frequency of certain events: students don't listen to the teacher in language-of-instruction class; there is noise and disorder; the teacher has to wait a long time for students to quieten down; students cannot work well; and students don't start working for a long time after the lesson begins.

The majority of students in OECD countries enjoy orderly classrooms in their language-of-instruction classes, and especially so in Japan. **Japanese students reported the best disciplinary climate among students in all other OECD countries** (Figure 2.20). Some 93% of Japanese students reported that their teacher never or only in some lessons has to wait a long time before students settle down (the OECD average is 72%); 92% reported that they never or only in some lessons feel that students don't listen (the OECD average is 71%); 91% reported that they never or only in some lessons feel that students don't start working for a long time after the lesson begins (the OECD average is 75%); 90% reported that noise or disorder never or only in some lessons affects learning (the OECD average is 68%); and 87% of students reported that they never or only in some lessons feel that (they) cannot work well. (the OECD average is 81%).

The disciplinary climate in Japanese classrooms has improved since 2000. The percentage of students who reported that they never or only in some lessons feel that students don't listen to what the teacher says, that they never or only in some lessons feel that students don't start working for a long time after the lesson begins, that they feel they can work well, that noise or disorder never or only in some lessons affects learning, increased by around eight percentage points or more since 2000. The percentage of students who reported that their teacher never or only in some lessons has to wait a long time before students settle down increased by two percentage points since 2000. In Japan, as in most OECD countries, there is a positive relationship between disciplinary climate and student performance. For example, the quarter of students in Japan reporting the poorest disciplinary climate are 2.3 times more likely to also be the quarter of poorest-performing students. That is the highest likelihood among the countries and economies that participated in PISA 2009.[9] What is also noteworthy is that there is a comparatively small variation on this measure among students in Japan, but the difference in disciplinary climates among schools is much greater than that in other OECD countries. Over a quarter of the variation in the *index of disciplinary climate* is attributable to the differences between schools, while the OECD average is 15%.

Positive attitudes and behaviour among teachers

To determine the extent to which teachers' behaviour influences student learning, school principals in PISA were asked to report whether they perceived learning in their schools to be hindered by such factors as teachers' low expectations of students, poor student-teacher relations, absenteeism among teachers, staff resistance to change, teachers not meeting individual students' needs, teachers being too strict with students, and students not being encouraged to achieve their full potential. Japan is slightly below the OECD average on these measures, and the reports from school principals highlight a number of challenges: 39% of students in Japan are enrolled in schools whose principals reported that learning is hindered to some extent or a lot because students are not being encouraged to achieve their full potential (OECD average is 23%); 37% are enrolled in schools whose principals reported that this is the case because staff resist change (the OECD average is 28%); 29% are in schools where, according to principals, teachers do not meet individual students' needs (the OECD average is 28%); and 24% are in schools where teachers' low expectations of students hinder learning (in contrast, in Finland that proportion is just 6% and the OECD average is 22%). But only 3% of school principals see teachers' absenteeism as "hindering learning" (the OECD average is 17%).

Results from PISA suggest that schools and countries where students work in a climate characterised by expectations of high performance and the will to work, good student-teacher relations, and high teacher morale, tend to achieve better results on average across countries. Even after accounting for socio-economic background and other aspects of the learning environment measured by PISA, the results show that reading performance is positively related to higher values, at the school level, on the *index of disciplinary climate* in 16 OECD countries, including Japan; on the *index of teacher-student relations* in 10 OECD countries, including Japan; and on the *index of teacher-related factors affecting school climate* in 14 OECD countries, including Japan (see Table IV.2.13 in OECD, 2010f). **In Japan, the difference in reading performance between schools that show higher or lower levels of these three aspects is greater than in most OECD countries**.

HOW THE JAPANESE EDUCATION SYSTEM IS ORGANISED AND EDUCATION POLICIES

Figure 2.21 and Table 2.12 show how Japan's education system is organised and illustrates the weight each educational level has in terms of student population, number of institutions involved, and number of teachers.

■ Figure 2.21 ■

Japan's educational system organisation

Age	Grade	Educational institutions				
3-4		Kindergarden				Special Education
4-5						
5-6						
6-7	1	Elementary School (Compulsory Education)				
7-8	2					
8-9	3					
9-10	4					
10-11	5					
11-12	6					
12-13	1	Junior High School/Lower Secondary School (Compulsory Education)				
13-14	2					
14-15	3					
15-16	1	High School/Upper Secondary School			College of Technology	
16-17	2					
17-18	3					
18-19		University - Undergraduate	Specialised Higher Education	Community College Vocational School		
19-20	Associate					
20-21						
21-22	Bachelor					
22-23		University - Master				
23-24	Master					
24-25		University - PhD	Medical School			
25-26			Veterinary School			
26-27	PhD		Dentistry School			
27-28	PhD		Pharmaceutical School			

Source: MEXT

Table 2.12 Size of Japan's Education System (2009)

Level	Number of students	Number of institutions	Number of teachers
Primary school	7 100 000	22 258	420 000
Lower secondary school	3 600 000	10 864	251 000
Upper secondary school	3 350 000	5 183	251 000
University	2 800 000	773	172 000
Non-university tertiary	850 000	3 800	55 000

Source: MEXT.

Moderate spending on education combined with effective spending choices

Japan's education system has produced strong results, especially when considering that total spending on education, both public and private, is well below the OECD average as a share of GDP.

Japan spends comparatively modest amounts on education. The country invests 3.4% of its GDP in education compared to the OECD average of 5.2%. This represents 9.4% of overall public expenditure, compared to the OECD average of 13.3%. This suggests that Japan invests where expenditures make the most difference for student learning outcomes. Because of demographic shifts, the low expenditure on education can be distributed over a smaller number of school-age children. Spending on primary and middle schools has remained stable at around 2% of GDP since 1995, despite declines of 17% in the number of students and 7% in the number of schools.

In a comparison of countries' average actual spending per student from the age of 6 to the age of 15, Japan ranks 14th among 34 OECD countries. Effective school systems require the right combination of trained and talented personnel, adequate educational resources and facilities, and motivated students ready to learn. But performance on international assessments cannot simply be tied to money: across OECD countries, expenditure per student for educational institutions explains only 9% of the variation in the mean PISA performance between countries. Japan's upwards deviation from the trend line suggests that the country performs better than would be expected from its spending on education per student. Italy and Slovenia, which spend similar levels on education per student as Japan, perform at least 34 score points lower than Japan, the equivalent of roughly one school year. However, these spending levels do not account for significant household spending on education outside educational institutions.

While Japan was successful in making the teaching profession very attractive, the wage premium for teachers has eroded over time. Meanwhile, MEXT aims to reduce class sizes to 35 students. Keeping the teaching profession attractive will no doubt require some trade-offs between Japan's aim to attract and retain high-quality teachers and its desire to reduce class size further.

Given the comparatively large size of most classes in Japan, **instruction is tailored toward whole-group learning**. Lessons tend to begin with the presentation of a practical problem, with little classroom time used for drilling or lecturing. Mistakes tend to be exploited as opportunities for learning. Even though the revisions of the Japanese Course of Studies in 1998 and 2008 aim to encourage tailored learning so that each student can develop according to his or her level of the subject taught, compared to other OECD countries, there is generally less instructional technology used in Japanese schools. Japanese students are not separated into ability groups; there are no special classes for gifted students, nor are students pushed ahead by a grade or more if they are perceived to be exceptionally able. Similarly, students are not held back if they are having difficulty. Although there are dedicated schools for severely handicapped students, many students requiring special education are assigned to the heterogeneous, regular classrooms. Teachers meet frequently with one another to discuss students who are having difficulty, and they provide as much individual attention to those students as they can within the regular school day. Students who are struggling often receive extra instruction after school.

Japan strives to distribute resources equitably among all schools by providing extra support to disadvantaged schools. Students who did not attain the basic performance level on PISA were not a random group. While PISA results show that socio-economic disadvantage does not have as strong an impact on student performance in Japan as it does in other countries, socio-economic differences among schools are significant. Some 9% of the variation in student performance in Japan is explained by students' socio-economic background (the OECD average is 14%).

A potential source of inequities in learning opportunities lies in the distribution of resources across students and schools. In school systems characterised by an equitable distribution of educational resources, the quality or quantity of resources allocated to individual schools would not be related to a school's average socio-economic background, as all schools would enjoy similar resources. Therefore, if there is a positive relationship between the socio-economic background of students and schools and the quantity or quality of resources, this signals that more advantaged schools enjoy more or better resources. A negative relationship implies that more or better resources are devoted to disadvantaged schools. No relationship implies that resources are distributed similarly among schools attended by socio-economically advantaged and disadvantaged students. In around half of OECD countries, the student-teacher ratio relates positively to the socio-economic background of schools, in other words, disadvantaged schools tend to have more teachers per student. Japan is one of these countries (OECD, 2010f). This positive relationship is also particularly pronounced in Belgium, Italy, Ireland, Spain, Estonia, Portugal and the Netherlands. This important measure of resource allocation indicates that these countries use the student-teacher ratio to reduce disadvantage. Among OECD countries, only Turkey, Slovenia, Israel and Austria favour socio-economically advantaged students and schools with access to more teachers.

In the majority of OECD countries, more advantaged students also enjoy a higher proportion of better-qualified, full-time teachers (OECD, 2010f). The picture is similar when examining schools whose principals reported that the lack of qualified teachers hinders learning. **In Japan, however, disadvantaged students enjoy qualified teachers at the same level that advantaged students do.**

In addition to paying teachers comparatively well, Japan also provides them with ample time for work other than teaching. An earlier review of strong-performing school systems, including Japan (OECD 2010g), suggests that teachers use non-teaching time for activities to support weaker students and help build social capital. While these policies drive costs upward, Japan supports them by maintaining comparatively large class size (OECD, 2010f), even though average class size in Japan has been declining steadily over the past decades.

In general, the accuracy with which socio-economic background predicts student performance varies considerably across countries. Most of the students who perform poorly in PISA come from disadvantaged backgrounds; yet some of their peers from similar backgrounds excel in PISA. These "resilient" students show that overcoming socio-economic barriers to achievement is possible. While the prevalence of resilience is not the same across educational systems, it is possible to identify substantial numbers of resilient students in practically all OECD countries.[10] Across the OECD, an average of 7% of students are resilient in that they are among the 25% most socio-economically disadvantaged in the country, yet perform much better than would be predicted based on their background. **In Japan, 11% of students can be considered resilient**, the same as the share of resilient students in Korea, Finland, the partner country Singapore and the partner economies Shanghai-China, Hong Kong-China and Macao-China – all high performers.

Competition among schools

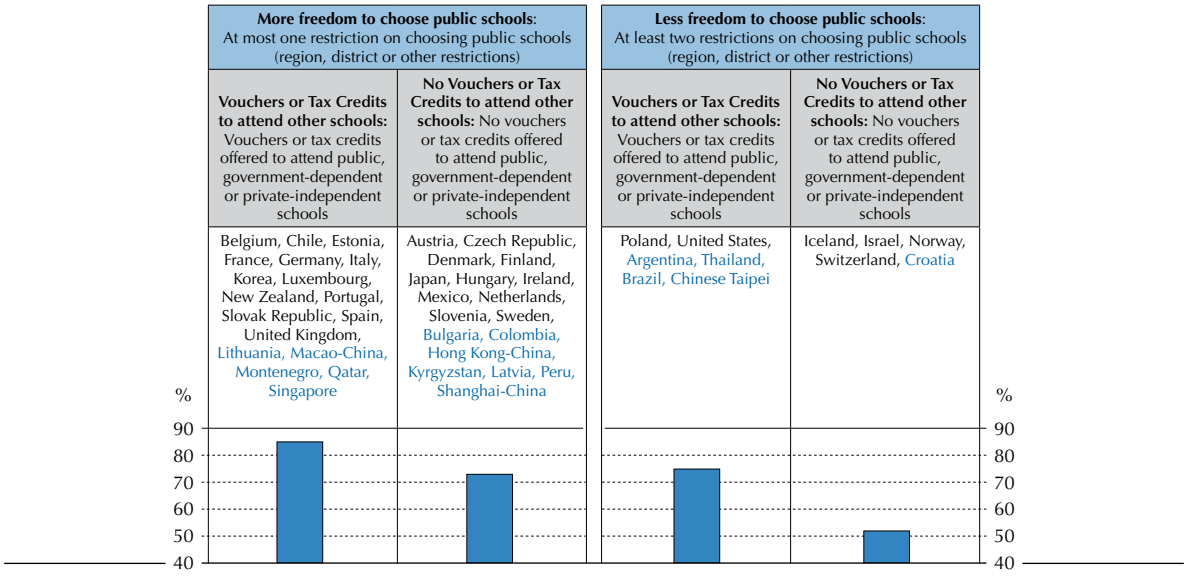
Students in some school systems are encouraged or even obliged to attend their neighbourhood school. However, in many countries, reforms over the past decades have tended to give more authority to parents and students to choose schools that meet their educational needs or preferences best. The assumption has been that if students and parents have sound information and choose schools based on academic criteria, this will foster competition among schools and create incentives for institutions to organise programmes and teaching in ways that better respond to diverse student requirements and interests, thus reducing the costs of failure and mismatches. In some school systems, schools not only compete for student enrolment, but also for funding. Direct public funding of independently managed institutions, based on student enrolments or student credit-hours, is one model for this. Giving money to students and their families through, for example, scholarships or vouchers, to spend in public or private educational institutions of their choice is another method (Figure 2.22).

According to the responses of school principals, across OECD countries, 76% of students attend schools that compete with at least one other school for enrolment. Only in Switzerland, Norway and Slovenia do fewer than 50% of students attend schools that compete with other schools for enrolment. In contrast, in the Netherlands, Australia, Belgium, the Slovak Republic and Japan, over 90% of students attend schools that compete with other schools for enrolment.

■ Figure 2.22 ■

Countries in which parents can choose schools for their children

Prevalence of school competition by school choice arrangements



Note: Bars represent the average percentages of school competition in OECD countries, by four categories of school choice arrangements.
Source: OECD, *PISA 2009 Database*, Tables IV.3.7 and IV.3.8a.

Some 13 OECD countries allow parents and students to choose public schools and use vouchers or tax credits in their school-choice arrangements. **Eleven OECD countries, including Japan, give parents freedom of choice of public schools, but do not offer vouchers or tax credits**; two OECD countries restrict parents and students in the choice of public schools, but offer tax credits or vouchers to attend other schools; and in four OECD countries, parents and students must attend the public school nearest to where they live and are not offered any kind of subsidy to attend other schools.

Among schools within a country, competition and performance do seem related; but once the socio-economic profile of students and schools are taken into consideration, the relationship weakens, since privileged students are more likely to attend schools that compete for enrolment. This may reflect the fact that socio-economically advantaged students, who tend to achieve higher scores, are also more likely to attend schools that compete for enrolment, even after accounting for location and attendance in private schools. **In Japan, school competition is not related to performance, even after accounting for the socio-economic and demographic background of students and schools**.

Why are socio-economically advantaged students more likely to attend schools of their choice? To understand differences in how parents choose schools for their children, PISA asked a series of questions regarding school choice in the questionnaire for parents that was distributed in eight OECD countries (no data from parents are available for Japan). On average, among the eight countries surveyed, socio-economically disadvantaged parents are over 13 percentage points more likely than advantaged parents to report that they considered "low expenses" and "financial aid" to be very important determining factors in choosing a school. **While parents from all backgrounds cite academic achievement as an important consideration when choosing a school for their children, socio-economically advantaged parents are, on average, 10 percentage points more likely than disadvantaged parents to cite that consideration as "very important".** It is possible that this difference in thinking reflects the fact that advantaged parents already have access to schools offering academic achievement. Still, this difference suggests that disadvantaged parents consider that their choice of schools for their children is limited by financial constraints. If children from these backgrounds cannot attend high-performing schools because of school fees, then school systems that offer parents more choice of schools for their children will necessarily be less effective in improving the performance of all students.

Balance of public and private education

Across OECD countries, schooling takes place mainly in public schools; but private education plays an important role in mobilising resources from a wider range of funding sources and is sometimes also considered a way of making education more cost-effective. The distinctions between public and private in both education financing and management has become somewhat blurred as an increasing variety of educational opportunities, programmes and providers are emerging worldwide. Publicly-financed schools are not necessarily also publicly managed. Governments can transfer funds to both public and private educational institutions according to various allocation mechanisms. Indeed, publicly-funded, privately-managed schools are the most common model of private education in OECD countries. Governments are experimenting with ways to mobilise resources for education and to design new policies that allow all stakeholders to participate more fully and share costs and benefits more equitably.

Private-sector spending on education in Japan is relatively high, particularly at the pre-primary and tertiary levels, accounting for one-third of the total in 2007 (Figure 2.12). Indeed, the private sector accounted for two-thirds of spending on tertiary education, matching the United States as the highest in the OECD area (Figure 2.24). This emphasis on private tertiary education is well above the OECD average and allows for greater public expenditure on other education levels, with better social rates of return.

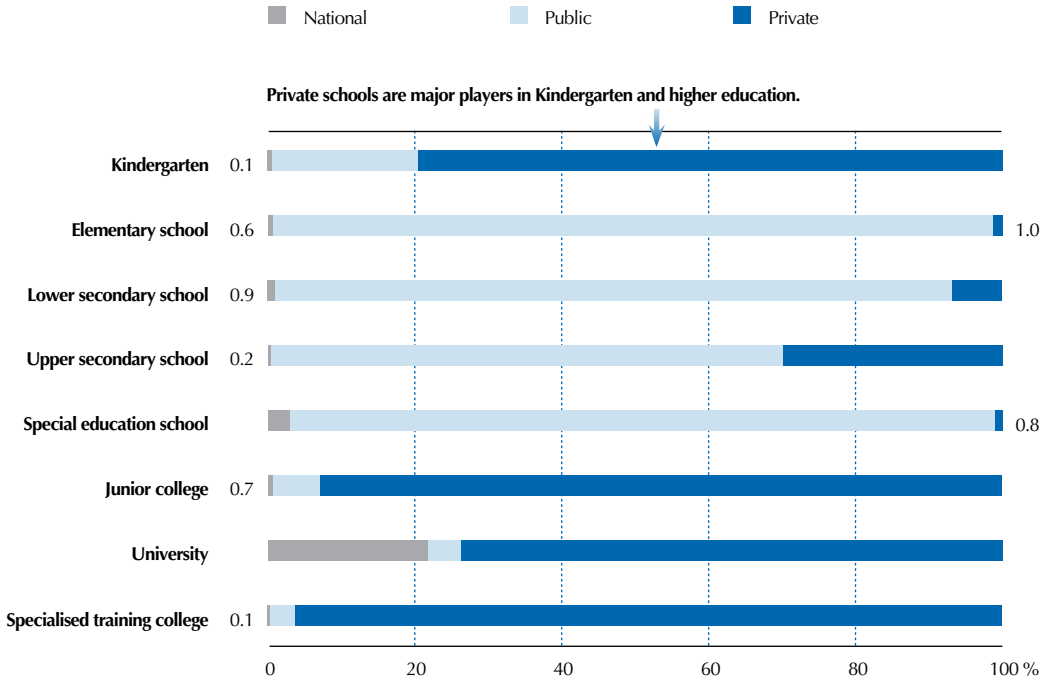
Across OECD countries, 15% of students are enrolled in privately-managed schools that are either privately or government funded. **Japan is well above the OECD average on this measure, with 29% of Japanese students attending upper secondary schools that are privately managed.** Nevertheless, more than 50% of 15-year-old students in the Netherlands, Ireland and Chile are enrolled in privately managed schools, while in Australia and Korea, between 35% and 40% of students are enrolled in such schools. In contrast, more than 98% of students in Turkey, Iceland and Norway attend schools that are publicly-managed (OECD, 2010f).

How does the public-private issue affect student performance in PISA? On average across OECD countries, privately-managed schools show a performance advantage of 30 score points on the PISA reading scale. However, once the socio-economic backgrounds of students and schools are accounted for, public schools come out with a slight advantage of seven score points, on average across OECD countries. **Before accounting for socio-economic background, there is no performance difference between public and privately managed schools in Japan; but after accounting for students' and schools' socio-economic backgrounds, public schools in Japan outperform private schools**. This may largely be because parents of students who did not pass the entrance tests of prestigious public schools then opt for private alternatives.

In April 2010, fees for public high schools in Japan were eliminated and replaced by transfers from the central government to prefectures. The central government also established a fund to offer subsidies to families whose children attend private high schools.

■ Figure 2.23 ■

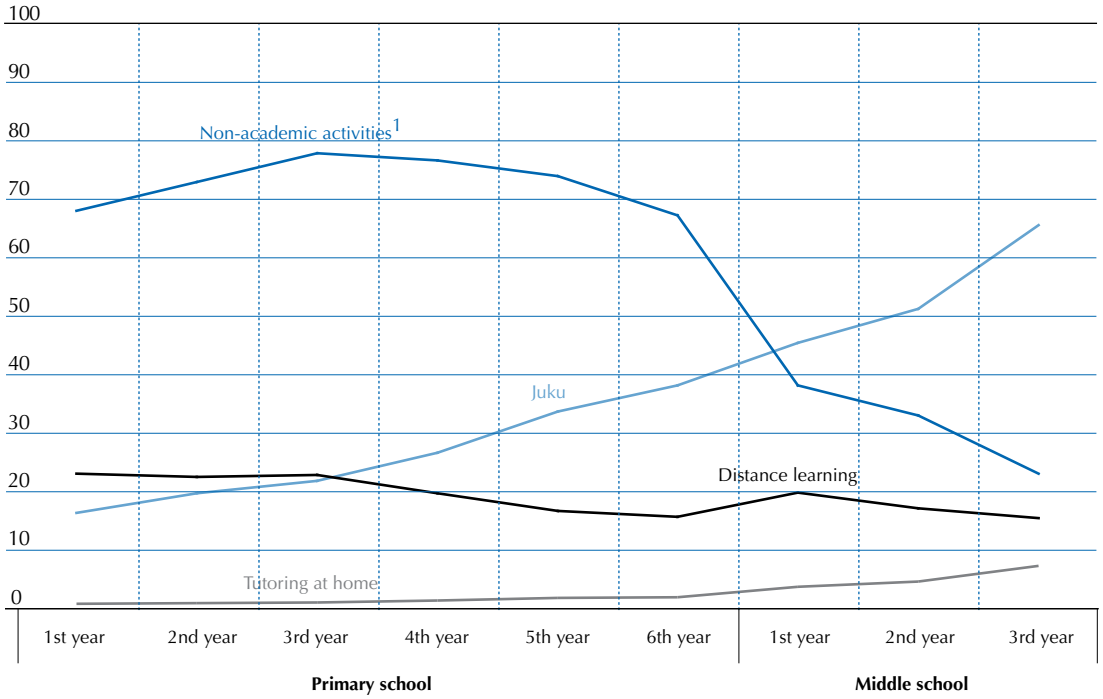
Size and composition of Japan's private education



Source: MEXT, *School Basic Survey*.

■ Figure 2.24 ■

Participation in after-school education in 2008



1. The major activities included piano (29%), swimming (27%), calligraphy (23%), foreign-language conversation (11%), soccer (11%) and martial arts (11%).
Source: MEXT 2008.

Growing reliance on private tutoring

The previous analysis of public and private expenditure on education does not take into account the significant role of private tutoring in Japan. A large percentage of Japanese students receive private, out-of-school academic instruction. Such instruction often takes place in institutions known as "*juku*", but is also delivered as home-based tutoring and distance learning. **At the primary school level, *juku* participation increased from 16% in 1985 to 26% in 2007, and at the lower secondary level, from 44% to 53%.** At the upper secondary level, participation in private tutoring is even greater (Figure 2.24).

The high level of participation in such activities is said to be driven by the severe competition to enter the country's top universities. In 2006, the applicant/entrant ratio for universities in Japan was estimated at between 4:1 and 5:1, although the overall capacity of tertiary education in Japan has risen to the point that it is roughly in line with the number of applicants. This means that the phenomenon may be driven by social demand. Indeed, in a 2008 MEXT survey of parents, respondents frequently attributed the growing role of *juku* to the social importance of having a child admitted to a prestigious university (60%). However, most parents also reported that public schools do not provide an adequate education (67%).

Juku represents a major service industry in Japan, with an estimated 50 000 firms providing instruction to up to two million students at both the primary and middle-school levels. Indeed, 21 *juku* are large enough to be publicly listed on the stock exchange. The evidence of the benefits and drawbacks of *juku* is mixed. Much criticism focuses on the possible inefficiencies of such supplemental education and the potential for *juku* to perpetuate socio-economic inequities.

One of the major concerns related to *juku* is the financial cost for families. The average expenditure per student more than doubled in real terms between 1985 and 2007, reaching an average of JPY 21 000 per month (about USD 3 150 annually), around 7% of per capita income. By the third year of lower secondary school, 13% of households paid more than JPY 40 000 per month per student (about USD 5 650 annually; Mimizuka and Makino, 2008; Table 2.13).

Although reducing the role of *juku* is not a government policy goal, efficiency and equity are. Further research is needed to ascertain *juku*'s effects on efficiency and equity in schooling to determine whether they align with Japan's education policy

Table 2.13 Spending on out-of-school instruction
Spending per student in 2007 in thousand yen

	Total	Boys	Girls	Grades 1 to 3	Grades 4 to 6	Middle School
Juku	21.3	21.9	20.7	12.0	18.5	26.1
Tutoring at home	24.8	26.3	23.5	13.0	22.6	26.3
Correspondence courses	5.6	5.7	5.5	3.8	5.1	8.4
Non-academic activities	6.6	6.1	7.1	6.4	6.2	8.0

Source: MEXT (2008), *Report on Children's Out-of-School Learning Activities*.

objectives. Findings based on PISA 2006 results, for example, show that attending after-school classes led by a school teacher tends to reduce the impact of students' socio-economic background on their academic performance, while attending after-school classes led by a teacher who is not from the regular school tends to reinforce that impact. Some countries have implemented policy changes to reduce reliance on private supplemental tutoring, such as modifying university entrance requirements to include a broader portfolio of entrance criteria rather than relying on a single test score, offering school-based, after-hours tutoring support, collaborating directly with tutoring firms to provide services more broadly at a lower cost, and stimulating online tutoring options.

Results from PISA 2006 also indicate that learning time spent in after-school lessons and individual study is negatively related to performance. Of course, this might be because students who attend after-school classes do so for remedial purposes, rather than to enhance their school studies. Still, across countries, findings show that students tend to perform better if a high percentage of their total learning time – which includes regular school lessons, after-school lessons and individual study – is spent during normal school hours in a classroom – and, most important, if the instruction offered in those classrooms is of high quality.

Nearly universal pre-primary education

Whether and how long students are enrolled in pre-primary education is also an important policy consideration. Many of the inequalities that exist within school systems are already present once students enter formal schooling and persist as students' progress through school. Earlier entrance into the school system may reduce these inequities. On average across OECD countries, 72% of students reported in PISA 2009 that they had attended pre-primary education for more than one year. **Attendance in more than one year of pre-primary education was practically universal (97%) in Japan**. In the Netherlands, Hungary, Belgium, Iceland

and France, over 90% of 15-year-old students reported that they had attended pre-primary school for more than one year. Pre-primary education is rare in Turkey, where less than 30% of students had attended pre-primary school for at least a year. More than one year of pre-primary education is uncommon in Canada, Chile, Ireland and Poland, where fewer than 50% of students attended pre-primary school for that length of time.

PISA 2009 results show that, in general, students who had attended pre-primary education perform better in reading at the age of 15 than students who had not. In 32 OECD countries, students who had attended pre-primary education for more than one year outperformed students who had not attended pre-primary education at all – in many countries by the equivalent of well over a school year. This finding holds in most countries even after accounting for students' socio-economic backgrounds. However, across countries, there is considerable variation in the impact of participating in pre-primary education on reading performance when students are 15 years old. Among OECD countries, in Israel, Belgium, Italy and France, students who attended pre-primary education for more than one year perform at least 64 score points higher in reading than those who did not, the equivalent of roughly one-and-a-half school years. This was the case even after accounting for students' socio-economic background. On the other hand, in Estonia, Finland, the United States and Korea, there is no marked difference in reading scores between those who attended pre-primary school for more than one year and those who did not attend at all, after accounting for students' socio-economic background. In Japan, students who had attended pre-primary education for one year or more scored an average of 39 points higher on the PISA reading scale – the equivalent of one school year – than those who had not; after accounting for students' socio-economic background, the performance advantage is 24 score points. International comparisons suggest the relative importance of pre-primary education in Japan, and Japan shows high pre-primary enrolment rates among both advantaged and disadvantaged children.

One factor that may explain the variations in the impact of pre-primary education on later school performance is the quality of pre-primary education. This hypothesis is supported by the fact that the impact tends to be greater in education systems where pre-primary education is of longer duration, has smaller pupil-to-teacher ratios, or benefits from higher public expenditure per pupil (Table 2.14). When this impact is compared according to socio-economic background, in most OECD countries, there is no significant difference in the impact between students from socio-economically disadvantaged and advantaged backgrounds. **Students thus benefit equally from attending pre-primary school in 31 OECD countries, including Japan, and 25 partner countries and economies**.

Given the nearly universal attendance in pre-primary education and its importance for student learning outcomes over time, the policy consideration in Japan is therefore one of investment. **Pre-primary education in Japan is largely a private investment, with 80% of Japanese children attending private kindergarten.** Data show that the benefits of pre-primary education accrue to individuals regardless of their socio-economic background. As Japan strives to provide extra support to disadvantaged primary and secondary schools, how might this approach be extended to assist disadvantaged families in securing quality pre-primary education for their children?

Table 2.14 Relationship between pre-primary school attendance and performance, by quality of pre-primary school education

	Regression coefficients							
	Attendance quality indicator*		Attendance		Socio-economic background of students		Socio-economic background of schools	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
Percentage of students attended pre-primary school	**4.73**	(0.62)	**-27.13**	(5.52)	**17.82**	(0.26)	**59.04**	(0.98)
Average duration of pre-primary schools	**9.93**	(1.53)	**-9.13**	(3.56)	**17.81**	(0.27)	**59.34**	(1.01)
Average pupils-to-teacher ratio in pre-primary schools	**-1.13**	(0.19)	**29.98**	(3.09)	**17.27**	(0.29)	**58.48**	(1.01)
Public expenditure on pre-primary school per student (ppp)	**1.27**	(0.56)	**7.91**	(2.97)	**17.76**	(0.28)	**59.87**	(1.09)

Notes: Values that are statistically significant are indicated in bold.
The model is run only for the OECD countries where the data are available.
This is a regression model with country fixed effects and interactions between individual pre-primary school attendance and one of the system-level quality indicators.
Variables included in the model are: escs, xescs, attendance, attendance*quality indicator, country fixed effect.
escs= PISA index of economic, social and cultural status (student-level variable)
xescs=school average of escs (school-level variable)
immig: 0=native student, 1=student with an immigrant background (student-level variable)
attendance: 0=not attended pre-primary school, 1=attended pre-primary school (student-level variable)
*Quality indicators are:
Percentage of students attended pre-primary school (system-level variable)
Average duration of pre-primary school (system-level variable)
Pupils-to-teacher ratio in pre-primary schools (system-level variable)
Public expenditure on pre-primary school per student (ppp) (system-level variable)
Source: OECD, *PISA 2009 Database*, Table II.5.6.

Japanese families shoulder a significant private financial burden for early childhood education and child care. Average net childcare costs are around 14% of average family income for dual-earner families and 16% for single-parent families; higher than the OECD average of 12% and 14%, respectively (OECD, 2007).[11] For pre-primary education, taxpayers cover a smaller share than in any other OECD country, leaving more than half the costs to be financed by households and other private sources.[12] In 2007, spending on pre-primary education per student, in absolute terms, was 17% below the OECD average. In addition, the public-sector share was only 44%, compared with an OECD average of 80%. **Consequently, public expenditure on pre-primary education was the third lowest among OECD countries. Moreover, it is relatively low compared to spending at other levels of education. Outlays per student in pre-primary education was only 62% of that for students in primary school and 52% of that for students in secondary schools, well below the OECD averages of 81% and 66%, respectively.**

The Japanese government considers the introduction of a new system in which the integration of the function of kindergartens and childcare centres will be promoted, enhancing quality of education and care and providing greater capacity. Parents' financial burden will be reduced by expanding the government's financial commitment.

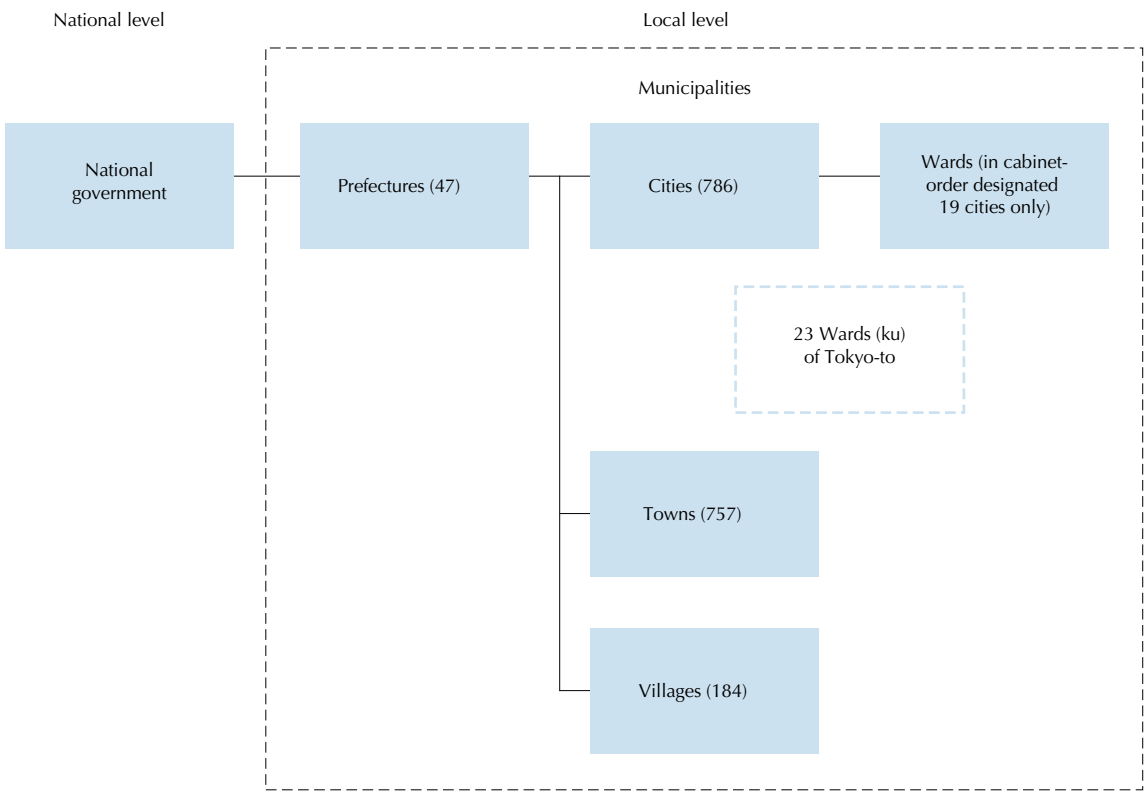
Governance of the education sector – centralised in some ways, decentralised where it matters

Many countries have shifted public and government concern away from control over the resources and content of education to focus on outcomes. This becomes apparent when the distribution of decision-making responsibilities in education is reviewed across successive PISA assessments. In addition, some countries have made greater efforts to devolve responsibility to the frontline, encouraging responsiveness to local needs and strengthening accountability. PISA shows a clear relationship between the relative autonomy of schools in managing instructional policies and practices, and outcomes across systems when autonomy is coupled with accountability.

The Japanese education system has sometimes been described as highly centralised. As PISA shows, however, the reality is far more nuanced: education in Japan tends to be decentralised where it matters most for educational outcomes. MEXT, the central authority responsible for developing and implementing national education policy, distributes public resources for education at the national, prefectural, and municipal levels, and guides national curriculum standards, textbook development, and teacher training. Each of the country's 47 prefectures has its own board of education responsible for co-ordinating education in its own geographic area (Figure 2.25). These boards are responsible for establishing and closing institutions and for certifying teachers. In addition,

■ Figure 2.25 ■

Government system by level (as of 1 April 2010)



Note: Figures in parentheses indicate number.
Source: Japanese Ministry of International Affairs and Communications.

Table 2.15 Local government employees, by type of administrative services (as of 1 April 2009)

Type of Services	Numbers
Primary school	2 855 106
Education	1 076 358
General administrative services	571 902
Social welfare and public hygiene	382 873
Police	280 898
Fire service	157 405
Public enterprise account sector	385 670
Hospitals	211 016
Water and sewerage	82 359
Transportation	28 168

Source: Japanese Ministry of International Affairs and Communications.

each of the approximately 1 700 municipalities in Japan has its own board of education responsible for selecting school textbooks. Teachers in Japan are largely responsible for how the curriculum is taught, and are given authority over instruction and actual classroom practice. PISA shows that these factors tend to be positively related to school performance across OECD countries.

Employment in education dominates local governments in Japan, representing nearly 38% of local government employees (Table 2.15). The central government had long paid 50% of the salaries of primary and lower secondary school teachers, although its share was cut to one-third in FY 2006. In addition, the central government also pays a substantial part of the costs of constructing school buildings as long as the local government complies with construction and equipment guidelines.

Japan shows below-average school autonomy in resource allocation (Table 2.16). However, the centralisation of resources in Japan does not have a negative impact on student outcomes. Evidence from PISA shows that devolving some aspects of teaching directly to schools has a favourable impact on student learning, which appears to be the case in Japan. Students must meet high standards, but teachers are given broad latitude in how to instruct so that their students meet those standards.

When examining the characteristics of schools attended by 15 year olds, it is important to keep in mind that the students assessed in PISA could be found in both lower and upper secondary schools, and this distribution differs greatly across countries. **In Japan, all 15-year-olds assessed in PISA attend upper secondary schools**, while over 95% of 15 year olds in Spain, Norway, Finland, Denmark, Poland, Sweden, Iceland, Estonia and Germany are in lower secondary schools. The organisational features described in this section – allocation of resources between schools, the level of school autonomy, school competition, the proportion of private schools and performance variation between schools – concern Japan's upper secondary schools.

The degree to which students and parents can choose schools, and the degree to which schools are considered autonomous entities that make organisational decisions independent of district, regional, or national entities, can affect student performance. Results from PISA suggest that school autonomy in defining curricula and assessments relates positively to the systems' overall performance (Table 2.17). For example, school systems that provide schools with greater discretion in making decisions regarding student-assessment policies, the courses offered, course content and the textbooks used, tend to be school systems that perform at higher levels.

PISA results show that Japan grants significant school autonomy over curricular and assessment policies and less autonomy over resource allocation. Some 98% of students in Japan are in schools whose principals reported that only principals and/or teachers have considerable responsibly in establishing student-assessment policies (the OECD average is 66%); 94% are in schools whose principals reported that only principals and/or teachers have considerable responsibility in deciding which courses are offered (the OECD average is 50%); 93% are in schools whose principals reported that only principals and/or teachers have considerable responsibility in determining course content (the OECD average is 45%); and 89% are in schools whose principals reported that only principals and/or teachers have considerable responsibility in choosing which textbooks are used (the OECD average is 78%) (Figure 2.26). This reflects the way education governance is structured in Japan, with the central government largely guiding financing, prefectures largely guiding teacher selection and evaluation, municipalities given authority over textbooks, and teachers given the freedom to innovate classroom practice.

Data from PISA also show that in school systems where most schools post achievement data publicly, schools with greater discretion in managing their resources tend to show higher levels of performance. In school systems where schools do not post achievement data publicly, a student who attends a school with greater autonomy in resource management than the average OECD school tends to perform 3.2 score points lower in reading than a student attending a school with an average level of autonomy. In contrast, in school systems where schools do post achievement data publicly, a student who attends a school

Table 2.16a **Index of school responsibility for resource allocation and reading performance, by national quarters of this index**
Results based on school principals' reports

		Index of school responsibility for resource allocation															
		All students		Bottom quarter		Second quarter		Third quarter		Top quarter		In lower secondary education (ISCED 2)		In upper secondary education (ISCED 3)		Difference between lower and upper secondary education	
		Mean index	S.E.	Mean index	S.E.	Mean index	S.E.	Mean index	S.E.	Mean index	S.E.	Mean index	S.E.	Mean index	S.E.	Dif.	S.E.
OECD	Australia	-0.07	(0.03)	-0.66	(0.01)	-0.51	(0.01)	-0.20	(0.01)	1.09	(0.12)	-0.04	(0.04)	-0.12	(0.07)	0.08	(0.06)
	Austria	-0.61	(0.02)	-0.76	(0.01)	-0.72	(0.00)	-0.62	(0.00)	-0.35	(0.06)	-0.72	(0.01)	-0.61	(0.02)	**-0.11**	(0.02)
	Belgium	-0.36	(0.01)	-0.73	(0.01)	-0.49	(0.01)	-0.18	(0.01)	-0.04	(0.03)	-0.40	(0.08)	-0.36	(0.01)	-0.04	(0.08)
	Canada	-0.39	(0.02)	-0.68	(0.00)	-0.59	(0.00)	-0.48	(0.00)	0.19	(0.07)	-0.39	(0.03)	-0.39	(0.02)	0.00	(0.03)
	Chile	0.45	(0.07)	-0.77	(0.01)	-0.45	(0.02)	0.77	(0.06)	2.27	(0.05)	-0.22	(0.11)	0.49	(0.07)	**-0.71**	(0.12)
	Czech Republic	1.12	(0.08)	-0.20	(0.02)	0.33	(0.02)	1.92	(0.09)	2.45	(0.00)	1.10	(0.09)	1.15	(0.12)	-0.06	(0.15)
	Denmark	0.18	(0.06)	-0.47	(0.01)	-0.23	(0.01)	-0.06	(0.01)	1.49	(0.13)	0.18	(0.07)	0.98	(0.58)	-0.81	(0.59)
	Estonia	-0.04	(0.05)	-0.39	(0.01)	-0.26	(0.01)	-0.12	(0.00)	0.61	(0.13)	-0.05	(0.04)	0.54	(0.24)	**-0.59**	(0.23)
	Finland	-0.39	(0.03)	-0.69	(0.01)	-0.56	(0.00)	-0.44	(0.00)	0.15	(0.09)	-0.39	(0.02)	c	c	c	c
	France	w	w	w	w	w	w	w	w	w	w	w	w	w	w	w	w
	Germany	-0.53	(0.03)	-0.75	(0.00)	-0.68	(0.00)	-0.58	(0.00)	-0.10	(0.11)	-0.53	(0.03)	-0.49	(0.08)	-0.04	(0.09)
	Greece	-0.77	(0.01)	-0.82	(0.00)	-0.81	(0.00)	-0.80	(0.00)	-0.64	(0.01)	-0.78	(0.01)	-0.77	(0.01)	-0.01	(0.02)
	Hungary	0.82	(0.09)	-0.41	(0.02)	-0.01	(0.02)	1.27	(0.08)	2.45	(0.00)	0.51	(0.19)	0.86	(0.10)	-0.35	(0.21)
	Iceland	-0.06	(0.00)	-0.44	(0.00)	-0.25	(0.00)	-0.11	(0.00)	0.54	(0.01)	-0.06	(0.00)	c	c	c	c
	Ireland	-0.42	(0.02)	-0.73	(0.01)	-0.52	(0.01)	-0.32	(0.01)	-0.13	(0.02)	-0.43	(0.02)	-0.42	(0.02)	-0.01	(0.01)
	Israel	-0.25	(0.05)	-0.66	(0.01)	-0.54	(0.00)	-0.43	(0.00)	0.62	(0.20)	-0.38	(0.07)	-0.23	(0.06)	**-0.15**	(0.06)
	Italy	-0.65	(0.02)	-0.83	(0.00)	-0.82	(0.00)	-0.74	(0.00)	-0.23	(0.06)	-0.68	(0.06)	-0.65	(0.02)	-0.03	(0.06)
	Japan	**-0.18**	(0.06)	**-0.77**	(0.01)	**-0.75**	(0.00)	**-0.57**	(0.01)	**1.36**	(0.13)	c	c	**-0.18**	(0.06)	c	c
	Korea	-0.44	(0.07)	-0.81	(0.00)	-0.74	(0.00)	-0.60	(0.01)	0.40	(0.20)	-0.72	(0.03)	-0.42	(0.07)	**-0.29**	(0.07)
	Luxembourg	-0.27	(0.00)	-0.75	(0.00)	-0.61	(0.00)	-0.54	(0.00)	0.81	(0.01)	-0.30	(0.00)	-0.23	(0.00)	**-0.08**	(0.01)
	Mexico	-0.37	(0.03)	-0.82	(0.00)	-0.72	(0.00)	-0.54	(0.00)	0.59	(0.07)	-0.56	(0.04)	-0.23	(0.03)	**-0.33**	(0.05)
	Netherlands	1.30	(0.10)	-0.03	(0.03)	0.70	(0.06)	2.07	(0.04)	2.45	(0.00)	1.27	(0.11)	1.37	(0.14)	-0.11	(0.15)
	New Zealand	0.11	(0.04)	-0.34	(0.01)	-0.14	(0.00)	-0.05	(0.01)	0.96	(0.11)	0.10	(0.05)	0.11	(0.04)	-0.01	(0.04)
	Norway	-0.23	(0.04)	-0.60	(0.01)	-0.45	(0.00)	-0.28	(0.01)	0.43	(0.13)	-0.23	(0.04)	c	c	c	c
	Poland	-0.36	(0.02)	-0.63	(0.00)	-0.51	(0.01)	-0.39	(0.01)	0.07	(0.07)	-0.36	(0.02)	c	c	c	c
	Portugal	-0.44	(0.06)	-0.78	(0.00)	-0.69	(0.00)	-0.57	(0.01)	0.27	(0.20)	-0.51	(0.05)	-0.40	(0.08)	-0.11	(0.06)
	Slovak Republic	0.50	(0.09)	-0.40	(0.02)	-0.15	(0.01)	0.17	(0.03)	2.37	(0.05)	0.38	(0.13)	0.57	(0.13)	-0.19	(0.19)
	Slovenia	-0.13	(0.01)	-0.49	(0.00)	-0.35	(0.00)	-0.20	(0.00)	0.51	(0.03)	0.36	(0.26)	-0.15	(0.00)	**0.51**	(0.26)
	Spain	-0.47	(0.03)	-0.82	(0.00)	-0.77	(0.00)	-0.53	(0.01)	0.24	(0.09)	-0.47	(0.03)	c	c	c	c
	Sweden	0.81	(0.07)	-0.34	(0.02)	0.14	(0.03)	0.99	(0.07)	2.45	(0.00)	0.81	(0.07)	0.61	(0.34)	0.20	(0.35)
	Switzerland	-0.18	(0.06)	-0.63	(0.01)	-0.46	(0.01)	-0.32	(0.01)	0.69	(0.16)	-0.19	(0.06)	-0.15	(0.19)	-0.04	(0.20)
	Turkey	-0.74	(0.01)	-0.83	(0.00)	-0.81	(0.00)	-0.75	(0.00)	-0.57	(0.05)	c	c	-0.74	(0.01)	c	c
	United Kingdom	0.83	(0.07)	-0.37	(0.02)	0.11	(0.02)	1.14	(0.07)	2.45	(0.00)	0.55	(0.55)	0.86	(0.07)	-0.31	(0.55)
	United States	0.40	(0.06)	-0.54	(0.01)	-0.24	(0.02)	0.72	(0.04)	1.67	(0.07)	0.38	(0.07)	0.41	(0.06)	-0.03	(0.06)
	OECD average	-0.06	(0.01)	-0.60	(0.00)	-0.41	(0.00)	-0.04	(0.01)	0.83	(0.02)	-0.09	(0.02)	0.05	(0.03)	-0.14	(0.04)
Partners	Albania	-0.60	(0.04)	-0.83	(0.00)	-0.81	(0.00)	-0.68	(0.01)	-0.07	(0.13)	-0.63	(0.05)	-0.56	(0.06)	-0.07	(0.07)
	Argentina	-0.56	(0.04)	-0.81	(0.00)	-0.74	(0.00)	-0.62	(0.01)	-0.06	(0.10)	-0.65	(0.03)	-0.50	(0.05)	**-0.16**	(0.05)
	Azerbaijan	-0.54	(0.02)	-0.78	(0.01)	-0.66	(0.01)	-0.56	(0.00)	-0.17	(0.06)	-0.55	(0.02)	-0.53	(0.03)	-0.02	(0.02)
	Brazil	-0.52	(0.02)	-0.84	(0.00)	-0.83	(0.00)	-0.77	(0.00)	0.36	(0.10)	-0.72	(0.02)	-0.45	(0.03)	**-0.26**	(0.03)
	Bulgaria	1.38	(0.09)	-0.09	(0.05)	0.74	(0.04)	2.41	(0.02)	2.45	(0.00)	1.46	(0.16)	1.37	(0.09)	0.09	(0.18)
	Colombia	-0.29	(0.07)	-0.82	(0.00)	-0.80	(0.00)	-0.67	(0.01)	1.13	(0.18)	-0.40	(0.06)	-0.23	(0.08)	**-0.17**	(0.06)
	Croatia	-0.39	(0.03)	-0.65	(0.01)	-0.49	(0.01)	-0.37	(0.01)	-0.06	(0.08)	c	c	-0.39	(0.03)	c	c
	Dubai (UAE)	0.82	(0.00)	-0.70	(0.00)	0.29	(0.00)	1.25	(0.01)	2.44	(0.00)	0.57	(0.02)	0.88	(0.01)	**-0.31**	(0.02)
	Hong Kong-China	0.20	(0.05)	-0.44	(0.02)	-0.15	(0.01)	-0.03	(0.01)	1.41	(0.15)	0.24	(0.06)	0.18	(0.06)	0.06	(0.05)
	Indonesia	0.04	(0.06)	-0.72	(0.01)	-0.60	(0.01)	-0.05	(0.05)	1.53	(0.09)	-0.07	(0.07)	0.17	(0.12)	-0.25	(0.15)
	Jordan	-0.63	(0.03)	-0.82	(0.00)	-0.80	(0.00)	-0.66	(0.01)	-0.24	(0.10)	-0.63	(0.03)	c	c	c	c
	Kazakhstan	-0.35	(0.05)	-0.65	(0.01)	-0.60	(0.00)	-0.48	(0.01)	0.33	(0.15)	-0.40	(0.04)	-0.15	(0.12)	**-0.25**	(0.12)
	Kyrgyzstan	-0.43	(0.04)	-0.77	(0.01)	-0.63	(0.00)	-0.50	(0.01)	0.20	(0.13)	-0.47	(0.04)	-0.27	(0.08)	**-0.20**	(0.05)
	Latvia	0.05	(0.05)	-0.47	(0.01)	-0.19	(0.01)	-0.04	(0.01)	0.90	(0.13)	0.05	(0.05)	0.09	(0.21)	-0.04	(0.21)
	Liechtenstein	0.15	(0.01)	-0.75	(0.00)	-0.62	(0.00)	0.36	(0.03)	1.61	(0.01)	0.07	(0.02)	c	c	c	c
	Lithuania	-0.28	(0.03)	-0.60	(0.00)	-0.46	(0.01)	-0.34	(0.01)	0.30	(0.10)	-0.28	(0.03)	c	c	c	c
	Macao-China	1.61	(0.00)	0.09	(0.00)	1.43	(0.00)	2.45	(0.00)	2.45	(0.00)	1.64	(0.00)	1.55	(0.00)	**0.09**	(0.01)
	Montenegro	-0.39	(0.00)	-0.60	(0.00)	-0.49	(0.00)	-0.41	(0.00)	-0.05	(0.00)	c	c	-0.38	(0.00)	c	c
	Panama	-0.33	(0.07)	-0.82	(0.00)	-0.76	(0.00)	-0.58	(0.01)	0.82	(0.20)	-0.47	(0.09)	-0.23	(0.14)	-0.25	(0.21)
	Peru	0.02	(0.07)	-0.81	(0.00)	-0.67	(0.01)	-0.48	(0.01)	2.03	(0.12)	-0.37	(0.06)	0.19	(0.09)	**-0.56**	(0.11)
	Qatar	0.27	(0.00)	-0.84	(0.00)	-0.55	(0.00)	0.37	(0.00)	2.09	(0.00)	0.41	(0.01)	0.23	(0.00)	**0.18**	(0.01)
	Romania	-0.75	(0.01)	-0.83	(0.00)	-0.82	(0.00)	-0.76	(0.00)	-0.57	(0.02)	-0.75	(0.01)	c	c	c	c
	Russian Federation	-0.08	(0.05)	-0.59	(0.01)	-0.40	(0.01)	-0.14	(0.01)	0.84	(0.09)	-0.10	(0.00)	-0.02	(0.00)	-0.08	(0.05)
	Serbia	-0.39	(0.03)	-0.63	(0.01)	-0.47	(0.01)	-0.40	(0.01)	-0.04	(0.08)	-0.54	(0.04)	-0.38	(0.03)	**-0.15**	(0.05)
	Shanghai-China	0.83	(0.07)	-0.35	(0.02)	0.10	(0.04)	1.21	(0.04)	2.36	(0.03)	0.78	(0.09)	0.86	(0.10)	-0.08	(0.13)
	Singapore	-0.43	(0.01)	-0.76	(0.00)	-0.62	(0.00)	-0.51	(0.00)	0.17	(0.04)	-0.52	(0.03)	-0.42	(0.01)	**-0.10**	(0.03)
	Chinese Taipei	0.05	(0.06)	-0.70	(0.01)	-0.47	(0.01)	-0.21	(0.02)	1.57	(0.14)	-0.39	(0.05)	0.28	(0.08)	**-0.68**	(0.07)
	Thailand	0.28	(0.07)	-0.59	(0.01)	-0.37	(0.01)	0.07	(0.03)	1.99	(0.10)	0.05	(0.12)	0.35	(0.08)	**-0.29**	(0.13)
	Trinidad and Tobago	-0.50	(0.00)	-0.77	(0.00)	-0.66	(0.00)	-0.61	(0.00)	0.02	(0.01)	-0.51	(0.01)	-0.50	(0.00)	0.00	(0.01)
	Tunisia	-0.71	(0.01)	-0.81	(0.00)	-0.75	(0.00)	-0.74	(0.00)	-0.53	(0.03)	-0.65	(0.01)	-0.75	(0.01)	**0.10**	(0.02)
	Uruguay	-0.51	(0.03)	-0.84	(0.00)	-0.77	(0.00)	-0.72	(0.00)	0.27	(0.13)	-0.70	(0.01)	-0.39	(0.05)	**-0.31**	(0.05)

Note: Values that are statistically significant are indicated in bold.
Source: OECD, *PISA 2009 Database*.

Table 2.16b **Index of school responsibility for resource allocation and reading performance, by national quarters of this index**
Results based on school principals' reports

		Index of school responsibility for resource allocation													
		In general programmes		In vocational programmes		Difference between general and vocational programmes		In public schools		In private schools		Difference between public and private schools		Variability in the index of school responsibility for resource allocation	
		Mean index	S.E.	Mean index	S.E.	Dif.	S.E.	Mean index	S.E.	Mean index	S.E.	Dif.	S.E.	Standard deviation	S.E.
OECD	Australia	-0.02	(0.04)	-0.55	(0.07)	**0.53**	(0.09)	-0.50	(0.01)	0.59	(0.09)	**-1.08**	(0.09)	0.89	(0.05)
	Austria	-0.67	(0.01)	-0.59	(0.03)	**-0.08**	(0.03)	-0.64	(0.01)	-0.41	(0.13)	-0.24	(0.13)	0.30	(0.08)
	Belgium	-0.40	(0.01)	-0.32	(0.02)	**-0.08**	(0.02)	-0.46	(0.03)	-0.32	(0.01)	**-0.14**	(0.03)	0.31	(0.03)
	Canada	a	a	a	a	a	a	-0.49	(0.01)	0.87	(0.18)	**-1.37**	(0.18)	0.55	(0.05)
	Chile	0.46	(0.07)	0.34	(0.16)	0.12	(0.14)	-0.66	(0.03)	1.25	(0.10)	**-1.91**	(0.11)	1.23	(0.04)
	Czech Republic	1.13	(0.09)	1.11	(0.14)	0.03	(0.16)	1.11	(0.08)	1.66	(0.41)	-0.55	(0.42)	1.17	(0.02)
	Denmark	0.18	(0.06)	c	c	c	c	-0.04	(0.05)	0.93	(0.19)	**-0.96**	(0.19)	0.90	(0.06)
	Estonia	-0.05	(0.05)	c	c	c	c	-0.07	(0.04)	0.87	(0.45)	**-0.94**	(0.45)	0.59	(0.08)
	Finland	-0.39	(0.03)	c	c	c	c	-0.44	(0.03)	0.93	(0.55)	**-1.37**	(0.56)	0.50	(0.04)
	France	w	w	w	w	w	w	w	w	w	w	w	w	w	w
	Germany	-0.53	(0.03)	-0.46	(0.09)	-0.07	(0.10)	-0.60	(0.02)	0.77	(0.39)	**-1.36**	(0.39)	0.49	(0.09)
	Greece	-0.76	(0.01)	-0.80	(0.01)	**0.04**	(0.01)	-0.78	(0.01)	-0.65	(0.04)	**-0.13**	(0.04)	0.08	(0.01)
	Hungary	0.81	(0.10)	0.90	(0.18)	-0.08	(0.21)	0.72	(0.10)	1.54	(0.24)	**-0.82**	(0.27)	1.17	(0.03)
	Iceland	-0.06	(0.00)	c	c	c	c	-0.08	(0.00)	c	c	c	c	0.50	(0.01)
	Ireland	-0.42	(0.02)	c	c	c	c	-0.60	(0.03)	-0.32	(0.02)	**-0.28**	(0.03)	0.24	(0.02)
	Israel	-0.25	(0.05)	c	c	c	c	-0.43	(0.04)	0.58	(0.22)	**-1.01**	(0.22)	0.75	(0.10)
	Italy	-0.62	(0.03)	-0.69	(0.02)	0.07	(0.04)	-0.76	(0.01)	0.93	(0.23)	**-1.69**	(0.23)	0.52	(0.05)
	Japan	**-0.57**	**(0.06)**	**0.92**	**(0.17)**	**-1.49**	**(0.18)**	**-0.67**	**(0.00)**	**0.99**	**(0.00)**	**-1.66**	**(0.18)**	**1.01**	**(0.07)**
	Korea	-0.41	(0.08)	-0.52	(0.08)	0.10	(0.11)	-0.73	(0.01)	0.06	(0.15)	**-0.80**	(0.15)	0.75	(0.11)
	Luxembourg	-0.25	(0.00)	-0.31	(0.01)	**0.05**	(0.01)	-0.60	(0.00)	1.59	(0.00)	**-2.18**	(0.00)	0.84	(0.00)
	Mexico	-0.37	(0.04)	-0.40	(0.03)	0.03	(0.05)	-0.59	(0.01)	1.29	(0.12)	**-1.88**	(0.12)	0.77	(0.04)
	Netherlands	1.35	(0.10)	1.06	(0.56)	0.29	(0.58)	1.26	(0.14)	1.32	(0.14)	-0.06	(0.20)	1.04	(0.03)
	New Zealand	0.11	(0.04)	c	c	c	c	0.01	(0.04)	1.88	(0.33)	**-1.86**	(0.33)	0.72	(0.06)
	Norway	-0.23	(0.04)	c	c	c	c	-0.25	(0.04)	c	c	c	c	0.60	(0.08)
	Poland	-0.36	(0.02)	c	c	c	c	-0.41	(0.02)	1.58	(0.25)	**-1.99**	(0.25)	0.44	(0.06)
	Portugal	-0.52	(0.04)	0.15	(0.28)	**-0.67**	(0.27)	-0.65	(0.01)	0.80	(0.31)	**-1.46**	(0.31)	0.71	(0.11)
	Slovak Republic	0.50	(0.12)	0.35	(0.23)	0.15	(0.26)	0.45	(0.09)	0.99	(0.34)	-0.54	(0.36)	1.12	(0.06)
	Slovenia	-0.14	(0.02)	-0.13	(0.00)	0.00	(0.02)	-0.14	(0.01)	0.18	(0.01)	**-0.33**	(0.02)	0.58	(0.02)
	Spain	-0.47	(0.03)	c	c	c	c	-0.74	(0.01)	0.06	(0.07)	**-0.80**	(0.07)	0.58	(0.06)
	Sweden	0.81	(0.07)	c	c	c	c	0.65	(0.08)	2.28	(0.07)	**-1.63**	(0.11)	1.12	(0.03)
	Switzerland	-0.18	(0.06)	-0.19	(0.21)	0.01	(0.22)	-0.31	(0.03)	1.13	(0.33)	**-1.44**	(0.33)	0.73	(0.10)
	Turkey	-0.73	(0.02)	-0.75	(0.01)	0.03	(0.03)	-0.75	(0.01)	c	c	c	c	0.21	(0.07)
	United Kingdom	0.86	(0.07)	c	c	**c**	c	0.78	(0.08)	2.08	(0.12)	**-1.30**	(0.15)	1.14	(0.03)
	United States	0.40	(0.06)	c	c	c	c	0.34	(0.06)	1.09	(0.29)	**-0.75**	(0.29)	0.92	(0.04)
	OECD average	-0.06	(0.01)	-0.05	(0.04)	-0.05	(0.04)	-0.21	(0.01)	0.88	(0.04)	**-1.08**	(0.05)	0.71	(0.01)
Partners	Albania	-0.61	(0.03)	-0.42	(0.22)	-0.19	(0.21)	-0.73	(0.01)	0.49	(0.26)	**-1.22**	(0.26)	0.54	(0.10)
	Argentina	-0.54	(0.04)	-0.68	(0.03)	**0.14**	(0.05)	-0.71	(0.01)	-0.28	(0.10)	**-0.43**	(0.10)	0.41	(0.07)
	Azerbaijan	-0.54	(0.02)	-0.50	(0.11)	-0.05	(0.11)	-0.55	(0.02)	c	c	c	c	0.32	(0.05)
	Brazil	-0.52	(0.02)	c	c	c	c	-0.78	(0.01)	1.33	(0.15)	**-2.11**	(0.15)	0.79	(0.05)
	Bulgaria	1.28	(0.10)	1.54	(0.18)	-0.26	(0.23)	1.36	(0.09)	c	c	c	c	1.12	(0.03)
	Colombia	-0.26	(0.07)	-0.41	(0.20)	0.15	(0.20)	-0.71	(0.03)	1.48	(0.22)	**-2.20**	(0.22)	1.05	(0.08)
	Croatia	-0.30	(0.08)	-0.43	(0.02)	0.13	(0.09)	-0.43	(0.01)	c	c	c	c	0.36	(0.08)
	Dubai (UAE)	0.82	(0.00)	c	c	c	c	-0.71	(0.00)	1.23	(0.00)	**-1.94**	(0.00)	1.20	(0.00)
	Hong Kong-China	0.20	(0.05)	c	c	c	c	-0.53	(0.05)	0.26	(0.06)	**-0.79**	(0.08)	0.88	(0.06)
	Indonesia	-0.04	(0.06)	0.53	(0.28)	**-0.57**	(0.29)	-0.60	(0.02)	0.90	(0.11)	**-1.51**	(0.11)	0.98	(0.05)
	Jordan	-0.63	(0.03)	c	c	c	c	-0.73	(0.01)	-0.19	(0.14)	**-0.55**	(0.14)	0.44	(0.09)
	Kazakhstan	-0.39	(0.05)	0.12	(0.30)	-0.51	(0.30)	-0.42	(0.04)	1.62	(0.53)	**-2.04**	(0.53)	0.66	(0.09)
	Kyrgyzstan	-0.45	(0.04)	0.41	(0.28)	**-0.86**	(0.28)	-0.50	(0.03)	1.96	(0.34)	**-2.46**	(0.33)	0.60	(0.09)
	Latvia	0.05	(0.05)	c	c	c	c	0.05	(0.05)	c	c	c	c	0.66	(0.07)
	Liechtenstein	0.15	(0.01)	c	c	c	c	0.07	(0.01)	c	c	c	c	1.01	(0.01)
	Lithuania	-0.28	(0.03)	c	c	c	c	-0.28	(0.03)	c	c	c	c	0.49	(0.07)
	Macao-China	1.61	(0.00)	c	c	c	c	-0.66	(0.00)	1.70	(0.00)	c	c	1.02	(0.00)
	Montenegro	-0.35	(0.01)	-0.41	(0.00)	**0.06**	(0.01)	-0.39	(0.00)	c	c	c	c	0.25	(0.00)
	Panama	-0.33	(0.07)	c	c	c	c	-0.71	(0.02)	0.97	(0.21)	**-1.68**	(0.21)	0.87	(0.09)
	Peru	0.02	(0.07)	c	c	c	c	-0.56	(0.04)	2.07	(0.12)	**-2.63**	(0.13)	1.25	(0.05)
	Qatar	0.27	(0.00)	c	c	c	c	0.07	(0.00)	0.54	(0.01)	**-0.47**	(0.01)	1.18	(0.00)
	Romania	-0.75	(0.01)	-0.72	(0.02)	-0.03	(0.03)	-0.75	(0.01)	c	c	c	c	0.13	(0.01)
	Russian Federation	-0.09	(0.00)	0.16	(0.00)	-0.24	(0.16)	-0.08	(0.05)	c	c	c	c	0.69	(0.06)
	Serbia	-0.43	(0.04)	-0.41	(0.02)	-0.02	(0.04)	-0.40	(0.02)	c	c	c	c	0.33	(0.09)
	Shanghai-China	0.71	(0.08)	1.26	(0.14)	**-0.55**	(0.16)	0.69	(0.07)	1.99	(0.16)	**-1.30**	(0.18)	1.08	(0.03)
	Singapore	-0.43	(0.01)	c	c	c	c	-0.44	(0.00)	c	c	c	c	0.63	(0.02)
	Chinese Taipei	-0.18	(0.07)	0.40	(0.10)	**-0.58**	(0.12)	-0.49	(0.02)	1.00	(0.16)	**-1.49**	(0.16)	1.02	(0.06)
	Thailand	0.11	(0.08)	0.89	(0.20)	**-0.78**	(0.20)	-0.02	(0.07)	1.73	(0.21)	**-1.75**	(0.23)	1.07	(0.05)
	Trinidad and Tobago	-0.49	(0.00)	-0.59	(0.00)	**0.10**	(0.00)	-0.63	(0.00)	0.54	(0.01)	**-1.17**	(0.01)	0.56	(0.00)
	Tunisia	-0.71	(0.01)	c	c	c	c	-0.74	(0.01)	1.19	(0.64)	**-1.93**	(0.64)	0.29	(0.05)
	Uruguay	-0.51	(0.04)	-0.76	(0.01)	**0.26**	(0.04)	-0.76	(0.00)	0.61	(0.17)	**-1.37**	(0.17)	0.64	(0.08)

Note: Values that are statistically significant are indicated in bold.
Source: OECD, *PISA 2009 Database*.

Table 2.16c **Index of school responsibility for resource allocation and reading performance, by national quarters of this index**
Results based on school principals' reports

		Performance on the reading scale by national quarters of this index								Change in the reading score per unit of this index		Increased likelihood of students in the bottom quarter of this index scoring in the bottom quarter of the national reading performance distribution		Explained variance in student performance (r-squared X 100)	
		Bottom quarter		Second quarter		Third quarter		Top quarter							
		Mean score	S.E.	Mean score	S.E.	Mean score	S.E.	Mean score	S.E.	Effect	S.E.	Ratio	S.E.	%	S.E.
OECD	Australia	**498**	(5.3)	503	(5.2)	517	(3.5)	**541**	(4.3)	**20.5**	(2.29)	**1.4**	(0.09)	3.4	(0.70)
	Austria	**489**	(9.1)	446	(9.5)	479	(8.8)	**465**	(8.3)	-13.1	(9.71)	**0.7**	(0.13)	0.2	(0.24)
	Belgium	**480**	(8.4)	507	(7.0)	517	(4.3)	**519**	(5.5)	36.6	(18.93)	**1.6**	(0.17)	1.2	(1.18)
	Canada	**516**	(3.3)	523	(3.1)	523	(3.3)	**535**	(3.5)	**17.5**	(2.92)	**1.1**	(0.07)	1.1	(0.45)
	Chile	**415**	(6.6)	438	(7.0)	467	(6.1)	**477**	(5.9)	**18.8**	(2.72)	**2.0**	(0.23)	7.9	(2.20)
	Czech Republic	**494**	(7.0)	461	(8.0)	476	(5.1)	**478**	(6.3)	-1.5	(3.65)	**0.7**	(0.12)	0.0	(0.25)
	Denmark	493	(4.5)	491	(3.1)	494	(4.5)	502	(5.3)	6.0	(3.32)	1.0	(0.09)	0.4	(0.47)
	Estonia	493	(5.4)	508	(4.8)	499	(5.1)	503	(7.0)	-5.5	(5.86)	1.2	(0.13)	0.2	(0.33)
	Finland	**529**	(4.4)	533	(4.2)	536	(4.6)	**546**	(5.1)	7.2	(7.79)	1.1	(0.10)	0.2	(0.40)
	France	w	w	w	w	w	w	w	w	w	w	w	w	w	w
	Germany	**483**	(8.1)	493	(8.1)	506	(7.6)	**508**	(6.1)	9.0	(5.22)	**1.4**	(0.18)	0.2	(0.24)
	Greece	**477**	(6.8)	475	(8.1)	475	(7.1)	**503**	(6.5)	**170.1**	(32.30)	1.1	(0.13)	2.3	(0.92)
	Hungary	507	(9.3)	490	(10.7)	485	(9.7)	495	(9.0)	-2.0	(4.48)	0.8	(0.17)	0.1	(0.52)
	Iceland	**501**	(2.7)	496	(4.2)	502	(3.6)	**493**	(3.6)	0.0	(3.14)	1.0	(0.08)	0.0	(0.03)
	Ireland	**475**	(8.2)	487	(9.5)	508	(5.7)	**506**	(7.3)	**58.1**	(16.79)	**1.4**	(0.21)	2.1	(1.27)
	Israel	**448**	(10.6)	470	(10.0)	478	(10.3)	**502**	(8.7)	13.8	(8.65)	**1.5**	(0.23)	0.9	(1.22)
	Italy	**492**	(3.7)	488	(3.6)	488	(5.8)	**476**	(4.6)	**-13.8**	(5.24)	**0.9**	(0.07)	0.6	(0.40)
	Japan	523	(5.5)	513	(6.7)	508	(12.8)	535	(9.0)	2.2	(5.78)	0.9	(0.11)	0.0	(0.43)
	Korea	**534**	(6.5)	534	(8.3)	538	(9.9)	**551**	(6.8)	**13.2**	(4.19)	1.1	(0.19)	1.6	(1.05)
	Luxembourg	**432**	(2.7)	458	(3.2)	503	(2.7)	**496**	(2.3)	**7.9**	(1.23)	**1.9**	(0.09)	0.4	(0.13)
	Mexico	**392**	(5.0)	410	(3.9)	438	(3.6)	**461**	(2.7)	**23.4**	(2.71)	**1.9**	(0.13)	4.6	(0.80)
	Netherlands	501	(13.7)	510	(9.5)	506	(7.4)	515	(9.7)	3.1	(5.65)	1.4	(0.27)	0.1	(0.62)
	New Zealand	512	(6.5)	523	(4.4)	524	(4.7)	525	(5.5)	6.1	(4.91)	1.2	(0.11)	0.2	(0.33)
	Norway	503	(4.5)	496	(4.7)	504	(4.5)	508	(4.9)	2.5	(4.38)	1.0	(0.09)	0.0	(0.11)
	Poland	497	(6.0)	509	(5.8)	497	(4.7)	498	(5.4)	**10.6**	(4.99)	1.0	(0.12)	0.3	(0.24)
	Portugal	490	(5.9)	491	(5.7)	480	(6.6)	496	(6.6)	8.8	(6.44)	0.9	(0.12)	0.5	(0.73)
	Slovak Republic	**456**	(7.3)	484	(7.5)	488	(8.8)	**482**	(10.3)	4.0	(4.78)	**1.5**	(0.19)	0.3	(0.53)
	Slovenia	**478**	(2.4)	484	(3.0)	505	(2.7)	**465**	(3.7)	**-11.5**	(3.23)	1.0	(0.06)	0.5	(0.32)
	Spain	**469**	(3.8)	466	(3.7)	482	(4.5)	**507**	(4.4)	**24.8**	(3.52)	**1.3**	(0.09)	2.7	(0.55)
	Sweden	**484**	(5.9)	490	(6.1)	502	(6.7)	**514**	(5.4)	**11.6**	(2.64)	**1.3**	(0.14)	1.7	(0.78)
	Switzerland	488	(6.3)	517	(7.4)	506	(5.1)	490	(7.2)	-3.8	(6.40)	1.2	(0.13)	0.1	(0.35)
	Turkey	469	(7.1)	461	(7.3)	465	(8.2)	461	(7.8)	24.4	(12.49)	0.9	(0.14)	0.4	(0.57)
	United Kingdom	493	(4.5)	486	(7.5)	507	(6.2)	497	(5.8)	3.6	(2.57)	1.0	(0.10)	0.2	(0.28)
	United States	495	(7.8)	494	(7.0)	505	(6.0)	506	(7.8)	3.2	(4.83)	1.1	(0.11)	0.1	(0.30)
	OECD average	**485**	(1.2)	489	(1.2)	497	(1.1)	**502**	(1.1)	**13.8**	(1.53)	**1.2**	(0.02)	1.0	(0.12)
Partners	Albania	**381**	(6.2)	373	(6.5)	377	(10.1)	**409**	(7.7)	**18.0**	(8.66)	1.0	(0.11)	0.9	(0.64)
	Argentina	**359**	(11.3)	374	(9.8)	407	(10.6)	**452**	(11.5)	**77.0**	(13.96)	**1.7**	(0.27)	8.5	(2.23)
	Azerbaijan	368	(7.2)	367	(6.4)	358	(9.0)	352	(6.9)	-18.2	(10.13)	0.8	(0.16)	0.6	(0.74)
	Brazil	**394**	(3.5)	395	(3.8)	401	(5.1)	**457**	(7.3)	**45.7**	(2.60)	**1.2**	(0.08)	14.8	(1.74)
	Bulgaria	**451**	(10.9)	427	(11.9)	420	(12.4)	**418**	(13.8)	-12.6	(7.06)	**0.7**	(0.13)	1.5	(1.77)
	Colombia	**394**	(6.5)	397	(6.4)	406	(6.3)	**455**	(9.4)	**23.9**	(3.42)	**1.4**	(0.15)	8.4	(1.99)
	Croatia	484	(7.1)	489	(7.4)	467	(5.9)	463	(10.5)	-3.4	(15.71)	**0.7**	(0.13)	0.0	(0.36)
	Dubai (UAE)	**392**	(1.8)	478	(2.4)	497	(2.7)	**470**	(2.5)	**24.8**	(0.93)	**2.6**	(0.11)	7.8	(0.56)
	Hong Kong-China	**541**	(7.3)	538	(5.6)	532	(7.0)	**522**	(6.9)	-9.1	(4.80)	0.9	(0.14)	0.9	(0.93)
	Indonesia	411	(7.5)	405	(7.8)	396	(6.3)	394	(6.6)	-6.0	(3.51)	0.8	(0.14)	0.8	(0.92)
	Jordan	400	(6.9)	404	(6.2)	407	(6.2)	408	(6.7)	9.5	(12.17)	1.1	(0.15)	0.2	(0.59)
	Kazakhstan	395	(5.7)	390	(5.5)	384	(8.2)	392	(8.2)	**13.0**	(6.58)	0.9	(0.11)	0.9	(0.88)
	Kyrgyzstan	**293**	(7.6)	322	(7.0)	310	(7.1)	**332**	(9.6)	**26.5**	(11.89)	1.3	(0.18)	2.6	(2.34)
	Latvia	489	(7.1)	478	(5.8)	491	(5.7)	478	(5.1)	-2.9	(4.36)	0.9	(0.14)	0.1	(0.21)
	Liechtenstein	**466**	(7.2)	442	(7.1)	522	(7.1)	**568**	(7.1)	**47.4**	(3.37)	1.7	(0.38)	33.6	(3.66)
	Lithuania	468	(6.8)	480	(5.5)	469	(6.0)	456	(6.0)	-10.7	(7.49)	1.1	(0.14)	0.4	(0.50)
	Macao-China	**490**	(1.6)	496	(1.6)	480	(2.1)	**482**	(2.0)	**-1.7**	(0.79)	1.0	(0.05)	0.1	(0.05)
	Montenegro	**398**	(2.8)	403	(5.6)	418	(2.7)	**412**	(2.0)	1.3	(4.92)	1.2	(0.09)	0.0	(0.02)
	Panama	**357**	(10.5)	331	(13.1)	352	(9.7)	**443**	(14.2)	**42.9**	(6.91)	1.1	(0.23)	14.2	(6.12)
	Peru	**351**	(6.6)	343	(6.5)	354	(10.1)	**431**	(9.1)	**28.4**	(3.51)	1.2	(0.16)	13.1	(3.00)
	Qatar	**373**	(1.5)	361	(1.8)	376	(1.8)	**377**	(1.9)	**4.4**	(0.75)	**0.6**	(0.03)	0.2	(0.07)
	Romania	414	(9.6)	426	(7.5)	429	(8.0)	429	(12.1)	31.2	(55.54)	1.3	(0.21)	0.2	(0.81)
	Russian Federation	450	(6.9)	464	(4.6)	461	(6.7)	462	(7.7)	1.1	(5.77)	1.2	(0.12)	0.0	(0.16)
	Serbia	444	(7.6)	440	(6.2)	438	(5.5)	445	(8.4)	-13.8	(13.79)	1.0	(0.17)	0.3	(0.61)
	Shanghai-China	555	(7.5)	564	(6.5)	551	(7.2)	553	(7.1)	-4.2	(3.71)	1.0	(0.16)	0.3	(0.60)
	Singapore	**516**	(2.3)	508	(2.3)	521	(2.9)	**558**	(2.9)	**35.5**	(3.22)	**1.2**	(0.06)	5.3	(0.82)
	Chinese Taipei	**503**	(6.0)	508	(6.7)	503	(6.9)	**466**	(6.4)	**-16.0**	(3.67)	**0.8**	(0.10)	3.6	(1.46)
	Thailand	411	(6.2)	425	(6.1)	436	(6.2)	414	(7.7)	-3.3	(3.09)	1.2	(0.15)	0.2	(0.46)
	Trinidad and Tobago	**409**	(2.2)	410	(3.7)	416	(3.7)	**449**	(2.4)	**19.2**	(1.84)	**1.2**	(0.07)	0.9	(0.17)
	Tunisia	408	(6.7)	410	(5.6)	411	(5.7)	386	(11.7)	**-34.0**	(9.60)	0.8	(0.14)	1.4	(0.43)
	Uruguay	**399**	(5.8)	407	(6.6)	415	(4.1)	**482**	(5.7)	**46.9**	(6.76)	**1.5**	(0.15)	9.2	(1.57)

Note: Values that are statistically significant are indicated in bold.
Source: OECD, *PISA 2009 Database*.

Table 2.17a Within and between school variation in reading performance and variation explained by school governance

		Variance		Remaining variance						Variance decomposition expressed as a percentage of the average variance in student performance in reading across OECD countries		
		Empty (or fully unconditional) model[1]		Model with demographic and socio-economic background[2]		Model with school policies and practices[3]		Model with demographic and socio-economic background and with school policies and practices[4]		Total variance in student performance	Total variance within schools as a percentage of total variance	Total variance between schools as a percentage of total variance
		Within-school	Between-school	Within-school	Between-school	Within-school	Between-school	Within-school	Between-school	%	%	%
OECD	Australia	7 631	2 692	6 997	880	7 702	1 849	6 998	847	112	83	29
	Austria	4 454	5 588	4 255	2 262	4 434	5 707	4 257	2 221	108	48	60
	Belgium	4 833	5 343	4 612	1 643	4 832	6 195	4 610	1 470	111	53	58
	Canada	6 780	1 877	6 238	986	6 784	1 582	6 233	940	94	74	20
	Chile	4 005	4 893	3 886	1 219	4 002	2 928	3 883	1 055	97	44	53
	Czech Republic	4 428	4 249	4 136	1 135	4 456	3 823	4 136	1 100	94	48	46
	Denmark	6 012	1 134	5 254	328	6 009	1 085	5 254	311	78	65	12
	Estonia	5 595	1 557	4 991	681	5 595	1 385	4 986	644	78	61	17
	Finland	6 993	665	5 641	458	6 994	609	5 645	445	83	76	7
	France	w	w	w	w	w	w	w	w	w	w	w
	Germany	3 890	5 890	3 558	1 708	3 868	4 193	3 563	1 474	106	42	64
	Greece	5 558	4 745	5 126	2 165	5 552	4 068	5 120	2 040	112	60	52
	Hungary	2 923	5 846	2 792	1 717	2 923	5 513	2 791	1 719	95	32	64
	Iceland	8 186	1 348	7 186	1 015	8 186	1 282	7 198	918	104	89	15
	Ireland	6 966	2 805	6 408	1 145	7 001	1 983	6 402	1 003	106	76	30
	Israel	6 615	6 250	6 312	3 230	6 648	6 550	6 320	3 251	140	72	68
	Italy	4 085	6 695	3 905	2 880	4 084	6 332	3 904	2 814	117	44	73
	Japan	5 386	5 087	5 248	2 255	5 420	5 486	5 252	1 797	114	59	55
	Korea	5 283	2 741	4 829	1 038	5 290	2 348	4 828	846	87	57	30
	Luxembourg	6 906	5 335	6 112	610	6 952	3 274	6 106	567	133	75	58
	Mexico	3 869	3 583	3 723	1 964	3 884	2 689	3 724	1 920	81	42	39
	Netherlands	2 795	5 107	2 670	2 224	2 795	4 821	2 670	2 034	86	30	55
	New Zealand	8 228	2 622	6 974	530	8 235	2 263	6 982	493	118	89	28
	Norway	7 598	874	6 455	669	7 585	833	6 440	634	92	83	9
	Poland	6 869	1 585	5 582	458	6 869	1 212	5 594	439	92	75	17
	Portugal	5 191	2 565	4 666	883	5 197	2 252	4 663	836	84	56	28
	Slovak Republic	4 565	2 989	3 972	1 151	4 566	2 815	3 973	1 148	82	50	32
	Slovenia	3 102	4 142	2 941	1 818	3 084	4 049	2 940	1 690	79	34	45
	Spain	6 048	1 690	5 390	816	6 053	1 323	5 393	796	84	66	18
	Sweden	8 290	1 877	7 007	605	8 280	1 558	7 017	590	110	90	20
	Switzerland	5 652	2 740	5 115	1 100	5 667	2 343	5 118	942	91	61	30
	Turkey	3 245	6 536	2 958	1 375	3 247	3 872	2 959	1 182	106	35	71
	United Kingdom	6 684	2 775	6 275	635	6 731	2 078	6 282	579	103	73	30
	United States	6 476	3 638	6 041	838	6 514	2 136	6 033	823	110	70	40
	OECD average	5 591	3 616	5 054	1 318	5 619	3 043	5 069	1 199	100	61	39
Partners	Albania	7 105	3 127	6 150	1 339	7 116	2 129	6 152	1 291	111	77	34
	Argentina	5 523	8 456	5 201	3 238	5 520	5 434	5 195	2 692	152	60	92
	Azerbaijan	3 459	2 490	3 287	2 054	3 464	2 306	3 288	1 989	65	38	27
	Brazil	4 702	4 417	4 514	1 770	4 727	2 829	4 510	1 637	99	51	48
	Bulgaria	6 439	6 418	5 794	2 053	6 437	5 366	5 787	1 804	140	70	70
	Colombia	4 813	3 162	4 711	688	4 845	2 079	4 710	574	87	52	34
	Croatia	4 473	4 045	4 183	1 391	4 488	3 602	4 176	1 013	93	49	44
	Dubai (UAE)	5 439	5 732	5 121	2 472	5 411	4 256	5 101	2 160	121	59	62
	Hong Kong-China	4 360	3 143	4 183	1 270	4 355	2 822	4 183	1 185	82	47	34
	Indonesia	2 298	1 749	2 117	1 181	2 301	1 656	2 117	1 173	44	25	19
	Jordan	5 461	3 312	5 186	1 727	5 487	2 915	5 194	1 423	95	59	36
	Kazakhstan	5 078	2 887	4 456	1 542	5 079	2 661	4 453	1 483	87	55	31
	Kyrgyzstan	5 901	3 266	5 126	1 398	5 922	2 259	5 119	1 208	100	64	35
	Latvia	5 200	1 391	4 491	634	5 201	1 336	4 490	596	72	57	15
	Lithuania	5 190	1 864	4 263	828	5 189	1 826	4 267	783	77	56	20
	Macao-China	4 179	2 882	4 000	775	4 188	1 916	3 992	670	77	45	31
	Montenegro	5 587	3 150	5 124	683	5 596	2 892	5 119	545	95	61	34
	Panama	4 213	5 942	4 103	2 647	4 200	4 206	4 101	2 343	110	46	65
	Peru	4 623	5 886	4 524	1 316	4 619	3 126	4 520	1 209	114	50	64
	Qatar	5 891	6 676	5 520	3 383	5 887	6 309	5 505	3 053	137	64	73
	Romania	3 832	4 057	3 678	2 308	3 810	3 860	3 682	2 183	86	42	44
	Russian Federation	5 826	1 965	5 193	900	5 837	1 874	5 193	903	85	63	21
	Serbia	4 123	3 909	3 954	1 840	4 121	3 123	3 955	1 789	87	45	42
	Shanghai-China	4 095	2 551	3 813	701	4 119	2 115	3 814	611	72	44	28
	Singapore	6 195	3 387	5 612	782	6 227	2 972	5 624	725	104	67	37
	Chinese Taipei	5 808	2 772	5 070	1 306	5 857	2 413	5 073	1 036	93	63	30
	Thailand	3 052	1 231	2 706	816	3 053	1 180	2 709	726	47	33	13
	Trinidad and Tobago	5 148	8 320	4 720	2 527	5 125	7 706	4 720	2 473	146	56	90
	Tunisia	4 291	3 034	4 174	1 640	4 311	2 474	4 173	1 424	80	47	33
	Uruguay	5 835	4 807	5 342	968	5 877	2 248	5 335	922	116	63	52

1. Multilevel regression model consists of the student- and school-levels.
2. Multilevel regression model: Reading performance is regressed on the variables of demographic and socio-economic background.
3. Multilevel regression model: Reading performance is regressed on the variables of school policies and practices.
4. Multilevel regression model: Reading performance is regressed on the variables of demographic and socio-economic background and on the variables of school policies and practices.
Source: OECD, *PISA 2009 Database*.

Table 2.17b Within and between school variation in reading performance and variation explained by school governance

		Within-school variance expressed as a percentage of the average of within-school variance in student performance in reading across OECD countries				Between-school variance expressed as a percentage of the average of between-school variance in student performance in reading across OECD countries			
		Solely accounted for by students' and schools' socio-economic and demographic background	Solely accounted for by school school governance	Jointly accounted for by students' and schools' socio-economic and demographic background and school governance	Remaining within-school variance	Solely accounted for by students' and schools' socio-economic and demographic background	Solely accounted for by school school governance	Jointly accounted for by students' and schools' socio-economic and demographic background and school governance	Remaining between-school variance
		%	%	%	%	%	%	%	%
OECD	Australia	7.6	0.0	-0.8	76.0	10.9	0.4	8.8	9.2
	Austria	1.9	0.0	0.2	46.2	37.9	0.4	-1.7	24.1
	Belgium	2.4	-0.1	0.0	50.2	50.6	1.8	-10.2	15.9
	Canada	6.0	0.0	-0.1	67.7	6.9	0.5	2.8	10.2
	Chile	1.3	0.0	0.0	42.2	20.3	1.9	19.5	11.4
	Czech Republic	3.5	0.0	-0.3	44.9	29.5	0.4	4.2	12.0
	Denmark	8.2	0.0	0.0	57.0	8.3	0.2	0.4	3.4
	Estonia	6.7	0.0	-0.1	54.1	7.9	0.4	1.5	7.1
	Finland	14.6	-0.1	0.0	61.4	1.8	0.1	0.4	4.9
	France	w	w	w	w	w	w	w	w
	Germany	3.3	0.0	0.3	38.7	30.3	2.5	14.6	16.6
	Greece	4.7	0.1	0.0	55.6	22.4	0.6	5.8	22.7
	Hungary	1.5	-0.1	-0.1	30.4	41.1	0.0	3.6	18.8
	Iceland	10.8	0.0	0.1	78.1	4.1	1.1	-0.5	10.0
	Ireland	6.7	0.1	-0.4	69.3	10.7	1.5	7.5	10.8
	Israel	3.5	0.2	-0.2	68.4	36.6	-0.3	-3.0	34.6
	Italy	1.9	-0.1	0.0	42.5	39.5	0.6	2.5	30.1
	Japan	1.8	0.0	-0.3	57.0	39.8	5.0	-9.3	19.7
	Korea	5.1	0.0	-0.1	52.3	16.5	2.0	2.2	9.0
	Luxembourg	9.2	0.1	-0.6	66.3	29.3	0.4	22.0	6.3
	Mexico	1.7	0.0	-0.2	40.4	8.3	0.5	9.2	20.9
	Netherlands	1.4	0.0	0.0	29.0	31.3	2.0	1.1	21.0
	New Zealand	13.4	-0.1	0.0	76.0	19.5	0.4	3.4	5.2
	Norway	12.4	0.2	0.0	70.0	2.1	0.3	0.1	6.9
	Poland	13.8	-0.2	0.1	60.9	8.2	0.2	4.0	4.8
	Portugal	5.8	0.0	-0.1	50.7	15.5	0.5	2.8	9.0
	Slovak Republic	6.5	0.0	0.0	43.1	18.5	0.0	1.7	12.2
	Slovenia	1.6	0.0	0.2	31.9	25.5	1.4	-0.4	18.5
	Spain	7.2	-0.1	-0.1	58.6	5.8	0.2	3.7	8.6
	Sweden	13.7	-0.2	0.3	76.2	10.2	0.1	3.7	6.4
	Switzerland	6.1	-0.1	-0.2	55.6	15.2	1.7	2.5	10.4
	Turkey	3.1	0.1	0.0	32.0	29.6	2.0	27.0	12.4
	United Kingdom	5.1	0.0	-0.5	68.0	16.2	0.6	7.1	6.2
	United States	5.3	0.0	-0.5	65.6	13.9	0.2	16.2	9.2
	OECD average	6.0	0.0	-0.1	55.0	20.1	0.9	4.6	13.0
Partners	Albania	10.6	0.2	-0.2	66.6	9.1	0.4	10.3	14.2
	Argentina	3.5	-0.3	0.0	56.7	35.5	5.3	21.4	29.8
	Azerbaijan	1.9	0.2	-0.1	35.5	3.9	0.0	0.8	22.3
	Brazil	2.3	0.0	-0.3	49.0	13.1	1.4	15.8	17.7
	Bulgaria	7.2	0.1	-0.2	62.9	38.9	2.9	8.5	19.4
	Colombia	1.5	0.0	-0.4	51.1	16.3	1.2	10.5	6.3
	Croatia	3.4	-0.1	-0.3	45.5	29.2	4.1	-0.4	11.0
	Dubai (UAE)	3.3	0.2	0.1	55.5	23.5	3.8	11.6	23.3
	Hong Kong-China	1.9	0.0	0.1	45.4	17.8	0.9	2.6	12.8
	Indonesia	2.0	0.0	0.0	23.0	5.4	0.1	0.9	12.7
	Jordan	3.0	-0.2	-0.1	56.6	16.1	3.0	1.3	15.6
	Kazakhstan	7.0	0.0	0.0	48.2	12.9	0.6	1.9	16.0
	Kyrgyzstan	8.5	0.0	-0.2	55.8	11.4	1.2	8.7	14.2
	Latvia	7.5	0.0	0.0	48.9	8.0	0.4	0.2	6.5
	Lithuania	10.1	-0.1	0.1	46.3	11.2	0.5	-0.2	8.6
	Macao-China	2.1	0.1	-0.2	43.4	13.5	1.1	9.4	7.3
	Montenegro	5.4	0.0	-0.2	55.5	23.7	0.6	3.3	6.6
	Panama	1.1	0.0	0.1	44.5	21.4	2.9	16.0	24.3
	Peru	1.1	0.0	0.0	49.1	20.4	1.3	28.7	13.5
	Qatar	4.1	0.2	-0.2	59.8	34.7	3.5	0.5	33.8
	Romania	1.4	-0.1	0.3	40.0	18.2	1.2	0.9	23.8
	Russian Federation	7.0	0.0	-0.2	56.4	10.6	0.0	1.0	9.7
	Serbia	1.8	-0.2	0.0	43.1	20.5	0.4	2.1	19.4
	Shanghai-China	3.3	0.0	-0.3	41.4	16.3	1.0	3.8	6.6
	Singapore	6.6	-0.1	-0.2	61.1	24.1	0.6	4.2	7.9
	Chinese Taipei	8.5	-0.1	-0.5	55.2	15.1	2.7	1.2	11.1
	Thailand	3.8	0.0	0.0	29.4	4.8	1.0	-0.3	7.9
	Trinidad and Tobago	4.4	0.0	0.3	51.2	56.7	0.4	6.2	27.0
	Tunisia	1.5	0.0	-0.2	45.4	11.7	2.3	3.5	15.4
	Uruguay	5.9	0.1	-0.5	57.9	14.6	0.5	27.3	9.9

1. Multilevel regression model consists of the student and school levels.
2. Multilevel regression model: Reading performance is regressed on the variables of demographic and socio-economic background.
3. Multilevel regression model: Reading performance is regressed on the variables of school policies and practices.
4. Multilevel regression model: Reading performance is regressed on the variables of demographic and socio-economic background and on the variables of school policies and practices.
Source: OECD, *PISA 2009 Database*.

■ Figure 2.26 ■

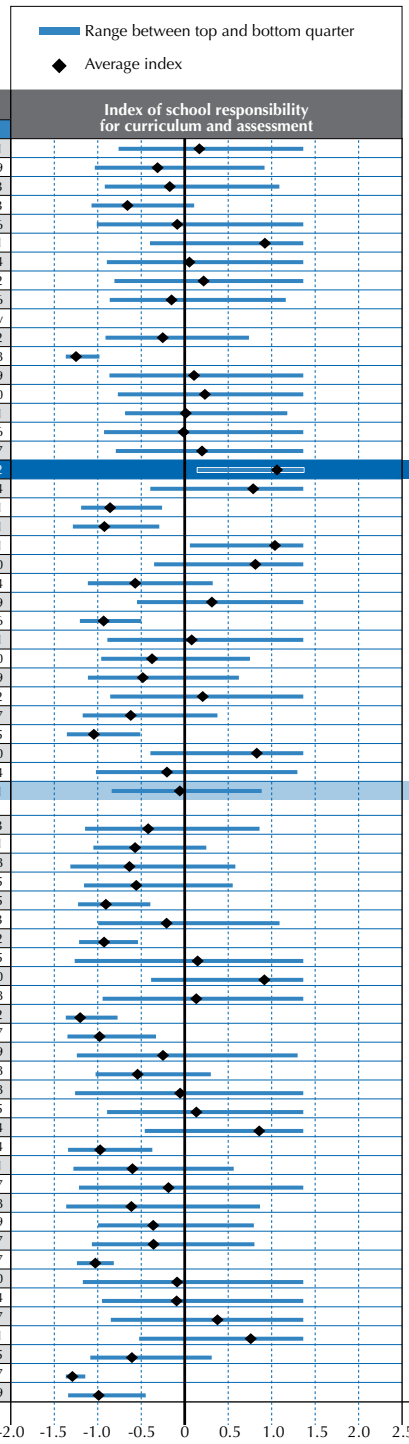
How much autonomy individual schools have over curricula and assessments

Percentage of students in schools whose principals reported that only "principals and/or teachers", only "regional and/or national education authority" or both "principals and/or teachers" and "regional and/or national education authority" have a considerable responsibility for the following tasks

A Establishing student assessment policies
B Choosing which textbooks are used
C Determining course content
D Deciding which courses are offered

1 Only "principals and/or teachers"
2 Both "principals and/or teachers" and "regional and/or national education authority"
3 Only "regional and/or national education authority"

	A			B			C			D			Variability in the index (S.D.)
	1	2	3	1	2	3	1	2	3	1	2	3	
OECD													
Australia	65	33	2	92	8	0	46	40	14	75	24	1	0.9
Austria	57	27	15	94	5	1	37	40	23	32	40	29	0.8
Belgium	78	19	4	94	4	1	32	42	26	40	46	13	0.8
Canada	28	62	10	40	49	11	12	51	38	44	54	3	0.6
Chile	72	21	6	73	20	7	43	22	35	64	20	16	1.0
Czech Republic	95	5	0	89	11	1	83	16	1	88	11	1	0.8
Denmark	61	28	11	100	0	0	56	32	12	47	39	14	0.9
Estonia	63	33	3	66	32	2	66	30	4	79	20	2	0.9
Finland	50	43	7	98	2	0	32	52	16	55	39	6	0.8
France	w	w	w	w	w	w	w	w	w	w	w	w	w
Germany	71	21	9	84	13	3	21	47	32	80	18	2	0.7
Greece	20	12	68	7	8	85	1	3	96	6	5	88	0.3
Hungary	94	6	0	98	2	0	49	36	15	43	28	29	0.9
Iceland	92	8	1	93	4	3	61	26	13	48	42	10	0.9
Ireland	87	13	0	97	3	0	29	37	34	78	21	1	0.7
Israel	80	20	0	53	43	4	52	44	5	44	50	6	1.0
Italy	91	8	1	99	1	0	59	27	14	49	25	27	0.9
Japan	98	2	0	89	8	3	93	6	1	94	5	2	0.7
Korea	92	6	2	96	4	0	89	8	2	79	17	4	0.8
Luxembourg	9	33	58	13	80	7	9	72	20	18	61	21	0.6
Mexico	56	15	29	63	11	26	14	7	79	5	5	91	0.5
Netherlands	99	1	0	100	0	0	87	12	1	89	10	1	0.6
New Zealand	81	17	2	99	1	0	79	20	1	92	8	0	0.8
Norway	38	36	27	97	2	1	30	40	30	23	33	44	0.7
Poland	92	8	0	92	8	0	93	7	0	40	31	29	0.8
Portugal	35	37	28	98	2	0	5	3	92	10	5	86	0.4
Slovak Republic	76	21	3	56	39	5	48	47	5	52	48	1	1.0
Slovenia	46	48	5	72	27	1	34	59	6	28	52	20	0.8
Spain	44	34	23	95	5	0	32	31	37	30	31	39	0.8
Sweden	66	30	3	99	1	0	66	26	8	53	25	22	1.0
Switzerland	57	27	16	40	40	20	21	41	38	24	50	27	0.7
Turkey	42	29	30	14	18	68	9	15	76	14	21	65	0.4
United Kingdom	88	12	0	98	2	0	77	20	2	86	14	0	0.8
United States	46	40	13	62	28	10	36	46	18	58	37	4	0.9
OECD average	66	23	11	78	15	8	45	31	24	50	28	21	0.8
Partners													
Albania	51	16	33	91	8	1	35	7	57	35	12	53	0.8
Argentina	74	20	6	81	16	3	28	43	29	8	30	61	0.6
Azerbaijan	54	8	38	50	6	43	27	9	64	37	5	58	0.8
Brazil	47	27	26	88	9	2	35	25	40	18	17	65	0.8
Bulgaria	25	37	38	88	12	1	10	26	65	10	15	75	0.4
Colombia	39	21	39	92	3	4	69	23	8	64	14	23	0.8
Croatia	26	36	38	63	34	3	11	50	39	2	25	72	0.4
Dubai (UAE)	77	10	13	55	17	27	62	13	26	59	16	25	1.1
Hong Kong-China	93	7	0	93	7	0	81	17	2	87	13	0	0.8
Indonesia	67	28	6	80	13	7	75	18	7	49	23	28	0.9
Jordan	27	4	70	4	1	95	7	1	93	7	1	92	0.5
Kazakhstan	31	22	47	16	14	70	11	18	71	40	22	37	0.5
Kyrgyzstan	65	8	26	68	8	23	59	10	31	44	7	49	1.0
Latvia	56	40	4	71	27	2	19	46	36	30	42	28	0.6
Liechtenstein	69	25	6	54	5	40	41	0	59	53	9	38	1.1
Lithuania	75	20	5	89	11	1	50	35	15	75	20	5	0.9
Macao-China	95	0	5	100	0	0	94	6	0	81	14	4	0.8
Montenegro	40	32	28	5	30	65	5	34	61	20	36	44	0.6
Panama	41	25	34	52	26	22	41	23	36	26	23	51	0.8
Peru	75	15	10	52	12	37	53	23	24	45	18	37	1.0
Qatar	45	18	37	37	16	47	31	9	60	35	17	48	0.9
Romania	42	36	22	86	13	1	46	33	20	31	41	29	0.7
Russian Federation	63	25	12	65	27	8	21	40	39	71	22	7	0.8
Serbia	49	44	7	19	59	23	2	41	57	0	12	87	0.2
Shanghai-China	86	9	5	49	17	34	45	22	33	52	28	20	1.0
Singapore	57	41	2	72	24	3	44	38	18	66	31	4	0.9
Chinese Taipei	74	17	8	92	8	0	81	16	3	68	25	7	0.9
Thailand	79	18	2	89	10	1	89	11	0	91	8	1	0.8
Trinidad and Tobago	50	45	5	29	62	10	21	40	39	34	51	15	0.7
Tunisia	11	11	78	0	1	99	3	14	83	4	9	87	0.1
Uruguay	23	30	47	31	36	33	3	26	71	21	19	59	0.4



Source: OECD, *PISA 2009 Database*, Table IV.3.6.

Table 2.18 Ratio of schools posting achievement data publicly and the relationship between school autonomy in allocating resources and reading performance

	Model for prevalence of schools' posting achievement data publicly (OLS regression estimates)			
	Gross model		Net model	
	Coef.	S.E.	Coef.	S.E.
School autonomy for resource allocation	**6.72**	(2.21)	**-3.24**	(1.45)
× Percentage of students in schools that post achievement data publicly (additional 10%)	-1.30	(4.34)	**0.58**	(0.28)
School autonomy for curriculum and assessment			0.04	(0.59)
Private school			-0.48	(1.49)
PISA index of economic, social and cultural status of student (ESCS)			**17.98**	(0.26)
PISA index of economic, social and cultural status of student (ESCS squared)			**2.06**	(0.22)
Student is a female			**36.23**	(0.51)
Student's language at home is the same as the language of assessment			**17.02**	(1.23)
Student without an immigrant background			**11.64**	(1.20)
School average PISA index of economic, social and cultural status			**58.13**	(0.97)
School in a city (100 000 or more people)			**-2.36**	(1.21)
School in a small town or village (15 000 or less people)			**2.93**	(1.14)
School size (100 students)			**1.61**	(0.13)
School size (100 students, squared)			**-0.01**	(0.00)
Number of observations	267 425		267 425	

Note: Estimates significant at the 5% level ($p < 0.05$) are in bold. Both net and gross models include country fixed effects, estimate no intercept, are run for OECD countries only and use BRR weights to account for the sampling design. All countries are weighted equally.
Source: OECD, *PISA 2009 Database,* Table IV.2.5

with above-average autonomy scores 2.6 points higher in reading than a student attending a school with an average level of autonomy (Table 2.18).

Autonomy in curricular decisions

PISA classifies OECD countries into four groups that share similar profiles in the way that they allow schools and parents to make decisions that affect their children's education. The grouping is based on levels of school autonomy and school competition. Two categories are identified for each dimension and the interplay between these dimensions results in four groups: school systems that offer high levels of autonomy to schools in designing and using curricula and assessments and encourage more competition between schools; school systems that offer low levels of autonomy to schools and limit competition between schools; school systems that offer high levels of autonomy to schools, but with limited competition between schools; and school systems that offer low levels of autonomy to schools, but encourage more competition between schools (Figure 2.27).

■ Figure 2.27 ■

How school systems are governed

		Less school competition	**More school competition**
		Schools that complete with other schools for students in the same area: 73%	**Schools that complete with other schools for students in the same area: 89%**
		Private schools: 8%	**Private schools: 52%**
Less school autonomy for curriculum and assessment	**Establish student assessment policies: 61%** **Choose which textbooks are used: 55%** **Determine course content: 14%** **Decide which courses are offered: 18%**	Greece, Mexico, Portugal, Turkey, Albania, Azerbaijan, Bulgaria, Croatia, Kazakhstan, Jordan, Montenegro, Qatar, Serbia, Tunisia, Uruguay,	–
More school autonomy for curriculum and assessment	**Establish student assessment policies: 92%** **Choose which textbooks are used: 97%** **Determine course content: 85%** **Decide which courses are offered: 87%**	Austria, Canada,[2] Czech Republic, Denmark, Estonia,[2] Finland,[2] Germany, Hungary, Iceland,[2] Israel, Italy, **Japan,[2]** Luxembourg, New Zealand,[1] Norway,[2] Poland,[1] Slovak Republic, Slovenia, Spain, Sweden, Switzerland,[1] United Kingdom, United States, Panama, Argentina, Brazil, Colombia, Kyrgyzstan, Latvia, Liechtenstein, Lithuania, Peru, Romania, Russian Federation, Shanghai-China,[1] Singapore,[1] Thailand, Trinidad and Tobago	Australia,[1] Belgium,[1] Chile, Ireland, Korea,[2] Netherlands,[1] Dubai (UAE), Hong Kong-China,[2] Indonesia, Macao-China, Chinese Taipei

Note: The estimates in the grey cells indicate the average values of the variables used in latent profile analysis in each group. See Annex A5 of OECD (2010f) for technical details.
1. Perform higher than the OECD average in reading.
2. Perform higher than the OECD average in reading and where the relationship between students' socio-economic background and reading performance is weaker than the OECD average.
Source: OECD, *PISA 2009 Database*.

- Across OECD countries, the most common configuration is the one that gives **schools the freedom to make curricular decisions, yet restricts competition for enrolment** among schools. These school systems have relatively limited levels of choice for parents and students and there is little competition for enrolment among schools. Private schools are not widely available in these countries. **Twenty-two OECD countries, including Japan, fall into this category**.
- School systems that offer relatively low levels of autonomy to schools and low levels of choice to parents are also fairly common across OECD countries: four OECD countries and 11 partner countries and economies share this configuration.
- Six other OECD countries offer high levels of autonomy and choice, either in the form of a high prevalence of private schools or competition among schools for enrolment. In these school systems, schools have the freedom to choose teaching methods to meet learning objectives, and parents and students can choose among a variety of schools for enrolment.

Setting standards and accountability arrangements

As discussed in the 2009 edition of *Education at a Glance* (OECD, 2009a), over the past decade, assessments of student performance have become common in many OECD countries – and the results are often widely reported and used in both public and more specialised debate. However, the rationale for assessments and the nature of the instruments used vary greatly within and across countries. Methods employed in OECD countries include different forms of external assessment, external evaluation or inspection, and schools' own quality-assurance and self-evaluation efforts.

Standards-based external examinations are a tool used in some accountability systems. These are examinations that focus on a specific school subject and assess a major portion of what students who are studying this subject are expected to know or be able to do. Essentially, they define performance relative to an external standard, not relative to other students in the classroom or school. These examinations usually have a direct impact on students' education – and even on their futures – and may thus motivate students to work harder. Other standardised tests, which may be voluntary and conducted by schools, often have only indirect consequences for students. For teachers, standardised assessments can provide information on students' learning needs and can be used to tailor their instruction accordingly. In some countries, such as Brazil, Hungary, Italy, Malaysia, Mexico, Poland and the Slovak Republic, such tests are also used to determine teachers' salaries or guide professional development (for data, see OECD, 2009a). At the school level, information from standardised tests can be used to determine the allocation of additional resources, and what interventions are required to establish performance targets and monitor progress.

Across OECD countries, students in school systems that require **standards-based external examinations** perform, on average, over 16 points higher than those in school systems that do not use such examinations (Figure 2.28). **There are standards-based external examinations for secondary school students in Japan**, the Czech Republic, Denmark, Estonia, Finland, France, Hungary, Iceland, Ireland, Israel, Italy, Korea, Luxembourg, the Netherlands, New Zealand, Norway, Poland, the Slovak Republic, Slovenia, Turkey and the United Kingdom. In Australia, these examinations cover 81% of secondary students, in Canada 51% and in Germany 35%. In Austria, Belgium, Chile, Greece, Mexico, Portugal, Spain, Sweden and Switzerland, such examinations do not exist or are found in only some parts of the system.

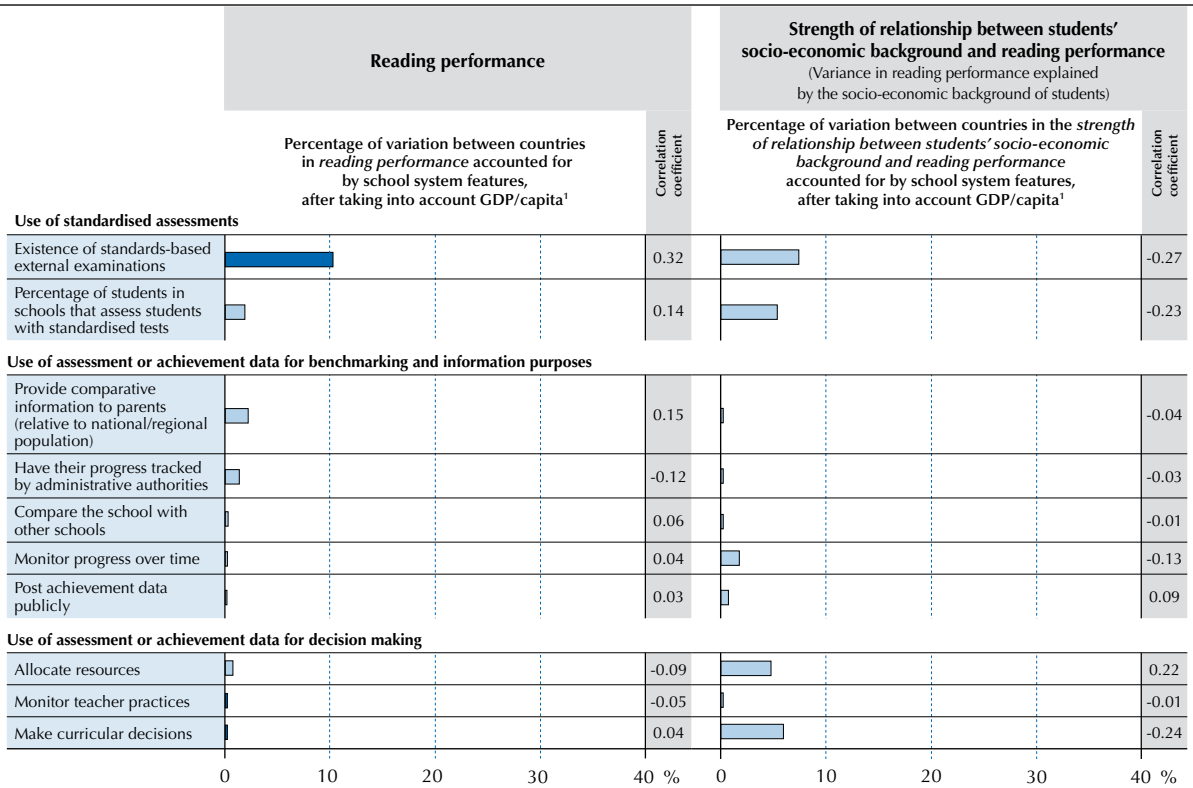
In PISA 2009, school principals were asked to report on the types and frequency of assessment used: **standardised tests**, teacher-developed tests, teachers' judgemental ratings, student portfolios or student assignments. Some 76% of students in OECD countries are enrolled in schools that use standardised tests. Standardised tests are relatively uncommon in Slovenia, Belgium, Spain, Austria and Germany, where less than half of 15-year-olds attend schools that assess students through standardised tests. In contrast, the use of standardised tests is practically universal in Luxembourg, Finland, Korea, the United States, Poland, Denmark, Sweden and Norway, where over 95% of students attend schools that use this assessment at least once a year. **In Japan, just 65% of students are in schools whose principals reported that they use standardised tests** (OECD, 2010f).

Standards are typically reflected in accountability frameworks and mechanisms. The purposes of assessments vary greatly across countries. At the school level, these assessments can be used by schools to compare themselves to other schools, to monitor progress, or to make decisions about instruction. In Japan, less than one-third of students attend schools that use achievement information this way. Some 59% of students across OECD countries are in schools that use achievement data to compare their students' achievement levels with those in other schools or with regional/national benchmarks. This practice is most common in the United States, New Zealand and the United Kingdom, where over 90% of students attend schools that use achievement data for comparative purposes.

It is more common for schools to use achievement information to monitor school progress from year to year; in Japan, 61% of students are in schools that use achievement data this way. On average across OECD countries, some 77% of students are in schools that use achievement data to monitor progress; in 21 countries, more than 80% of students attend schools that use achievement data this way. Only in Denmark, Luxembourg, Switzerland and Austria do less than 50% of students attend schools that use achievement data to monitor progress.

■ Figure 2.28 ■

How school systems' assessment and accountability policies are related to educational outcomes



Note: Correlations that are statistically significant at the 10% level ($p<0.10$) are marked in a darker tone.
1. The percentage is obtained by squaring the correlation coefficient and then multiplying it by 100.
Source: OECD, *PISA 2009 Database,* Table IV.2.1.

Data on student achievement can also be used to identify aspects of instruction or the curriculum that could be improved. In Japan, 83% of students are in schools that use achievement data this way. Across OECD countries, 77% of students are in schools that reported doing so, and over 90% of students in New Zealand, the United States, the United Kingdom, Iceland, Poland, Mexico, Chile, Spain and Israel attend schools whose principals reported that they use achievement data to assess the curriculum or instruction practices. Using achievement data for this purpose is less common in Greece and Switzerland, where less than 50% of students attend schools that use achievement data this way.

PISA does not show that the prevalence of standardised tests is systematically related to performance. This may be partly because the content and use of standardised tests vary considerably across schools and systems. However, education systems with a higher prevalence of standardised tests tend to show smaller socio-economic inequities between schools and consequently show a smaller impact of school socio-economic background on performance. The same holds for the use of assessment data to identify aspects of instruction or the curriculum that could be improved and the high proportions of schools whose achievement data is tracked over time by administrative authorities.

PISA 2009 collected data on the nature of accountability systems and the ways in which the resulting information was used. Some school systems make achievement data public to make stakeholders aware of the comparative performance of schools and, where school-choice programmes are available, to make parents aware of the choices available to them. **In Japan less than 10% of students attend schools that make achievement data available to the public**; similar rates are reported for Austria, Belgium, Finland, Spain, and Switzerland. Across OECD countries, an average of 37% of students attend schools that make achievement data available to the public; but in the United States and the United Kingdom, more than 80% of students attend schools that make student achievement data publicly available. In seven OECD countries and nine partner countries and economies, schools whose principals reported that student achievement data are posted publicly perform better than schools that do not post such information, before accounting for the socio-economic and demographic backgrounds of students and schools. In Japan, however, **no relationship is seen between reporting student achievement data and student performance**. Since in most countries the schools that post achievement data publicly tend to be socio-economically advantaged schools, this performance advantage is often not observed once socio-economic background is accounted for.

Only 11% of students in Japan attend schools whose achievement data is tracked over time by administrative authorities, while across OECD countries, an average of 66% of students attend such schools.

Across OECD countries, some 33% of students attend schools that use achievement data to determine how resources are distributed. In Israel, Chile and the United States, more than 70% of students attend schools whose principal reported that instructional resources are allocated according to the school's achievement data. **The practice of using achievement data to determine how resources are distributed is least common in Japan**, Iceland, Greece, the Czech Republic and Finland, where less than 10% of students attend schools that use achievement data this way.

Some school systems make achievement data available to parents in the form of report cards and by sending teacher-formulated assessments home. Some school systems also provide information on the students' academic standing compared with other students in the country or region or within the school. Across OECD countries, an average of 52% of students attend schools that use achievement data relative to national or regional benchmarks and/or as a group relative to students in the same grade in other schools. **In Japan, 79% of students attend schools that provide any information regarding the academic standing of the students in either of these ways**. In Sweden, the United States, Korea, Chile, Norway and Turkey, more than 80% of students attend schools that provide parents with achievement data comparing their students with national or regional student populations.

An average of 59% of students across OECD countries attend schools whose student achievement data are used to monitor teacher practices. **In Japan, only 52% of students attend schools that use achievement data to monitor teacher practices**. In comparison, over 80% of students in Poland, Israel, the United Kingdom, Turkey, Mexico, Austria and the United States attend such schools, while 30% or less of students in Finland, Switzerland, Greece and Sweden attend such schools. Many schools across OECD countries complement this information with qualitative assessments, such as teacher peer reviews, assessments by school principals or senior staff, or observations by inspectors or other people external to the school. Most schools across OECD countries use either student-derived, direct observations or reviews to monitor teachers. In Japan, 52% of students attend schools that use student assessments to monitor teachers; 86% of students attend schools that use observations of lessons by the principal or senior staff to monitor teacher practices; 43% of students attend schools that use teacher peer review to monitor teacher practices; and 23% of students attend schools that monitor teacher practices using observations of classes by inspectors or other people external to the school. In contrast, school principals in high-performing Finland reported that they rarely use either to monitor teacher practices. Some 18% of students in Finland attend schools that use student assessments to monitor teachers; around 20% of students attend schools that use more qualitative and direct methods to monitor teacher practices; and only 2% of students attend schools that monitor teacher practices using observations of classes by inspectors or other people external to the school.

PISA organises OECD countries into four groups that share similar profiles based on two dimensions (Table 2.19). The first dimension is whether achievement data are used for various benchmarking and information purposes. The second is whether achievement data are used to make decisions that affect the school. The idea is that school systems that use achievement data for benchmarking and information purposes are more likely to use this data to compare themselves with other schools, monitor progress across time, have their progress tracked by administrative authorities, make their achievement data public and provide parents with their child's achievement benchmarked to national or regional populations. School systems that use achievement data for decision making are more likely to use achievement data to determine the allocation of resources, make curricular decisions, and evaluate teachers' instruction.

- A first group, composed of 16 OECD countries, tends to use achievement data for benchmarking and information purposes and also for decisions that affect the school.
- Three OECD countries use achievement data for benchmarking and information, but not for decisions affecting the school.
- A third group, composed of four OECD countries, including **Japan, uses achievement data for decisions affecting the school, but not for benchmarking and information**.
- The fourth group, composed of nine OECD countries, is less likely to use achievement data either for benchmarking and information or for decision making.

Low levels of differentiation and emphasis on heterogeneous classes

PISA classifies school systems into 12 groups, according to the differentiation[13] policies and practices they adopt (Table 2.20):

- Thirteen OECD countries are characterised by relatively low levels of formal differentiation. In these school systems, students are not systematically streamed, schools are not selective in their admissions processes, and students usually do not repeat grades and are not transferred to other schools. As a result, classrooms tend to be heterogeneous.
- School systems in six other OECD countries, including Japan, stratify students into different programmes based on students' academic performance, usually before they are 15 years old. Grade repetition is not common in these school systems, nor is horizontal differentiation at the school level. **In Japan, all students enter primary school at the same age and there is no grade repetition, consequently there is no variation in the grade level among 15 year olds and Japan is classified as having low levels of vertical differentiation.** The first selection in the education system occurs at the age of 15 when there are two distinct education programmes available to 15 year olds. Some 88% of students are in schools where school principals reported that students' record of academic performance and/or recommendations of feeder schools are always considered for student admittance. Japan

is thus classified as using a medium level of horizontal differentiation at the system level. Some 8% of Japanese students are in schools that are very likely to transfer difficult students to other schools, and 11% are in schools that group students by ability in all subjects. Thus Japan is classified as using low levels of horizontal differentiation at the school level.

- In four OECD countries, horizontal differentiation is also applied at the system level. These school systems are characterised by their use of streaming and early selection into programmes based on students' academic performance, but generally, they do not use grade repetition or school-level differentiation.
- Among the countries whose school systems use vertical differentiation to create homogeneous learning environments, the Netherlands and Switzerland also apply high levels of horizontal differentiation at the school level and at the level of the school system.

Table 2.19 How school systems use student assessments

		Infrequent use of assessment or achievement data for benchmarking and information purposes	Frequent use of assessment or achievement data for benchmarking and information purposes
		Provide comparative information to parents: 32%	Provide comparative information to parents: 64%
		Compare the school with other schools: 38%	Compare the school with other schools: 73%
		Monitor progress over time: 57%	Monitor progress over time: 89%
		Post achievement data publicly: 20%	Post achievement data publicly: 47%
		Have their progress tracked by administrative authorities: 46%	Have their progress tracked by administrative authorities: 79%
Infrequent use of assessment or achievement data for decision making	Make curricular decisions: 60% Allocate resources: 21% Monitor teacher practices: 50%	Austria, Belgium,[1] Finland,[2] Germany, Greece, Ireland, Luxembourg, Netherlands,[1] Switzerland,[1] Liechtenstein	Hungary, Norway,[2] Turkey, Montenegro, Tunisia, Slovenia
Frequent use of assessment or achievement data for decision making	Making curricular decisions: 88% Allocating resources: 40% Monitor teacher practices: 65%	Denmark, Italy, Japan,[2] Spain, Argentina, Macao-China, Chinese Taipei, Uruguay	Australia,[1] Canada,[2] Chile, Czech Republic, Estonia,[2] Iceland,[2] Israel, Korea,[2] Mexico, New Zealand,[1] Poland,[1] Portugal, Slovak Republic, Sweden, United Kingdom, United States, Albania, Azerbaijan, Brazil, Bulgaria, Colombia, Croatia, Dubai (UAE), Hong Kong-China,[2] Indonesia, Jordan, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Panama, Peru, Qatar, Romania, Russian Federation, Shanghai-China,[1] Singapore,[1] Thailand, Trinidad and Tobago, Serbia

Note: The estimates in the grey cells indicate the average values of the variables used in latent profile analysis in each group. See Annex A5 for technical details.
1. Perform higher than the OECD average in reading.
2. Perform higher than the OECD average in reading and where the relationship between students' socio-economic background and reading performance is weaker than the OECD average.
Source: OECD, *PISA 2009 Database*.

Table 2.20 How school systems select and group students for schools, grades and programmes

		Low vertical differentiation		High vertical differentiation	
		Students who repeated one or more grades: 7% Students out of modal starting ages: 7%		Students who repeated one or more grades: 29% Students out of modal starting ages: 11%	
		Low horizontal differentiation at the school level	High horizontal differentiation at the school level	Low horizontal differentiation at the school level	High horizontal differentiation at the school level
		Schools that transfer students to other schools due to low achievement, behavioural problems or special learning needs: 15%	Schools that transfer students to other schools due to low achievement, behavioural problems or special learning needs: 33%	Schools that transfer students to other schools due to low achievement, behavioural problems or special learning needs: 15%	Schools that transfer students to other schools due to low achievement, behavioural problems or special learning needs: 33%
		Schools that group students by ability in all subjects: 8%	Schools that group students by ability in all subjects: 38%	Schools that group students by ability in all subjects: 8%	Schools that group students by ability in all subjects: 38%
Low horizontal differentiation at the system level	Number of school types or distinct educational programmes: 1.1 First age of selection: 15.8 Selective schools: 17%	Australia,[1] Canada,[2] Denmark, Estonia,[2] Finland,[2] Greece, Iceland,[2] New Zealand,[1] Norway,[2] Poland,[1] Sweden, United States, United Kingdom, Kazakhstan, Latvia, Lithuania, Russian Federation	Jordan	Spain, Argentina, Brazil, Tunisia, Uruguay	Chile, Colombia, Peru
Medium horizontal differentiation at the system level	Number of school types or distinct educational programmes: 3.0 First age of selection: 14.5 Selective schools: 42%	Ireland, Israel, Italy, **Japan,**[2] Korea,[2] Slovenia, Albania, Azerbaijan, Dubai (UAE), Hong Kong-China,[2] Montenegro, Shanghai-China,[1] Thailand	Indonesia, Kyrgyzstan, Qatar, Romania, Chinese Taipei	Mexico, Portugal	Luxembourg, Macao-China, Panama
High horizontal differentiation at the system level	Number of school types or distinct educational programmes: 4.3 First age of selection: 11.2 Selective schools: 61%	Austria, Czech Republic, Hungary, Slovak Republic, Croatia, Liechtenstein, Singapore[1]	Turkey, Bulgaria, Serbia	Belgium,[1] Germany, Trinidad and Tobago	Netherlands,[1] Switzerland[1]

Note: The estimates in the grey cells indicate the average values of the variables used in latent profile analysis in each group. See Annex A5 of OECD (2010f) for technical details.
1.Perform higher than the OECD average in reading.
2.Perform higher than the OECD average in reading and where the relationship between students' socio-economic background and reading performance is weaker than the OECD average.
Source: OECD, *PISA 2009 Database*.

■ Figure 2.29 ■

Japan: Profile data

Language(s)	Japanese (national language – not official language)
Population	127 567 900[13]
Youth population	13.3%[14] (OECD average 18.7%)
Elderly population	22.1%[15] (OECD average 14.4%)
Growth rate	0.06%[16] (OECD average 0.66%)[17]
Foreign-born population	1.7% (OECD average 12.9%)[18]
GDP per capita	USD 34 132[19] (OECD average 33 732)[20]
Economy-Origin of GDP	Service: 63.9%; Manufacturing: 18.6%; Other: 14.3%; Agriculture and forestry: 3.8% (2008)[21]
Unemployment	4.0% (2008)[22] (OECD average 6.1%)[23]
Youth unemployment	7.2% (2008) (OECD average 13.8%)[24]
Expenditure on education	3.4% of GDP (OECD average 5.2%) 2.5% on primary, secondary and post-secondary non-tertiary 0.6% on tertiary[25] education[26] (OECD average 3.5%; 1.2% respectively) 9.4% of total government expenditure[27] (OECD average 13.3%) 6.8% on primary, secondary and post-secondary non-tertiary 1.7% on tertiary education[28] (OECD average 9%; 3.1% respectively)
Enrolment ratio, early childhood education	86%[29] (OECD average 71.5%)[30]
Enrolment ratio, primary education	100.7%[31] (OECD average 98.8%)[32]
Enrolment ratio, secondary education	98.3%[33] (OECD average 81.5%)[34]
Enrolment ratio, tertiary education	58%[35] (OECD average 24.9%)[36]
Students in primary education, by type of institution or mode of enrolment[37]	Public: 99% (OECD average 89.6%) Government-dependent private: no data[38] (OECD average 8.1%) Independent, private: 1% (OECD average 2.9%)
Students in lower secondary education, by type of institution or mode of enrolment[39]	Public 92.9% (OECD average 83.2%) Government-dependent private: no data[40] (OECD average 10.9%) Independent, private: 7.1% (OECD average 3.5%)
Students in upper secondary education, by type of institution or mode of enrolment[41]	Public: 69.2% (OECD average 82%) Government-dependent private: no data[42] (OECD average 13.6%) Independent, private: 30.8% (OECD average 5.5%)
Students in tertiary education, by type of institution or mode of enrolment[43]	Tertiary type B education: Public: 7.3% Government-dependent private: no data[44] Independent-private: 92.7% (OECD average Public: 61.8% Government-dependent private : 19.2% Independent-private: 16.6%) Tertiary type A education: Public: 24.6% Government-dependent private: no data[45] Independent-private: 75.4% (OECD average Public: 77.1% Government-dependent private : 9.6% Independent-private: 15%)
Teachers' salaries	Average annual starting salary in lower secondary education: USD 27 545 (OECD average USD 30 750)[46] Ratio of salary in lower secondary education after 15 years of experience (minimum training) to GDP per capita: 1.44[47] (OECD average: 1.22)[48]
Upper secondary graduation rates	95% (OECD average 80%)[49]

Notes

1. Although rank 5 is the best estimate, due to sampling and measurement error, the rank could be between 3 and 6.
2. Although rank 4 is the best estimate, due to sampling and measurement error, the rank could be between 3 and 6.
3. Although rank 2 is the best estimate, due to sampling and measurement error, the rank could be between 2 and 3.
4. No such data are available for Japan.
5. See OECD, 2010f, Table II.2.3.
6. This is measured by the PISA index of economic, social and cultural status of students. The index has an average of 0 and a standard deviation of 1 for OECD countries. The index value for the most disadvantaged quarter of students is -0.93 for Japan and -1.14 for the OECD average. The index value for the entire student population is -0.01 for Japan and 0.00 for the OECD average.
7. Resilient students are those who come from a socio-economically disadvantaged background and perform much better than would be predicted by their background. To identify these students, first, the relationship between performance and socio-economic background across all students participating in the PISA 2009 assessment is established. Then the actual performance of each disadvantaged student is compared with the performance predicted by the average relationship among students from similar socio-economic backgrounds across countries. This difference is defined as the student's residual performance. A disadvantaged student is classified as resilient if his or her residual performance is found to be among the top quarter of students' residual performance from all countries.
8. In Japan, one unit of the PISA index of teacher-student relations is positively associated with 22.9 score points on the PISA reading scale (Table IV.4.1).
9. In Japan, one unit of the PISA index of disciplinary climate is positively associated with 35.1 score points on the PISA reading scale (Table IV.4.2).
10. Resilient students are those who come from a socio-economically disadvantaged background and perform much better than would be predicted by their background. To identify these students, first, the relationship between performance and socio-economic background across all students participating in the PISA 2009 assessment is established. Then the actual performance of each disadvantaged student is compared with the performance predicted by the average relationship among students from similar socio-economic backgrounds across countries. This difference is defined as the student's residual performance. A disadvantaged student is classified as resilient if his or her residual performance is found to be among the top quarter of students' residual performance from all countries.
11. For dual earner families, estimated at 167% of average wage and sole parent families at 67% of average wage (OECD, 2009d).
12. Vertical differentiation refers to the ways in which students progress through the education systems as they become older. Even though the student population is differentiated into grade levels in practically all schools in PISA, in some countries, all 15-year-old students attend the same grade level, while in other countries they are dispersed throughout various grade levels as a result of policies governing the age of entrance into the school system and/or grade repetition. Horizontal differentiation refers to differences in instruction within a grade or education level. It can be applied by the education system or by individual schools that group students according to their interests and/or performance. At the system level, horizontal differentiation can be applied by schools that select students on the basis of their academic records, by offering specific programmes (vocational or academic, for example), and by setting the age at which students are admitted into these programmes. Individual schools can apply horizontal differentiation by grouping students according to ability or transferring students out of the school because of low performance, behavioural problems or special needs.
13. OECD (2010h). Data from 2008.
14. OECD (2010h). Ratio of population aged less than 15 to the total population (data from 2008).
15. OECD (2010h). Ratio of population aged 65 and older to the total population (data from 2008).
16. OECD (2010h). Annual population growth rate (data from 2005; data not available for 2006-2007).
17. OECD (2010h). Annual population growth rate (data from 2005).
18. OECD (2010h). Foreign-born population as a percentage of the total population (data from 2007).
19. OECD (2010h). Current prices and PPPs (data from 2008).
20. OECD (2010h). Current prices and PPPs (data from 2008).
21. OECD (2009). Measured as percentage distribution of workers.
22. OECD (2010h). Total unemployment rates as percentage of total labour force (data from 2008).
23. OECD (2010h). Total unemployment rates as percentage of total labour force (data from 2008).
24. OECD (2010i). Unemployed as a percentage of the labour force in the age group: youth aged 15-24.
25. The OECD follows standard international conventions in using the term "tertiary education" to refer to all post-secondary programmes at ISCED levels 5B, 5A and 6, regardless of the institutions in which they are offered (OECD, 2008).
26. OECD (2010c). Public expenditure presented in this table includes public subsidies to households for living costs (scholarships and grants to students/households and students loans), which are not spent on educational institutions (data from 2006).
27. OECD (2010c).

28. OECD (2010c). Public expenditure presented in this table includes public subsidies to households for living costs (scholarships and grants to students/households and students loans), which are not spent on educational institutions (data from 2006).
29. OECD (2010c). Net enrolment rates of ages 4 and under as a percentage of the population aged 3 to 4 (data from 2008).
30. OECD (2010c). OECD average net enrolment rates of ages 4 and under as a percentage of the population aged 3 to 4 (year of reference – 2008).
31. OECD (2010c). Net enrolment rates of ages 5 to 14 as a percentage of the population aged 5 to 14 (data from 2008).
32. OECD (2010c). OECD average net enrolment rates of ages 5 to 14 as a percentage of the population aged 5 to 14 (year of reference – 2008).
33. EDStats *http://web.worldbank.org/*, gross enrolment ratio (data from 2008).
34. OECD (2010c). OECD average net enrolment rates of ages 15 to 19 as a percentage of the population aged 15 to 19 (year of reference – 2008).
35. EDStats *http://web.worldbank.org/*, gross enrolment ratio (data from 2008).
36. OECD (2010c). OECD average net enrolment rates of ages 20 to 29 as a percentage of the population aged 20 to 29, year of reference 2008. This figure includes all 20-29 year olds, including those in employment, etc. The gross enrolment ratio (GER), measured by the UN as the number of actual students enrolled/number of potential students enrolled, is generally higher. The GER for Japan in 2008 is 58%. (UIS).
37. OECD (2010c). Data from 2008.
38. Data is not applicable because category does not apply.
39. OECD (2010c). Data from 2008.
40. Data is not applicable because category does not apply.
41. OECD (2010c). Data from 2008.
42. Data is not applicable because category does not apply.
43. OECD (2010c). Data from 2008.
44. Data is not applicable because category does not apply.
45. Data is not applicable because category does not apply.
46. OECD (2010c). Starting salary/minimum training in USD adjusted for PPP (data from 2008).
47. OECD (2010c). Data from 2008.
48. OECD (2010c). Data from 2008.
49. OECD (2010c). Sum of upper secondary graduation rates for a single year of age (year of reference for OECD average – 2008).

References and further reading

Amano, I. and **G. Poole** (2005), "The Japanese University in Crisis", *Higher Education*, Vol. 50.

Arani, M. and **T. Fukaya** (2009), Learning Beyond Boundaries: Japanese Teachers Learning to Reflect and Reflecting to Learn, Child Research Net website, *www.childresearch.net/RESOURCE/RESEARCH/2009/ARANI.HTM*, accessed 16 June 2011.

Auslin, M. (2009), "Can Japan Thrive – or Survive?", *American Enterprise Institute for Public Policy Research* (AEI), Vol. 1, No. 2, AEI, Washington, DC.

Bae, S., H. Oh, H. Kim, C. Lee and **B. Oh** (2010), "The Impact of After-School Programs on Educational Quality and Private Tutoring Expenses", *Asia Pacific Education Review*, Volume 11.

Bray, M. (2009), *Confronting the Shadow Education System*, International Institute for Educational Planning, UNESCO, Paris.

Business Week (2005), "Crazy for Cramming: Tutoring Outfits are Thriving and New International Student Rankings may Intensify Demand", *Business Week* 18 April.

Cave, P. (2007), *Primary School in Japan*, Routledge, London.

Central Council for Education (2005), *A Vision for the Future of Higher Education in Japan*, Central Council for Education, Tokyo.

Channel News Asia (2010), *Japan Ruling Party Banks on Firebrand Female Minister for Votes*, Channelnewsasia.com, 8 July, *www.channelnewsasia.com/stories/afp_asiapacific/view/1068283/1/.html*.

Chetty, R. et al., (2010), "How Does Your Kindergarten Classroom Affect Your Earnings? Evidence from Project STAR", *NBER Working Paper*, Cambridge, available at *http://obs.rc.fas.harvard.edu/chetty/STAR.pdf*.

Cohen, P.A., J.A. Kulik, and **C.L.C. Kulik** (1982), "Educational Outcomes of Tutoring: A Meta-Analysis of Findings," *American Educational Research Journal*, Summer 1982, Vol. 19, No. 2: 237-248.

Crowell, T. (2010), "Japan's New Prime Minister Faces the Voters", *Asia Sentinel*, 6 July.

Cummings, W. (2003), "Why Reform Japanese Education", in R. Goodman and D. Phillips (eds.) *Can the Japanese Change Their Education System*? Oxford Studies in Comparative Education, Symposium Books, Oxford.

Dewey, J. (1902), *The Child and the Curriculum*, The University of Chicago Press, Chicago.

Dore, R. (1982), *The Diploma Disease: Education, Qualification and Development*, George Allen and Unwin, London.

Education Rebuilding Council (2007), *Education Rebuilding by Society as a Whole*, Third Report, Education Rebuilding Council, Tokyo.

Gartner, A. and **D. Lipsky** (1989), *The Yoke of Special Education: How to Break It*, monograph, National Center on Education and the Economy, Rochester, New York.

Goodman, R. (2003), "The Why, What and How of Educational Reform in Japan", in R. Goodman and D. Phillips (eds.) *Can the Japanese Change Their Education System*? Oxford Studies in Comparative Education, Symposium Books, Oxford.

Goodman, R., S. Hatakenaka and **T. Kim** (2009), "The Changing Status of Vocational Higher Education in Contemporary Japan and the Republic of Korea", *UNESCO-UNEVOC Discussion Paper Series,* No. 4, UNESCO-UNEVOC International Centre, Bonn.

Harrison, L. J. and **J. Ungerer** (2002), "Maternal Employment Predictors of Infant-Mother Attachment Security at 12 Months Postpartum", *Developmental Psychology*, 38(5), 2002.

Heckman, J. and **D. Masterov** (2007), "The Productivity Argument for Investing in Young Children", *Review of Agricultural Economics*, Vol. 29.

Hojo, M. (2010), "Estimate of the Production Function of Education Based on an International Academic Performance Survey", *Niigata University Working Paper Series*, No. 107 (in Japanese).

Hood, C. (2003), "The Third Great Reform of the Japanese Education System: Success in the 1980s Onwards", in R. Goodman and D. Phillips (eds.) *Can the Japanese Change Their Education System*? Oxford Studies in Comparative Education, Symposium Books, Oxford.

IMF (International Monetary Fund) (2010), *Japan Country Report* No. 10/211, IMF, Washington DC.

INSEAD (2010), *Global Innovation Index Report 2009-2010*, INSEAD Business School and the Confederation of Indian Industry, INSEAD, Fontainebleau, France.

Ishida, H. (2003), *Educational Expansion and Inequality in Access to Higher Education in Japan*, University of Tokyo.

Ito, H. and **J. Kurihara** (2010), "A Discourse on the New Kai'entai: A Scenario for a Revitalized Japan", *Cambridge Gazette*, Politico-Economic Commentaries No. 3, 17 March, Cambridge, Massachusetts.

Jansen, M. (2000), *The Making of Modern Japan*, Harvard University Press, Cambridge, Massachusetts.

JETRO (2005), "Child Day Care Industry in Japan", *Japan Economic Monthly,* November, Tokyo.

Joumard, I. and **T. Yokoyama** (2005), "Getting the Most out of Public Sector Decentralisation in Japan", *OECD Economics Department Working Papers*, No. 416, OECD Publishing.

Kaneko, M. (1992), "Higher Education and Employment in Japan: Trends and Issues", *RIHE International Publication Series* No. 5, Research Institute for Higher Education (RIHE), Hiroshima.

Kaneko, M. (1997), "Efficiency and Equity in Japanese Higher Education", *Higher Education*, No. 34, pp. 165-181.

Kato, H. (2000), "Econometric Analysis of Childbirth, Marriage and Labour Market", *Population Study,* Vol. 56, No. 1, National Institute of Population and Social Security Research, (in Japanese), Tokyo.

Lefebvre, P. and **P. Merrigan** (2005), "Low-fee ($5/day/child) Regulated Child Care Policy and the Labor Supplyof Mothers with Young Children: A Natural Experiment from Canada", *CIRPÉE Working Paper* 05-08, Centre Interuniversitaire sur le Risque, les Politiques Économiques et l'Emploi, Université du Québec à Montréal, Montreal.

Lehmann, J. (2010), "Corporate Japan is a Little Lost in Communication", *Taipei Times* 17 April, available at: www.taipeitimes.com/News/editorials/archives/2010/04/17/2003470763.

McKinsey and Co. (2010), *How the World's Most Improved School Systems Keep Getting Better,* McKinsey and Co., New York.

McNeill, D. (2010), "Japan's Globalization Project Stalls as Some Criticize Focus on Elite Universities", *Chronicle of High Education*, 8 September.

MEXT (Ministry of Education, Culture, Sports, Science and Technology) (2002), *Educational Reform for the 21st Century*, White Paper, Ministry of Education, Culture, Sports, Science and Technology, Tokyo.

MEXT (2005), *Redesigning Compulsory Education: Summary of the Report of the Central Council for Education*, National Education Policy, MEXT, Tokyo.

MEXT (2006), *Japan's Education at a Glance*, MEXT, Tokyo.

MEXT (2008), *Report on Children's Out-Of-School Learning Activities* (in Japanese), MEXT, Tokyo.

MEXT (2009a), *Concerning Making Pre-Primary Education Free*, Study group regarding the promotion plan for pre-primary education (in Japanese), MEXT, Tokyo.

MEXT (2009b), *ECEC System in Japan*, MEXT, Tokyo.

MEXT (2009c), *White Paper on Education, Culture, Sports, Science and Technology, 2009,* MEXT, Tokyo.

MEXT (2010), *Elementary and Secondary Education*, MEXT website, *www.mext.go.jp/English/shotou/index.htm*.

Mimizuka, H. and **Makino, K.** eds. (2008), *Determinants of Children's Academic Achievements in Primary Education, Crisis in Academic Achievement and Transition: The Way Blocked to Adulthood*, Kanken Research Report.

Ministry of Economy, Trade and Industry (2010), *The New Growth Strategy: Blueprint for Revitalizing Japan*, METI Cabinet Decision, 18 June, METI, Tokyo.

Mizukoshi, T. (2007), *Educational Reform in Japan: Retrospect and Prospect*, Osaka University, Osaka, available at *http://unpan1.un.org/intradoc/groups/public/documents/apcity/unpan011543.pdf*

Monahan, A. (2010), "Japan Data Show Fragile Economy", *Wall Street Journal,* 9 July, available at: *http://online.wsj.com/article/SB10001424052748703636404575353664100091340.html.*

Mori, I. and **D. Baker** (2010), "The Origin of Universal Shadow Education: What the Supplemental Education Phenomenon Tells us about the Postmodern Institution of Education", *Asia Pacific Education Review*, Volume 11.

Mullis, I.V.S., et al. (1998), *Mathematics and Science Achievement in the Final Year of Secondary School: IEA's Third International Mathematics and Science Study (TIMSS),* TIMSS & PIRLS International Study Center, Boston College, Chestnut Hill, Massachusetts.

Mullis, I.V.S., et al. (2008), *TIMSS 2007 International Mathematics Report: Findings from IEA's Trends in International Mathematics and Science Study at the Fourth and Eighth Grades,* TIMSS & PIRLS International Study Center, Boston College, Chestnut Hill, Massachusetts.

Nash, J.M. (1997), "Fertile minds", *Time, 149,* 48-56.

Newby, H. *et al.* (2009), *OECD Reviews of Tertiary Education – Japan*, OECD Publishing.

Noguchi, H. and **S. Shimizutani** (2003), "Quality of Child Care in Japan: Evidence from Micro-level Data", *ESRI Discussion Paper Series*, No. 54, Tokyo.

OECD (2003), *Babies and Bosses*, Vol. 2, OECD Publishing.

OECD (2005), *Attracting, Developing and Retaining Effective Teachers – Final Report: Teachers Matter*, OECD Publishing.

OECD (2006), *Starting Strong II*, OECD Publishing.

OECD (2008), *Tertiary Education for the Knowledge Society: Volume 1*, OECD Publishing.

OECD (2009a), *OECD Economic Survey of Japan,* OECD Publishing.

OECD (2009b), *OECD Reviews of Tertiary Education: Japan,* OECD Publishing.

OECD (2009c), *Education at a Glance 2009: OECD Indicators*, OECD Publishing.

OECD (2009d), *Doing Better for Children*, OECD Publishing.

OECD (2010a), *PISA 2009 Results: What Students Know and Can Do: Student Performance in Reading, Mathematics and Science (Volume I)*, OECD Publishing.

OECD (2010b), *PISA 2009, Learning Trends: Changes in Student Performance Since 2000 (Volume V),* OECD Publishing.

OECD (2010c), *Education at a Glance 2010: OECD Indicators*, OECD Publishing.

OECD (2010d), *PISA 2009 Results: Overcoming Social Background: Equity in Learning Opportunities and Outcomes (Volume II)*, OECD Publishing.

OECD (2010e), *PISA 2009 Results: Learning to Learn: Student Engagement, Strategies and Practices (Volume III),* OECD Publishing.

OECD (2010f), *PISA 2009, What Makes a School Successful? Resources, Policies and Practices(Volume IV)*, OECD Publishing.

OECD (2010g), *Strong Performers, Successful Reformers: Lessons from PISA for the United States,* OECD Publishing.

OECD (2010h), *OECD Factbook 2010*, OECD Publishing.

OECD (2010i), *Employment Outlook*, OECD Publishing.

OECD (2010j), *Pathways to Success - How knowledge and skills at age 15 shape future lives in Canada,* OECD Publishing.

OECD (2011a), *Health at a Glance 2011*, OECD Publishing.

OECD (2011b), *PISA 2009, Students On Line: Digital Technologies and Performance (Volume VI),* OECD Publishing.

Oshio, T. and **W. Seno** (2007), "The Economics of Education in Japan", *The Japanese Economy*, Vol. 35.

Oshio, T., S. Sano and **K. Suetomi** (2010a), "Estimate of the Production Function of Education", *The Japanese Economy*, Vol. 37.

Oshio, T., S. Sano, Y. Ueno and **K. Mino** (2010b), "Evaluations by Parents of Education Reforms: Evidence from a Parent Survey in Japan", *Education Economics*, Vol. 18, No. 2.

Palley, H. and **C. Usui** (2008), "Child Daycare Policy in Japan: An Examination of the Program and its Impacts", *Journal of Comparative Social Welfare*, Vol. 24, No. 2.

Qi, J. (2009), "Globalization, Citizenship and Education Reform", paper presented at the *Annual Meeting of the American Educational Research Association*, San Diego, April 13-17, 2009.

Roesgaard, M. (2006), *Japanese Education and the Cram School Business: Functions, Challenges and Perspectives of the Juku*, NIAS Press, Copenhagen.

Rohlen, T. (1983), *Japan's High Schools*, University of California Press, Berkeley.

Shiraishi, S. and **W. Suzuki** (2003), "Quality of Child Care by Type of Management: A Comparison of Licensed and Non-licensed" (in Japanese), in N. Yashiro (ed.) Social Security in the 21st Century: Perspectives and Policies,Toyo Keizai Shimposha, Tokyo.

Shonkoff, J. and **D. Phillips** (2000) (eds.), From Neurons to Neighbourhoods: The Science of Early Childhood Development, National Academy Press, Washington DC.

Shonkoff, J.P. (ed.) (2000), *Handbook of Early Childhood Intervention*, Cambridge University Press, New York.

Siegel, A. (2004), "Telling Lessons from the TIMSS Videotape: Remarkable Teaching Practices as Recorded from Eighth-Grade Mathematics Classes in Japan, Germany, and the U.S.", in W. Evers and H. Walberg (eds.), Testing Student Learning, Evaluating Teaching Effectiveness, Hoover Press, Stanford.

Statistics Bureau (2010), Statistical Handbook of Japan 2010, Statistics Bureau, Japan.

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

Stewart, D. (2010), "Slowing Japan's Galapagos Syndrome", HuffPost Social News website, *www.huffingtonpost.com/devin-stewart/slowing-japans-galapagos_b_557446.html*, 21 July.

Sutherland, D. and **R. Price** (2007), "Linkages Between Performance and Institutions in the Primary and Secondary Education Sector", *OECD Economics Department Working Paper*, No. 558, OECD Publishing.

Teichler, U. (2007), "Does Higher Education Matter? Lessons from a Comparative Graduate Survey", European Journal of Education, Vol. 42.

Tsuneyoshi, R. (2001), The Japanese Model of Schooling, RoutledgeFalmer, New York and London.

Tsurita, Y. (2003), "Globalisation and the Recent Reforms in Japanese Higher Education", in R. Goodman and D. Phillips (eds.), Can the Japanese Change Their Education System?, Oxford Studies in Comparative Education, Symposium Books, Oxford.

UNESCO (2008), Status of Teacher Education in the Asia-Pacific Region, Prepared by International Reading Association, UNESCO, Paris.

Ventura, A. and **S. Jang** (2010), "Private Tutoring through the Internet: Globalization and Offshoring", Asia Pacific Education Review, Volume 11.

White, M. (1988), The Japanese Educational Challenge: A Commitment to Children, The Free Press, New York.

Wieczorek, C. (2008), "Comparative Analysis of Educational Systems of American and Japanese Schools: Views and Visions", Educational Horizons, Vol. 86, No. 2, pp. 99-111.

Wong, A. et al. (2010), Japanese Science and Technology Capacity: Expert Opinions and Recommendations, RAND Technical Report, RAND Corporation, Santa Monica, California.

Yonezawa, A. and **T. Kim** (2008), "The Future of Higher Education in the Context of a Shrinking Student Population: Policy Challenges for Japan and Korea", Higher Education to 2030, Volume 1: Demography, OECD Publishing.

Zhou,Y. and **A. Oishi** (2005), "*Underlying Demand for Licensed Childcare Services in Urban Japan*", Asian Economic Journal, Vol. 19. No: 1.

3

Finland: A Non-Competitive Education for a Competitive Economy

Finland has been ranked as one of the top-performing countries in PISA for the past decade. During the same period, it has also been cited as one of the world's most competitive economies. This chapter looks at some of the factors that contribute to this double success, including an emphasis on co-operation and networking, rather than competition; education policies that favour informality, flexibility and quick decision making; career guidance and work placements that bridge formal education and the world of work; and an emphasis on teaching skills and creativity.

INTRODUCTION

Prior to 2000 Finland rarely appeared on anyone's list of the world's most advanced nations, let alone education systems. Many young people were leaving the system relatively early, and Finland's performance was never better than average on five different international mathematics or science assessments of the International Association for the Evaluation of Educational Achievement (IEA) between 1962 and 1999. However, over the past decade Finland has been a major international leader in education (Table 3.1; OECD, 2010a). It has consistently ranked in the top tier of countries in all PISA assessments since 2000, and its performance has been notable for its remarkable consistency across schools.

No other country has so little variation in outcomes between schools, and the gap within schools between the top- and bottom-achieving students is extraordinarily modest as well. Finnish schools seem to serve all students well, regardless of family background or socio-economic status. For these reasons, Finnish schools have become a kind of tourist destination, with hundreds of educators and policy makers annually travelling to Helsinki to try to learn the secret of their success.

Table 3.1 Finland's mean scores on reading, mathematics and science scales in PISA

	PISA 2000	PISA 2003	PISA 2006	PISA 2009
	Mean score	Mean score	Mean score	Mean score
Reading	546	543	547	536
Mathematics		544	548	541
Science			563	554

Source: OECD (2010a).

With an economy now based significantly on the service industry, Finland is dependent on a skilled labour force, advanced knowledge workers, and creative designers. But higher and longer education is not enough. It is essential that there is a right balance between solid expertise and creative talent available for the Finnish labour market. This chapter describes the essential facts about the educational changes that have taken Finland from the periphery to the limelight in education and how the country has ensured coherence in its education policies and economic strategies.

FINNISH EDUCATION: A BRIEF HISTORY

Inauspicious beginnings: 1917-1970

Finland became independent from the newly born Soviet Union in 1917. Finland had to fight long and hard against the Soviet Union to preserve that independence through the Second World War. For a nation with a population of less than four million, the cost of the war was devastating: 90 000 dead; 60 000 permanently injured and 50 000 children orphaned (Sahlberg, 2011). Additionally, as part of the 1944 peace treaty with the Soviet Union, Finland was forced to cede 12% of its land, requiring the relocation of 450 000 Finnish citizens.

The first post-war elections in 1945 produced a parliament in which the seats were almost evenly divided between three political parties: the Social Democrats, the Agrarian Centre Party, and the Communists. In the 1950s the Conservatives gained sufficient strength to be included in major negotiations. Multi-party systems typically require the development of a political consensus in order to move any major policy agenda forward, and one priority around which such a consensus developed was the need to rebuild and modernise the Finnish education system.

In 1950 the structure of Finnish economy was at the level of Sweden's in 1910. Poverty was common and many people were leaving the country in search of a better life. The education system was highly unequal and more reflective of the needs of a predominantly rural, agricultural society than of a modern industrial society. In 1950 most young Finns left school after six years of basic education; only those living in towns or larger municipalities had access to a middle grade education. Students were separated at the age of 11 into either academically or practically-oriented educational pathways: 1) *civic schools*, run by some municipalities, which offered two or three additional years of schooling after six grades of elementary school, and which could lead to further vocational education if you happened to live in a town large enough to support such a school; and 2) *grammar schools*, which offered five additional years of schooling and typically led to the academic high school (*gymnasium*) and then to university. Only about a quarter of young Finns in 1950 had access to the grammar school path, and two-thirds of the grammar schools were privately governed.

This two-track system, generally reflecting the social class boundaries, prevailed until 1970, and is the reason why the old structure has been labelled a parallel education system. A fundamental belief underpinning this old structure was that *everyone cannot learn everything;* in other words, children's ability to be educated is not evenly distributed across society.

From backwater to watershed: Systemic reform in the 1970s

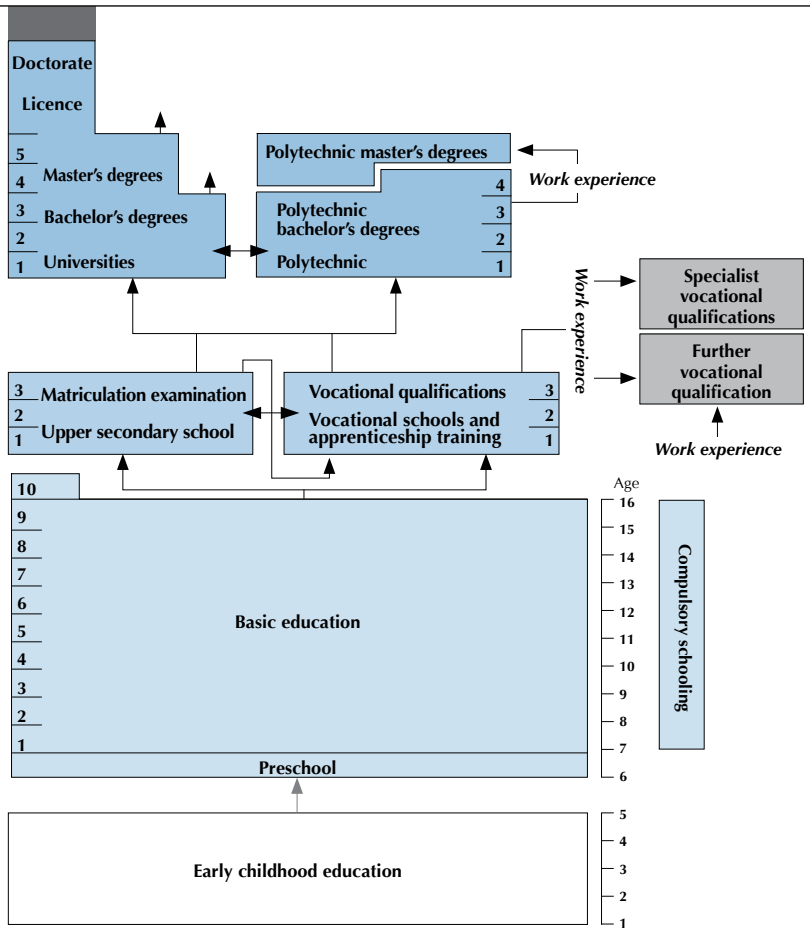
By the second half of the 1960s, a new social policy climate was diffusing the values of equality and social justice throughout Finnish society. The search was on for a more socially just society with higher education levels for all. The New Basic School System (or *peruskoulu* in Finnish) was developed in the early 1970s. Its central idea was to merge existing grammar schools, civic schools and primary schools into a comprehensive nine-year municipal school (Figure 3.1). This meant that all students, regardless of their socio-economic background or interests, would enroll in the same basic schools governed by local education authorities.

The transition from a parallel form of school organisation to the single comprehensive system was challenging, and consequently was phased in slowly, beginning in 1972 in northern Finland and only gradually spreading to the more populated municipalities and towns in the south. Critics of the new system maintained that it was not possible to have the same educational expectations for children from very different social and intellectual circumstances. Other opponents argued that the entire future of Finland as a developed industrial nation was at risk because overall education attainment would have to be adjusted downward to accommodate less talented students.

A major vehicle for addressing the anxieties of veteran teachers and resolving some of the difficulties inherent in merging the formerly parallel sets of schools into a unified system was the development of a new national core curriculum for the comprehensive school. The process for developing the curriculum engaged hundreds of teachers and took five years (1965-1970). One important decision that allayed the fears of some of the critics of the comprehensive school was to allow some differentiation in the upper grades to accommodate perceived differences in ability and interests, especially in mathematics and foreign languages. Schools could offer three levels of study in these subjects: basic, middle, and advanced, with the basic level corresponding to what had been offered in civic schools and advanced to what had been offered in the old grammar schools. This form of ability grouping persisted into the mid-1980s, when it was finally abolished.

▪ Figure 3.1 ▪

Finland's education system



A world-class education system: Finland today

Today the level of Finnish adults' educational attainment is high by international standards. According to the OECD, 38% of Finnish 25-34 year-olds have attained a higher education degree and over 90% have upper secondary education qualifications (OECD, 2010b). This indicates that participation rates in different levels of education are also high. Indeed, practically all pupils participate in voluntary pre-school and then successfully complete nine years' compulsory *peruskoulu*. Either general or vocational upper secondary education is available to all, and higher education to over 60% of the age cohort. Furthermore, Finnish adults participate in adult learning courses and programmes more than most of their peers in other countries.

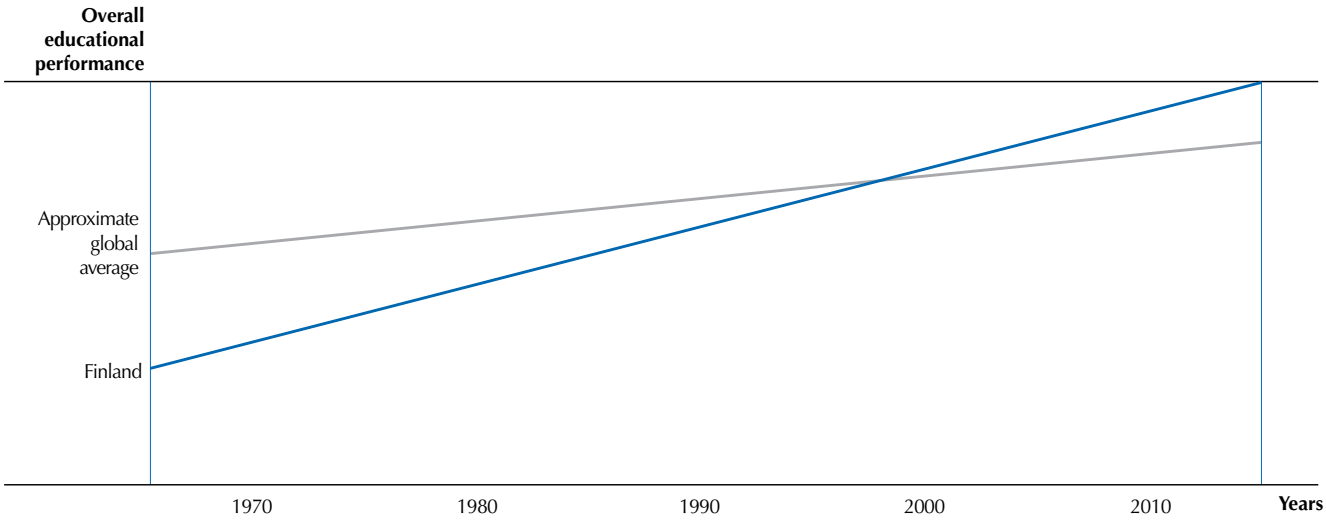
However, strong education performance in the Finnish context means more than high student academic achievement as measured by international comparative assessment studies. Strong educational performance, as it is understood in Finland, also includes the level of participation in and access to education, even distribution of learning outcomes throughout different schools and learners, and affordability and overall cost of education. Equal educational opportunity has been the leading value and the guiding principle of Finnish education policies since the 1960s. The virtue of Finnish education is that everyone has easy access to high-quality and publicly funded educational opportunities.

An important indicator of educational performance is to what extent the education system is able to cope with inequalities that different pupils bring with them into schools. This normally refers to equity of education outcomes. One way to look at this is to compare student achievement in different schools in the education system. PISA studies show that of all OECD countries, Finland has the smallest between-school variation of student achievement. For example, in the 2009 PISA reading literacy scale performance variation between schools in Finland was 7.7% compared to the OECD average variation of 42% (OECD, 2010a). Other international student achievement studies also found similar small between-school variations in students' performance.

However, this strong educational performance took a while to emerge. After implementing *peruskoulu* reform in the late 1970s all four aspects of educational performance – level of participation, equity in education, efficiency of the system, and student achievement – were rather undeveloped. Indeed, before the first PISA results became public in December 2001 there were only a few internationally notable aspects in the Finnish education system. All IEA studies that compared the performance of Finnish 4th- and 8th-grade students to that of their international peers confirm that Finland was at best a mediocre educational performer. Figure 3.2 illustrates the outcome of successful reform to Finland's education system (measured as participation, equity, efficiency and academic achievement) and compares it with the global average since the early 1970s.

▪ Figure 3.2 ▪

Finnish educational improvements compared to the approximate global average



Source: Sahlberg, 2011.

FIVE DRIVERS OF SUCCESSFUL REFORM

As with all education systems that achieve good results, Finland's success is a function of the network of several different factors that work together to create a coherent approach that supports consistent system-wide development and performance. Some of these factors are cultural. Finland's history and geography – caught between the powerful kingdom in the west and the even bigger empire in the east – compelled it to put the nation's interest first and not allow education policy to become victim to partisan

politics. Finland is a small nation that the rest of the world sees as a strange place that speaks a language nobody else understands. Over the past half-century Finns have adopted an understanding that the only way to survive as a small, independent nation is by educating all people. This is the only hope amid the competition between bigger nations and all those who have other benefits Finns don't have. Building a welfare state and its public education system driven by this spirit of survival is an important cultural context that explains, among other things, why Finns have succeeded in reaching consensus on such complicated issues as the comprehensive school system in the 1960s or upper secondary education for all in the 1970s.

The following five interrelated factors are often offered as the reasons behind successful reform and strong educational performance in Finland.

A focus on equity and well-being

While Finland has guarded its hard-won independence, in many areas of social policy it has been much influenced by its Scandinavian neighbours, especially Sweden. As noted above, the idea of the comprehensive school emerged in Finland as part of a larger movement in the 1960s for more social and economic equality, and over the next two decades the Finns adopted many features of the Swedish welfare state. Consequently, Finnish schools are embedded in a society with strong social safety nets and a broad and deep commitment to the healthy development and well-being of children. Education in Finland is not just about teaching and learning, but it also has a strong element of child well-being and care. Schools are expected to maintain strong support systems for all learners – healthful nutrition, health services, psychological counselling and student guidance are normal practice.

Equality in educational opportunities also lies at the heart of Finland's education policy. Education policies emphasise equity and well-being in schools and rely on the principle of inclusive education. The aim is for all children to find their neighborhood school sufficient and appropriate to their needs and to their parents' expectations. However, parents still have freedom to choose any school they like in their own municipality.

Optional pre-school at the age of six is available for all children. More than 98% of this age group participates in pre-school, combined with half-day school and another half daycare. All Finnish children start their formal schooling in August of the year they turn seven. Normally, primary school lasts six years followed by a three-year lower secondary school, although the new law allows some variation. Today it is widely recognised that the six-year primary school provides a solid basis for high educational performance. Finnish experience and international research show that investment in primary education pays off in later grades through better aptitude and learning skills, as well as through positive overall outcomes. Schools are typically small, with class sizes ranging from 15 to 30 students. In 2004, more than one-third of Finnish comprehensive schools had fewer than 50 pupils; just 4% of all schools had 500 or more pupils (Statistics Finland, 2011).[1] Lower grades (1 to 6) typically have fewer than 300 pupils and often operate separately from upper grades (7 to 9), although the unified *peruskoulu* is gradually closing the gap between these two. Compulsory education lasts until completion of nine years of basic school or until a young person turns 16, whichever comes first. Grade repetition is rare and over 99% of young Finns successfully complete nine years of basic school.

Dealing with difference

Bringing together students with often very different life circumstances and aspirations to learn together in the same schools and classrooms required a fundamentally new approach to education. This was especially so for those with special educational needs. The equal opportunity principle insisted that all students must be offered a fair chance to be successful and to enjoy learning. From early on, it was understood that educating pupils with special needs would only be successful if learning difficulties and other individual deficits were identified early on and treated promptly. Special education and pedagogical differentiation quickly became integral parts of school curricula, and all municipalities and schools soon housed experts trained to support special needs pupils.

Every comprehensive school has a student welfare team that meets at least twice a month for two hours. The team consists of the principal, the special education teacher, the school nurse, the school psychologist, a social worker, and the teachers whose students are being discussed. The parents of any child being discussed are contacted prior to the meeting and are sometimes asked to be present.

Funding efficiency

The vast majority of primary, secondary and tertiary education is financed from the public coffers, with only about 2% of total education expenditure coming from private sources (OECD, 2010b). Parents rarely contribute financially to their children's education and therefore private tutoring or after-school academic classes – common in many other high-performing countries – don't exist in Finland. Finland's education system is also highly efficient: in 2007 Finland spent 5.6% of its GDP on education, less than the OECD total average of 6.2% (OECD, 2010b). This efficiency is discussed further in the conclusions to this chapter.

Teachers who are highly valued and highly trained

The *peruskoulu* reform was not just an organisational change, it was a new educational philosophy. This philosophy included the beliefs that all pupils can learn if they are given proper opportunities and support, that understanding of and learning through human diversity is an important educational goal, and that schools should function as small-scale democracies, just as John Dewey had insisted decades before. *Peruskoulu* required that teachers, who had previously worked in very different schools, had to now all work in the same type of school with students with diverse abilities. This meant that teachers needed new instructional methods, they needed to design learning environments that enable differentiated learning for different pupils, and they needed to perceive teaching as a top profession. These expectations led to a wide-scale teacher education reform in 1979 that emphasised the professional development and research-based learning that have been the key drivers of Finland's rapid educational improvement.

Until the mid-1970s, primary school teachers were prepared in teacher colleges. Middle and high school teachers studied in subject departments of Finnish universities. By the end of the 1970s, all teacher-education programmes became university-based. At the same time, scientific content and educational research methodologies began to enrich the teacher education curriculum. Teacher education is now research-based, meaning that it must be supported by scientific knowledge and focus on thinking processes and cognitive skills used in conducting research (Toom, et al., 2010).

Among young Finns, teaching is consistently the most admired profession in regular opinion polls of high school graduates (Sahlberg, 2011). Classroom teaching is considered an independent and creative, high-status profession that attracts some of the best secondary school graduates each year (Box 3.1). The entry requirement for permanent employment as a teacher in all Finnish basic and high schools today is a Master's degree. Pre-school and kindergarten teachers must have a bachelor's degree.

Wages are not the main reason young people become teachers in Finland. Teachers earn very close to the national average salary level, typically equivalent to what mid-career, middle-school teachers earn annually in the OECD nations – about USD 41 000 (Table 3.3, OECD, 2010b). More important than salaries are such factors as high social prestige, professional autonomy in schools, and the ethos of teaching as a service to society and the public good. Thus, young Finns see teaching as a career on a par with other professions where people work independently and rely on scientific knowledge and skills that they gained through university studies. Another reason for teaching's high appeal is the fact that the master's degree also opens up other career options. A teacher with a master's degree often interests human resource departments within Finnish private sector and third-sector organisations. These teachers also have open access to doctoral studies in Finnish universities. Over the past decade, Finnish schools have noted an upsurge in school principals and teachers who possess a PhD in education.

Box 3.1 **Becoming a teacher in Finland**

Becoming a primary school teacher in Finland is a very competitive process, and only Finland's best and brightest are able to fulfil those professional dreams. Every spring, thousands of high school graduates submit their applications to the Departments of Teacher Education in eight Finnish universities. Normally it's not enough to complete high school and pass a rigorous national Matriculation Examination; successful candidates must have the highest scores and excellent interpersonal skills. Annually only about one in every ten applicants will be accepted to study to become a teacher in Finnish primary schools. In 2011 the University of Helsinki received 2 300 application for 120 study places in its primary teacher education programme. Among all categories of teacher education, about 5 000 teachers are selected from about 20 000 applicants.

The teacher-education programmes for prospective primary and upper grade teachers are somewhat different in structure, but not in rigour. Primary-grade teachers major in education, but they are expected to minor in at least two of the subjects included in the primary school curriculum. This means, for example, that they are studying mathematics in the mathematics department, not in the education department. Upper-grade teachers major in the subject they will be teaching, but they do substantial work in education as well, either in an integrated five-year programme or in a concentrated fifth year after they have completed their work in their subject field. It is also possible for a master's degree holder to take one year of pedagogical studies in the faculty of education to gain a formal teacher qualification.

Teacher education in Finland has at least four distinguishing qualities:

- Research-based. Teacher candidates are not only expected to become experts in pedagogical content knowledge, but they are required to write a research-based dissertation as the final requirement for the master's degree. Upper-grade teachers major in

an academic subject area of their choice; primary-grade teachers major in educational sciences. The rationale for requiring a research-based dissertation is that teachers are expected to be able to have a holistic view of teaching and learning process, and be able to engage in continuous professional development in their career as a teacher.

- Strong focus on developing pedagogical content knowledge. Traditional teacher-preparation programmes too often treat good pedagogy as generic, assuming that good questioning skills, for example, are equally applicable to all subjects. Because teacher education in Finland is a shared responsibility between the teacher education faculty and the academic subject faculty, there is substantial attention to subject-specific pedagogy for prospective primary as well as upper-grade teachers.
- Good training for all Finnish teachers in diagnosing students with learning difficulties and in adapting their instruction to the varying learning needs and styles of their students. Special education belongs to all teacher-education programmes and all teachers are expected to have at least basic knowledge and skills related to students with special educational needs.
- A strong clinical component. There are two main kinds of practicum within teacher-education programmes in Finland. The first – a minor portion of clinical training – occurs in seminars and small-group classes in the Department of Education, where students practice basic teaching skills in front of their peers. The second – the major teaching practice – happens mostly in special Teacher Training Schools governed by the universities, which have similar curricula and practices as normal public schools. Some student teachers also practice in a network of selected Field Schools (normal public schools). Primary-school teacher-education students devote approximately 15% of their intended study time to practice teaching in schools. In subject teacher education, practice teaching comprises about one-third of the curriculum.

The result is that today the Finnish teaching profession is on par with other highly skilled professions: teachers can diagnose problems in their classrooms and schools, apply evidence-based and often alternative solutions to them and evaluate and analyse the impact of implemented procedures. Parents trust teachers as professionals who know what is best for their children.

An OECD review on equity in education in Finland describes how Finland has created a virtuous circle surrounding teaching:

> High status and good working conditions – small classes, adequate support for counselors and special needs teachers, a voice in school decisions, low levels of discipline problems, high levels of professional autonomy – create large pools of applicants, leading to highly selective and intensive teacher preparation programs. This, in turn, leads to success in the early years of teaching, relative stability of the teacher workforce, and success in teaching (of which PISA results are only one example), and a continuation of the high status of teaching (OECD, 2005).

Smart accountability policies

Finland has not followed the global educational accountability movement that assumes that making schools and teachers more accountable for their performance is the key to raising student achievement. Finns don't think that frequent testing of students' achievement and schools' performance using standardised assessments is required. There are three primary reasons for this:

- While assessment practice is grounded in the national curriculum, education policy in Finland gives a high priority to individualised education and creativity as an important part of how schools operate. Therefore each student is judged more against his or her individual progress and abilities rather than against statistical indicators.
- Policy makers realised early on that teaching is the key element that makes a difference in what students learn in school – not externally set standards, standardised testing or alternative instructional programmes. Education developers insist that curriculum, teaching, and learning should drive teachers' practice in schools, rather than testing. Student assessment in Finnish schools is embedded in the teaching and learning process and used to improve both teachers' and students' work throughout the academic year.
- Finns want to avoid the disadvantages often associated with external standardised testing – narrowing of the curriculum, teaching to the test, and unhealthy competition among schools. Finnish education leaders think that the success of a high-stakes testing policy is whether it positively affects student learning, not whether it increases student scores on a particular test. If student learning remains unaffected, or if testing leads to biased teaching, the validity of such high-stakes tests must be questioned. Finnish school principals, and especially teachers, are not convinced that frequent external census-based testing and accountability built on test results are beneficial to students and their learning.

Along with curriculum design (Box 3.2), teachers play a key role in assessing students. Since Finnish teachers must design and conduct appropriate curriculum-based assessments to document student progress, classroom assessments and school-based evaluations are important parts of teacher education and professional development. All assessments of student learning are based on teacher-made tests within each school. Normally Finnish pupils are not assessed using numerical grades that would enable direct comparison with one another before 5th grade. Only descriptive assessments and feedback are used, depending on how student assessment is described in the school curriculum or municipal education plan. Finnish schools accept that there may be some limitations on comparability when teachers do all the grading of students. But the fact that primary school is, to a large extent, free from standardised testing enables teachers to use creative teaching methods and pupils to concentrate on learning and

sustaining their natural curiosity. The national PISA report concludes that only 7% of 15-year-old Finnish students said they feel anxious when working on mathematics tasks at home compared to 52% in Japan (Kupari & Välijärvi, 2005).

Smart accountability in the Finnish education context preserves and enhances trust among teachers, students, school leaders and education authorities and involves them in the process, offering them a strong sense of professional responsibility and initiative. Shared responsibility for teaching and learning characterises education in Finland; parents, students and teachers alike prefer an approach that allows schools to keep the focus on learning and permits more freedom in curriculum planning than the external standardised testing culture prevailing in some other nations.

Box 3.2 **Growing autonomy for teachers**

During the course of Finland's education reforms, teachers have demanded more autonomy and responsibility for curriculum and student assessment (Aho, et al., 2006). While the *National Curriculum Framework for Basic School* and similar documents for upper secondary education provide guidance to teachers, curriculum planning is the responsibility of schools and municipalities. Local education authorities approve curricula for schools, but teachers and school principals play a key role in curriculum design. Teacher education provides them with adequate curriculum knowledge and planning skills. Moreover, the importance of curriculum design in teacher practice has helped shift the focus of professional development from fragmented in-service training towards more systemic, theoretically grounded school-wide improvement efforts.

A culture of trust

Much of what has been previously noted is possible only if parents, students, and authorities trust teachers and school principals. The Finnish education system was highly centralised until the early 1990s. Schools were strictly regulated by the central agencies; a dense network of rules and orders governed the daily work of teachers. The gradual shift towards trusting schools and teachers began in the late 1980s. In the early 1990s, the era of a trust-based school culture formally started in Finland.

The culture of trust means that education authorities and political leaders believe that teachers, together with principals, parents and their communities, know how to provide the best possible education for their children and youth. Trust can only flourish in an environment that is built upon honesty, confidence, professionalism and good governance. Tellingly, Finland also performs well in international transparency rankings that indicate the perceptions of corruption among citizens (Sahlberg, 2010). Public institutions generally enjoy high public trust in Finland. Trusting schools and teachers is a consequence of a well-functioning civil society and high social capital. Honesty and trust are often seen as among the most basic values and the building blocks of Finnish society (Lewis, 2005).

The degree of Finnish social cohesion and trust in government is partly a function of the country's size and relative cultural homogeneity, but also reflects the national temperament. Social cohesion and trust are difficult factors to isolate and quantify, but they clearly are part of the explanation for why teaching has become such an attractive profession for talented young people in Finland.

Sustainable leadership and political coherence

The success of Finnish education reform from an international perspective is mainly based on institutions and institutional structures established in the 1970s and 1980s, rather than on changes and improvements implemented from the 1990s. Changes in Finnish education after 1990 have been more about ideas and innovation than about new institutional structures. Institutional changes in the 1990s have been smaller, except in tertiary education where a new polytechnic system was introduced. Nonetheless, directions remain clear and are based on the earlier policies.

Education policies are intertwined with other social policies, and with the overall political culture. Education in Finland is seen as a public good that contributes to the well-being of all and therefore has a strong nation-building function. The key success factor in Finland's development of a well-performing knowledge economy with good governance and a respected education system has been its ability to reach broad consensus on most major issues concerning the country's future directions. The conclusion is that Finland seems particularly successful in implementing and maintaining the policies and practices that constitute sustainable leadership and renewal.

Increased interaction among various public-sector policies has strengthened the coherence of economic and social reforms and created conditions for sustainable leadership in Finnish society in general and the education sector in particular. This has enabled systematic commitment to a long-term vision and inter-sector co-operation among different policies and strategies.

Governments from the political left and right have respected education as the key public service for all citizens and maintained their belief that only a highly and widely educated nation will be successful in world markets.

EDUCATION AND NATIONAL ECONOMIC COMPETITIVENESS

Is there a correlation between a country's educational performance and its national economic competitiveness? Using available international studies and surveys the simple answer is "no" (Schwab, 2010; OECD, 2010a). Countries like the United States and Norway rank high in the global competitiveness ratings – such as those of the World Economic Forum (Schwab, 2010) – but only modestly in the assessments of their students' learning achievement, such as PISA. On the other hand, Korea, Canada and the Netherlands are high in the student learning comparisons but not at the top of economic competitiveness rankings. Many countries seem to reach similar opposite positions in these two ratings, simultaneously at the high and low ends of the scales; therefore we cannot assume that these two measures correlate. Nevertheless, some countries do manage to do consistently well in both rankings.

Finland has been ranked as one of the most competitive economies since the early 2000s (Routti and Ylä-Anttila, 2006). Two major events occurred in the early 1990s that triggered a significant shift in the economic development strategy promoted by Finland's governmental and private sector leaders. The first was the initiation of the accession process that led to Finland's acceptance into the European Union in 1995. With the collapse of the Soviet Union (a major trading partner), Finland had no choice but to diversify its export strategy and begin to move away from its historic reliance on forest products and other traditional industries. The second and more powerful stimulus was a major economic recession in the early 1990s, set off by a collapse of the financial sector reminiscent of the banking crisis the US has recently experienced. Unemployment in Finland approached 20%; gross domestic product (GDP) declined by 13% and public debt exceeded 60% of GDP (Aho, et al., 2006). The government used this crisis as an opportunity to develop a new national competitiveness policy designed to support private sector innovation and focused heavily on the development of the telecommunications sector, with Nokia as the central player. In a remarkably short time, Finland managed not only to dig itself out of recession but to reduce its historical reliance on its natural resources and transform its economy into one based on information and knowledge. Investments in research and development provided the fuel for this growth. In 1991 only five Finnish workers out of 1 000 were in the research and development (R&D) labour force. By 2003 this number had increased to 22, almost three times the OECD average (Routti and Ylä-Anttila, 2006). By 2001 Finland's ranking in the World Economic Forum's global competitiveness index had climbed from 15th to 1st, and it has remained at or near the top in these rankings ever since.

Economists have been interested to find out why Finland has been able to become the most competitive economy in the world since 1990. Good governance, strong social cohesiveness and an extensive social safety net provided by the welfare state made this exceptionally rapid economic recovery possible. Educational performance has to be seen in the context of other systems in society, *e.g.* health, environment, rule of law, governance, economy and technology. It is not only that education functions well in Finland, but that it is a part of well-functioning democratic welfare state (Castells and Himanen, 2002). Attempts to explain the success of the education system in Finland should be set in this wider context and seen as a part of overall function of democratic civil society.

There are some interesting parallels between education and economic development policies in Finland during the period of transformation and related rapid growth in the 1990s. Table 3.2 summarises some of the key policies and strategies that have been driving education system development and economic growth since 1990.

Four common features are often mentioned as contributing to positive educational and economic progress:

- *Policy development has been based on integration* rather than exclusive sub-sector policies. Education sector development is driven by medium-term policy decisions that rely on sustainable basic values, such as equal opportunities to good education for all, inclusion of all students in mainstream publicly financed education and strong trust in public education as a civil right rather than an obligation. These medium-term policies integrate education and training and involve the private sector and industry in the creation and monitoring of their results. Similarly, economic and industrial policies have integrated science and technology policies and innovation system with industrial clusters (Routti and Ylä-Anttila, 2006). Integrated policies have enhanced the systemic development and interconnectedness of these sectors and have thus promoted more sustainable and coherent political leadership for their successful implementation.

Table 3.2. Comparison of education policies and economic development policies in Finland since 1990

Education development	Economic development
BASIC POLICY PRINCIPLES	
▪ Equal opportunities to receive good education ▪ Strong belief in public education ▪ Comprehensive medium-term policies integrating education and research	▪ Integrated science and technology policies and innovation system with industrial clusters ▪ Maintained high public spending on research and development
STRATEGIC FRAMEWORK	
▪ Long-term view of comprehensive schooling that is the same for all pupils ▪ Flexibility at all levels of the education system ▪ Emphasis on creativity in organising schooling and classroom work	▪ Long-term view of the knowledge-based economy and integrated approaches to development ▪ Flexible regulatory framework ▪ Investing in innovations and promotion of regional innovation strategies
ROLE OF GOVERNANCE AND INSTITUTIONS	
▪ Good governance and public institutions play an important role in policy-making and monitoring ▪ Development-oriented evaluation and accountability are spread throughout the system ▪ Consensus on policies among education authorities, employers and trade unions fosters sustainable leadership	▪ Strong governance and rule of law provide solid basis for economic development ▪ Flexible accountability ▪ Specific institutions, such as the Committee of the Future, and the innovation system are shared by private and public representatives for consensus-making purposes
HUMAN CAPITAL	
▪ Well-trained teachers ▪ Recognised professionalism in schools and education institutions ▪ Participatory planning, leadership and evaluation	▪ Private sector participates actively in education and training policy formulation and implementation ▪ Significant financing of staff development ▪ Encouraging lifelong learning and continuous professional development

Source: Sahlberg, 2011.

- Strategic framework development and change have been built upon *longer-term vision*. National development strategies – for example the Information Society Programme (Ministry of Finance, 1995), National Lifelong Learning Strategy (Ministry of Education, 1997) and Ministry of Education Strategy 2015 (Ministry of Education, 2003) – have served as overarching frameworks for the sector strategies. These and other strategies have emphasised increasing flexibility, coherence among various sectors, and the development of local and regional responsiveness and creativity in institutions.
- *The roles of governance and public institutions* have been central in policy developments and implementation of both education and economic reforms. Good governance, high quality public institutions and rule of law play important roles in policy development and implementation of planned changes. Evaluation approaches in both sectors are development-oriented and various players in the system are held accountable for process and outcomes. Particular institutions, for example the Committee of the Future and the Committee of Vocational Education and Training, are shared by private and public representatives as well as the key stakeholders of the society for consensus-making purposes.
- A highly educated labor force and broad participation in education at all levels guarantee the stock of *human capital* that is necessary for both good education service delivery and economic growth. For instance, all teachers are required to hold a master's degree and most workers are encouraged to participate in continuous professional development as part of their work. Teachers are professionals in their schools and therefore actively involved in planning and implementing changes in their work.

Specific policies and desired practices for skills in a competitive knowledge economy

Against this background, what Finnish policies and educational reforms have had a significant impact on its national economic competitiveness? The following education policies have addressed the aspects of teaching and learning that encourage risk-taking in classrooms, creativity in schools and flexibility in the education system. The key assumption is that expert thinking and complex communication require less regulation and more opportunities for real co-operation in schools.

Less competition, more collaboration

A key Finnish lesson is that to prepare themselves for a more competitive economy, schools and students must compete less. Instead, schools should increase internal collaboration. Co-operation and networking rather than competition and disconnectedness should lead the education policies and development of education systems. Schools and other educational institutions should cultivate attitudes, cultures and skills that are necessary in creative and collaborative learning environments. Finnish education policies assume that expert thinking, complex communication and creative problem solving can only flourish when collaboration is maximised and competition is minimised.

Economic competitiveness can be promoted and enhanced by fostering co-operation and interaction at three levels in education: schools, teachers and students. This has been the key strategic principle in educational development in Finland (Box 3.3). It means that supporting school networking has to be given a high priority in education reforms. In almost any education system necessary innovations and ideas for improvement already exist in the system. The challenge is to share them among schools. Therefore, developing the education system in a way that encourages and enables schools to create partnerships and information exchange networks is likely to spread existing good practices. Helping teachers to work as professional communities combats the isolation that is common to many teaching cultures. Learning to teach in new ways is not easy. A safe and supportive professional climate in schools is a necessary condition for the professional improvement of teachers. Designing education reforms in a way that will provide teachers with opportunities and incentives to collaborate more will increase the likelihood of sustainable implementation of intended changes. A national school improvement initiative, the Aquarium Project, implemented in the 1990s in Finland is an example of networking and collaboration at the system level to enhance implementation of intended policies (Sahlberg, 2011).

Box 3.3 **Learning schools**

Education policies in Finland encourage local education leaders, principals and teachers to take risks, find new solutions to make education more meaningful to all, and put creativity at the centre of play in schools. As the level of teacher professionalism gradually increased in schools during the 1990s, the prevalence of effective teaching methods and pedagogical classroom and school designs increased. A new flexibility within the Finnish education system enabled schools to learn from each other, and thus make best practices universal by adopting innovative approaches to organise schooling. It also encouraged teachers and schools to continue to expand their repertoires of teaching methods, and to individualise teaching in order to meet the needs of all students.

Another aspect of the education system in Finland is the role of networks of schools and communities of teachers in school improvement and teachers' professional development. Andreas Schleicher, who leads the PISA in the OECD, concluded in his analysis of Finnish education that building networks of schools that stimulate and spread innovations helps to explain Finland's greatest success in making "strong school performance a consistent and predictable outcome throughout the education system, with less than 5% variation in student performance between schools" (Schleicher, 2006).

More flexibility in the system

Flexibility has been another of the key denominators of education and economic development in Finland. The education system went through a major transformation in the early 1990s when most state regulations were abolished and pathways to education opportunities were dramatically increased. Similarly, private sector regulations were loosened and more flexible standards were introduced, especially to foster networking between firms, universities, and research and development institutions.

Today's education policies emphasise informality, quick decision-making, and freedom to act so that local education authorities and schools can react to changing situations and surrounding environment. As with Nokia (Box 3.4), the objective of educational management in Finland has been to have decisions made by the people who have the best knowledge and skills. The education management system is not only less hierarchical than many other education systems, it is decidedly anti-hierarchical. The objective of meritocratic management in both Nokia and the Finnish education system is to encourage creativity, entrepreneurship and personal responsibility.

Box 3.4 **Matching curricula to the needs of the economy**

In many Finnish companies today the objective is to hire the most innovative as well as collaborative people they can find and to give them the freedom to work together and take risks. In a meeting for the new national curriculum for science and technology in the early 1990s, as part of a task force on the national science curriculum, Finnish business leaders and employers were asked what their expectations were from schools. They explained that if people work or learn in an environment where avoidance of mistakes and fear of failure are dominant, they typically don't think for themselves. Fear of failure does not engender creativity. A senior Nokia manager put it this way:

"If we hire a youngster who doesn't know all the mathematics or physics that is needed to work here, we have colleagues here who can easily teach those things. But if we get somebody who doesn't know how to work with other people, how to think differently or how to create original ideas and somebody who is afraid of making a mistake, there is nothing we can do here. Do what you have to do to keep our education system up-to-date but don't take away creativity and open-mindedness that we now have in our schools." (Sahlberg, 2011)

This was an important message for those education experts crafting the new national curriculum frameworks in mathematics and science at that time. In my recent interviews with some of the main Finnish service and technology companies' human resource heads a similar trend was confirmed. Successful applicants' academic merits normally weigh less than their personality and attitude. As one informant said, "we are hiring attitudes and talents, not credits or diplomas". Policy makers and schools listen closely to what employers expect of their new human resources. Curriculum policy today is in the balance between children's personal development needs, and the expectations of the Finnish economy.

Sound career pathways

Career guidance and counselling became a compulsory part of the *peruskoulu* curricula in all schools. Career guidance was intended to minimise the risk of students making irreversible choices about their educational futures. Career guidance and counselling soon became a cornerstone of both lower and upper secondary education, and has been an important factor in explaining Finland's very low drop-out rates and grade repetition. Career guidance has also served as a bridge between formal education and the world of work. As part of the overall career guidance curriculum, each student in basic school spends two weeks in a selected workplace to learn about the work environment.

Value experimentation and creativity

Improving economic competitiveness requires well-educated and trained people, technological and network readiness, and the knowledge and skills to work in an innovation-rich world. In order to be on the cutting edge of creative design and continuous innovation in high-tech industries, Finland has contended that people and their creative talent must be the key (Box 3.4). Creativity will not flourish and be sustained in schools unless people feel secure to take risks and explore the unknown. Moreover, working with and understanding innovations require creative and risk-intensive contexts. In other words, economic competitiveness is promoted by creating safe and inspiring learning environments in schools. In such schools teachers and principals will step beyond their conventional territories of thinking and doing that are often conditions for making a difference in students' learning and schools' performance.

Making learning interesting for students is the imperative for achieving sustainable development and change in schools. Economic competitiveness is above all about sustained learning. When individuals or societies have severe learning difficulties the economic forecasts will not look good. If students do not learn to love learning in their schools and universities, they will not find learning and change attractive afterwards. Therefore, education policies should first and foremost try to make learning in schools interesting and creative for all students without sacrificing the other important goals of education.

Linda Darling-Hammond, a leading US scholar and practitioner of teacher education, describes how Finnish teacher preparation can instill creativity:

> Student teachers participate in problem-solving groups, a common feature in Finnish schools. The problem-solving groups engage in a cycle of planning, action, and reflection/evaluation that is reinforced throughout the teacher education program and is, in fact, a model for what teachers will plan for their own students, who are expected to use similar kinds of research and inquiry in their own studies. Indeed, the entire system is intended to improve through continual reflection, evaluation, and problem-solving, at the level of the classroom, school, municipality, and nation. (Darling-Hammond, 2010)

LESSONS FROM FINLAND

For all of Finland's perceived advantages of size, relative cultural homogeneity and economic strength, it is important to remember that as recently as 1970 only 14% of Finnish adults had completed upper secondary school (Sahlberg, 2010). In 1993 Finland was in near economic collapse due to the banking crisis. Finland's ascent into the very top tier of educational performance was by no means inevitable: it was at least as much the result of a set of policy decisions deliberately taken, implemented thoughtfully, and sustained over a very long period of time as of factors endemic to the country's culture and history.

There are five main lessons from the story of Finland's path to the head of the international pack in educational performance. The overall conclusion from the Finnish experience has to do with time, i.e., with understanding that changing a country's education system is a complex process that requires stability and continuity of both politics and policy over decades, not years. Finland's leaders took the time to build a solid political consensus across party lines before enacting the comprehensive school legislation in the early 1960s, and then took several more years to phase in the implementation of the law. Everything that has followed has been built upon that consensus-based foundation.

High-quality teachers

There is now strong evidence that the quality of teachers and teaching is by far the most important school-based determinant of educational performance and student achievement, especially for students from less advantaged backgrounds (Hanushek and Wössmann, 2007; Auguste, et al., 2010). Many countries pay lip-service to the importance of attracting and retaining a high-quality teacher force, but few have pursued this goal as single-mindedly as Finland. While teachers have always enjoyed a degree of respect in Finnish society, through a combination of raising the bar for entry into the profession and granting teachers greater autonomy and control over their classrooms and working conditions than their peers enjoy elsewhere, Finland has managed to make teaching one of the most desirable career choices among young Finns. Consequently, teaching is now a highly selective occupation in Finland, with well-trained professionals spread throughout the country. This fact, more than any other, accounts for the high level of consistency across Finnish schools.

Some of the noteworthy successful practices in Finland appear to be:

- The development of rigorous, research-based teacher-education programmes that prepare teachers in content, pedagogy, and educational theory, as well as the capacity to do their own research and craft creative pedagogical solutions for teaching.
- Significant financial support for teacher education, professional development, reasonable and equitable salaries, and supportive working conditions.
- The creation of a respected profession in which teachers have considerable authority and autonomy, including responsibility for curriculum design and student assessment, which engages them in the ongoing analysis and refinement of practice.

Highly efficient policies

With such policies and reforms, Finland appears to get more for less in education. Finland differs from many other countries in its minimalistic approach to educational effectiveness. Finnish children start formal schooling later than most other children, at the age of seven. According to international surveys they also are expected to do much less school-related homework than others. Comparisons of intended instructional hours during compulsory education reveal that pupils in Finland have less classroom-based learning time than pupils in other developed countries (Box 3.5). Last but not least, Finnish children experience little or no external standardised testing of what they have learned. This minimalistic approach to education policy and practice might suggest that the education system is mediocre. That does not seem to be the case. Some Finnish analysts suggest that a golden balance has been struck in Finnish schools between formal instruction and informal learning that allows both students and teachers to use their creative potential and imagination to complement the effect of education. These smart education policies optimise inputs and limit the use of expensive quality control and data mechanisms that are common in many other countries.

Diagnosis and early intervention

Finnish teachers are trained to accept that *all* children can learn, and to intervene before struggling children become discouraged and fall too far behind their classmates. The proximity of help in the form of specially trained intervention experts in every school – the special education teacher – means that the regular classroom teacher has easy access to support and that struggling children are much less likely to go unnoticed or to fall through the cracks. The small size of Finland's schools is an important factor here, as is the co-ordination of resources embodied in the pupils' care group. Most primary school teachers also teach the same class of pupils for several years, i.e. from first grade to sixth, allowing them to become very familiar with the needs and personalities of each student. Again, this combination of elements helps explain why the gap between the top and bottom performing schools and students in Finland is so narrow compared with virtually all other nations.

Box 3.5 **Teaching less does not mean achieving less**

From an international perspective, Finnish teachers devote less time to teaching than do teachers in many other nations. For example, a typical middle-school teacher in Finland teaches just less than 600 hours annually, corresponding to about four 45-minute lessons a day. In the United States, by contrast, a teacher at the same level devotes 1 080 hours to teaching over 180 school days (OECD, 2010b). This means that, on average, a middle-school teacher in the United States devotes almost twice as much time to teaching compared with his or her counterpart in Finland.

This, however, does not imply that teachers in Finland work less than they do elsewhere. An important – and still voluntary – part of Finnish teachers' work is devoted to improving classroom practice, the school as a whole, and working with the community. Formally, teacher's working time in Finland consists of classroom teaching, preparation for teaching, and two hours a week planning school work with colleagues. But because Finnish teachers take on significant responsibility for curriculum and assessment, as well as experimentation with and improvement of teaching methods, some of the most important aspects of their work are conducted outside of classrooms.

Creativity

Creativity and innovation are overused words in education, especially by merchants of the latest pieces of hardware or software that promise to revolutionise teaching and learning. However, in this chapter creativity refers to the emphasis in Finnish schools on the importance of cultivating in young people those dispositions and habits of mind that are often associated with innovators: risk-taking, flexibility, initiative, collaboration, and the ability to apply knowledge to novel situations. Some skeptics about Finland's success attribute its consistently high performance on PISA to the degree of alignment between the kind of learning PISA measures and values and the goals of the Finnish education system. There is clearly some truth to this observation, but this hardly constitutes a criticism of the Finnish system. The Finns are not the least bit apologetic about their focus on preparing people for an economy in which creativity, innovation and entrepreneurship will continue to be drivers of progress.

Deep sectoral reforms

Most governments enact education reform through new programmes – e.g. smaller class size, more ambitious external assessments, increased professional development. Reforms like these take the basic features of the system as given. The Finnish reforms, by contrast, especially the creation of the comprehensive school, created a sector that functioned in a radically different way. It is the shape of this new sector, not continued programmatic initiatives from a central government, which accounts for Finland's success. Closer analysis of Finnish education policies and reforms since the 1970s reveals that Finland has employed different solutions to transforming its education system compared with many other OECD countries (Darling-Hammond, 2010; Hargreaves and Shirley, 2009; Sahlberg, 2011). This is sometimes called *the Finnish Way* of educational reform. The Finnish experience shows that successful reform of the education system is possible without strong emphasis on competition, choice, external inspection, standardised testing or non-public governance of schools (such as charter schools). Finnish policies have endorsed the systematic building of professionalism among teachers and leaders, the gradual creation of trust in schools and teachers, and the importance of personalisation of teaching and learning. Moreover, Finnish education policies have put creativity and experimentation on a par with teaching for academic achievement. One of the key lessons from Finland is therefore a notion of hope: it is possible to turn around an education system if the change strategies are based on right things.

THE CHALLENGE AHEAD

The big question all high-performing systems need to face is whether or not the policies and practices that have brought about their current high performance will be sufficient to sustain them in a rapidly-changing, globalising world. Like all other countries, Finland needs to put serious effort into renewing its education system to meet the needs of a society that will be more globalised, complex and unpredictable than today's. The following challenges to the Finnish education system are likely to need rapid attention:

- Although the educational performance of Finnish schools, as measured by international student assessments, is remarkably even, the gap between individuals in Finland is increasing. In reading literacy, for example, differences between girls and boys are already significant. Domestic research also reveals that the number of adolescents who find no or little value in studying at school is growing. Education policies need to address these indifferences in achievement and engagement. One option is to have more personalised learning and customised schools that would better meet the interests and needs of individuals and communities (Sahlberg, 2011).

- The global economic downturn is reducing available funds for the public sector in Finland. Many Finnish municipalities are in serious fiscal crisis and spending in education is at stake. In some cases local decision makers argue that good enough results can be accomplished with a reduced education budget. But continuous renewal of the education system requires both human and financial resources. The risk is that shrinking resources will eventually jeopardise the process of renewal.
- During times of economic downturn, professional development budgets are often the first to vanish. Concerns have been raised recently about the variability of in-service professional development for teachers. Municipalities, as the overseers of primary, middle and high schools, are responsible for providing teachers with learning opportunities, based on their needs. Therefore, some schools receive greater allocations for professional development and school improvement than others. In response to concerns that participation in professional development may be decreasing, the government is planning substantial increases in professional development budgets and considering ways to require that all teachers have access to adequate professional training financed by municipalities. The state budget annually allocates some USD 30 million to professional development of teachers and school principals through various forms of pre-tertiary and continuing education. The government determines the focus of the training, based on current national educational development needs, and the training is contracted out to service providers on a competitive basis. The Finnish Ministry of Education, in collaboration with municipalities, plans to double the public funding for teacher professional development by 2016.
- Finally, creativity is the central power of Finnish education system. Lack of fear, and the freedom to find one's own personal way to learn are the main drivers of the risk-taking and relaxed atmosphere in Finnish schools. Increasing diversity in classrooms also helps teachers to look for new ways to make learning inspiring for all. It is paramount to maintain that diversity and further develop creative approaches in schools and classrooms. Having more creativity and innovation in education is not only a methodological or curricular issue. This is first and foremost a cultural issue, and the challenge is to organise schools to make the best use of everybody's imagination and creative talent. Minimising external control of schools and maximising trust will be the success factors of Finnish education for the decades to come.

▪ Figure 3.3 ▪

Finland: Profile data

Language(s)	Finnish and Swedish[2]
Population	5 326 000[3]
Youth population	16.7%[4] (OECD average 18. 5%)
Elderly population	16. 9%[5] (OECD average 14. 6%)
Growth rate	0.38%[6] (OECD average 0.51%)[7]
Foreign-born population	3.8%[8] (OECD average 12.9%)
GDP per capita	35 918 USD[9] (OECD average 33 732)[10]
Economy-Origin of GDP	Services: 70.6%; Industry and construction: 24.6%; Agriculture, forestry and fishing: 4.9%[11]
Unemployment	6.4% (2008)[12](OECD average 6.1%)
Youth unemployment	21,6% (OECD average 18.0%)[13]
Expenditure on education	5.9% of GDP; (OECD average 5.2%) 3.7% on primary, secondary and post-secondary non-tertiary 1.9 % on tertiary[14] education[15] (OECD average 3.5%; 1.2% respectively) (Table B4.1) 12.5% of total government expenditure[16] 7.9% on primary, secondary and post-secondary non-tertiary 3.9 % on tertiary education[17] (OECD average 9%; 3.1% respectively)
Enrolment ratio, early childhood education	48.2% (OECD average 71.5%)[18]
Enrolment ratio, primary education	95.5% (OECD average 98.8%)[19]
Enrolment ratio, secondary education	87.2% (OECD average 81.5%)[20]
Enrolment ratio, tertiary education	42.6%[21] (OECD average 24.9%)[22]
Students in primary education, by type of institution or mode of enrolment[23]	Public 98.6% (OECD average 89.6%) Government-dependent private: 1.4% (OECD average 8.1%) Independent, private: no data[24] (OECD average 2.9%)
Students in lower secondary education, by type of institution or mode of enrolment[25]	Public 95.7% (OECD average 83.2%) Government-dependent private: 4.3% (OECD average 10.9%) Independent, private: no data[26] (OECD average 3.5%)
Students in upper secondary education, by type of institution or mode of enrolment[27]	Public 86.1% (OECD average 82%) Government-dependent private: 13.9% (OECD average 13.6%) Independent, private: no data[28] (OECD average 5.5%)
Students in tertiary education, by type of institution or mode of enrolment[29]	Tertiary type B education: Public: 100% Government-dependent private[30] Independent-private: no data[31] (OECD average Public: 61.8% Government-dependent private : 19.2% Independent-private: 16.6%) Tertiary type A education: Public: 89.3% Government-dependent private: 10.7% Independent-private: no data[32] (OECD average Public: 77.1% Government-dependent private : 9.6% Independent-private: 15%)[33]
Teachers' salaries	Average annual starting salary in lower secondary education: USD 32 513 (OECD average USD 30 750) Ratio of salary in lower secondary education after 15 years of experience to GDP per capita: 1.15 (OECD average: 1.22)[34]
Upper secondary graduation rates	93% (OECD average 80%)[35]

Notes

1. As a consequence of the tightening financial conditions in Finnish municipalities, about 1 000 basic schools were shut down during the first decade of this century. Many of them were small rural schools.
2. "Population according to language and the number of foreigners and land area km2 by area". Statistics Finland's PX-Web databases. Helsinki: Statistics Finland. 2008-12-31.
3. OECD (2010c), *OECD Economic Surveys: Finland 2010*, OECD Publishing (data from 2009).
4. OECD (2010d), *OECD Factbook* 2010, Ratio of population aged less than 15 to the total population (data from 2009).
5. OECD (2010d), *OECD Factbook* 2010, Ratio of population aged 65 and older to the total population, (data from 2009).
6. OECD (2010d), *OECD Factbook 2010*, Annual population growth rate, (data from 2009).
7. OECD (2010d), *OECD Factbook 2010*, OECD total, Annual population growth in percentage, year of reference 2007.
8. OECD (2010d), *OECD Factbook 2010*, Foreign-born population as a percentage of the total population, year of reference 2007. The estimated average for the OECD area is 13.5% for the 21 OECD countries out of 29 which reported foreign-born population.
9. OECD (2010d), *OECD Economic Surveys: Finland 2010*, OECD Publishing.
10. OECD (2010d), *OECD Factbook 2010*, current prices and PPPs, (data from 2008).
11. OECD (2010c), *OECD Economic Surveys: Finland 2010*. OECD Publishing, p.7.
12. OECD (2010d), *OECD Factbook 2010*, Total unemployment rates as percentage of total labour force, (data from 2008).
13. OECD (2010e) *Employment Outlook*, OECD Publishing. Unemployed as a percentage of the labour force in the age group: youth aged 15-24. Data from 2009.
14. The OECD follows standard international conventions in using the term "tertiary education" to refer to all post-secondary programmes at ISCED levels 5B, 5A and 6, regardless of the institutions in which they are offered. OECD (2008), *Tertiary Education for the Knowledge Society: Volume 1*, OECD Publishing.
15. OECD (2010b), *Education at a Glance 2010: OECD Indicators*, OECD Publishing. Data from 2007. Public expenditure presented in this table includes public subsidies to households for living costs (scholarships and grants to students/households and students loans), which are not spent on educational institutions.
16. OECD (2010c), *OECD Economic Surveys: Finland 2010*, OECD Publishing.
17. OECD (2010b), *Education at a Glance 2010: OECD Indicators*, OECD Publishing. Data from 2007. Public expenditure presented in this table includes public subsidies to households for living costs (scholarships and grants to students/households and students loans), which are not spent on educational institutions.
18. OECD (2010b), *Education at a Glance 2010: OECD Indicators*, OECD Publishing. Data from 2008 on net enrolment rates of ages 4 and under as a percentage of the population aged 3 to 4. 1. The rates "4 and under as a percentage of the population aged 3 to 4" are overestimated. A significant number of students are younger than 3 years old. The net rates between 3 and 5 are around 100%.
19. OECD (2010b), *Education at a Glance 2010: OECD Indicators*, OECD Publishing. OECD average net enrolment rates of ages 5 to 14 as a percentage of the population aged 5 to 14, year of reference 2008.
20. OECD (2010b), *Education at a Glance 2010: OECD Indicators*, OECD Publishing. OECD average net enrolment rates of ages 15 to 19 as a percentage of the population aged 15 to 19, year of reference 2008.
21. OECD (2010b), *Education at a Glance 2010: OECD Indicators*, OECD Publishing. Data from 2008 on net enrolment rates of ages 20 to 29 as a percentage of the population aged 20 to 29. This figure includes includes all 20-29 year olds, including those in employment, etc. The Gross Enrolment Ratio (GER), measured by the UN as the number of actual students enrolled / number of potential students enrolled, is generally higher. The GER for tertiary education in Finland in 2008 is 94%, compared to the regional average of 70% (UIS 2010).
22. OECD (2010b), *Education at a Glance 2010: OECD Indicators*, OECD Publishing. OECD average net enrolment rates of ages 20 to 29 as a percentage of the population aged 20 to 29, year of reference 2008.
23. OECD (2010b), *Education at a Glance 2010: OECD Indicators*, OECD Publishing (data from 2008).
24. Data is not applicable because category does not apply.
25. OECD (2010b), *Education at a Glance 2010: OECD Indicators*, OECD Publishing (data from 2008).
26. Data is not applicable because category does not apply.
27. OECD (2010b), *Education at a Glance 2010: OECD Indicators*, OECD Publishing (data from 2008).

28. Data is not applicable because category does not apply.
29. OECD (2010b), *Education at a Glance 2010: OECD Indicators*, OECD Publishing (data from 2008).
30. Magnitude is either negligible or zero.
31. Data is not applicable because category does not apply.
32. Data is not applicable because category does not apply.
33. OECD (2010b), *Education at a Glance 2010: OECD Indicators*, OECD Publishing (data from 2008).
34. Starting salary/ minimum training in USD adjusted for PPP, (OECD, 2010b) *Education at a Glance 2010: OECD Indicators,* OECD Publishing (data from 2008).
35. Sum of upper secondary graduation rates for a single year of age (Year of reference 2008). (OECD, 2010b), *Education at a Glance 2010: OECD Indicators,* OECD Publishing.

References and further reading

Aho, E., K. Pitkänen, K. and **P. Sahlberg** (2006), *Policy Development and Reform Principles of Basic and Secondary Education in Finland Since 1968,* The World Bank, Washington, DC.

Auguste, B., P. Kihn, P. and **M. Miller** (2010), *Closing the Talent Gap: Attracting and Retaining Top Third Graduates to a Career in Teaching,* McKinsey & Company, London.

Castells, M. and P. Himanen (2002), *The Information Society and the Welfare State: The Finnish Model*, Oxford University Press, Oxford.

Darling-Hammond, L. (2010), *The Flat World and Education. How America's Commitment to Equity will Determine our Future,* Teachers College Press, New York.

Hanushek, E. and **L. Wössmann** (2007), *Education Quality and Economic Growth*, The World Bank, Washington, DC.

Hargreaves, A. and **D. Shirley** (2009), *The Fourth Way. The Inspiring Future for Educational Change,* Corwin, Thousand Oaks.

Kupari, P. and **J. Välijärvi** (Eds.) (2005), *Osaaminen kestävällä pohjalla. PISA 2003 Suomessa [Competences on Solid Ground. PISA 2003 in Finland],* Institute for Educational Research, University of Jyväskylä, Jyväskylä.

Lewis, R. (2005), *Finland, Cultural Lone Wolf,* Intercultural Press, Yarmouth.

Ministry of Education (1997), *National Lifelong Learning Strategy,* Ministry of Education, Helsinki.

Ministry of Education (2003), *Ministry of Education Strategy 2015,* Ministry of Education, Helsinki.

Ministry of Finance (1995), *Finnish Information Society Program,* Ministry of Finance, Helsinki.

OECD (2005), *Equity in Education. Thematic Review of Finland*, OECD Publishing.

OECD (2010a), *PISA 2009 Results: What Students Know and Can Do: Student Performance in Reading, Mathematics and Science (Volume I)*, OECD Publishing.

OECD (2010b), *Education at a Glance: OECD Indicators*, OECD Publishing.

OECD (2010c), *OECD Economic Surveys: Finland 2010*, OECD Publishing.

OECD (2010d), *OECD Factbook 2010, Ratio of population aged less than 15 to the total population,* OECD Publishing.

OECD (2010e) *Employment Outlook,* OECD Publishing.

Routti, J. and **P. Ylä-Anttila** (2006), *Finland as a Knowledge Economy. Elements of Success and Lessons Learned*, The World Bank, Washington, DC.

Sahlberg, P. (2010), "Educational Change in Finland", in A. Hargreaves, A. Lieberman, M. Fullan and D. Hopkins (Eds.), *Second International Handbook of Educational Change*, Springer, New York.

Sahlberg, P. (2011), *Finnish Lessons: What Can the World Learn from Educational Change in Finland,* Teachers College Press, New York.

Schleicher, A. (2006), *The Economics of Knowledge: Why Education is Key for Europe's Success,* The Lisbon Council, Brussels.

Schwab, K. (Ed.) (2010), *The Global Competitiveness report 2010-2011*, World Economic Forum, Geneva, available at *www3.weforum.org/docs/WEF_GlobalCompetitivenessReport_2010-11.pdf.*

Statistics Finland (2011), *Education*, available at *www.stat.fi/til/kou_en.html.*

Toom, A., H. Kynäslahti, L. Krokfors, R. Jyrhämä, R. Byman, K. Stenberg, K. Maaranen, and **P. Kansanen** (2010), "Experiences of Research-based Approach to teacher Education: Suggestion for the future policies", *European Journal of Education*, 45(2), 331-344.

4

Singapore: Thinking Ahead

Singapore has transformed itself from a developing country into a modern industrial economy in one generation. In the past decade, Singapore's education system has remained at or near the top of most major world education rankings. This chapter examines how Singapore has achieved so much so quickly, focusing on the government's ability to match skills supply with demand; the prevailing belief in the centrality of education; the emphasis on building teacher and leadership capacity to deliver reforms at the school level; and a culture of continuous improvement that benchmarks its own education practices against the best in the world.

INTRODUCTION

When Singapore became independent in 1965, it was a poor, small (about 700 sq km), tropical island with few natural resources, little fresh water, rapid population growth, substandard housing and recurring conflict among the ethnic and religious groups that made up its population. At that time there was no compulsory education and only a small number of high school and college graduates and skilled workers. Today, Singapore is a gleaming global hub of trade, finance and transportation. Its transformation "from third world to first" in one generation is one of Asia's great success stories (Yew, 2000).

All children in Singapore receive a minimum of 10 years of education in one of the country's 360 schools. Singapore's students were among the top in the world in mathematics and science on the Trends in International Math and Science Study (TIMSS) in 1995, 1999, 2003 and 2007. They came fourth in literacy in the 2006 Progress in International Reading Literacy Study (PIRLS). Their excellence is further underlined by the fact that Singapore was one of the top-performing countries in the 2009 PISA survey (Table 4.1 and Figure 4.1), the first PISA survey in which it participated. Singapore was rated as one of the best performing education systems in a 2007 McKinsey study of teachers (Barber and Mourshed, 2007), and was rated first in the 2007 *IMD World Competitiveness Yearbook* (IMD, 2007) for having an education system that best meets the needs of a competitive economy. At the higher education level, the National University of Singapore was ranked 34th in the world and 4th in Asia in the *Times Higher Education Supplement* Rankings of World Universities in 2010 (*Times Higher Education Supplement,* 2010). How has this little red dot on the map, as Singaporeans frequently refer to their country, a nation that is not even 50 years old, evolved from a backwater undeveloped economy into a world economic and educational leader in such a short period of time? What education policies and practices has Singapore employed? Are the lessons from Singapore's experience relevant for other countries? And how is its education system adapting to the fast-changing demands of a global and digital 21st century? This chapter attempts to provide some answers to these questions. First, however, we look at the broader context

Table 4.1 Singapore's mean scores on reading, mathematics and science scales in PISA 2009

	PISA 2000	PISA 2003	PISA 2006	PISA 2009
	Mean score	Mean score	Mean score	Mean score
Reading				526
Mathematics				562
Science				542

Note: Singapore did not participate in the 2000, 2003 and 2006 assessments.
Source: OECD (2010a).

Under British colonial rule, from 1819 onwards, Singapore developed as a major seaport at the mouth of the Malacca Straits, on the shipping lanes between Britain, India and China. During this period, it attracted large numbers of immigrants, primarily from southern China, India and the Malay Archipelago. At independence from Britain in 1959 and then separation from Malaysia in 1965, Singapore had no assets other than its deepwater port. There was no real economy, no defence, and simmering tensions with neighbouring countries. Moreover, it had to import most of its food, water and energy. The Republic of Singapore seemed an unlikely candidate to become a world-class economic and educational powerhouse.

The risks facing this nation at birth – the sense of political and economic vulnerability to larger countries and global changes – created a sense of urgency which influences policy to this day. Lee Kuan Yew, Singapore's first Prime Minister, set out two overarching goals: to build a modern economy and to 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 labour-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 has 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. The results of the government's economic policies have been stunning – rapid economic growth to reach developed country levels and an average per capita income in 2009 of about SGD 52 000 (USD 39 000) estimated at current market prices. One of the so-called Asian Tigers, Singapore is a free market, business-friendly and globally-oriented economy, shaped by an active and interventionist government.

The government of Singapore is a highly efficient, honest and flexible meritocracy with a strong focus on integrated strategic planning and detailed execution. "Dream, Design, Deliver" aptly characterises its approach to policy development and implementation. Singapore's small size and political stability (the same People's Action Party has ruled Singapore since independence) have kept the vision of making Singapore a great global city constant, but have also 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.

With respect to Lee Kuan Yew's second goal of nation building, early race riots led to a profound commitment to creating a multi-racial and multi-ethnic society. At independence, Singapore had multiple religious groups (Buddhist, Muslim, Taoist, Hindu and Christian); multiple ethnic groups (Singapore's population is about 74% Chinese, 13% Malay, 9% Indian and 3% other); and no common language. Nor did it have a common school system or a common curriculum. A series of measures was gradually put in place to realise the Singapore pledge: "One united people regardless of race, language or religion". Singapore recognises and teaches four official languages – Chinese, English, Malay and Tamil – although English is the language of government and, since 1978, the medium of instruction in schools.[1] Two years of compulsory national service unite different ethnic groups, as does the policy of mixing groups within the government-built housing where most Singaporeans live. This has helped avoid the racial and ethnic segregation that afflicts many countries. Schools play a major role in inculcating Singaporean values and character, and civic and moral education play a major role in schools. Honesty, commitment to excellence, teamwork, discipline, loyalty, humility, national pride and an emphasis on the common good have been instilled throughout government and society.

Lacking other resources, human resources were and still are seen as the island republic's most precious asset. Education was, from the beginning, seen as central to building both the economy and the nation. Its job was to deliver the human capital engine for economic growth and to create a sense of Singaporean identity. The economic goals of education have given education policy a very pragmatic bent and a strong focus on scientific and technical fields. Singapore's education system has evolved over the past 40 years in tandem with the changing economy.

SINGAPORE'S EDUCATION SYSTEM: THE PATH TO BECOMING A LEARNING NATION

Over the past 40 years, Singapore has been able to raise its education level from one similar to that of many developing countries to match the best in the OECD. The current system did not emerge perfectly-formed, but has developed in three broad phases as it was adapted to changing circumstances and ideas:

The survival-driven phase (1959-1978)

According to then-Prime Minister Lee Kuan Yew, the aim of Singaporean education in its early days was to "produce a good man and a useful citizen". This first phase of education has been dubbed the "survival-driven" phase. In the late 1950s, 70% of GDP was from port and warehousing activities. This was not enough to sustain, let alone grow, the economy which was suffering from high population growth and significant unemployment. The government decided that there was a need to expand the industrial base and, because of the small size of the domestic market, to make it export-oriented. It set about trying to attract foreign manufacturers who needed low-skilled labour (e.g. textiles, garments, wood products), both to provide jobs and to gain expertise.

Prior to independence, only the affluent were educated. At independence, most of Singapore's two million people were illiterate and unskilled. Therefore the focus of this "survival" period was on expanding basic education as quickly as possible. Schools were built rapidly. Teachers were recruited on a large scale. The schools that had been established by different ethnic groups were merged into a single Singaporean education system. A bilingual policy was introduced so that all children would learn both their own language and English. A textbook agency was created to provide textbooks. The expansion was so rapid that universal primary education was attained in 1965 and universal lower secondary by the early 1970s. By the end of the "survival-driven phase", Singapore had created a national system of public education.

However, the quality of education was not very high. In the early 1970s, out of every 1 000 pupils entering primary grade one, only 444 reached secondary grade four after 10 years. And of these, only 350 (35% of the cohort) gained three or more passes in O-level examinations. A significant report by Dutch economic advisor Dr. Albert Winsemius estimated that every year between 1970 and 1975, Singapore would be short of 500 engineers and 1 000 technical workers and would have a severe shortage of people with management skills (Lee, et al., 2008). The oil crisis of 1973 and the increasing competition from other Asian countries for low-skilled, labour-intensive industry led to a growing realisation that Singapore's comparative advantage was eroding and that it needed to evolve to a higher-skill economy. However, a large number of policy changes and changes of ministers of education caused confusion. Teacher morale was low and there was considerable attrition. Although there were attempts to expand vocational education, it had low status and was viewed as a dumping ground. In 1979, a watershed education report highlighted the high dropout rates and low standards and ushered in the next phase of reform (Goh, 1979).

Efficiency-driven phase (1979-1996)

During this phase of education, the focus shifted. The government's economic strategy was to move Singapore from a third-league, labour-intensive economy to a second-league, capital and skill-intensive country. So in January 1979, a new education system was introduced. Singapore moved away from its earlier one-size-fits-all approach to schooling to create multiple pathways for students in order to reduce the drop-out rate, improve quality and produce the more technically-skilled labour force needed to achieve the new economic goals. Streaming (tracking) based on academic ability was introduced, starting in elementary schools, with the goal of "enabling all students to reach their potential while recognising that all students do not grow academically at the

same pace" (Interview with Ho Peng, Director General of Education, Ministry of Education). Students could have more time, for example, to complete different stages of schooling. The multiple pathways included three types of high school: 1) academic high schools, which prepared students for college; 2) polytechnic high schools, which focused on advanced occupational and technical training and that could also lead to college; and 3) technical institutes, which focused on occupational and technical training for the lowest fifth of students. The Curriculum Development Institute of Singapore was established to produce high-quality textbooks and instructional materials for the different pathways. While streaming was unpopular when it was introduced, drop-out rates did, in fact, decline significantly: by 1986, only 6% of students were leaving school with fewer than 10 years of education.[2] The range of efforts to raise standards also yielded results: performance in the O-level English examinations went from a 60% failure rate to a 90% pass rate by 1984, and by 1995 Singapore led the world in mathematics and science on TIMSS.

As Singapore sought to attract companies with a more sophisticated technological base (e.g. silicon wafers, computers), a major goal of this second phase was to produce technical workers at all levels. Concerned about the low status of blue-collar jobs, from 1992 Singapore invested significantly in the Institute for Technical Education (ITE). With a number of campuses around the city, the ITE provides high-quality technical and vocational education, with high-tech facilities and amenities that are comparable to those of modern universities elsewhere. Each technical field is advised by industries in that sector to keep it current with changing demands and new technologies. New programmes can be built for multinational companies looking to locate in Singapore. There has been strong market demand for ITE graduates, and it is possible for the top graduates from the ITE to go on to polytechnics and then to university. As a result of these changes, the image and attractiveness of vocational education vastly improved. At the top end of the technical workforce, the number of university and polytechnic places was also expanded during this period to increase the pool of scientists and engineers.

Ability-based, aspiration-driven phase (1997-present)

By the early 1990s, the efficiency-driven education system had yielded clear results. But, as became clear during the Asian financial crisis of 1997, the world economy was shifting to a global knowledge economy. The competitive framework of nations was being redefined and national progress would increasingly be determined by the discovery and application of new and marketable ideas. The growth of the global knowledge economy required a paradigm shift in Singapore's education system towards a focus on innovation, creativity and research.

A key instrument as Singapore intentionally navigated towards the global knowledge economy has been the government Agency for Science, Technology and Research (A* Star), which provides generous funding for research and aims to attract top scientists and scientific companies. One million foreign nationals with scientific, technical or managerial skills have been encouraged to work in Singapore in international corporations and in higher education. Singapore's three universities, and especially the National University of Singapore and Nanyang Technological University, have research partnerships with leading universities around the world with a focus in selected fields, including bioinformatics, information sciences and medical technologies.

At the school level, Singapore created a new educational vision, "Thinking Schools, Learning Nation". This major milestone in Singapore's education journey recognised Prime Minister Goh Chok Tong's belief that "A nation's wealth in the 21st century will depend on the capacity of its people to learn" (Goh, 1979). "Thinking Schools represented a vision of a school system that can develop creative thinking skills, lifelong learning passion and nationalistic commitment in the young. Learning nation is a vision of learning as a national culture, where creativity and innovation flourish at every level of society" (Lee, et al., 2008).

Thinking Schools, Learning Nation encompassed a wide range of initiatives over a number of years that were designed to tailor education to the abilities and interests of students, to provide more flexibility and choice for students and to transform the structures of education. Career paths and incentives for teachers were revamped and teacher education upgraded, as described in more detail later. Curricula and assessment changes put greater emphasis on project work and creative thinking. A major resource commitment, involving three successive master plans, was made to information and communication technology (ICT). A broader array of subject matter courses was created for students and a portfolio of different types of schools encouraged – specialising in arts, mathematics and science, and sports – and a number of independent schools established. "We need a mountain range of excellence, not just one peak, to inspire all our young to find their passions and climb as far as they can," explained Tharman Shanmugaratnam, then Minister for Education (cited in Lee, et al., 2008).

Major changes were also made in the management of schools. Moving away from the centralised top-down system of control, schools were organised into geographic clusters and given more autonomy. Cluster Superintendents – successful former principals – were appointed to mentor others and to promote innovation. Along with greater autonomy came new forms of accountability. The old inspection system was abolished and replaced with a school excellence model. It was felt that no single accountability model could fit all schools. Each school therefore sets its own goals and annually assesses its progress towards them against nine functional areas: five "enablers", as well as four results areas in academic performance (Ng, 2008a).[3] Every six years there is an external review by the School Appraisal Branch of the Ministry of Education. Greater autonomy for schools also led to

a laser-like focus on identifying and developing highly effective school leaders who can lead school transformation. This is also described in more detail later.

Current structure

In Singapore's education system today, students receive six years of primary education, and four to five years of secondary education, followed by two years at junior college, polytechnic or the Institute for Technical Education (ITE; see Figure 4.1).[4]

Primary education consists of a four-year foundation stage during which all students follow a common curriculum that emphasises English, mother-tongue language and mathematics. Science is introduced from primary grade 3. Other subjects taught in primary school are civics and moral education, social studies, health, physical education, art and music. Streaming, which was a key feature of the Singapore education system, was designed to allow students to progress at their own pace from primary grade 5 onwards. However, in 2008, streaming was replaced with subject-based banding. At the end of primary grade 6, all students sit for the Primary School Leaving Examination in English, mathematics, mother-tongue language and science. Based on the results of this examination, students are admitted to an express (60% of students), normal academic (25%) or normal technical (15%) course in secondary school.

Students in the express course follow a four-year programme culminating in the general certificate of education (GCE) O-level exam. Students in the normal academic course follow a four-year course to GCE N-level and may sit for O-levels in year five (Figure 7.1). The normal technical programme prepares students for technical higher education, jobs or the postsecondary ITE after a four-year programme leading to the GCE-N level. In recent years, more choice has been offered to students in secondary school, with a wider range of subjects at O-level and elective modules. Students who are clearly of university calibre may study in Integrated Programme Schools where they can skip O-levels; this arrangement allows them to engage in broader learning experiences that develop their leadership potential and capacity for creative thinking. There is now more horizontal mobility between courses, and students who do well are allowed to transfer between streams. The ratio among streams is further enhanced with students being able to follow subjects from a different stream. Schools specialising in sports, art, mathematics and sciences are also available, as well as a small number of independent schools.

After 10 years of general education, students go to post-secondary education: junior colleges (31% of students), polytechnics (43%) or ITE (22%). Academically inclined students can take A-levels during this period and then proceed to university. Students may also take diploma courses in technical or business subjects at polytechnics. Many polytechnic graduates who have done well also go on to university. Students with GCE O or N-levels can take skill-based certificates in technical or vocational subjects at ITE. Outstanding ITE graduates can also go on to polytechnics or universities. About 25% of a cohort goes on to university in Singapore (the number of places will rise to 30% in 2015). Many students also go abroad to university (see Figure 4.3).

SINGAPORE'S SUCCESS IN EDUCATION

Singapore has pursued its vision of a high-quality education system over a long period of time and has accomplished significant improvements at each stage of its journey. What are some of the key features that have helped Singapore become so successful?

A forward-looking, integrated planning system

In modern Singapore, education has consistently been the building block for economic and national development. As Prime Minister Goh Chok Thong famously stated: "The wealth of a nation lies in its people."

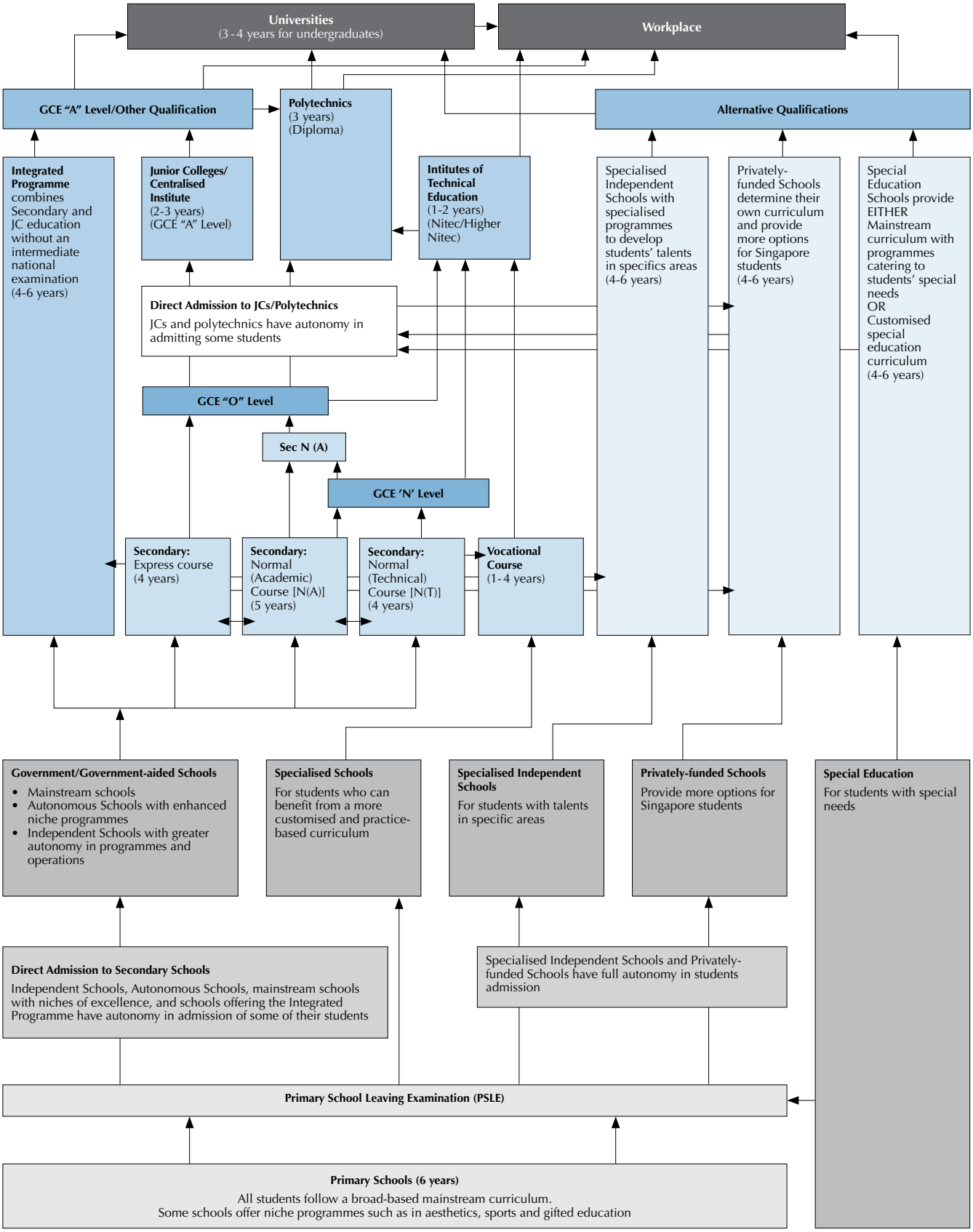
Since the founding of the republic, the high value placed on education as the key to economic development and national cohesion in a country with no natural resources is evident in the statements by Singapore's senior leaders. But the statements about "nurturing every child" are not just political rhetoric. They have been accompanied by willingness at each stage to invest considerable financial resources in education. Education spending rose to 3.6% of GDP in 2010, approximately 20% of total government expenditure and second only to defence.

The linkage to economic development is tight and is driven from the top of the government. As Singapore evolved from an economy based on port and warehousing activities, through a low-wage, labour-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 was expected to ramp up the quality of its education and the supply of specific skills needed to make Singapore globally competitive.

Singapore has a uniquely 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. In other countries, labour and education markets make these adjustments slowly over time, but the Singapore government

■ Figure 4.1 ■

Singapore's education system



Source: Singapore Ministry of Education website: *www.moe.gov.sg/education/*

believes that its manpower planning approach helps students to move faster into growing sectors, reduces oversupply in areas of declining demand more quickly, and targets public funds more efficiently for post-secondary education. 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.

In short, the ability of the government to successfully manage supply and demand of education and skills is a major source of Singapore's competitive advantage. As Singapore seeks to become a global scientific hub, it is bringing together all aspects of the government – the finance ministry, economic development board, manpower ministry, education ministry, urban and environmental planning bodies, housing and immigration authorities – to create the next platform for Singapore's growth.

Singapore demonstrates strong alignment among policies and practices. One of the most striking things on visiting Singapore is that wherever one goes – whether the ministries of manpower, national development, community development, or education; the universities, technical institutes, or schools – one hears the same clear focus on the same bold outcomes: careful attention to implementation and evaluation, and orientation towards the future. "Milestone" courses bring together top officials from all the ministries to create a shared understanding of national goals. And a focus on effective implementation is shared throughout government. 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. This means that the Ministry of Education can then design the policies and implement the practices that will meet this vision.

Close links between policy implementers, researchers and educators

At the institutional level, both policy coherence and implementation consistency are ensured 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 trains teachers. NIE's research is fed back to the ministry and is used to inform policy development. Since NIE professors are regularly involved in ministry discussions and decisions, it is relatively easy for NIE's work to be aligned with ministry policies. NIE is Singapore's only institution for training prospective teachers, but professional in-service development for teachers comes from various institutions/sources besides NIE (see below).

Policies and the means to implement them

According to David Hogan, Senior Research Scientist at NIE and interviewed for this report, the degree of institutional alignment in Singapore is very unusual in global terms. Singapore is a "tightly coupled" system in which the key leaders of the ministry, NIE, and the schools share responsibility and accountability. Its remarkable strength is that no policy is announced without a plan for building the capacity to meet it. And while there is variation in performance within schools, there is relatively little variation between schools. By contrast, more loosely-coupled systems have a much harder time bringing about reform initiatives and are often typified by an endless parade of new, sometimes conflicting policies, without building the capacity to meet them. The teacher preparation programmes in universities are also often not aligned with the reform policies. Consequently, practitioners become cynical and wait for successive reform waves to pass. There are usually also large discrepancies between schools in the extent to which reforms are carried out.

In recent years, Singapore has loosened its tight coupling somewhat. More autonomy has been given to schools so as to encourage more innovation, and NIE has the appropriate independence for an institute in a modern research-oriented university. However, there is still strong alignment among the curriculum, examinations and assessments; incentives for students to work hard; and accountability measures for teachers and principals. This makes policy making and implementation much easier and more effective than in loosely-coupled systems.

The advantages of a small scale

In trying to understand Singapore's success, it is also important to remember its small size. Singapore's national education system is more like that of a city or a small state, with approximately 522 000 students and 360 schools. Professor Lee Sing Kong, Director of the NIE, likens it to "turning around a kayak rather than a battleship". The stability of the government and the broad popular consensus on the purposes of education also make it possible to pursue policies for long enough to see if they have any impact.

Commitment to equity and merit

Singapore has demonstrated an unfailing commitment to equity and meritocracy. Meritocracy was a cornerstone philosophy of Lee Kuan Yew's government from the beginning. He believed it was the most efficient way to run a government and the only way to create a peaceful multi-ethnic society. The system of education during colonial times was highly elitist and separated by ethnicity and religion; he sought to replace it with a universal state-funded system in which talent and hard work would prevail.

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. These gaps threatened the political stability of Singapore, as well as its economic development. In the first education phase, the survival phase, rapid expansion of schooling led to universal elementary and lower secondary education by the early 1970s. In the second phase, streaming was introduced to reduce the high drop-out rates from the system; although controversial, it was successful. Today, with a secondary school graduation rate of 98% (10th grade), the gaps in educational attainment have been substantially reduced. However, there is more work to be done. In the TIMMS results, for example, Singapore has very high mean achievement scores in mathematics and science but there is also a long tail to the achievement distribution. On other measures too, socio-economic status has a significant impact on achievement.

According to Professor Lee, the measures Singapore has taken to reduce the achievement gap have been both social and educational. Believing that the causes of underachievement lie in social structures such as single-parent families, Singapore has developed a system of local town and community councils that identify families in need and can provide a range of support, including financial assistance. In addition, each of the ethnic communities has a self-help community group, the Malay *Mendaki*, Indian *Sinda* and Chinese CDAC. These organisations are funded by members of each community and support children in need.

It would be interesting to explore whether Singapore's housing policies have an impact on its small achievement gap; 80% of people live in government-built, but self-owned apartments and ethnic groups are deliberately mixed in each housing block. When asked about this during interviews for this report, Professor Lee said that he did not know of any empirical studies, but thought that it seemed plausible that being in a community with high expectations for academic achievement would have an overall positive effect on children.

On the educational side, children who require additional support in learning to read are identified through screening tests at the start of first grade. These children are provided with daily systematic intervention by teachers in small groups (8-10 students) in learning support programmes so that they do not fall behind. About 12-14% of children need such support for reading. The curriculum includes phonics and English language development since many of the children speak languages other than English at home. Learning support programmes also exist in mathematics. In addition, while most preschools in Singapore are privately funded, the government provides funding support to preschools that cater for low-income students.

In recent years, Singapore has replaced streaming in elementary schools with subject matter banding. It has also created more opportunities for students to move horizontally between streams at the secondary level and beyond – to create more flexibility in the system and to recognise "late bloomers". Another remarkable feature of the Singapore education system is the value, attention and resources it devotes to lower level achievers, not just high achievers. This focus on "levelling up", so that the lowest stream gets very high quality training, exemplifies the "many pathways" approach and is discussed in the section below on the Institute for Technical Education. The resources devoted to vocational and technical training are immense and the vocational and technical system is perhaps the best in the world – a significant element of the Singapore success story.

The goal of the education system is to nurture every child, no matter what their ability or achievement level. The ecology of education reform rests on these shared values. Parents want good opportunities for their children, high levels of social mobility and rising levels of income. The government has delivered them, so most parents believe in the fairness of the system.

> We have avoided the large disparities in educational standards seen elsewhere, between schools for the privileged and those for the masses. We have achieved high standards across a spectrum of abilities, allowing a large proportion of Singaporeans to proceed to high-quality post-secondary and tertiary education. (Tharman Shanmugaratnam, former Minister of Education, cited in Lee, et al., 2008)

A strong focus on mathematics, science and technical skills

Singapore has focused on the universal development of strong mathematics, science and technical skills (Box 4.1). The country's solid foundation in mathematics and science for all students in the elementary grades seems to be a core part of students' later success. At the primary and secondary levels, mathematics and science are core subjects that every student must take. Mathematics begins when students enter school in primary 1 and science is taught from primary 3 onwards. Students have specialist teachers in mathematics and science from upper primary onwards. Deployment of teachers is a school-based decision. Some schools deploy specialist teachers in mathematics and science, although often teachers teach English, mathematics and science. From upper secondary onwards, there is a range of specialised mathematics courses at higher levels for those students who are interested. At the tertiary level, more than half the programmes are oriented towards science and technology.

In many countries, technical education is looked down upon as a dead-end option, of low quality and typically out of step with the changing needs of employers. But vocational education has been an important pathway in Singapore's journey to educational excellence. In 1992, Singapore took a hard look at its own poorly-regarded vocational education and decided to transform and reposition it so that it was not seen as a place of last resort. Dr Law Song Seng led the creation of the Institute for Technical

Education (ITE), which transformed the content, quality and image of vocational education. Its goal was to build a world-class technical education institution that is "effective, relevant and responsive to the knowledge-based economy" (Lee, et al., 2008). ITE's founders brought in leaders with a broad vision and staff committed to caring for students. They completely revamped the curriculum and workforce certification system, developed courses in new industries and consolidated existing technical campuses into three mega campuses with a sophisticated technology base and close ties to international corporations. To combat the societal prejudice against less academically-inclined students, ITE promoted and rebranded its kind of "hands-on, minds-on, hearts-on" applied learning. The result has been a doubling of enrolment since 1995, and ITE students now constitute about 25% of the post-secondary cohort. More than 82% of students in 2009 completed their training and are placed in jobs. Pay levels for ITE graduates have also been strong, and the ITE track is now seen by students as a legitimate path to a bright future. Part of the reason for the success of the technical education at ITE is that students get a strong academic foundation early in their academic careers so they can acquire the more sophisticated skills required by leading edge employers. The ITE received the IBM Innovations Award in Transforming Government, given by the Ash Center for Democratic Governance and Innovation at the Harvard Kennedy Schooland has been recognised world-wide as a global leader in technical education.

Box 4.1 **Off to a good start in mathematics and science**

The Singapore approach to mathematics is distinctive and renowned worldwide because of students' success in international assessments of mathematics. The mathematics curriculum states that the role of the mathematics teacher is to instil "maths sense". In a Singapore mathematics classroom, the focus is on helping students understand how to solve problems and master mathematical concepts, rather than on the rote production of correct answers or memorising formulae. Teachers cover far less material, but cover it in depth. This saves time because there is less re-teaching of material.

The Singapore "model method" makes extensive use of visual aids to help students understand mathematics. It follows a progression from concrete, to pictorial, to abstract representation, based on an understanding of how children learn mathematics. Explanations are extremely simple and clear, which benefits the many ESL students in Singapore classrooms. By 4th grade, students are mastering fractions, and by 6th grade, they are doing complex multi-step problems. Teachers are all trained to teach the curriculum and they meet regularly to fine-tune exercises and hone lessons. The combination of focusing on mastery of essential mathematics skills, providing simple and clear explanations and guidance, using the model method of problem-solving, and employing well-trained teachers is highly effective.

The Singapore science curriculum in primary and lower secondary grades focuses on developing the idea of science as a process of inquiry. It does so through three domains: 1) knowledge, understanding and application; 2) skills and processes; and 3) ethics and attitudes. To awaken students' interest in science as a useful skill, inquiry projects are based on the roles played by science in daily life, society and the environment. Co-curricular activities such as mathematics and science fairs, competitions and learning trails (applying mathematics and science in outdoor settings) are designed to generate interest among students. The DNA Centre at the Singapore Science Centre develops hands-on activities for life sciences, and the government science agency, A*STAR, introduces students to research done by working scientists.

Mathematics and science teachers are selected from the top one-third of their cohort, receive initial training on the national math and science curricula during their pre-service training, and are entitled to 100 hours of professional development each year.

Human resource management that matches the demands of the system

The high quality of Singapore's workforce today is the result of deliberate policy actions, especially dating from the 1990s onward. Since then, high-quality teachers and school leaders have formed the cornerstone of the education system and are a major reason for its high performance. Rather than focusing on just one element, Singapore has developed a comprehensive system for selecting, training, compensating and developing teachers and principals, thereby creating tremendous capacity at the point of education delivery. Key elements of that system are described below:

Recruitment: Prospective teachers are carefully selected from the top one-third of the secondary school graduating class, by panels that include current principals. Strong academic ability is essential, as is commitment to the profession and to serving diverse student bodies. Prospective teachers receive a monthly stipend that is competitive with the monthly salary for fresh graduates in other fields. They must commit to teaching for at least three years. Interest in teaching is seeded early through teaching internships for high school students; there is also a system for mid-career entry, which is a way of bringing real-world experience to students.

Training: All teachers receive training in the Singapore curriculum at the National Institute of Education (NIE) at Nanyang Technological University. They take either a diploma or a degree course depending on their level of education at entry. There is a close working relationship between NIE and the schools, where all new teachers are mentored for the first few years. As NIE's primary purpose is training all Singapore teachers, there are no divisions between arts and sciences and education faculties. Thus, according to Lee Sing Kong, the conflicting priorities that plague many Western teacher education programmes are less significant and there is a stronger focus on pedagogical content. NIE has put in place a matrix organisational structure whereby programme offices (e.g. Office for Teacher Education) liaise with individual academic groups in drawing up initial teacher training programmes. This means that these programmes are designed with the teacher in mind, rather than to suit the interests of the various academic departments. As such, there is a stronger focus on pedagogical content and greater synergies among modules within each programme.

Compensation: The Ministry of Education keeps a close watch on occupational starting salaries and adjusts the salaries for new teachers to ensure that teaching is seen as equally attractive as other occupations for new graduates. Teachers' salaries do not increase as much over time as those in private sector jobs, but there are many other career opportunities within education for teachers. Teaching is also regarded as a 12-month position. There are retention bonuses and high-performing teachers can also earn significant amounts in performance bonuses.

Professional development: In recognising the need for teachers to keep up with the rapid changes occurring in the world and to be able to constantly improve their practice, they are entitled to 100 hours of professional development per year. This may be undertaken in several ways. Courses at the National Institute of Education focus on subject matter and pedagogical knowledge and lead towards higher degrees or advanced diplomas. Much professional development is school-based, led by staff developers. Their job is to identify teaching-based problems in a school, for example, with a group's mathematics performance; or to introduce new practices such as project-based learning or new uses of ICT. 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. Teachers' networks and professional learning communities encourage peer-to-peer learning.

Performance appraisal: Like every other profession in Singapore, teachers' performance is appraised annually by a number of people and against 16 different competencies. Included in this Enhanced Performance Management System is 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's bonus pool. This individual appraisal system sits within the context of great attention to the school's overall plan for educational excellence, since all students in Singapore have multiple teachers, even in primary school.

Career development: Throughout Singapore, talent is identified and nurtured rather than being left to chance. After three years of teaching, teachers are assessed annually to see which of three career paths would best suit them – master teacher, specialist in curriculum or research or school leader. Each path has salary increments. Teachers with potential as school leaders are moved to middle management teams and receive training to prepare them for their new roles. Middle managers' performance is assessed for their potential to become vice principals, and later, principals. Each stage involves a range of experience and training to prepare candidates for school leadership and innovation.

Leadership selection and training: Singapore has a clear understanding that high-quality teaching and strong school performance require effective leaders. Poor quality leadership is a key factor in teacher attrition in many countries (Ng, 2008b). Singapore's approach to leadership is modelled on the approach of large corporations. The key is not just the training programme, but the whole approach to identifying and developing talent. This differs from the US or UK approach, for example, in which a teacher can apply to train as a principal or school head, and then apply for a position in a school. In Singapore, young teachers are continuously assessed for their leadership potential and given opportunities to demonstrate and learn, for example, by serving on committees, then being promoted to head of department at a relatively young age. Some are transferred to the ministry for a period. After these experiences are monitored, potential principals are selected for interviews and go through leadership situational exercises. If they pass these, then they go to NIE for six months of executive leadership training, with their salaries paid. The process is comprehensive and intensive and includes an international study trip and a project on school innovation. Only 35 people per year are selected for the executive leadership training. Asked why Singapore uses the "select then train" rather than the "train then select" model, Professor Lee Sing Kong said that while the train-then-select approach is feasible, it carries a higher risk. Singapore is very confident that they consistently have the best possible leaders for their schools and that there is a wide range of inputs into their selection. Principals are transferred between schools periodically as part of Singapore's continuous improvement strategy.

By putting its energy in the front end of recruiting high-quality people and giving them good training and continuing support, Singapore does not have the massive problems of attrition and persistently ineffective teachers and principals that plague many systems around the world. Teaching has developed into a competitive and well-regarded occupation. It is also now considered to be an honour to be a teacher in Singapore.

Finally, another critical aspect of the human resource capacity of the Singapore system is the civil service. Lee Kuan Yew's philosophy of governance was to recruit very high quality people into public service. Singapore has an extremely competent civil service, including in the Ministry of Education. Top civil servants are carefully selected, well trained (many at the best universities in the world), pragmatic, hard working and well paid. They have a global outlook, paying attention to education developments around the world, and are accustomed to using data and evidence in decision making. They have clear responsibility for the efficiency and effectiveness of the Singapore education system.

A system that is continuously being improved

While Singapore has devolved considerable authority to schools in recent years, it is still a centrally-driven government system. In many countries, government bureaucracies are sclerotic and move very slowly. But Singapore has inculcated an attitude and developed mechanisms for continuous improvement. In addition to the ties to economic planning that drove the major shifts in educational goals between the three major phases, there is a multitude of smaller changes and improvements being made, seemingly constantly.

Officials from the ministry and NIE frequently visit schools and have a good informal idea of what is going on, unlike the remote government departments and universities in many countries. They also pay a great deal of attention to data such as the School Cockpit and Student Hub data systems (internal ministry data systems).

There is now also a high level of investment in research relative to the size of the country (Hogan interview). The publication of the policy document, *Thinking Schools, Learning Nation* in 1997 led to a national education research agenda costing SGD 50 million (about USD 38 million). A wide range of different types of research has been carried out, with research design decided by researchers not the government. One major set of studies was carried out by David Hogan, former Dean and now Senior Research Scientist at the Centre for Research on Pedagogy and Practices at NIE. This six-year effort aimed to understand to what extent modern pedagogical practices were being used in Singapore classrooms. It piloted interventions to demonstrate how to move classrooms from a predominantly knowledge transmission model to a 21st century model where students engage in complex knowledge construction. This research does not just sit on a shelf, but is regularly referred to in the ministry's deliberations.

Singapore has also made extensive use of international benchmarking as a tool for improvement and to move up the educational value chain. Staff of the ministry, NIE, and the schools all visit other systems and explore international best practice. Typically, the visits and research focus on very specific issues and on what does and doesn't work in implementing particular policies. For example:

- Singapore's mathematics curriculum was developed after reviewing mathematics research and practice from around the world.
- Recently, Ministry of Education personnel visited the United States and other countries to examine language teaching to non-heritage speakers (heritage speakers of a language are those who learn it at home).
- Ministry staff have also visited a number of countries, including Hong Kong, Australia, Scotland and Sweden, to examine new kinds of assessments.

As a result, Singapore classrooms incorporate a wide range of pedagogical styles. Principals and master teachers are also encouraged to examine innovations in other countries and explore how they could be adapted for use in Singapore schools. A couple of years ago, a *Washington Post* reporter covered a visit by a group of Singapore principals to several schools in northern Virginia. "Why," she asked, "since Singapore is best in the world on the TIMSS international mathematics and science assessments, was a group of Singapore principals visiting science classes in northern Virginia schools?" The Singapore response: "There is no perfect system in the world. There are pockets of excellence in many places; the key is how to adapt them to the local context and implement them well."

Whenever Singapore seeks to create a new institution, it routinely benchmarks its planning to the best in the world. If Singapore is not in a position to create a world-class institution in a particular field, it will try to import the expertise. For example it did this in its recent partnerships with Duke University to create a new medical centre, and with Yale University to create a liberal arts college. All Singapore educational institutions – from the National University of Singapore ("A global university centred in Asia") to individual schools – are being encouraged to create global connections.

LESSONS FROM SINGAPORE

Singapore is both a "rapid improver" and a "continuing high performer". To those who believe that large-scale change in educational performance is not possible, Singapore has shown several times over that significant change *is* possible. Singapore has developed a high-quality system in terms of educational retention, quality and efficiency. To become and remain high-performing, countries need a policy infrastructure that drives performance and builds the capacity for educators to deliver it in schools. Singapore has developed both. Where Singapore is today is no accident. It is the result of several decades of judicious policy and effective

implementation. On the spectrum of national reform models, Singapore's is both comprehensive – the goal has been to move the whole system – and public policy-driven.

While the small-scale and tightly-coupled nature of the education system in Singapore may make its approaches seem inapplicable elsewhere, in fact Singapore is the size of many states/ provinces or large cities in other countries. Many of its principles and practices *are* applicable to countries of a different scale and governance structure, although their implementation would have to take a different form. Some of the key lessons learned from Singapore are as follows:

- **Vision and leadership:** Leaders with a bold long-term vision of the role of education in a society and economy are essential for creating educational excellence. Changing any system takes five to ten years – where there are frequent changes of political leadership, a guiding coalition needs to be created to keep the vision moving forward rather than having a change of direction with every change of government.
- **Alignment of the education system to economic development goals:** The strong link between education and economic development in Singapore has kept investment in education a central priority, made education policies highly pragmatic, led to high-quality mathematics and science and also to world-class vocational/technical education – an area where most countries fail. It has also kept education dynamic, expecting to change as conditions change rather than being mired in the past. While the tightness of the link may not be possible in less planned economies, bringing together economic and education policy makers, business and education leaders to continually assess changes in economic conditions and how education and economic development could better work together would strengthen both.
- **Coherence of the education system:** In many countries there is an enormous gap between policies and their implementation at the school level. In Singapore, whenever a policy is developed or changed, there is meticulous attention to the details of implementation – from the Ministry of Education, to the National Institute of Education, cluster superintendents, principals and teachers. The result is remarkable fidelity of implementation and relatively little variation across schools. While different mechanisms would be needed in larger, more multi-layered or decentralised systems, finding ways to bring greater alignment and to make all the parts work together is essential for producing results in the classroom in other nations' systems.
- **Clear goals, rigorous standards and high-stakes gateways:** Singapore's education system is extremely rigorous. The academic standards set by its Primary School Leaving Examination and O and A-levels are as high as anywhere in the world. Rigour is the watchword. Students, teachers and principals all work very hard towards these important gateways. All students have a strong early foundation in the core subjects of mathematics, science, and literacy in two languages.
- **Curriculum, instruction and assessment to match the standards:** Singapore does not just establish high standards and then leave it to individual teachers to figure out how to achieve them. Serious attention to curriculum development has produced strong programmes in mathematics, science, technical education and languages, in particular, and has ensured that teachers are well-trained to teach them. Having been very successful as a knowledge transmission education system, Singapore is now working on curriculum, pedagogy and assessments that will lead to a greater focus on high-level, complex skills (see below).
- **High-quality teachers and principals:** In earlier times, Singapore often had teacher shortages and was not always able to attract the highest quality people into teaching. 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 ambitions for its students. The system rests on active recruitment of talent, accompanied by coherent training and serious and continuing support. Education policies in Singapore today are less focused on structure and more on maintaining and increasing the quality of the educational professions. In 2007, it introduced the GROW package, consisting of measures to promote teacher Growth, Recognition, Opportunity and Well-Being.
- **Strong central capacity and authority to act:** The Ministry of Education in Singapore is staffed by knowledgeable, pragmatic individuals, trained at some of the best universities in the world. They function in a culture of continuous improvement, constantly assessing what is and isn't working using both data and practitioner experience. They respect and are respected by professionals in the schools. While countries vary in whether the locus of authority is at the national state/province or local level, whoever is charged with developing strategy and holding authority would do well to emulate the competence and capacity of the Singapore Ministry of Education.
- **Accountability:** Singapore runs on performance management. Teachers, principals, ministry and NIE staff, students – all have incentives to work hard. To maintain the performance of teachers and principals, 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 too are a range of other measures, such as contribution to school and community, and judgements by a number of senior practitioners. Reward and recognition systems include honours and salary bonuses. Individual appraisals take place within the context of school excellence plans. While no country believes it has got accountability exactly right, Singapore's system uses a wide range of indicators and involves a wide range of professionals in making judgements about the performance of adults in the system.

- **Meritocratic values:** Underpinning the whole Singaporean system is the belief – for students of all ethnic backgrounds and all ranges of ability – that education is the route to advancement and that hard work and effort pay off. The government has developed a wide range of educational and social policies to advance this goal, with early intervention and multiple pathways to education and career. The success of the government's economic and educational policies has brought about immense social mobility that has created a shared sense of national mission and made cultural support for education a near-universal value.

  Lee Kuan Yew's greatest fear was that his little country would fall prey to the kinds of ethnic and religious rivalries that have thwarted the development of so many other societies. He realised that what happens in the schools could be one of the most important antidotes to this threat. So the schools became a theatre in which the country would do everything possible to give all students the skills and knowledge needed to succeed, independent of their socio-economic status. Singapore makes sure that every school has a fair share of the best teachers, and assigns their best teachers to the students who are struggling. The belief that achieving high standards is a function of effort is stoutly embraced in Singapore and extends to the great emphasis put on raising the quality of the educators.
- **Adaptation of proven practices from abroad:** The design of Singapore's education system owes a lot to lessons from other parts of the world. Focused and universal use of international benchmarking and, more recently, significant funds for research, have enabled Singapore to move up the value chain and foster a culture in which it never stands still. This system recognises the rapidity of change around the world and has the capacity and inclination to learn and adapt. In the words of Tan Chorh Chuan, President of the National University of Singapore, Singaporeans must be ready to "scale new heights in a changed world".

  While the specific details of Singapore's education system remain particular to Singapore, the lessons from its education journey to excellence can be generalised for other settings. Success requires a clear vision and belief in the centrality of education for students and the nation; persistent political leadership and alignment between policy and practice; a focus on building teacher and leadership capacity to deliver reforms at the school level; ambitious standards and assessments; broad support in the population; and a culture of continuous improvement and future orientation that benchmarks educational practices against the best in the world.

PREPARING SINGAPOREANS FOR THE FUTURE

"If we are teaching the children today what we were taught yesterday, then we are robbing them of tomorrow." This oft-repeated quote from American educator, John Dewey, is as profound today as when he wrote it in the early part of the 20th century. Countries around the world are wrestling with globalisation, the ubiquity of digital technologies, the abundance of information, and the need to prepare students for the unpredictable world of the future.

This final section asks what skills does Singapore consider to be essential for the future and what policies and mechanisms is the government using to develop them? How do these policies build on earlier reform efforts?

Singapore is obsessed with the future, and over the past few years it has made a number of changes to adapt its strong academically focused, knowledge-transmission school system in order to prepare its students to thrive in a fast-changing and highly-connected world. The main expression of this is the policy document *Curriculum 2015* (Singapore Ministry of Education, 2010b), which builds on and expands on earlier efforts (notably the "teach less, learn more" concept and the Primary School Review; Box 4.2).

Curriculum 2015

In 2008, the Ministry of Education began a future visioning exercise. This involved extensive conversations within the ministry and among educators, a review of international literature, and consultations with industry leaders. This exercise resulted in a new framework for building 21st-century skills and results, *Curriculum 2015*, published in March 2010 (Figure 4.2; and see Singapore Ministry of Education, 2010b). The goal is to provide "a holistic education to better prepare our students to thrive in a fast-changing and highly connected world.

Curriculum 2015 aims for every student to become (shown on the outermost ring of Figure 4.2):

- a confident person who thinks independently and critically and communicates effectively;
- a self-directed learner who questions, reflects and takes responsibility for his or her own learning;
- an active contributor who is innovative, exercises initiative, takes risks and strives for excellence; and
- a concerned citizen who is informed about world and local affairs, has a strong sense of civic responsibility and participates actively in improving the lives of others.

The core of this framework is its values – the beliefs and attitudes that underpin knowledge and skills. The next ring represents the socio-emotional competencies, or "soft skills", that are needed to establish positive relationships and handle challenging situations effectively. The next ring out represents Singapore's perspective on the 21st-century skills necessary for the globalised world in which we live. These are described as:

- civic literacy, global awareness and cross-cultural skills;
- critical and inventive thinking; and
- information and communication skills.

Box 4.2 **Singapore's education philosophy evolves**

Teach less, learn more

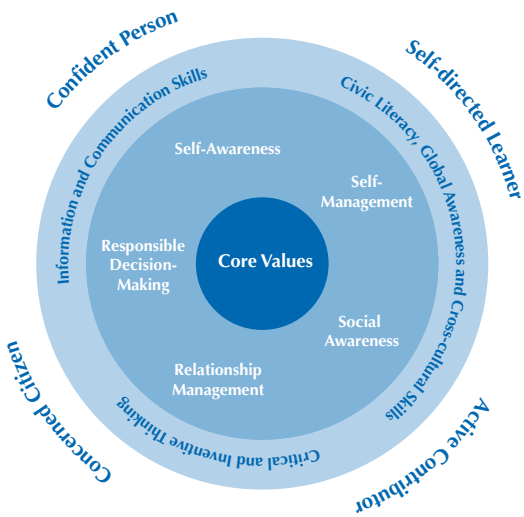
In 2004, despite the country's widely-recognised successes, Singaporeans were concerned that their students were too passive, overloaded with content and driven to perform, but not necessarily inspired. Prime Minister Lee Hsien Loong introduced the idea of "teach less, learn more" as a fundamental change in the way teaching and learning happens in Singapore classrooms. Its aim was to engage students more deeply in learning by opening up more "white space" in the curriculum and changing the types of pedagogy used. "Teach less, learn more" aims to "touch the hearts and engage the minds of learners by promoting a different learning paradigm in which there is less dependence on rote learning, repetitive tests and instruction, and more on engaged learning, discovery through experiences, differentiated teaching, learning of lifelong skills, and the building of character through innovative and effective teaching approaches and strategies" (interview with Ho Peng). The content of the curriculum was reduced by 10%-20% in certain subjects and a wide range of different approaches to teaching, assessment and curriculum design was introduced.

Primary Education Review

In 2008-2009 the government conducted a review of primary education. The recommendations of the Primary Education Review and Implementation Committee (PERI) aimed "to strike a better balance between the teaching of knowledge and the development of skills and values" by using more active and engaging teaching methods, limiting the importance of written examinations, and using more holistic assessments in primary schools. They also recommended greatly expanding art, music and physical education. All schools are to move to single sessions rather than double sessions, and social service providers will be given space in schools to better support disadvantaged students. Approximately USD 4.8 billion will be spent over 10 years to develop new programmes, recruit new teachers, build new schools or upgrade old ones, and reduce class sizes by 20% by 2015.

■ Figure 4.2 ■

21st-century competencies and student outcomes



Source: Singapore Ministry of Education (2010b).

Curriculum 2015 points out that while many of these skills are already being taught in Singapore's schools, the aim now is to strike a better balance between content knowledge and skills (Interview with Wong Siew Hoong, Director of Schools, Ministry of Education). *Curriculum 2015* will be implemented in a number of ways, each described in turn below.

Updating the curriculum

The next curriculum review cycle will take place between 2012 and 2014. The skills targeted in *Curriculum 2015* will be incorporated into this review. Singapore aims to maintain its traditional strengths in the core academic areas of mathematics, science, and literacy, but to further integrate 21st-century competencies, such as problem-solving, inquiry and use of ICT, into each subject.

There will be a much stronger emphasis on physical education, arts and music to enable students to develop physical robustness and enhance their creative and expressive capacities. More time and facilities for each of these subjects will be added to schools and, over time, single subject specialisation for art and music teachers will be required. In addition, more extra-curricular activities – sport, art and outdoor activities – will be encouraged since they can help students acquire many of the "soft skills" targeted by *Curriculum 2015*.

School pilots

Singapore has set up a number of specialised schools for sports, arts and music. In addition, every school is encouraged to innovate as it sees fit. For example, each school has a fund to allow teachers to travel overseas and learn about innovations and best practices in their discipline and bring the lessons home. Similarly, many schools are trying to upgrade ICT applications (Box 4.3). A number of primary schools are piloting holistic student assessments. These prototypes will then be reviewed for possible dissemination throughout the system.

Box 4.3 **ICT for the future**

Singapore children spend 18 hours per week online aside from their educational uses of computers (2009 survey by Saffron, cited in NIE, 2010). Students have exceptionally fast access to information and children as young as four are able to use computers. Students also adapt to new forms of technology with minimal effort, and outside school use of ICT is changing the way students interact (NIE, 2010). Societies need new models of teaching and learning to adapt to these 21st-century learners and technologies. In earlier phases Singapore had built an ICT infrastructure and seeded innovations such as the use of podcasts for language learning, doing field research using mobile personal digital assistants (PDAs) and data loggers, and role-playing social studies in the online game Second Life. Now, in line with Curriculum 2015, the goal of the third ICT master plan (mp3) is to help students develop skills for self-directed and collaborative learning through the use of ICT; and to ensure they become discerning and responsible ICT users. Once teachers and schools have developed effective innovations they will be spread throughout the system through teachers' learning circles and by being incorporated into syllabi and subject guides.

Teacher preparation for the 21st century

In 2009, recognising the rapid pace of change occurring in the world, an institution-wide review of teacher preparation was conducted by NIE, leading to NIE's new Teacher Education Model for the 21st Century (TE21). Its theme is that 21st-century learners need 21st-century teachers who not only possess 21st-century literacies themselves, but can create the learning environments that enable their students to develop such skills (NIE, 2009). Many of the changes being made under TE21 echo the teacher-education reforms now being implemented in a number of countries:

- clear standards for what teaching graduates should know and be able to do in each subject;
- accountability built into teacher-preparation programmes for ensuring that teachers have these competencies;
- more emphasis right from the start on guided practice for trainee teachers in classroom settings;
- more involvement by teacher-education institutions in mentoring new teachers in schools;
- giving trainee teachers a wider pedagogical repertoire, including co-operative and inquiry-based learning;
- greater capacity by teachers to incorporate ICT in all coursework;
- greater facility by teachers in using assessment of school children and data to guide instruction;
- a service learning requirement to promote understanding of local communities; and
- teaching research skills to diagnose and solve classroom problems based on evidence.

Professional development

Singapore has a competent teaching force and robust systems for recruiting and developing teachers. This is more important than ever because teaching critical thinking and problem-solving requires teachers to have a deeper mastery of their subjects than for traditional knowledge transmission. September 2010 saw the launch of the Academy of Singapore Teachers. Its mandate – to facilitate a teacher-led culture of professional excellence centred on the holistic development of the child. The underlying idea is to give the teaching profession more autonomy over professional development, raise the level of professional practice, and strengthen the professional ethos. The academy will be governed by a council of teachers, and a range of programmes will drive professional development for Singapore's 30 000 teachers. For example, master teachers can design and offer courses and workshops in their particular subjects for their colleagues across the system. The competencies targeted in *Curriculum 2015* will frame the academy's work.

Assessments

Reflecting the philosophy of *Curriculum 2015,* Singapore is interested in changing the balance in student assessment from assessment *of* learning to assessment *for* learning. It has begun by looking at what other countries are doing in this field, including Hong Kong, Australia, Sweden, and Scotland, but has not found a great deal of established work to date. The Ministry of Education is working on a Holistic Development Profile for each student. The idea is that from 2012, each student will have a profile that reflects the skills required by *Curriculum 2015,* enabling parents to be updated on their child's progress in developing these competencies.

Research and evaluation

The Curriculum 2015 and 21st-century competencies framework are relatively new, so there is no formal research and evaluation being conducted at this point. In future, as innovations develop in schools and classrooms, a research programme will be devised.

CHALLENGES AND NEEDS

As we have seen, Singapore has developed a very strong knowledge-transmission education system in the core areas of mathematics, science and literacy, a strength it does not want to lose. Its excellent performance in PISA 2009 showed that in addition to having a good grasp of subject matter, Singapore's students can also think critically and solve real-life problems. The country has also been extraordinarily successful at matching the output of its education system to the changing skills demands of the economy, something that is becoming harder to do in a rapidly-globalising knowledge and innovation economy, when the next generation of jobs has not yet even been imagined. As a small country, Singapore is vulnerable to shifts in the global economy or by larger powers. But it has also developed the kind of systematic and continuous improvement processes through which new educational goals can be tested in pilot schools, integrated into new curricula, teacher preparation and professional development programmes, then fed back from schools to the ministry for the next iteration. This allows Singapore to develop new skills and competencies as they are needed.

However, changing the way they teach and the skills they need to impart is a complex undertaking for teachers who are used to a more traditional way of teaching. This is especially the case when public examinations, which continue to emphasise traditional content knowledge, occupy such an important place in the life of the student and the community. If school or university entrance examinations do not evolve, the education system will keep heading in the old direction, whatever the latest policy goals. The trouble is that nobody knows with any certainty how to define, deliver or assess these skills, so there is a danger that in many places, talk of 21st-century competencies will remain just that: talk. The need for ways to assess these new skills is therefore an urgent priority, and an area where international collaboration might be very useful. There is also a need to synthesise the relevant research bases in cognitive science, motivation and memory to create a more solid evidence base and strategies to inform the teaching and learning of these 21st-century skills.

▪ Figure 4.3 ▪

Singapore: Profile data

Language(s)	English, Mandarin, Tamil, Malay[5]
Population	4 987 600[6]
Growth rate	5.3%[7] (OECD 0.51%)[8]; World 1.16%)[9]
Foreign-born population	Chinese: 74%; Malay: 13.4%; Indian: 9.2%; Other: 3.2% [10]
GDP per capita	37 293 USD[11] (OECD average 33 732)[12]
Civilian employment (% of total)	
Unemployment	3.2% (2008)[13] (OECD average 6.1%)[14]
Youth unemployment	Females (15-24 year-olds): 11.1%; Males (15-24 year-olds): 6.9% (2007)[15] (OECD average 18.0%)[16]
Expenditure on education	2.8% of GDP[17]; (OECD average 3.5%) 15.3% of total public expenditure[18], (OECD average 13.0%)[19] of which: 21% on primary education 33% on secondary education 34% on tertiary education 12% on unknown[20]
Enrolment ratio, early childhood education	No data (regional average 49%)[21]
Enrolment ratio, primary education	106.2% (2007)[22] (regional average 110%)[23]
Enrolment ratio, secondary education	76.4% (2007)[24] (regional average 77%)[25]
Enrolment ratio, tertiary[26] education	No data (regional average missing)[27]

Interview partners

Ho, Peng, Director General of Education, Ministry of Education, Singapore.

Hogan, David, Principal Research Scientist, National Institute of Education, Singapore.

Lee, Sing Kong, Director, National Institute of Education, Singapore.

Low, Ee Ling, Associate Professor, National Institute of Education.

Pang, Elizabeth, Programme Director, Literacy Development, Curriculum Planning and Development Division, Ministry of Education, Singapore.

Suppiah, Mangoran, Executive Director, Academy of Singapore Teachers.

Wong, Siew Hoong, Director of Schools, Schools Division, Ministry of Education, Singapore.

Representatives from the Economic Development Board, Housing Development Board, Ministry of Manpower, National University of Singapore, Ministry of National Development, NUS School of Science and Math, Victoria High School, Chongfu Primary School, Assumption Pathway School, Institute of Technical Education, National Institute of Education, A*Star, Keppel Offshore and Marine, and Marshall Cavendish who met with a delegation from North Carolina State Board of Education, January 2010.

Notes

1. This evolution from four languages to English was a result of parental choice, rather than government decree.
2. This figure dropped to 4% in 2000, 2% in 2006 and 1.2% in 2009.
3. The five enablers are leadership, staff management, strategic planning, resources and student-focused processes. The four result areas are outcomes of holistic development of students (which includes academic results), staff well-being results, administrative and operational results and results of engagement with partners and community.
4. Polytechnic education lasts three years, leading to a diploma; ITE education lasts two to three years, depending on the qualifications sought.
5. Republic of Singapore Independence Act. *http://statutes.agc.gov.sg/non_version/cgi-bin/cgi_getdata.pl?actno=1997REVED-SI&doctitle=REPUBLIC%20OF%20SINGAPORE%20INDEPENDENCE%20ACT%0A&date=latest&method=whole.*
6. Population (Mid Year Estimates) & Land Area 2009, Statistics Singapore, 2009, *www.singstat.gov.sg/stats/keyind.html#popnarea.*
7. Annual population growth rate, 2008, *http://data.worldbank.org/country.*
8. OECD (2010b), *OECD Factbook 2010*, OECD Publishing, Paris: Annual population growth in percentage, year of reference 2009.
9. OECD (2010b), *OECD Factbook 2010*, OECD Publishing, Paris: Annual population growth in percentage, year of reference 2009.
10. Department of Statistics Singapore website: *www.singstat.gov.sg*, accessed 3 May 2011.
11. Singapore data on International Monetary Fund website, accessed 3 May 2011: *www.imf.org/external/pubs/ft/weo/2010/01/weodata/weorept.aspx?sy=2007&ey=2010&scsm=1&ssd=1&sort=country&ds=.&br=1&c=576&s=NGDPD%2CNGDPDPC%2CPPPGDP%2CPPPPC%2CLP&grp=0&a=&pr.x=43&pr.y=11.*
12. OECD (2010b), *OECD Factbook 2010*, OECD Publishing, Current prices and PPPs, (data from 2008).
13. World Bank country data, *http://data.worldbank.org/country*, accessed 3 May 2011.
14. OECD (2010b), *OECD Factbook 2010*, OECD Publishing, total unemployment rates as percentage of total labour force (data from 2008).
15. World Bank country data, *http://data.worldbank.org/country*, accessed 3 May 2011.
16. OECD (2010c), *Employment Outlook*, OECD Publishing, Unemployed as a percentage of the labour force in the age group: youth aged 15-24. Data from 2009.
17. UNESCO-UIS (UNESCO Institute for Statistics) (2010), *UIS Statistics in Brief: Singapore*, (data from 2008).
18. UNESCO-UIS (2010), *UIS Statistics in Brief: Singapore*, (data from 2008).
19. OECD (2010d), *Education at a Glance 2010: OECD Indicators*, OECD Publishing, Public expenditure presented in this table includes public subsidies to households for living costs (scholarships and grants to students/households and students loans), which are not spent on educational institutions, (data from 2007).
20. UNESCO-UIS (2010), *UIS Statistics in Brief: Singapore*, (data from 2008).
21. UNESCO-UIS (2010), *UIS Statistics in Brief: Singapore*, Percentage represents gross enrolment rate for MF; 2008(Regional average 49%).
22. World Bank country data, *http://data.worldbank.org/country*, accessed 3 May 2011.
23. UNESCO-UIS (2010), *UIS Statistics in Brief: Singapore*, Percentage represents gross enrolment rate for MF; 2008 (Regional average 110%).
24. World Bank country data, *http://data.worldbank.org/country*, accessed 3 May 2011.
25. UNESCO-UIS (2010), UIS Statistics in Brief: Singapore. Percentage represents gross enrolment rate for MF; 2008 (regional average 77%).
26. The OECD follows standard international conventions in using the term "tertiary education" to refer to all post-secondary programmes at ISCED levels 5B, 5A and 6, regardless of the institutions in which they are offered. *Tertiary Education for the Knowledge Society: Volume 1*, OECD Publishing; Paris.
27. UNESCO-UIS (2010), *UIS Statistics in Brief: Singapore*, (data from 2008).

References and further reading

Asia Society (2007), *Learning in a Global Age: Knowledge and Skills for a Flat World*, Asia Society, New York.

Asia Society and **Council of Chief State School Officers** (2010), *International Perspectives on US Policy and Practice*, Asia Society, New York, available at http://asiasociety.org/files/learningwiththeworld.pdf.

Barber, M. and **M. Mourshed** (2007), *How the World's Best-Performing School Systems Come Out on Top*, McKinsey and Company, London.

Darling-Hammond, L. (2010), *The Flat World and Education*, Teachers College Press, New York.

Goh, K.S. (1979), *Report on the Ministry of Education 1978*, Singapore National Printers, Singapore.

Hong, K.T., Y.S. Mei, and **J. Lim** (2009), *The Singapore Model Method for Learning Mathematics*, Curriculum Planning and Development Division, Ministry of Education, Singapore.

IMD (2007), *IMD World Competitiveness Yearbook,* IMD, Lausanne.

Quek, G. et al. (eds) (2007), *TIMSS Encylopedia: A Guide to Mathematics and Science Education Around the World*, Vol 1, TIMSS, International Association for the Evaluation of Educational Achievement, Boston College, Massachusetts.

Lee, S.K. et al. (eds) (2008), *Toward a Better Future: Education and Training for Economic Development in Singapore since 1965*, The World Bank, Washington, DC.

Low, E. (2010), *Educating Teachers for the 21st Century: The Singapore Model*, National Institute of Education, Singapore.

NIE (National Institute of Education) (2009), *TE21: A Teacher Education Model for the 21st Century.* National Institute of Education, Singapore.

NIE (2010), *Perspectives in Motivating Educators and Learners,* Motivation in Education Research Lab, National Institute of Education, Singapore.

National University of Singapore (2009), *State of the University 2009*, National University of Singapore, Singapore.

Ng, E.H. (2008), *Speech by Dr Ng Eng Hen*, Minister for Education, Ministry of Education website, www.moe.gov.sg.

Ng, P.T. (2008a), "Education reform in Singapore: From quantity to quality", *Educational Research for Policy and Practice*, 7: 5-15.

Ng, P.T. (2008b), "Developing forward-looking and innovative school leaders: The Singapore Leaders in Education Program", *Journal of In-Service Education*, 34:2, 237-255.

OECD (2010a), *PISA 2009 Results, What Students Know and Can Do: Student Performance in Reading, Mathematics and Science, Volume 1,* OECD Publishing.

OECD (2010b), *OECD Factbook 2010*, OECD Publishing.

OECD (2010c), *Employment Outlook*, OECD Publishing.

OECD (2010d), *Education at a Glance 2010: OECD Indicators*, OECD Publishing.

Schmidt, W. (2005), "The Role of Curriculum", *American Educator,* 23, no 4.

Sclafani, S. and **E. Lim** (2008), *Rethinking Human Capital in Education: Singapore as a Model for Human Development*, Aspen Institute, Washington, DC.

Singapore Ministry of Education (2009), "Government Accepts Recommendations on Primary Education", *Ministry of Education Press Release,* 14 April 2009, www.moe.gov.sg.

Singapore Ministry of Education (2010a), "MOE to Enhance Learning of 21st Century Competencies and Strengthen Art, Music, and Physical Education", *Ministry of Education Press Release,* March 2010, www.moe.gov.sg.

Singapore Ministry of Education (2010b), *Nurturing our Young for the Future: Competencies for the 21st Century*, Ministry of Education, Singapore, available at www.moe.gov.sg/committee-of-supply-debate/files/nurturing-our-young.pdf.

Stewart, V. (2010), *Dream, Design, Deliver: How Singapore Developed a High-Quality Teacher Workforce*, Phi Delta Kappa International, Bloomington, Indiana.

Times Higher Education Supplement (2010), *Rankings of World Universities 2010*, available online at www.timeshighereducation.co.uk/world-university-rankings/.

Yew, L.K. (2000), *From Third World to First*, Harper Collins, New York.

5

Ontario: Harnessing the Skills of Tomorrow

Not only do Canadian students perform well in PISA, they do so despite their socio-economic status, first language or whether they are native Canadians or recent immigrants. Canada has achieved success within a highly federated system that accommodates a diverse student population. This chapter examines Canada's success through an in-depth look at the education system of the country's largest province, Ontario. It describes how the province combines a demand for excellence with extensive capacity-building, and fosters a climate of trust and mutual respect among all stakeholders.

Introduction

Canada is a relative latecomer to the top of the international rankings. Unlike Japan and Korea, it was not a clear leader in international assessments in the 1980s and 1990s, and it was only after the release of the PISA rankings in 2000 that Canada found itself a leader of the pack (Table 5.1). These results have been confirmed in subsequent administrations of the PISA tests, which have revealed that Canada both has strong mean results as well as less dispersion among its socio-economically advantaged and disadvantaged students than many other nations (OECD, 2010a).

Understanding the reasons for this strong performance is not easy for two reasons. First, Canadian education is governed at the provincial level with a limited to non-existent federal role, and thus each of the ten provinces and three territories has its own history, governance structure, and educational strategy. Second, because Canada is a newcomer to educational success, there has only recently been an influx of visitors, scholars, and other interested observers, so the kind of secondary literature that one could build upon to try to tell a story of Canadian success as a whole is only beginning to be built up. That said, there has been substantial attention paid, over the past two decades, to some of the reforms instituted in Alberta, and the recent educational improvement strategy of the nation's largest province, Ontario, will be the focus of this chapter. Before turning to Ontario, however, it is important to provide some overall information about the wider Canadian context.

Table 5.1 Canada's mean scores on reading, mathematics and science scales in PISA

	PISA 2000	PISA 2003	PISA 2006	PISA 2009
	Mean score	Mean score	Mean score	Mean score
Reading	534	528	527	524
Mathematics		532	527	527
Science			534	529

Source: OECD (2010a).

UNDERSTANDING THE CANADIAN SYSTEM

As mentioned above, the most striking feature of the Canadian system is its decentralisation. It is the only country in the developed world that has no national ministry, or minister, of education. Education is the responsibility of its ten provinces and three territories. Four of those provinces and territories hold approximately 80% of the Canada's five million students: Ontario (two million), Quebec (one million), British Columbia (610 000), and Alberta (530 000). It should be noted, however, that over 40 years ago Canadian ministries and departments of education created the Council of Ministers of Education (CMEC), through which provinces and territories work collaboratively on projects and initiatives of mutual interest through a consensus-building process.

Responsibility within the provinces and territories is divided among the central provincial government and locally elected school boards. The provincial government is responsible for setting the curriculum, determining many major policies for schools, and providing the majority, if not all, of the funding for schools (though funding patterns vary across provinces and territories). The minister of education is chosen by the premier from elected members of the provincial legislature, and becomes a member of the ruling party's cabinet. The deputy minister of education is a civil servant who carries much of the operational responsibility for the workings of the department.

Local school boards employ staff and appoint principals and senior administrators. They also set annual budgets and make decisions on some programmes. Over time, the number of districts has shrunk considerably through processes of consolidation. In Alberta, for example, there used to be more than 5 000 districts; by the end of the 20th century, the number was less than 70. There is no interim level of administration between the provinces/territories and districts in Canada – they work directly with one another on province-wide initiatives.

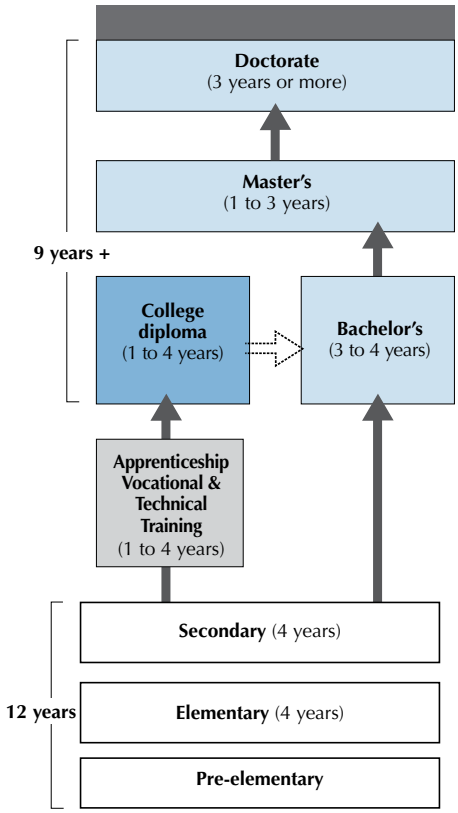
Teachers are unionised in Canada, and the unit of collective bargaining varies across provinces and territories: some bargain at the local level, some at the provincial level, and some are mixed. Teacher training takes place in universities. Standards for certification were traditionally set by the provinces and territories. In 1987, however, British Columbia granted to its College of Teachers exclusive responsibility for entry, discipline and professional development of teachers, and in 1996, Ontario followed suit, creating an Ontario College of Teachers with similar functions. The Ontario College has a 37-member governing council with 23 teachers elected by the college, and 14 members appointed by the Ontario Minister of Education. In both cases, more traditional bread and butter issues continue to fall under collective bargaining and are separate from the work of these self-regulating bodies.

The Canadian system is also internationally distinctive for its efforts to balance respect for diversity of language and religious affiliation with province and territory-wide educational goals. Section 93 of the Constitution Act 1867 sought to protect parents' rights to send their children to Protestant and Catholic schools, subject to provincial control over funding and teachers, but using

public funding. This structure means that these schools and school boards in Canada are within the public system and under partial control of the Ministry of Education, not in the private sector. These schools were named "separate schools" in Canada West and "dissentient" schools in Canada East. There is variation across provinces and territories in exactly how these arrangements have evolved – in some provinces/territories, like Alberta, Ontario, and Saskatchewan, public and dissentient separate schools exist; in others, like Manitoba and British Columbia, parents seeking a Catholic or Protestant education have to send their children to private schools, though even these often receive some degree of public funding.

■ Figure 5.1 ■

Canada's education system organisation



CANADIAN SUCCESS FACTORS

In addition to a strong welfare state and a high cultural value placed on education, observers cite three factors as important to Canada's strong international performance:

- The establishment of a common curriculum within each of the provinces and territories. Curricula are developed by the respective ministries of education, in a process of extensive consultation with groups of teachers and subject matter experts. In some provinces and territories these curricula are fairly detailed, whereas in others they serve more as guidelines of what should be learned and when. While there is certainly wide variation in the degree to which these curricula actually penetrate classroom practices, they do provide basic guidance as to what should be learned by which students at what ages. In recent years, some of the smaller provinces in the west have started co-ordinating these efforts to establish greater uniformity across provinces, similar to consortia of states in the United States working together towards common core standards. Recent PISA results have shown that Alberta is the highest scoring province, and the Alberta Ministry ascribes this success in part to the quality of its curriculum. The collaboration between Canadian jurisdictions on curriculum matters goes even further in some cases where some territories draw heavily on curriculum documents from neighbouring jurisdictions.
- The high degree of selectivity in choosing teachers. The 2007 McKinsey report on PISA leaders emphasised that one factor which differentiated PISA leaders from those further down the chart was the degree to which teacher education programmes were able to draw their students from the top end of the talent pool (Barber and Mourshed, 2007). According to Ben Levin, former deputy minister in Ontario and a widely cited scholar on Canadian education, Canadian applicants to teachers colleges are in the "top 30%" of their college cohorts. The education within Canada's teacher training institutions is seen by some to be of high quality;

Levin estimates there are perhaps 50 across Canada, as opposed to hundreds across the United States, which allows for greater monitoring of training quality. Other respondents agreed that teacher selectivity was high, but were more sceptical about the quality of the training institutions.

- Equalised funding. Since funding responsibility lies entirely, or almost entirely, at the province/territory level, they are able to provide funding to offset the greater neediness of some of their students. Public funding for education comes either directly from the provincial or territorial government or through a mix of provincial transfers and local taxes collected either by the local government or by the boards with taxing powers. Provincial and territorial regulations, revised yearly, provide the grant structure that sets the level of funding for each school board based on factors such as the number of students, special needs, and location. Funding from the provinces and territories to districts is generally split into three categories: block grants based on number of students; categorical grants which are either used to fund particular programmatic needs (e.g. special education) or to help those districts struggling to provide basic services (e.g. more geographically-dispersed districts need more funds for transportation); and equalisation funding, which is used in the districts that retain some local funding to top up the poorer districts.

ONTARIO: REFORMING FOR THE FUTURE

Between 2003 and 2010, Ontario was a world leader in its sustained strategy of professionally-driven education reform. Initiated by Premier Dalton McGuinty on his election in 2003, the Ontario strategy has achieved widespread positive results in increasing elementary literacy and numeracy, improving graduation rates, and reducing the number of low-performing schools. The constellation of elements that came together to fuel the success of this strategy is described below.

Ontario is the largest province in Canada, with an area of about 1 100 000 square kilometres and a population of approximately 13 million: 40% of all Canadians. It has a major role in the Canadian economy contributing about 37% of the country's GDP. It is a highly urbanised province, with 80% of students located in metropolitan areas. In terms of diversity, 27% of Ontario students are born outside of Canada and 20% are visible minorities. Toronto, the main city in Ontario, is one of the most diverse cities in the world.

There are four sets of locally elected school boards in Ontario, in order to fulfil Canada's constitutional requirements for public support of minority languages and religious minorities:

- 31 English public school boards serve about 1.4 million students;
- 29 English Catholic school boards serve about 590 000 students;
- 8 French Catholic boards have 70 000 students; and
- 4 French public boards have 23 000 students.

This means that any given area of the province will be served by four boards, allowing for some degree of choice in the system. There are about 5 000 schools in the public system; there is no public funding for private schools.

Focusing on a few clear goals

From the beginning, central to Ontario's theory of change was that systemic reform across several layers of government and 5 000 schools would require a steady and coherent focus on a very limited number of goals. Too often, school systems are easily distracted and drawn into many questions and controversies that have little or no relationship to improving student learning and educational attainment. McGuinty had made two central commitments that guided the work of the ministry: to increase literacy and numeracy performance in elementary schools, and to increase the high school graduation rate. The government also set ambitious, but realistic, long-term numerical targets for each of these goals: to increase the proportion of students achieving at the provincial standard – a high standard, equivalent to a B grade – in reading, writing, and mathematics from 55% to 75%; and to increase the high school graduation rate from 68% to 85%.

To achieve these goals, the ministry introduced a multifaceted strategy for improvement based on a clearly articulated hypothesis: that system pressure combined with targeted school-level support would yield greater results than top-down pressure accompanied by punitive consequences for persistently low performance. This work was informed by a careful analysis of the failings of previous initiatives. Most top-down initiatives, they concluded, were unable to achieve deep and lasting changes in practice because: 1) the reforms were focused on things that were too distant from the instructional core of teaching and learning; 2) the reforms assumed that teachers would know how to do things they didn't know how to do; 3) blizzards of conflicting reforms asked teachers to do too many things simultaneously; and 4) teachers and schools did not buy-in to the reform strategy.

To achieve sustained change, then, would require:

- strategies directly focused on improving the act of teaching;
- careful and detailed attention to implementation along with opportunities for teachers to practise new ideas and learn from their colleagues;
- a single integrated strategy and one set of expectations for teachers and students;
- a commitment to build partnerships with teachers and school boards; and

Both province and district policies would need to be crafted with all of these goals in mind.

Building support among teachers, unions, and other stakeholders

Of all of these points, the last one (gaining teacher support) was perhaps most important to the new strategy. To improve results across 5 000 schools would require a continuous and sustained effort on the part of hundreds of thousands of teachers to try to improve their practice. This, they thought, could only happen if teachers were "onside" (to use their word).

To this end, the ministry drew a sharp contrast between its capacity-building approach to reform and the more punitive versions of accountability used in some other countries. Its focus was on supporting the continuous improvement of all schools, with special attention and support to the lowest performers. In that context, it did not use public reporting of results to shame or blame, but to mobilise additional resources and assistance to struggling schools, while being accountable to parents and the broader community for results.

Politically, it is clear that the ministry acted extremely skilfully to engage the support of teachers, schools, and unions in a shared vision of reform. Appointing Gerard Kennedy as Education Minister (widely seen as someone who supported public education and was sensitive to the needs of teachers) and Ben Levin (a deeply knowledgeable academic and practitioner) as his Deputy signalled a commitment to a more consultative, coalition-building style of leadership in education. The Deputy Minister met quarterly with the major teachers' unions, superintendents' organisations, and principal associations to discuss ongoing reform strategies. The ministry also created the Ontario Education Partnership Table where a wider range of stakeholders could meet with ministry officials two to four times a year; this led to working tables, where smaller groups of stakeholders worked in more detail on particular issues.

Of particular importance to these efforts was the signing in 2005 of four-year collective bargaining agreements between the four major teachers' unions and provincial trustee associations. These agreements were the result of a set of provincial dialogues convened by the government, and which created a framework that advanced the government's educational improvement strategy while addressing teacher workload issues. Specifically, McGuinty had pledged to increase investments in elementary education and reduce class size, which provided the funding for 5 000 new elementary teaching positions in music, art, physical education and languages, while providing regular classroom teachers with additional preparation time. The government also provided money for hiring a full or part-time Student Success Officer (see below) in each secondary school. These agreements thus both pushed forward the educational agenda and created a sustained period of labour peace that allowed for a continued focus on educational improvement.

Creating the structures for solid implementation

There were two major initiatives pursued by the Ontario Education Ministry over this time period: the first focused on elementary schools; the second on high schools. These initiatives, however, need to be seen in the context of a broader government commitment to the education and development of children that begins in the pre-school years and culminates in post-secondary success in higher education or the workforce.

Reforming literacy and numeracy in elementary schools

The ministry's first initiative focused on literacy and numeracy, and its strategy revolved around the creation of a new school assistance unit, the Literacy and Numeracy Secretariat (LNS; Box 5.1). The aim here was to increase reading and maths results in elementary schools. Through a deep capacity-building strategy, this initiative has succeeded in raising the proportion of students meeting the provincial standard on provincial assessments from roughly 55% (2003) to roughly 68% (2010) in reading, mathematics and writing in third grade. Similar gains of about 10-12 percentage points are apparent in the same subjects in sixth grade

Reducing high school dropouts

The second ministry initiative was called Student Success and aimed to increase the high school graduation rate. From the outset, the Student Success strategy was comprised of three main pillars: increased focus on literacy and numeracy achievement; clearly demarked pathways to post-secondary destinations; and supportive, caring school communities designed to strengthen student

Box 5.1 **Building the capacity for reform: the Literacy and Numeracy Secretariat**

The LNS was a new 100-person unit responsible for building the capacity and expertise to do the work in schools. Organisationally independent of the ministry, it was able to start afresh without the usual bureaucratic obstacles. The ministry also required that teams be created in each district and each school in order to lead the work on literacy and numeracy. By so doing, they paired external expertise with sustained internal time and leadership to push the initiative. Avis Glaze, who was responsible for leading the LNS, said that the effort succeeded in part because of its field base:

"We recruited a new team of people who had deep experience in the field – teachers, principals, subject matter specialists – people who were deeply respected by teachers and schools, and were not seen primarily as representatives of the department. This mini-organisation was largely based in the field – we had six regional teams plus one French language team, each of six to eight people. This means that the majority of the people in the Secretariat were actively working in the field, building relationships with schools, principals and teachers, rather than in the home office back at the Ministry." (Interview conducted for this report)

engagement. The insight behind this programme was that the road to dropping out of high school starts early: by tracking students who have failed one or more courses in ninth grade, it is possible to identify potential dropouts quickly.

For this initiative, the government pursued a different strategy. Rather than sending out a team from the ministry, they gave money to each district to hire a Student Success Teacher responsible for co-ordinating efforts in their district. The ministry also gave money to allow the district leaders to meet and share strategies. Again each high school was given support to hire a provincially-funded Student Success Teacher and required to create a Student Success team to track data on which students failed one or more courses in ninth grade and then design appropriate early interventions. Programmes of "credit recovery" were also created, allowing students to make up the parts of courses that they failed. These strategies have helped increase graduation rates from 68% to 75%.

Avoiding top-down mandates and clarifying roles

Another element of success was that the ministry tried to ensure that reform was really a two-way street, rather than simply something imposed from the top. As described by Michael Fullan, an internationally known expert on education reform who served as Special Advisor to the Ontario Premier and Minister of Education, this was one of the lessons learned from the British model:

> Michael Barber in the English strategy eventually called their strategy 'Informed Prescription.' So the idea of Informed Prescription was that you do your homework at the centre, you get informed and then you pretty much prescribe the curriculum and the instructional methods and use of time, including such things as the literacy hour. By contrast, when we set up our Secretariat, we said to the field, to our 72 districts, 'Don't worry, we are not going to come up with Informed Prescription and start advocating particular usages. Rather, what we are going to do is join in partnership with you in the field, the sector, and identify good practices and consolidate those and spread them. They might eventually come to have a certain kind of status that comes close to being non-negotiable, but we are not in the business at the centre of telling you what to do. We are in the business of jointly co-discovering it'. So that's what we did and that's how we did it. (Interview conducted for this report)

The ministry also pursued a clear theory of comparative advantage in terms of who should do what in implementing to the reforms. The role of the ministry was to set clear expectations and targets, to provide funding, to create a working collective bargaining agreement that would support improved teaching and learning, to provide external expertise, and to intervene with support in struggling schools. The role of the district was to align its personnel and hiring policies with the overall strategy, and to support the schools as they went through continuous processes of learning. Much of the real action had to happen in schools, which was where teachers worked in communities to think about problems of practice, and to learn from one another. While the mission and sustained pressure came from the top, there was a clear recognition that it was at the school level in which change had to happen, and that the role of other actors in the system was to support the learning and change that had to happen there.

Cultural support for universal high achievement by a diverse population

Ontario attracts almost one-third of all immigrants to Canada, and immigrant children succeed at high levels in Ontario's schools. PISA results suggest that within three years, Canadian immigrants average a score of 500 (OECD average) on the PISA assessment, which is remarkably strong by international standards (OECD, 2010). For comparison's sake, on the 2003 PISA reading survey,

Canadian first-generation immigrants scored an average of more than 510 points, ranking second, compared to less than 460 points in the United States and less than 430 points in France (OECD, 2003). Canada is also one of very few countries where there is no gap between its immigrant and native students on the PISA. Second-generation Canadians perform significantly better than first-generation Canadians, suggesting that the pattern is one of progress over time. Finally, Canada is one of only two countries (along with Australia), where there is no difference in performance between students who do not speak the language of instruction at home and those who do.

The performance of Ontario's immigrant student population mirrors that of the nation and largely reflects the provincial government's investment in creating diverse, equitable, and inclusive learning environments, and engaging students, parents, and communities in meaningful ways. It is also a reflection, however, of the high expectations immigrant families have for their children, and of the fact that those high expectations seem by and large to be held by educators as well. Because Canada has historically seen its immigrants as important members of Canadian society, crucial to the continuing development of the country, and because its immigration policies reflect those values, schools see their role as integrating children into the mainstream culture as rapidly as possible. If anything, the value placed on high achievement for immigrant children seems to have positive spillover effects onto the expectations for Canadian-born children, rather than the other way round.

A coherent system based on shared understanding and common purpose

Although some observers complained about the sheer number of initiatives launched by the McGuinty government over the years, it is apparent that the Ontario reform designers worked hard to develop and implement a systemic response to the problems and challenges they inherited. An important, but often underestimated, barrier to achieving system coherence is the lack of a shared understanding among key stakeholders about how key government leaders see the problems of the system and what lies behind the policies and programmes they have designed in response. The McGuinty government worked tirelessly to build a sense of shared understanding and common purpose among key stakeholder groups, and consequently their two major systemic initiatives – the Literacy and Numeracy Secretariat (Box 5.1) and the Student Success/Learning to 18 strategy – enjoyed broad public understanding and support.

A strong focus on educator quality

Ontario's reforms rested heavily on the government's confidence in the quality of the province's teaching force. The Literacy and Numeracy Secretariat decided not to follow England's "informed prescription" model, but rather to put seed money into the field to encourage local experimentation and innovation. This sent a strong signal that teacher-generated solutions to weaknesses in reading and maths performance were likely to be more successful than solutions imposed from above. The fact that teaching has historically been a respected profession in Canada, one that continues to draw its candidates from the top one-third of secondary school graduates, meant that the government had a solid basis for believing that its trust would pay off. The Student Success Teachers worked in teams to develop workable solutions for individual students because they were capable of doing so successfully. This show of trust in the competence and professionalism of the teaching force was an essential ingredient in forming a partnership between the profession and the government.

Ontario has paid special attention to leadership development, especially for school principals and vice-principals. In 2008 the government initiated the Ontario Leadership Strategy, based upon the Ontario Leadership Framework that spells out the leadership practices and the skills, knowledge and attitudes of effective leaders. Among the elements of the strategy are a strong mentoring programme that has now reached over 5 000 principals and vice-principals and a new province-wide performance system for school leaders. Additionally, funding and other resources have been provided for districts to develop and implement a Board Leadership Development Strategy that includes talent development and succession planning to ensure a pipeline of strong, committed candidates to fill leadership positions..

Strong and persistent leadership

All accounts of Ontario agree that sustained political leadership by Premier McGuinty has been fundamental to the success of the reforms. McGuinty ran on a platform of becoming the "education premier", and throughout his election, and re-election in 2007, he has kept a steady focus on educational improvement. He built on the foundations of national assessments and accountability that had been established by previous governments. McGuinty was personally involved in the reforms, and has met repeatedly with key educational stakeholders over the course of his premiership to emphasise the importance of the reforms. Michael Fullan, a major architect of the strategy, said of McGuinty during interviews for this report:

> The Premier is key, obviously. If Premier McGuinty had left it would have been a different story. I said to him in the first term, when you get re-elected….[don't] lose the plot, fail to keep the sustainability and focus on it. And the week after he got re-elected, he said to me, Not only am I not going to lose the plot, I'm going to intensify it, become even more committed and more confident and more impatient.

The combination of skilled, sustained political leadership from the Premier and a succession of capable ministers, and very strong professional leadership from Ben Levin and his successors in the Deputy Minister role, accounts for a big part of Ontario's success. While the initial decision to create the Literacy and Numeracy Secretariat outside the bureaucracy suggests that the political leadership did not have confidence that the Education Department could carry out such an ambitious, high-profile initiative, one of Levin's key goals was to make the department more attentive and responsive to the field, and it seems he and his successors have made significant progress in that regard, as evidenced by the decision to re-integrate the LNS into the ministry.

Enhanced professional accountability

Ontario has managed to balance administrative and professional accountability well. The McGuinty government made no attempt to dismantle or weaken the assessment regime put in place by the previous government, and it has consistently communicated the message to the field and the public that results matter, as defined by performance on the provincial assessments. However, its response to weak performance has consistently been intervention and support, not blame and punishment. The underlying assumption of Ontario's leaders seems to be that teachers are professionals who are trying to do the right thing, and that performance problems are much more likely to be a product of lack of knowledge than lack of motivation. Consequently, teachers seem to own more responsibility for performance than is often the case in countries with a more punitive approach to external accountability. Teachers' success is celebrated when they are included in provincial Innovation Awards along with members of other professions and recognised by the Premier's Awards for Teaching Excellence.

HARNESSING THE SKILLS OF TOMORROW, IN BOTH STUDENTS AND TEACHERS

In his 2008 budget Premier McGuinty asked a research institute at the University of Toronto to undertake a study of the changing composition of Ontario's economy and workforce and to examine historical changes and projected future trends affecting Ontario. The aim was "to provide recommendations to the province on how to ensure Ontario's economy and people remain economically competitive". The resulting report, *Ontario in the Creative Age* (Florida and Martin, 2009), made a powerful case for the centrality of creativity and innovation as key to Ontario's future prosperity, an argument with clear implications for education as well as for other units of government more directly focused on workforce development and the economy. In subsequent speeches the Premier has continued to sound the theme that the future belongs to places that can harness the creativity, skills, knowledge, and drive of their people. In this section we describe some of the strategies Ontario has put in place to develop these elements through the education system.

Strategies for developing critical thinking

One of the most striking things about Ontario's success in moving the needle on its most important measures – academic proficiency in the elementary grades, graduation rates in the high schools – has been that these gains have not been achieved as a consequence of narrowing the curriculum or focusing on teaching to the test. Rather, this progress has occurred in the context of a deliberate province-wide focus on ensuring that all schools offer a rich curriculum and an instructional focus on the development of critical, higher-order thinking skills. This emphasis on critical thinking is not limited to language arts, mathematics, and science, but permeates all subjects in the Ontario curriculum, as does the development of metacognitive skills (thinking about thinking). It is also woven into the fabric of everyday life in Ontario's schools. It can be seen in the curriculum documents that frame the goals of education in the province, the professional development supports offered to teachers, the structure and diversity of programme offerings for students in the high schools, and in the language the government uses in its publications to communicate with Ontario parents and citizens. It is clear from a recent set of interviews with Toronto-area administrators and from reviewing a set of teacher-developed units of study that these more ambitious learning goals for young people – what economists Frank Levy and Richard Murnane refer to as "expert thinking" and "complex communications" – exist not simply in official documents but are making their way into Ontario classrooms (Levy and Murnane, 2004).

Early in Premier McGuinty's second term the government released a policy paper entitled *Reach Every Student – Energizing Ontario Education* (Ontario Ministry of Education, 2008). Rather than declaring victory on his three major first-term priorities and moving on to a new set of initiatives, the government asserted its intention to go "deeper and wider" on literacy and numeracy and get 75% of students to an advanced level on these skills. It defined advanced literacy for the 21st century as follows:

> Literacy is defined as the ability to use language and images in rich and varied forms to read, write, listen, view, represent, and think critically about ideas. It involves the capacity to access, manage, and evaluate information; to think imaginatively and analytically; and to communicate thoughts and ideas effectively. Literacy includes critical thinking and reasoning to solve problems and make decisions related to issues of fairness, equity and social justice. Literacy connects individuals and communities and is an essential tool for personal growth and active participation in a cohesive, democratic society. (Ontario Ministry of Education, 2008)

The government's definition of advanced numeracy is equally focused on higher order thinking and application, as evidenced by the following sentence:

> Through mathematical activities that are practical and relevant to their lives, students develop mathematic understanding, problem-solving skills, and related technological skills they can apply in their daily lives and in the future workplace. (Ontario Ministry of Education, 2008)

Allowing children to customise their education

In Ontario, advanced literacy and numeracy skills are framed as a means to enable students to solve real-world problems. This focus on application of knowledge and skills is accompanied by a very strong commitment to an individualised, customised approach to education. The *Reach Every Child* motto assumes that each child is different and that no single approach can work for all students. This philosophy can be seen most clearly in Ontario's high schools, where as part of its Student Success Strategy the government has been steadily expanding the array of choices and options available to students, including dual credit programmes, co-operative education, youth apprenticeship, and most prominently, the Specialist High Skills Majors (SHSM) programme (Box 5.2).

Box 5.2 **Aligning school work with the real world**

The Specialist High Skills Majors (SHSM) programme offers high school juniors and seniors an opportunity to customise their educational programme by aligning their academic courses with an occupational area they want to explore. There are 18 majors, covering a broad range of occupational sectors, e.g. *arts, construction, energy, environment, ICT and sports*. Each major is differentiated within the design of the programme to meet a wide range of student skills and interests. All school districts offer at least one major, and some schools offer as many as seven. The idea is to strengthen student engagement and motivation both by making language arts and maths courses more relevant to student interests by drawing on examples and projects linked to the major and by providing more opportunities for experiential learning through job shadowing and internships. Students who meet the requirements of the programme get a red seal embossed on their high school diploma, recognition for SHSM credits on their transcript, and an SHSM record or portfolio of their accomplishments. SHSM credits can count toward post-secondary education or an occupational certificate. The programme has grown exponentially since its inception in 2006/07, when it enrolled 600 students in 27 programmes in 44 schools. In 2010/11 over 28 000 students are enrolled in 1 050 programmes in 540 schools. This has now become a mainstream programme.

In order to receive credit toward their high skills major, students must participate in specially designed "contextualised learning activities" (CLAs) in one of their academic subjects. Contextualised learning makes learning more relevant for many students because the activities relate to a recognisable issue and the activities are set in the context in which they would be used in real life. This approach makes knowledge concrete and easier to learn while engaging young minds in critical thinking and problem solving.

These CLAs draw on knowledge and skills relevant to the occupational sector while meeting the curriculum requirements of the course. The CLAs are created by teachers, and after review for accuracy and bias by the ministry are then made available to other teachers. Box 5.3 presents two examples which highlight how contextualised, applied learning can build critical thinking skills and allow for student creativity in responding to the assignment.

A focus on big ideas

The SHSM programme is primarily a strategy for engaging young people for whom an academics-only curriculum might not be compelling enough to hold them in school through graduation. But what curricular strategies does Ontario employ in the earlier grades to help all students see the relevance of what they are studying to the world around them, and to encourage them to move beyond the mastery of facts to the development of higher order thinking skills?

Ontario's Grades 1-8 Science Curriculum provides a powerful example of the ministry's orientation. The Science Curriculum document begins by setting out three broad goals for science education in these grades, the first of which is to relate science and technology to society and the environment (Ontario Ministry of Education, 2007). The document then describes six fundamental concepts – matter, energy, systems and interactions, structure and function, sustainability and stewardship, and change and continuity – around which the science curriculum is organised, concepts that not only provide a framework for acquiring scientific

Box 5.3 **Building critical thinking through real-world activities**

Case 1: The Ethanol Debate is designed for a 12th-grade English class with students majoring in transportation or environment. It extends over five 75-minute classes and meets a specified set of reading, writing, and communications standards. After an initial introduction to the topic, students must complete five exercises: 1) a statistics and graphing exercise involving four sets of ethanol statistics; 2) a charting exercise in which students list and categorise all of the foods in their kitchens to identify those using corn products; they then speculate about the effect on food production if corn was diverted from food production to ethanol; 3) a corn flow chart on which they have to plot the impact of one event (*e.g.* a rise in corn prices) on other related factors, and then write how what they have learned might affect their future choices about the types of food they consume; 4) students assess a list of "ethanol stakeholders" to decide which stakeholders would favour or oppose ethanol use and why; and 5) students write a persuasive essay in favour or against the use of food crops for the production of ethanol, providing at least three supporting arguments.

Case 2: The arts fundraiser. In this CLA example, an ICT class for students majoring in arts and culture must plan a fundraiser for an arts organisation in their community. The event planning requires students working in teams to develop an organisational structure, deal with budgeting and staffing issues, develop a marketing plan, address a variety of logistical issues (permits, security, traffic control), and ultimately prepare a Power Point presentation of the plan. The entire class then works together to implement the strongest plan, with every student assigned a task. The activity culminates with a post-event analysis of every aspect of the fundraiser. In addition to some of the occupationally specific skills developed through this activity (*e.g.* use of spreadsheets for budgeting), the exercise is also designed to promote entrepreneurship, organisational skills, creativity and communication skills.

knowledge, but also for integrating that knowledge with other subject areas. The concepts themselves are less unusual than what comes next: a focus on "big ideas", described in the document as:

> …broad, important understandings that students should retain long after they have forgotten many of the details of something they have studied…Developing a deeper understanding of the big ideas requires students to understand basic concepts, develop inquiry and problem-solving skills and connect these concepts and skills to the world beyond the classroom. (Ontario Ministry of Education, 2007)

An understanding of big ideas encourages appreciation of the large and emerging issues that citizens in Ontario will have to deal with, such as those related to environment or the economy.

According to several recently-interviewed district leaders, the focus on big ideas promotes a cross-disciplinary focus on teaching for understanding. In the words of one Education Director, "We are planning around the big ideas. Rather than giving system-level messages that 'thou shall cover all the expectations of the curriculum', we're helping teachers move away from that kind of checklist mentality and cluster the expectations around a single compelling idea."

Virtually all the directors interviewed mentioned the Teacher-Learning Critical Pathway (T-LCP) model as an important vehicle for organising the kind of deeper learning and inquiry that the "big ideas" focus is designed to promote (Hine and Maika, 2008). This approach is sponsored by the Literacy and Numeracy Secretariat (LNS; Box 5.1) and seems to have gained considerable traction across the province. As described in an article by two Student Achievement Officers from the LNS (Hine and Maika,2008), the T-LCP is a strategy for aligning the work of all professional learning communities in a school around a single "big idea" that engages students.

The T-LCP process begins with a close look at student achievement in the school in order to identify the area of greatest need. The next step is to analyse current teaching practice in relation to that area of need, and then to build clusters of expectations and a set of criteria for determining what successful student work would look like against those expectations. Once a "big idea" is selected, the faculty then plan a six-week teaching block and build collective understanding of how they will teach and what kind of classroom assessment they will use. Throughout the six weeks teachers will together assess student work against the previously-determined criteria, monitor the progress of individual students, make mid-course corrections as they go, and engage in an extended review of the evidence of student learning.

This is a way of promoting teacher learning as well as student learning by focusing discussion and action on examining "the interdependence of curriculum expectations, assessment of and for learning, thinking strategies, teaching strategies, and reflection". (Hine and Maika, 2008)

Collaborative inquiry for teachers' professional development

The research literature suggests that most professional development has very little impact on changing teacher practice, and consequently virtually no impact on improving student outcomes (Hill, 2007). Teachers in the United States refer derisively to "drive-by" or "spray and pray" forms of professional development, in which hundreds of teachers are herded into a vast auditorium at the end of a tiring day of teaching to be treated to a lecture by a well-known guru urging teachers to adopt some new classroom strategy guaranteed to elicit more student engagement in learning.

Ontario has placed its bets on a much deeper, more sustained approach to teacher learning, one that is less dependent on external "experts" and more focused on providing the time and support for teachers in their own collaborative inquiry. T-LCP is only one example of this innovative kind of professional development that is spreading across Ontario. An unstated but implicit premise undergirding Ontario's push toward a more ambitious form of learning for its students has been that if teachers are engaged in professional learning focused on strengthening their own critical thinking and inquiry skills, they are more likely to model such learning in their own teaching practice.

In the words of a director whose district has shown strong improvement in mathematics in the last few years, "I believe it's the kind of focused capacity-building and support for collaborative inquiry that makes the difference when you are talking about the development of critical and higher order thinking." This director goes on to generalise about the reasons for high performance in Ontario:

> I would suggest that the reason why as a province we are doing better on PISA is because in the last seven years all of us have moved away from the notion of 'throw all the teachers into a big room, talk to them about problem-solving in math or comprehensive literacy or individualized instruction and then send them home and expect them to do something different'. Today you'd be hard pressed to find any boards, including mine, that do this. Now we use our professional development dollars for collaborative inquiry, where professionals get around the table, using protocols to focus deep discussion on analysis of student work, and then moving from reflection to figure out what we are going to do next.
>
> We've become much more concrete about asking for evidence from teachers about what they're implementing and why they believe it is or isn't working. We can talk about the concepts and we can understand the concepts, but implementation is the name of the game. We're no longer providing professional development "programmes"; rather, we're providing time, protocols, expectations, all of which leads to increased collaboration focused on students and their work. It's a different use of release dollars and PD dollars than five or ten years ago and a different use of consultants, as well as a different set of expectations around the de-privatisation of practice.

An emerging focus on creativity in assessment

The contextualised learning activities described above are one example of the focus on creativity that is making its way into Ontario classrooms. A second more subtle, yet pervasive, example is the shift in the province's assessment philosophy, as reflected in the 2010 Ontario Ministry of Education policy document, *Growing Success: Assessment, Evaluation, and Reporting in Ontario's Schools*. In the introduction to the document, the commitment to a more individualised approach to assessment is stated as follows:

> The Ontario government is committed to enabling all students to reach their potential, and to succeed. Our challenge is that every student is unique and each must have opportunities to achieve success according to his or her own interests, abilities, and goals. We have defined high expectations and standards for graduation, while introducing a range of options that allow students to learn in ways that suit them best and enable them to earn their diplomas. We are proud that our students regularly place among the world's best on international standardized tests". (Ontario Ministry of Education, 2010)

The policy document also discusses the "learning skills and work habits" that teachers observe, assess and report on, and cites a list of 16 "habits of mind" developed by two American researchers, Costa and Kallick. Their list includes such things as "gathering data through all senses […] creating, imagining, and innovating […] responding with wonder and awe […] thinking about thinking (metacognition) […] and […] taking responsible risks". (Costa and Kallick, cited in Ontario Ministry of Education, 2010)

In policy and through professional development, Ontario has put significant emphasis on assessment *for* learning and *as* learning, not just assessment *of* learning. Ontario teachers are expected to engage in assessment *for* learning by integrating assessment with instruction, developing a shared understanding of learning goals and success criteria with students, modelling effective learning, and providing feedback on student learning. Teachers engage in assessment *as* learning by helping all students to become creative and critical thinkers and independent learners who are able to set individual goals, monitor their own progress, and reflect on their thinking and learning.

Ontario has sought a balance between using assessment information for system accountability and fostering the best in individualised teaching and learning. Ontario educators are encouraged to use their informed professional judgment to incorporate a range of

evidence through conversations, observations and products, such as student portfolios and project work, in the assessment of student learning. Through the integration of assessment for learning with differentiated instruction, teachers empower students to make choices and express preferences in their learning and to explore more creative modes of inquiry. In the words of a principal of a relatively new K-8 school with a strong creative arts emphasis, "I'm not worried that the heat will be shut off at my school or that my budget will be slashed if my kids don't perform well in math. We don't have that degree of surveillance, so I feel free to experiment with things. I've always thought all education should be highly experimental."

This particular principal is a devotee of Ken Robinson, a British writer and educator well known for his work on creativity and student learning. Citing Robinson's view that creativity should be driving education, this principal has placed the arts at the centre of his school's curriculum, bringing in arts specialists not only to engage students in making art, but more generally to promote a school culture that continuously experiments with different strategies to reach all students. In this school, at least, Premier McGuinty's message of the importance of rewarding creativity and innovation seems to have taken hold, as it has in the high school SHSM programmes cited above.

LESSONS FROM ONTARIO

If there is a big lesson from Ontario's approach to critical thinking and creativity, it is that the development of these skills and habits of mind are not the subject of a single course or strand of the curriculum, but rather are woven into virtually all aspects of schooling. In the words of a senior ministry official, "critical thinking and creativity skills are embedded within our existing policies and initiatives." This focus can be found across the curriculum as well as in the increasing attention Ontario schools have paid to the use of formative assessments at the classroom level. But most critically, this focus has driven deep, sustained investments in building the capacity of Ontario's teaching force to work collaboratively to examine their own practices and the effect of those practices on the quality of student work. As Ontario's curriculum, assessment and reporting system has moved from an emphasis on mastery of facts to an understanding of "big ideas" and the ability to apply one's knowledge to the problems one confronts in everyday life, the teacher-learning agenda has kept pace accordingly. Interdisciplinary approaches, systems thinking, and collaborative inquiry into problems of practice is increasingly the norm in Ontario schools, strongly supported by the work of the Literacy and Numeracy Secretariat, the Student Success/Learning to 18 team, and other units in the ministry. Ontario's strong PISA results would suggest that this emphasis on building the critical thinking and problem-solving skills of teachers has strengthened the capacity of teachers to enable the development of these same kinds of skills in their students.

There are important lessons as well from Ontario's overall reform efforts, and it is important not to lose sight of them, for Ontario has created a broad set of enabling conditions that help account for the continuing strong performance of its schools. One such condition has been a major investment in the development of a comprehensive early learning and childcare system, now under the umbrella of the Ministry of Education. A second such condition is the strong cultural commitment to the importance of education. This seems to be an important underlying national value that helps explain Canada's overall strong performance, despite the absence of any visible national governmental role in education. The commitment to the welfare of children, as expressed in Canada's strong social safety net, helps explain why Ontario's achievement gaps, while still worrisome, are nowhere near as profound as those in many other countries.

■ Figure 5.2 ■

Canada: Profile data

Language(s)	English and French[1]
Population	32 934 166 (2007)[2] (12th largest in OECD) 13 210 667 (Ontario)[3]
Youth population	16.7%[4] (OECD average 18.7%)
Elderly population	13.6%[5] (OECD average 14.4%)
Growth rate	1[6] (OECD 0.68%)[7]
Foreign-born population	20%[8] (OECD average 12.9%)
GDP per capita	USD 38 975 [9] (OECD average 33 732)[10]
Economy-Origin of GDP	Other: 66.4%; Manufacturing: 15.8%; Construction: 6.3%; Public Administration: 5.6%; Mining and quarrying: 3.6%; Agriculture: 2.3%[11]
Unemployment	6.1% (2008)[12] (OECD average 6.1%)[13]
Youth unemployment	11.6% (2008) (OECD average 13.8%)[14]
Expenditure on education	4.9% of GDP (OECD average 5.2%) 3.1% on primary, secondary and post-secondary non-tertiary 1.8% on tertiary[15] education[16] (OECD average 3.5%; 1.2% respectively) 12.3% of total government expenditure (OECD average 13.3%) 7.8% on primary, secondary and post-secondary non-tertiary 4.5% on tertiary education[17] (OECD average 9%; 3.1% respectively)
Enrolment rate, early childhood education	70.5%[18] (OECD average 71.5%)[19]
Enrolment rate, primary education	106.2%[20] (OECD average 98.8%)[21]
Enrolment rate, secondary education	80.2%[22] (OECD average 81.5%)[23]
Enrolment rate, tertiary education	25.4% [24] (OECD average 24.9%)[25]
Students in primary education, by type of institution or mode of enrolment[26]	Public* (OECD average 89.6%) Government-dependent private* (OECD average 8.1%) Independent, private* (OECD average 2.9%)
Students in lower secondary education, by type of institution or mode of enrolment[27]	Public* 94.2% (OECD average 83.2%) Government-dependent private (included in "public" figure) (OECD average 10.9%) Independent, private (included in "public" figure) (OECD average 3.5%)
Students in upper secondary education, by type of institution or mode of enrolment[28]	Public* 94.2% (OECD average 82%) Government-dependent private (included in "public" figure) (OECD average 13.6%) Independent, private (included in "public" figure) (OECD average 5.5%)
Students in tertiary education, by type of institution or mode of enrolment[29]	Tertiary type B education: missing data[30] (OECD average public: 61.8% Government-dependent private: 19.2% Independent-private: 16.6%) Tertiary type A education: missing data[31] (OECD average public: 77.1% Government-dependent private: 9.6% Independent-private: 15%)
Teachers' salaries	Average annual starting salary in lower secondary education: missing data* (OECD average USD 30 750)[32] Ratio of salary in lower secondary education after 15 years of experience to GDP per capita: missing data (OECD average: 1.22)
Upper secondary graduation rates	76% (OECD average 80%)[33]

*Data on institutional breakdown and Canadian teachers' salaries missing from *Education at a Glance 2010* (OECD, 2010).

Notes

1. OECD (2008), *OECD Economic Surveys: Canada*, OECD Publishing.
2. OECD (2008), *OECD Economic Surveys: Canada*, OECD Publishing.
3. *www.statcan.gc.ca*. Data from 2010.
4. OECD (2010b), *OECD Factbook 2010*, OECD Publishing. Ratio of population aged less than 15 to the total population (data from 2008).
5. OECD (2010b), *OECD Factbook 2010*, OECD Publishing. Ratio of population aged 65 and older to the total population (data from 2008).
6. OECD (2008), *Jobs for Youth Canada*, OECD Publishing. Ontario's population growth depends largely on immigration. Ontario, Alberta and British Columbia are the only provinces in which the projected average annual growth would exceed the growth rate for Canada as a whole.
7. OECD (2010b), *OECD Factbook 2010*, OECD Publishing. Annual population growth in percentage, OECD total (year of reference – 2007).
8. OECD (2010b), *OECD Factbook 2010,* OECD Publishing. Foreign-born population as a percentage of the total population (data from 2007).
9. OECD (2010b), *OECD Factbook 2010*, OECD Publishing. Current prices and PPPs (data from 2008).
10. OECD (2010b), *OECD Factbook 2010*, OECD Publishing. Current prices and PPPs (data from 2008).
11. OECD (2008), *OECD Economic Surveys: Canada*, OECD Publishing. Origin of GDP, percent of total (data from 2006).
12. OECD (2010b), *OECD Factbook 2010*, OECD Publishing. Total unemployment rates as percentage of total labour force (data from 2008).
13. OECD (2010b), *OECD Factbook 2010*, OECD Publishing. Total unemployment rates as percentage of total labour force (data from 2008).
14. OECD (2010c), *Employment Outlook*, OECD Publishing. Unemployed as a percentage of the labour force in the age group: youth aged 15-24.
15. The OECD follows standard international conventions in using the term "tertiary education" to refer to all post-secondary programmes at ISCED levels 5B, 5A and 6, regardless of the institutions in which they are offered. OECD (2008), *Tertiary Education for the Knowledge Society: Volume 1*, OECD Publishing.
16. OECD (2010d), *Education at a Glance 2010: OECD Indicators,* OECD Publishing. Public expenditure presented in this table includes public subsidies to households for living costs (scholarships and grants to students/households and students loans), which are not spent on educational institutions (data from 2006).
17. OECD (2010d), *Education at a Glance 2010: OECD Indicators,* OECD Publishing. Public expenditure presented in this table includes public subsidies to households for living costs (scholarships and grants to students/households and students loans), which are not spent on educational institutions (data from 2006).
18. UNESCO Institute for Statistics, *http://data.worldbank.org/country*, Gross enrolment ratio (data from 2006). GER, measured by the UN as a number of actual students enroled/number of potential students enroled, is usually higher than the NER.
19. OECD (2010d), *Education at a Glance 2010: OECD Indicators,* OECD Publishing. OECD average net enrolment rates of ages 4 and under as a percentage of the population aged 3 to 4 (year of reference – 2008).
20. *http://data.worldbank.org/country,* Gross enrolment ratio (data from 2007). GED, measured by the UN as a number of actual students enroled/number of potential students enroled, is usually higher than the NER.
21. OECD (2010d), *Education at a Glance 2010: OECD Indicators,* OECD Publishing. OECD average net enrolment rates of ages 5 to 14 as a percentage of the population aged 5 to 14 (year of reference – 2008).
22. OECD (2010d), *Education at a Glance 2010: OECD Indicators,* OECD Publishing. Net enrolment rates of ages 15 to 19 as a percentage of the population aged 15 to 19 (data from 2007).
23. OECD (2010d), *Education at a Glance 2010: OECD Indicators,* OECD Publishing. OECD average net enrolment rates of ages 15 to 19 as a percentage of the population aged 15 to 19 (year of reference – 2008).
24. OECD (2010d), *Education at a Glance 2010: OECD Indicators,* OECD Publishing. Net enrolment rates of ages 20 to 29 as a percentage of the population aged 20 to 29 (data from 2007). This figure includes includes all 20-29 year olds, including those in employment, etc. The Gross Enrolment Ratio (GER), measured by the UN as the number of actual students enrolled / number of potential students enrolled, is generally higher. The GER for tertiary education in Canada in 2002 is 60%, compared to the regional avg of 70% (UIS 2010).
25. OECD (2010d), *Education at a Glance 2010: OECD Indicators,* OECD Publishing. OECD average net enrolment rates of ages 20 to 29 as a percentage of the population aged 20 to 29 (year of reference – 2008).
26. OECD (2010d), *Education at a Glance 2010: OECD Indicators,* OECD Publishing. Data from 2008.
27. OECD (2010d), *Education at a Glance 2010: OECD Indicators,* OECD Publishing. Data from 2008.
28. OECD (2010d), *Education at a Glance 2010: OECD Indicators,* OECD Publishing. Data from 2008.

29. OECD (2010d), *Education at a Glance 2010: OECD Indicators,* OECD Publishing. Data from 2008.
30. Data missing from *Education at a Glance 2010: OECD Indicators*, OECD Publishing.
31. Data missing from *Education at a Glance 2010: OECD Indicators*, OECD Publishing.
32. OECD (2010d), *Education at a Glance 2010: OECD Indicators*, OECD Publishing. Starting salary/minimum training in USD adjusted for PPP (data from 2008).
33. OECD (2010d), *Education at a Glance 2010: OECD Indicators*, OECD Publishing. Sum of upper secondary graduation rates for a single year of age in 2007 (year of reference for OECD average – 2008).

References and further reading

Barber, M. and **M. Mourshed** (2007), *How the World's Best-Performing School Systems Come Out on Top,* McKinsey and Company, London, available at *mckinsey.com/App_Media/Reports/SSO/Worlds_School_Systems_Final.pdf.*

Florida, R. and **R. Martin** (2009), *Ontario in the Creative Age,* Rotman School of Management, University of Toronto, available at *http://martinprosperity.org/research-and-publications/publication/ontario-in-the-creative-age-project.*

Hill, H. (2007), "Teachers' Ongoing Learning: Evidence from Research and Practice," *The Future of Children* 17: 111-128.

Hine, E. and **D. Maika** (2008), "Why the Teaching-Learning Critical Pathway and Why Now?", *Principal Connections* 12 (1): 16-19.

Institute for Education Leadership (2008), Putting Ontario's Leadership Framework into Action: A Guide for School and System Leaders, Toronto, ON: Institute for Education Leadership, available at: *http://www.education-leadership-ontario.ca.*

Levy, F. and **R. Murnane** (2004), *The New Division of Labor: How Computers are Creating the Next Job Market,* Princeton University Press, Princeton, New Jersey.

OECD (2003), *Learning for Tomorrow's World: First Results from PISA 2003,* OECD Publishing.

OECD (2010a), *PISA 2009 Volume I, What Students Know and Can Do: Student Performance in Reading, Mathematics and Science*, OECD Publishing.

OECD (2010b), *OECD Factbook 2010*, OECD Publishing.

OECD (2010c), *Employment Outlook*, OECD Publishing.

OECD (2010d), *Education at a Glance 2010: OECD Indicators*, OECD Publishing.

Ontario Ministry of Education (2010), *Board Leadership Development Strategy: Requirements Manual,* Toronto, available at *http://www.edu.gov.on.ca/eng/policyfunding/leadership/strategy.html*

Ontario Ministry of Education (2007), *The Ontario Curriculum Grades 1-8, Science and Technology, Revised Edition,* Ontario Ministry of Education, available at *www,edu.gov.on.ca/eng/curriculum/elementary/scientic18currb.pdf.*

Ontario Ministry of Education (2008), *Reach Every Student – Engaging Ontario Education*, Ontario Ministry of Education, available at *www.edu.gov.on.ca/eng/document/energize/energize.pdf.*

Ontario Ministry of Education (2010), *Growing Success: Assessment, Evaluation and Reporting in Ontario's Schools, First Edition Covering Grades 1 to 12,* Ontario Ministry of Education, available at *www.edu.gov.on.ca/eng/policyfunding/success.html.*

6

Shanghai and Hong Kong: Learning to Learn

Less than three decades after the Cultural Revolution, when educated people, including teachers, were sent to rural areas to work in the field, parts of China, notably Shanghai, now rank among the best-performing countries and economies in PISA. This chapter looks at how the education systems in both Shanghai and Hong Kong have benefited from the realisation that economic growth depends on individuals who are adaptable, creative and independent thinkers. Education reforms in these two cities have focused on upgrading teaching standards and teacher education, introducing greater curricular choice for students, and giving local authorities more autonomy to decide the content of examinations.

INTRODUCTION

Despite China's emergence as one of the world's most influential economies, relatively little is known in other countries about the country's educational system and how its students learn. The prevailing impression tends to be that students in China learn by rote, and that much in the schools is about memorising and cramming for examinations.

This chapter seeks to provide a more nuanced and accurate picture of education in China, using Shanghai and Hong Kong as examples. Shanghai is one of China's most developed urban areas, while Hong Kong, despite having the similar cultural roots, is a rather different society, and more or less self-governing under the "one country, two systems" political arrangement. While Shanghai and Hong Kong may not be representative of all parts of such a diverse country, they can provide a window into education in China through their shared lessons and future ambitions. In both cases, student learning has become the focus, with other dimensions – such as teaching, school facilities and systemic strategies – providing the context and supporting various aspects of student learning.

This chapter starts by describing the cultural and historical context – essential for understanding China's education systems and philosophy – before moving on to describe the educational systems and recent reforms in Shanghai and Hong Kong.

THE CULTURAL CONTEXT

Observers outside China frequently attribute the success of the students in Shanghai and Hong Kong to their cultural heritage. The most overwhelming cultural influence in this part of the world is Confucian philosophy, which originated in China.[1] While it is a complex theory and not easy to define, Confucianism sees human beings as teachable, improvable and perfectible through personal and communal endeavour, especially including self-cultivation and self-creation. There is a general observation that the Confucian heritage favours children's education; hence education has the support of parents and society at large. Nevertheless, this heritage has also brought some limitations and struggles to the realm of education in these Confucian societies.

Certainly, China has a long tradition of valuing education highly. This was bolstered early on by the Civil Examination system, established in 603 AD, and which was later exported to Japan and Korea in the 7th century. It was a very competitive, yet efficient, system for selecting officials, and was known for its rigor and fairness. The general approach was basically an essay test, in which the candidates were confined for days in an examination cell, fed with good food, and required to write essays of political relevance. Candidates prepared for years[2] by reading the classics (the *Four Books and Five Classics*). In their essays, they had to recite and quote these ancient classics to support their arguments – hence the requirement for "rote learning". The final selection procedure was usually held in the Examinations Department, which was often part of the imperial organisation. Whoever gained the appreciation of the Emperor, who was virtually the chief examiner, would be the champion, followed by a few runners-up.

These examinations evolved over many dynasties before their abolition in 1905. There are several features of the Civil Examination that distinguished it from other systems of civil servant selection and recruitment, and which meant that it became a strong social institution. It involved a selection process open to all candidates regardless of their background and with virtually no pre-requisites, other than that of gender.[3] In fact it was the only path for social mobility in ancient Chinese society; becoming an officer was the only way one could change one's social status. The incentive was tremendous, and reinforced by the fact that Chinese folklore over hundreds of years – reflected in novels, operas, dramas and all art forms – included stories about scholars from poor families who endured years of hardship and poverty before triumphing in the Civil Examination, being appointed ministers, marrying princesses and enjoying glorious home-coming ceremonies. Even today, a large number of ancient novels and operas, which refer to success in the Civil Examination by candidates from poor families, are still popular.

The Civil Examination gave almost all families, regardless of socio - economic status, high hopes for their children's future (i.e., the boys), and such hopes translated into hard work and adaptability to difficult learning environments. However, it also led to the emphasis (almost exclusive emphasis) on examination results for validating genuine learning or knowledge. It meant that for more than 16 centuries, generation after generation of young people were trained only to face the challenges of examinations.

Cultural paradoxes

The heritage of the Civil Examination has brought several paradoxes to the education systems of Confucian societies:

Paradox One. Education is the most essential means of social mobility and, as such, is an overriding policy concern, and the most important item on parents' agendas. However, this also explains the unanimous conclusion in the contemporary literature that motivation for student achievement in Confucian societies is largely extrinsic in nature. That is, success in education is not equivalent to learning more or better; it means succeeding in examinations.

Paradox Two. It is taken for granted that education is a matter of selection. It does not matter how well one achieves. It is about the degree to which you are better than others, or how resoundingly you could beat others. In this context, the Civil Examinations

put every candidate on a level playing field. Everybody who wanted to receive the prize had to follow the same rules. On the one hand, the Civil Examination reflected the collectivism in society and, in return, helped shape a collective culture. It bred both aggressiveness and adaptability among young people. On the other hand, everyone had to submit to uniform requirements, rather than what one might desire or feel one deserved. This reflected a general negligence, if not suppression, of individuality and diversity in human development.

Paradox Three. The Civil Examination legacy has instilled the virtue of hard work, and placed an emphasis on effort over innate ability (Stevenson and Stigler, 1992). This contrasts strongly with basic Western assumptions about ability versus effort, and indeed overturns the entire notion of *ability*. Many have attributed students' success in Confucian societies to this belief in hard work. However, such a belief has also led to unrealistic expectations of students' tolerance of pressures, examination pressures in particular. Indeed, while using the pressure for examination and competition has been attractive to many education reformers in the West, removing such pressure has become the major object of reform in Confucian societies.

THE HISTORICAL CONTEXT

Ideology-driven systems: 1905 to 1976

In China, a school system in the contemporary sense only began in 1905 after the abolition of the Civil Examination. However, China's mixed colonial history left a legacy of different school systems. For example, many of the schools in those early years were started in Shanghai (see below) largely because of its early contacts with the West. Shanghai was divided into "concessions" under the "unequal treaties" signed in the mid and late 19th Century. Schools in the British Concession followed the British system, and those in the French Concession followed the French system. Nevertheless, at the national level, schools were often seen as symbols of modernisation and liberalisation, and were strongly influenced by American educational thinkers, particularly John Dewey.

Since the establishment of the socialist nation state in 1949, the national system on China's mainland has undergone several stages of development. In the 1950s – the early years of the People's Republic – the entire education system followed the Russian model, with very rigid specialisation and heavy doctrines of collectivism. Then with the weakening of the Soviet link in the early 1960s, there was a short "renaissance" in education, when many innovations and new thinking blossomed. Shanghai was known for many such innovations and new thoughts, especially in the realm of pedagogy.

This renaissance was very short, swept aside by the Cultural Revolution (1966-1976), which proved a national disaster in all respects and which ruined the education system. Schools were closed down, and formal learning was replaced by practical experiences in farming and factories, underpinned by dense ideologies of class struggle. Schools and higher education institutions were taken over by political committees comprising workers, peasants and soldiers who were seen as the only people who could represent the proletariat revolutionary ideology.

The reconstruction of education: the late 1970s onwards

It would not be exaggerating to say that China had to completely rebuild its education system in the late 1970s and early 1980s after the collapse of the Cultural Revolution. Indeed, it has been in a continuous era of overhauling and reforms ever since. The achievements of these reforms have been many and varied; to highlight a few:

- China achieved almost universal enrolment in basic education in a very short space of time, between around 1980 and the early 1990s. In most urban areas, there are now also very high enrolment rates at senior secondary level, either in general schools or vocational schools. Higher education has also seen spectacular expansion since 1999.
- China has decentralised its school system in terms of management and finance. Schools are basically administered by authorities at the county level. The school curriculum, textbooks and public examinations are also decentralised. Moving away from a centralised uniform system was quite an undertaking.
- There has been a significant expansion of the private sector, which could be interpreted as either mobilisation of non-government resources or the privatisation of public resources. Although the status of private schools is still sometimes unclear, and their quality varies, this trend is here to stay.
- With decentralisation leading to disparity among regions, between urban and rural areas, within cities, and between different types of citizens (mainly minorities and migrants), China has enacted a range of policy measures to overcome or reduce these differences. The latest move, begun in 2006 and guaranteed by law, is to target subsidies from the central government to regions according to economic need.
- Since the late 1980s, successive waves of curriculum reform have aimed to improve the quality of education and to reform public examinations. The syllabus and textbooks were decentralised for the first time in 1988. In 2001, there was a major reform in the curriculum to support modern pedagogical theory. Another new wave of reform has just started in 2010.

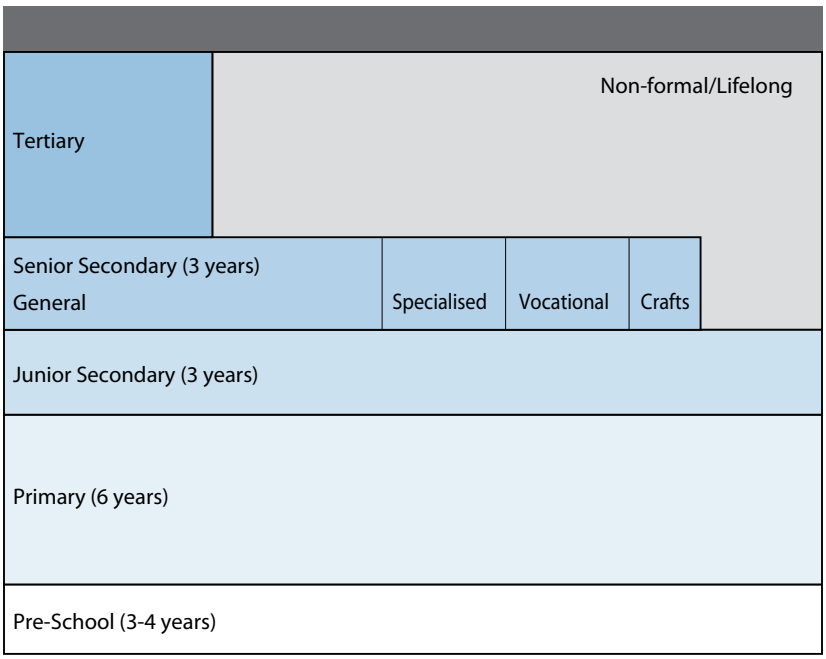
- China has expended enormous energy on upgrading teacher quality. Such efforts include the re-training of unqualified community teachers (*minban*) in rural schools and the requirement for qualifications for teachers at all levels. China has finally managed to supply its vast system with enough teachers. In 2009, there were over 10.6 million teachers teaching over 200 million students in primary and secondary schools. Shanghai was among the first in China to have a fully-qualified teaching force. Moreover, Shanghai has raised the expected qualification of teachers well ahead of other parts of the nation.

The system today

Overall, China has now passed the stage of quantitative expansion in basic education. Official statistics (for 2009) show a net enrolment rate of 99.4% at the primary school level, which is the envy of many countries. The gross enrolment ratio for junior secondary school was 99%.[3] In the same year, gross enrolment at senior secondary level, both academic and vocational, was 79.2%. The general academic senior secondary schools enrol 52.5% of students, putting the remaining senior high school students in the vocational and specialised stream (Figure 6.1). However, the figures may conceal regional disparities. In most urban areas, gross enrolment at the senior secondary level is 100% or above, which means that the number of students enrolled exceeds the number in the appropriate age group.

■ Figure 6.1 ■

China's education system, 2009



If the highlight of the 1980s and 1990s was expansion of basic education to the entire population, then the emphasis of the first decade of the 21st century has been on the expansion of higher education. Starting in 1998, China broke away from its long-standing policy of restricting higher education to a small percentage of the population, and launched a spectacular expansion. In 1999, all institutions across the nation were required to increase their intake by 50%. This was followed by jumps of 25% in 2000 and 22% in 2001.[4] Despite government intentions to pause this expansion, higher education has now gained its own momentum, and all kinds of non-government initiatives, such as private institutions and self-financing programmes, are flourishing at their own pace. The population of students in higher education grew from less than 6 million in 1998 to 29.8 million in 2009 - by far the largest and fastest such enrolment increase in the world.

However, the enrolment ratio still stood at a low 24.2% in 2009 (Ministry of Education of the PRC, 2010a), just short of the world average of 26% (Altbach, et al., 2009).

The quantitative picture would not be complete without including China's complex structure of lifelong learning, which includes full-time sabbatical study, evening spare-time programmes, distance learning programmes and self-study examinations. Such learning opportunities often lead to formal credentials such as certificates and diplomas, and sometimes to degrees. Operators range from major institutions of higher education (as their extension programmes), to individual professionals and private for-profit enterprises.

Having set the cultural and historical scene, we now turn to look at education and learning in two major Chinese cities: Shanghai and Hong Kong. Both are vibrant economies and have undertaken major comprehensive education reforms in the past two decades. While they have both inherited the same cultural traditions in education, the two cities work under different political and ideological frameworks. Nevertheless, their reform efforts share a similar philosophy of making student learning central, although this is approached in different ways.

SHANGHAI: A LEADER IN REFORMS

Shanghai is a metropolitain area in China, whose urban population is now over 20.7 million, 13.8 million of whom are permanent residents and 5.4 million are considered temporary. In addition, there are around 1.5 million who can be classified as mobile or without a fixed home in Shanghai (Shanghai Municipal Statistics Bureau, 2010). The city is one of the four municipalities in China with the status of a province (the others are Beijing, Tianjin and Chongqing). In 2009, Shanghai's GDP was USD 11 361 per capita (Figure 6.3). While its population and land account for just 1% and 0.06% of the nation's total, respectively, the regional economy contributes to one-eighth of China's overall income (Information Office of Shanghai Municipality and Shanghai Municipal Statistics Bureau, 2010). In 2009, the contribution of the service sector to economic growth in Shanghai was around 60%, the highest on the Chinese mainland.

While Beijing is China's political centre, Shanghai is its undeniable business centre. Shanghai is also the country's most international and open city. This is attributable to its prosperous and colonial past before the change of government in 1949. It was among the first ports forced open by international powers in the mid-19th century.[5] After 1978, as China opened up to trade and began the transition to a market economy (the "socialist market economy"), Shanghai took on new approaches on almost all fronts, including education.

Shanghai was among the first cities to achieve universal primary and junior secondary education and was also among the first to achieve almost universal senior secondary education. According to the *Shanghai Yearbook 2009* (Shanghai Municipal Government, 2010), enrolment at the age of compulsory education was above 99.9%, and 97% of the age cohort attended senior secondary school (general and vocational). It is notable that enrolment for preschool programmes was 98%, already surpassing the new national preschool education goal for 2020.

There are many dimensions in education in which Shanghai has been a pioneer. In 1980, Shanghai was the first city in China to create vocational high schools, from which graduates were free to seek jobs. This was an unprecedented break from the job-assignment convention, which was an essential element of the planned economy. In 1985, Shanghai was also the first to launch its own version of the higher education entrance examination, starting the trend of localising the national selection system. As will be discussed later, Shanghai was also the first to implement neighbourhood attendance in primary schools, confronting the tradition of early competition and selection. Moreover, Shanghai was among the first cities in China to aim at an all-graduate teaching force.

Statistics show that over 80% of the city's higher education age cohort are admitted into higher education in one way or another, compared to the national figure of 24% (Ding, 2010). In other words, all those who would like to attend higher education are able to do so. There were 61 institutions of higher education in Shanghai in 2009, plus quite a few private institutions yet to be officially recognised. There would be higher education over-supply if only residents of Shanghai were counted,[6] but Shanghai institutions also admit students from all over the nation.[7] Indeed, Shanghai has always been a preferred place to pursue higher education, perhaps second only to Beijing, and has attracted the best students from the national pool of elite candidates.

Although Shanghai is the most internationalised city on the Chinese mainland, cultural traditions in education still prevail. Popular support for education means the city has had little difficulty in launching universal education. However, Shanghai still struggles with undue examination pressure. Even with the very generous admissions quota for local students, the sense of competition is still very keen. Reformers had thought that when the system became less selective, undue competition would also be reduced. This does not seem to have happened. One possible interpretation is that parents and students still see the system as a vertical hierarchy[8] and everyone wants to be at the top. Indeed, educational institutions are ranked in parents' minds; this is part of the cultural legacy. By the same token, parents would like to see their children become top of their class, and anything less than 100% is perceived as undesirable (Stevenson and Stigler, 1992). Another interpretation is that the cultural tradition cherishes hard work, and that to "study" (or "reading books" in the ancient tradition) is a student's "responsibility". Parents and teachers like to keep students busy studying, and do not feel comfortable if students spend less time studying.

Hence, despite the increase in higher education opportunities, examination pressure persists in Shanghai as in other parts of China. And, as hinted at above, a belief in competition has also led to a tolerance of disparity. Chinese societies seem to see disparity as necessary in a hierarchical system where people compete to climb to the top. Shanghai has tried hard to work against these adverse cultural influences in order to overcome this tolerance of disparity and to fight undue examination pressures. The city has encouraged and embraced many unconventional experiments during this search.

How education is practised

There are two core dimensions to the practice of education in Shanghai: student engagement and the organisation of teaching.

Student engagement

One of the most essential influences of China's cultural heritage is the intensity of students' engagement in learning. In a typical Shanghai classroom, students are fully occupied and fully engaged. Inattentive students are not tolerated. For example, in one typical mathematics lesson observed for this research, students at Junior Secondary II were learning about parabolas. Students covered 15 problems at their desks, and selected students gave blackboard demonstrations. This is rather different from classrooms in other cultures, where students may not be required to be fully engaged or attentive throughout the entire lesson; and the amount of work expected is seldom comparable.

Such intense concentration is perhaps due to the heavy examination pressure and the accompanying culture of diligence. After all, to "study" is regarded as students' responsibility, and having a large quantity of work is often seen as a proxy for working hard. When local educators are asked about the phenomenon, their first response is often one of surprise – "why not?" Probing further often leads to explanations that working hard is a virtue. In Chinese society, when a student is not doing well in school, the usual explanation is that the student is "lazy"; ability is seldom blamed.

Student engagement in learning is not limited to lessons. Homework is an essential part of their learning activities and governs their home lives after school. Parents expect students to do homework every evening and are prepared to devote their family lives to student study, as ancient tradition dictates. In other words, the family is ready to sacrifice everything for their children's education. This is very different from other cultures, for example in the West, where school work is not supposed to "invade" private family lives.

The intensity of students' engagement goes well beyond school. As described in an interview with Zhang Mingsheng, former Deputy Secretary-General of the Shanghai Education Commission, there is a rather comprehensive "remedial system" of tutorial schools to help children with exam preparation. Although no formal statistics exist, it is estimated that over 80% of parents send their children to tutorial schools. Such schools are mostly for-profit, operate after school hours or at weekends, and tend to use small groups to focus on particular subjects. Parents see these tutorial schools as essential for enabling students to pass the public examinations with flying colours. Teachers are not totally against such schools either, because they also think that passing examinations is the prime aim of student study. Even parents who are against examination cramming often send their children to tutorial schools, almost as a matter of insurance. Those who go to such classes are not all weak students; even very strong students like to reinforce their strengths to achieve higher scores in the examinations.

Apart from this "remedial system", there is also a "supplementary system" of institutions or programmes outside schools, where young people can learn music, fine arts, sports, martial arts and all kinds of experiences not offered by schools. Parents are quite prepared to invest in these learning activities, even though they can be expensive.

Another tradition, since China started its schools in the early 20th century, has been to focus on student development in five dimensions – moral, intellectual, physical, social and aesthetic, in that order. Since 1949, this has evolved into moral, intellectual and physical. Students are expected to be fully developed in all three dimensions. Hence, students are expected to take part in all kinds of other activities (see Box 6.1). In Shanghai schools, for example, there is a municipal requirement that every student should engage in at least one hour of physical education every day. Students start with a morning exercise before class; there is an "intermission exercise" in the middle of the morning; and other physical activities are held after school. Some schools practise "eye exercises" where student massage essential acupuncture points in order to prevent eyesight deterioration. Students also engage in all kinds of extracurricular activities in sports and the arts, where they are expected to learn organisation and leadership. Students take turns at "daily duties" in cleaning the classrooms and nearby corridors, for example. Students are also assigned teamwork in keeping the campus tidy. They are also organised to visit rural villages or deprived social groups as a matter of social or service learning. All these activities are co-ordinated by the municipal education authority.

Compared with other societies, young people in Shanghai may be much more immersed in structured learning in the broadest sense of the term. The logical conclusion is that they learn more, even though what they learn and how they learn are subjects of constant debate. Critics see young people as being "fed" learning because they are seldom left on their own to learn in a way of their choosing. They have little direct encounters with nature, for example, and little experience with society either. While they have learned a lot, they may not have learned how to learn. Students are often overwhelmed by all these learning activities, both within and outside schools, and most of which are imposed on them.

The Shanghai government is developing new policy interventions to reduce student workload and to refocus the quality of student learning experiences over quantity. Challenges from a changed and changing society maintain tension between such intense

engagement and genuine learning in the broader sense. The national mid and long-term education reform and development plan, the *Outline 2020,* calls for "reducing student workload" as a major theme of reform (Ministry of Education of the PRC, 2010b; Box 6.6). Shanghai is already much more engaged of this issue than many other places in China. Good schools often refrain from holding classes during evenings and weekends, and parents do not normally press for heavier workloads. Homework is such a burden to students that many local authorities in China have stipulated a maximum amount of homework, measured in hours and depending on the students' age, that schools are allowed to assign. Shanghai was among the first to impose such limits as a municipal policy.

Box 6.1 **Oriental Green Ark**

A spectacular facility established by the Shanghai Municipal Education Department is the education base known as the Oriental Green Ark. This huge education park occupies more than 60 000 acres and includes activity centres, physical challenge centres, military training, museums, villas and hotels, as well as a convention centre. The villas and hotels follow the concept of a global village, with each block in the style of a particular nation. Every student in Shanghai primary and secondary schools experiences the Oriental Green Ark at least once as an organised school visit. Many parents also send their children to the Ark through individual bookings at their own cost. Children see it as an alternative amusement park.

Teaching and teachers

Organisation

As in other parts of China, Shanghai has developed a rather rigorous framework and system of teaching. At the grassroots level, subject-based "teaching-study groups" engage in study and improvement of teaching on a daily basis. For example, a physics teacher of Senior Secondary 2 (SS2) involved in a teaching-study group typically teaches 12-15 classes per week, teaching only one programme and nothing else. There are timetabled sessions when the study group meets, often with related personnel such as laboratory assistants, to draw up more detailed lesson schemes for a particular topic the following week. Teachers are expected to teach according to the scheme, which is then translated into more detailed lesson plans by and for individual teachers.

The lesson plan serves not only as a guide for the teacher during the lesson, but also as documentation of the teacher's professional performance. In many cases, teachers are observed by the school principal or by district education officers when they are being considered for promotions or awards. In short, a Chinese teacher sees a lesson more as a show or a performance, and puts in many hours of preparation to cover the standard 40-minute period.[9]

The "teaching-study group" is supervised for each of its subject areas by the "teaching-study office" in the Education Bureau (in a rural country or city district), which is in turn supervised by the relevant "teaching-study office" in the Education Department in the provincial or municipal government. Professionally, all these "teaching-study" setups work under the Basic Education Department II within the central government's Ministry of Education. The Basic Education Department II is charged with all matters related to curriculum development, textbook production, pedagogy enhancement and school management for the whole nation. In this way, teaching in China is very centrally organised.

Teachers may observe each other or may be observed by peers (for example, when teaching a new topic due to a change in the curriculum), by new teachers (so they can learn from more experienced teachers), by senior teachers (for mentoring), or by the school principal (for monitoring or for development purposes). Sometimes, teachers are expected to teach demonstration lessons, called public lessons, for a large number of other teachers to observe and comment upon. This structured organisation of teaching in China is thus not only a means for administration; it is also a major platform for professional enhancement.

Class sizes in mainland China are generally large: the national norm is 50 students. However, in rural areas or suburban areas where good schools are sparse, it is not unusual to see classes of over 80 or, in extreme cases, over 100. Parents often indicate their preference for better schools and better teachers over smaller classes. However, in Shanghai, as in other major cities, recent drastic declines in population have forced local governments to adopt small classes so as to minimise teacher layoffs. As is the case elsewhere, the actual effects of small classes are still under debate. Nonetheless, small classes have created room for new pedagogy by introducing student activities that would be impossible in large classes.

Qualifications and professional development

Recently, Shanghai has upgraded the qualifications required by teachers, and is moving towards an "all graduate, all trained" teaching force. This has meant a major reorganisation of the teacher training institutions. The in-service College of Education has

also been merged into the normal universities, although the effect of this subject to some debate. At present, all primary school teachers must have a sub-degree diploma, and all teachers in secondary schools are degree-holders with professional certification. Many teachers also have master's degrees.

Shanghai was the first in China to require continuous professional development for teachers. Every teacher is expected to engage in 240 hours of professional development within five years. This rigorous system of professional development and pedagogical advancement means that teachers are perceived as autonomous professionals, and hence continuous enhancement of their individual professional capacities is emphasised. This is very different from pure performance-based monitoring, where teachers' teaching productivity is entrusted to control mechanisms further up the hierarchy. In other words, teachers in China are fundamentally regarded as "generals" who can independently handle teaching and face any difficult student situations. This is very different from other systems where teachers are regarded as "staff members" or "foot-soldiers", subject to commands and directives, and are expected to perform according to standard indicators. Thus, in contrast to a system where only a handful of principals or superintendents play the "general", there are millions of "generals" in China.

Teachers in Shanghai, as part of a national system, are classified into four grades as an indication of their professional status. Promotion from one grade to the next often requires the capacity to give demonstration lessons, contribute to the induction of new teachers, publish in journals or magazines about education or teaching, and so forth. Of course, many other aspects of education are unique to China, but the teaching protocols are perhaps among the most relevant to this chapter.

While teachers in mainland China do not receive very high salaries, they often have other significant income on top of their salaries. This may come from additional assignments beyond normal responsibilities, income generated outside school, such as from private tutorials or invited talks, or school "bonuses" (e.g., sponsoring fees collected from students who come from other neighbourhoods or whose test scores are below the official admissions cut-off). In major cities, such as Beijing and Shanghai, where the economy is more open and incomes fluctuate more, teaching stands out as a preferred occupation because it guarantees a more stable income than many other professions. Over the years, because of the improvement in teachers' salaries, teaching has risen up the ladder of preferred occupations.

This picture of teaching in Shanghai would not be complete without mentioning that almost all the officers in the government education authorities, both at municipal and district levels, started as school teachers. Most of them distinguished themselves as teachers or school principals with strong track records at the grassroots. This perhaps explains their devoted professional attention to teaching and learning amidst all the administrative chores and political issues they normally contend with. They manage, however, to maintain this teaching focus while at the same time relying on a strategic vision that enables them to navigate a policy arena well beyond education.

Reform strategies: from teaching to learning

All aspects of education are being, or have been, reformed in China and in Shanghai. There are reforms in curriculum, assessment and examinations, pedagogy, and teacher preparation, all aimed at enhancing the quality of education. However, crucial to all is the reform in assessments and examinations. In a culture where exams are of such central concern, Shanghai reformers see examinations, particularly public examinations, as preventing all the other reforms from having their maximum impact.

Curriculum reform

At the national level, a major curriculum reform was heralded by a document issued in 2001, which called for schools to:

- move away from pure knowledge transmission towards fostering learning attitudes and values;
- move away from discipline-based knowledge, towards more comprehensive and balanced learning experiences;
- move away from pure "bookish" knowledge and to improve relevance and interest in the content of a curriculum;
- move away from repetitive and mechanistic rote-learning towards increased student participation, real-life experience, capacity in communications and teamwork, and ability to acquire new knowledge and to analyse and solve problems;
- de-emphasise the screening and selective functions of assessments and instead to emphasise their formative and constructive functions; and
- move away from centralisation, so as to leave room for adaptation to local relevance and local needs (Ministry of Education of the PRC, 2001).

These principles are by no means political slogans or academic jargon. They apply not only to the curriculum, but also to pedagogy in the classrooms, as well as the entire system. These principles point to a new direction, running counter to the old traditions, to conventions of the former planned economy, as well as to tacit assumptions about education.

Concrete changes include dilution of the disciplined structure of "subjects" so as to re-organise content according to life-relevance and progression in learning; the introduction of new integrated contents at the cross-over between natural sciences and humanities; the creation of elective arts modules as a compulsory part of the curriculum; to change examination formats from fact regurgitation to analyses and solutions for stated problems; and so forth.

Shanghai has always been seen as a pioneer in education reform, with reform of the curriculum taking centre stage. Curriculum reform in Shanghai follows the general framework of national reform. But Shanghai is often given the privilege of experimenting with reforms before they are endorsed for other parts of the nation. Since 1989, Shanghai has launched two waves of curriculum reform. Their essence has been to overcome "examination orientation" practices in schools in order to build quality education (Ding, 2010).[10]

The first phase of curriculum reform in Shanghai started in 1988, with an attempt to allow students to select courses of personal interest. A curriculum comprising three blocks was established: compulsory courses, elective courses and extra-curricular activities. Accordingly, textbooks and teaching materials were produced and phased in.

Curriculum reform moved into its second phase in 1998, with the aim of integrating natural sciences with the humanities, the national curriculum with school-based curricula, and knowledge acquisition with active inquiry. The purpose was to transform students from passive receivers of knowledge to active participants in learning, so as to improve their capacity for creativity and self-development and to fully achieve their potential. Traditional subjects were re-organised into eight "learning domains": language and literature, mathematics, natural science, social sciences, technology, arts, physical education, and a practicum. Schools were encouraged to make their own curricula specific to their conditions. Museums and other "youth education bases" (such as the Oriental Green Ark, Box 4.2) have now become crucial places in which the new curriculum is implemented.

The new curriculum has three components: the *basic curriculum*, to be experienced by all students, mainly implemented through compulsory courses; the *enriched curriculum*, which aims to develop students' potential and is realised mainly through elective courses, and *inquiry-based curriculum,* which is mainly implemented through extra-curricular activities. The inquiry-based curriculum asks students, backed up by support and guidance from teachers, to identify research topics based on their experiences. It is hoped that through independent learning and exploration, students can learn to learn, to think creatively and critically, to participate in social life and to promote social welfare. Since 2008, the new curriculum has been implemented throughout the city.

Overall, the curriculum reform involves broadening students' learning experiences, enhancing the relevance of subjects by relating them to broader human and social issues, and concentrating on the development of "capability" rather than the accumulation of information and knowledge. What is unprecedented in the reform is the intention to promote creative and independent thinking, which is very much against the collective and submissive tradition of Chinese culture. These are reflected in the reform of both examinations and pedagogy.

In order to facilitate the sharing of good practices of curriculum design, development and implementation, a web-based platform[11] was constructed and put into use in 2008. Included on the website are resources for curriculum development and learning, success stories of curriculum implementation, and research papers on teaching and learning. However, reform does not stop there: a draft version of Shanghai's plan for educational reform and development to 2020, which has been put out for public consultation, calls for school-based curricula and proposes a credit system at the senior secondary level to make learning more individualised and flexible (see later section).

Assessment reform

In China, examinations remain a major barrier to reforming student learning. Shanghai is no exception. No matter how well the curriculum reform is designed and explained, and no matter how committed teachers are, they feel unable to do anything about the examination pressure, shaped as it is by the broader culture and the pragmatic approach of students. Despite the general belief that emphasis on examinations jeopardises the genuine development of young people and is detrimental to the entire national population, social pressures have driven teachers to submit. Educators cynically describe the situation as follows: "High-sounding appeals for quality education, down-to-earth preparation for examinations."

Given this context, instead of eliminating or reducing examinations, Shanghai has chosen to modify them so that they serve a better purpose. If ones see public examinations as the baton that conducts the entire symphony of school lives, rather than removing the baton, Shanghai has decided to modify the baton so that it conducts good music.

Since 2001, the higher education entrance examination in Shanghai has taken the form of "3+X": the three core subjects of Chinese, English and mathematics, plus the "X" of any other subject(s) as required by individual institutions or faculties. The "X" component may take the form of paper-and-pencil examination, oral examination, test of practical skills and so on. The content may cover one discipline, one kind of ability, or several disciplines or abilities in integration. Individual institutions decide on the

weighting of the three core subjects and the "X" component. For example, at Shanghai University for Science and Technology, the three core subjects contribute to 40% of the candidate's overall scores and the "X" component is 60%.

From 2006, higher education institutions in Shanghai started to organise their own entrance examinations and to set their own admission requirements (Shanghai Municipal Education Commission, 2008). The overall trend and intention is to diversify higher education entrance examinations so as to reduce the pressure from a single uniform exam. To lower exam pressures further, Shanghai has moved to allow admissions based on school recommendations at both senior secondary and university entrance levels. Other selected institutions, presumably the stronger, have also been given the autonomy to set their own admission criteria and entrance examinations. More recently, students have been allowed to recommend themselves for admissions at higher levels of education – and universities are now willing to consider such self-recommendations.

As part of the reform, Shanghai created a Record of Growth of Primary and Secondary School Students in 2004. This is a student portfolio which combines various evaluation aspects, such as basic, enriched, and inquiry-based curricula, and moral conduct. Methods of evaluation included quantitative and qualitative analysis, self-evaluation and peer evaluation. This is seen as major step to move away from taking examination scores as the sole indicator of student performance.

However the reform in examinations is most noteworthy in the introduction of new concepts and approaches in the mode of assessments. From Grade 7 on, teachers begin to set integrated papers that cross disciplinary boundaries and test students' capacity to apply their knowledge to real-life problems. Students are provided with a hypothetical situation and are asked to analyse and comment on the situation from multiple perspectives. For example, the situation might be the dramatic increase in the number of private motor cars. An analysis could include the consumption of metals, increase in traffic, human habits, income-tax implications, employment of workers, etc. As another example, questions provide students with information not covered in the syllabi to test their analytical abilities or skills in processing new information for insights or problem-solving. Multiple-choice questions have basically disappeared from assessments and public examinations. All these are seen as important moves to free students from rote learning and to cultivate abilities in independent thinking and creativity, to "integrate their talents".

Hence, it would be fair to say that teachers in Shanghai have moved to change their assessments to approaches and modes which are more conducive to integrated learning. In this study, when teachers who had no experience with PISA were asked about and understood the nature of the PISA tests, many of them responded: "That is more or less what we are doing!" There has apparently been a genuine paradigm shift among teachers about assessments and examinations, but in a culture that reveres examinations. However, educators and researchers comment that the changes to assessments are more effective within schools than in public examinations. There is an interesting paradox here. On the one hand, teachers and schools have moved ahead to more advanced thinking about assessments for authentic learning, and have mastered the expertise in practising such assessments within schools. On the other hand, the public examinations are only taking slow steps, and heavy examination pressure remains.

Pedagogical reform

Alongside the curriculum reforms have come changes to pedagogy. One very significant change has been implemented in recent years through the slogan "return class time to students". This involves allocating more time to student activities in classes and less to lecturing by teachers. This has caused a fundamental change in the perception of what a good class should look like. Once typified as involving well-designed presentations by teachers, videos of model teaching concentrated on teachers' activities. Now, model classes are filmed using two cameras, one of which records student activities. Teachers' performances are now also evaluated by the time given to student participation and how well student activities are organised.

A similar slogan is "to every question there should be more than a single answer". This poses a challenge to the orthodoxy and authority of teachers over the information they teach (Box 6.2).

Box 6.2 **The principle of multiple approaches**

In a typical lesson to introduce addition of fractions, the teacher did not start by directly providing the methods of "common denominator". Instead, she asked students to compare two fractions: 4/5 and 3/4. In a matter of around 15 minutes, student came up with five different ways of comparing the two fractions: drawing pies, drawing bars, subtracting from 1, common numerator, and common denominator. The teacher then introduced common denominator as one of the convenient ways of adding two fractions with different denominators. The principal said that in the conventional classroom, it normally took two to three weeks before students could master the method. Now, all are mastered within one lesson of 40 minutes.

These add up to a sea change in classroom pedagogy. The use of slogans is a Chinese tradition, carefully crafted to capture the essence of the proposed change, yet to be easily understood and followed by grassroots teachers. This is particularly powerful in rural schools, where most theories are still foreign ideas. The use of slogans in pedagogy reform is also based on the culture of what could be called "constructive conformity" in China. That is, teachers do not mind replicating other teachers' good practices, and indeed creative practices are meant to be copied. This is very different from the meaning of creativity in other countries, where practices are called creative only when they are different from others.

The changes in teacher and student activities in classes are a fundamental deviation from the Chinese tradition in pedagogy. It has been a huge step changing from a focus on teaching to a focus on learning. Student participation in classrooms is a pretty new idea to most teachers in China. It challenges and changes teachers' authoritative role as the knowledge controller. However, these changes in classroom practices have allowed students to generate their own paths of learning, and hence creativity and independent thinking.

The reform in pedagogy has caused a fundamental change in the teacher-student relationship. It has empowered students in the process of learning and in the creation of knowledge. As a result, classrooms have become more liberal in terms of student thinking, despite the intensity of activities and strict discipline.

Reforms to eliminate disparities

Strong performance in PISA means not only good individual student performance, but relatively small disparities among individual students.

In recent year, China has joined the international community in realising the importance of overcoming inequities in education – and in society at large. This is of particular significance since success in the overall reform has been based on a break from the extreme egalitarianism that prevailed during the Cultural Revolution. Deng Xiaoping pursued the concept of "let a few become rich first". Disparity was at that time seen as an incentive to the growth of national wealth and a cure to national poverty. However, over the past 30 years of development, the uneven growth in the nation has given rise to significant inequality and disparity between different areas, and within regions. As a major metropolitan area where wealth accumulates, disparities within Shanghai can be quite stark.

Neighbourhood attendance

In 1994, Shanghai was the first city in China to introduce neighbourhood attendance at primary and junior secondary levels, requiring students to attend their local schools and, in effect, eliminating the notion of key schools at these levels. This was a challenge to society and caused some unease among parents, who were bewildered that their children could no longer compete for admission to the best schools. The social pressure was so great that eventually a compromise was reached: students could choose schools in other neighbourhoods by paying a sponsorship fee. This is often known as the Chinese version of "school choice," which was then a hot issue in America. Parents see the additional fees as fair, because otherwise preferential admissions could go to parents with political power or personal connections.

Neighbourhood attendance also prompted concern among teachers who were not used to teaching classes of mixed abilities. Now, however, teachers seem to be proud of being able to handle children of diverse backgrounds and different abilities, realising that diversity and disparity within schools are common features in contemporary societies. Neighbourhood attendance has allowed public examinations to be removed at the end of primary schooling, releasing primary teaching from examination pressure. As an immediate result, innovations and creativity now flourish in primary schools. Policy makers often see this as an essential factor in making Shanghai a champion of curriculum and pedagogy reforms.

A belief in the value of effort

The cultural heritage of believing in effort over innate ability can be positive. Shanghai is home to quite a few experimental programmes. One such example is "success education" which illustrates how hard work and innovative approaches can improve results for poor perfoming students (Box 6.3).

Migrant children

Neighbourhood attendance also prepared the school system to face the challenges of migrant children, who became a major national problem in the late 1990s. In the 1980s, migrant workers flooded in from rural villages to work in urban areas. Most are low-wage labourers in factories, while others are contract workers on construction sites. Still others created small businesses to tap into the urban market. Migrant workers have contributed immensely to China's economic growth, but educating their children has become a national challenge.

One problem has been the shortage of supply, because local schools had not prepared spaces for migrant education. Second, given the keen competition among schools, migrant children, who are often less academically prepared, are not welcomed by local

Box 6.3 **Success education**

In 1999, Liu Jinghai, originally an educational researcher, started an experiment in the Zhabei city district, a relatively underdeveloped area of Shanghai. He took over a junior secondary school (School No. 8) and decided to admit only the lowest performers from primary schools. In a matter of two or three years, his graduates were becoming renowned for their success at getting into the best senior secondary schools. His strategy is to start at low levels and move in quick but small steps. His basic belief is that all students can learn, and learn well. It is a matter of persistent effort and new approaches. This is a reaction to the teachers who stereotype students and make them believe that they could not succeed. Liu is now being asked to take over nine more schools to have them follow the same philosophy.

Source: Author visits to the school in 2003 and 2009.

schools. Third, local governments were reluctant to spend taxpayers' money on the children of non-taxpayers. Fourth, some local parents do not like to see migrant children in their children's schools because they fear they will lower standards and be disruptive.

To date, around 30 million children of school age belong to migrant families all over China. This is 20% of the entire student population at the basic education level. In other words, one in every five school children comes from a migrant family. About 20 million are with their parents in cities, but the other 10 million have been left behind in villages without parental care. Both categories pose serious educational as well as social problems and have become a major issue on the government's agenda. They are also one of the major issues China pledged to tackle in its 2020 education plan. Since 2002, national policy on education migrants has been based on two statements, known as the policy of "Two Mainly": "Education of migrant children is mainly the responsibility of the recipient city", and "Migrant children should be educated mainly in public schools."[12] The national policy is interpreted differently in different cities.

Shanghai is one of the principal recipients of migrant workers because of its active industrial and commercial economies. Statistics in 2006 indicated that 80% of migrant children were of school age, and those who studied in Shanghai schools were 21.4% of the entire student population at the basic education level (Ding, 2010). There are largely three approaches to educating migrant children. First, admit migrant children into conventional public schools and let them mix with the local students. Second, start new public schools catering mainly for migrant children. Third, establish private schools for the migrants. Shanghai is among the cities that accomodates migrant children. It has established the notion that migrant children are "our children" and works constructively to include them in its educational development. Meanwhile, at the system level, the admission of migrant children to public schools helps solve the problem caused by the acute decline of school-age children among the permanent residents.

The city's spectacular economic growth can be very much attributed to the contribution of migrant workers. It follows that their children should be well treated. Gu Lingwan, former Deputy Director of the Shanghai Academy of Educational Research, a renowned teacher and reformer in mathematics education says: "Shanghai has historically always been a city of migrants. Children of the migrants today will stay on and become *bona fide* citizens of Shanghai. How they are treated today will determine how they feel towards and contribute to the future of Shanghai".

It is noticeable that in PISA 2009, the rigorous sampling did reflect the presence of the migrant children in the system.

Strengthening weak schools

Although basic education is free and compulsory, the quality of schools varies, and that affects the quality of education children receive. Indeed, public schools in Shanghai have long been criticised for the disparity among them. In order to reduce this disparity, the Shanghai government has adopted several strategies:[13]

- ***School renovation.*** The government evaluates schools in terms of their infrastructure and educational quality, and then classifies them into four levels according to the degree to which they meet the standards. Since the 1980s, several rounds of school renovation attempted to ensure that schools were in sound physical condition. In the mid-1990s, the demographic decline began to show, which gave the government a good opportunity to further improve the schools (Jin, 2003). In 1999, Shanghai started a second wave of school renovation, upgrading school buildings and facilities according to a "standard programme." A total of 1 569 schools were either re-organised or closed, accounting for three-quarters of all schools in Shanghai. A third wave of school renovation started in 2002, from which one-third of junior secondary schools in Shanghai benefited. The second and third rounds included other reform measures, such as strengthening the team of teachers or selecting a strong principal. By 2005, all the lowest performing schools had been eliminated. In junior secondary education, 64% of public schools have now reached the highest level.

- ***Financial transfers.*** The mobilisation of public funding with positive discrimination. Statistics showed that per-student expenditure in rural areas was only 50% to 60% of that in the city. Rural schools also had far lower capital spending than downtown schools on average (Shanghai Municipal Education Commission, 2004). The strategy was then to set a minimum standard for per-student public expenditure at different levels, and to transfer public funds to the deprived areas. With the improved economy, the Shanghai municipal government has been keen to help households support children's education. Since 2006, all students in compulsory education have been exempt from tuition and miscellaneous fees. Since 2007, all students in compulsory education have been provided with free textbooks and exercise books (Shanghai Municipal Education Commission, 2009). All these equity measures echoed the national policy of government subsidy of non-tuition expenses for students from poor families.
- ***Teacher transfers*** from urban to rural areas and *vice versa*. It was often difficult for rural schools to recruit teachers, and they also suffered from high teacher turnover. To reverse the situation, the government transferred a considerable number of teachers from urban public schools to rural schools, along with some outstanding urban principals. Meanwhile, young and middle-aged principals and teachers from rural schools were transferred to urban schools. They are expected to return to the rural schools, bringing their new urban experiences with them (Shanghai Municipal Education Commission, 2008).
- ***Pairing off*** urban districts with rural districts. In 2005, the educational authorities of nine urban districts signed three-year agreements with educational authorities of nine rural districts, so that the former could help srengthen the latter. Moreover, some 91 schools paired up as sister schools, and a substantial number of teachers undertook exchange programmes among the sister schools. The first round of the three-year "pairing off" programme ended in 2008, and the second round is under way (Shanghai Municipal Education Commission, 2009).
- ***Commissioned administration.*** This relatively new strategy has gained increasing attention. It is a kind of school custody programme in which the government contracts "good" public schools to take over the administration of "weak" ones. Under this scheme, the "good" public school may take over the principalship of a rural school, strengthen its leadership by appointing experienced teachers to the leadership, or sending experienced teachers to strengthen the teaching in the rural schools. It is believed that the ethos, management style and teaching methods of the good schools can in this way be transferred to the poorer school. The city government bears the cost of the partnership (Shanghai Municipal Education Commission, 2008). Such an arrangement not only benefits the poor schools; it also gives the good schools more room to promote their teachers.[14]
- ***Establish a consortium of schools***, where strong and weak schools, old and new, public and private are grouped into a consortium or cluster, with one strong school at the core (Box 6.4).

Box 6.4 **The Qibao Education Group**

Qibao is a suburb of Shanghai. Its secondary school, established in 1947, has become known for the humanist values that permeate all aspects of school life. It is also known for the percentage of its graduates admitted to good universities. Some graduates from Qibao have been directly admitted to Harvard University. Since the 1960s, Qibao Secondary School has been identified as an "experimental school" or a "demonstration school" because of its effective leadership, and it has become famous in the realms of science education, sports, arts and music, and technology. Under the leadership of Principal Qiu Zhonghai, the Qibao Education Group was established in 2005 with Qibao Secondary School as the core. To date it hosts six schools. Three other public schools were renamed and "adopted" by Qibao, while two private secondary schools, one junior and one senior, were newly established by the group. All six schools have demonstrated continuous improvement since becoming members of the Qibao Group.

Source: Focus group discussion with administrators of the Qibao Education Group, 2010.

Achievements and challenges

Shanghai's high performance in PISA 2009 (Table 6.1; OECD, 2010) is encouraging for Shanghai educators, and suggests that their reforms are paying off.

There is consensus among all those interviewed (see list at end of chapter) about the positive impact of the reforms, particularly changes in student assessments. Local experts believe that students are now exposed to a much broader knowledge base and are trained to integrate their knowledge and tackle real-life problems. Students have also become used to identifying questions of interest to themselves, and to making open-ended explorations. All these changes are markedly different from the traditional Chinese approach in which students learn subjects by heart and regurgitate such knowledge in examinations.

Table 6.1 Shanghai-China's mean scores on reading, mathematics and science scales in PISA

	PISA 2000	PISA 2003	PISA 2006	PISA 2009
	Mean score	Mean score	Mean score	Mean score
Reading				556
Mathematics				600
Science				575

Note: Shanghai-China did not participate in PISA 2000, PISA 2003 and PISA 2006.
Source: OECD (2010a).

However, none of the interviewees was completely satisfied with the quality of Shanghai's education. As one experienced educator insightfully expressed it, the changes in student learning were brought about chiefly by organised and structured top-down reforms, implemented either through examinations or policy shifts.[15] Such measures may be well-designed, but students are still not given much autonomy in their study. There is no encouragement for individuality, and hence students times are still almost fully occupied by learning tasks assigned either by the school or by parents.

Indeed, the conformity and uniformity are not limited to students. Schools with outstanding and extraordinary characteristics are still rare. That is, there are stronger schools, but there are no "alternative schools" with alternative philosophies and goals, and unconventional approaches and strategies, as could be seen elsewhere, even in similar cultures such as Korea or Japan. Examination results are still predominantly the goal for school education.

Looking to the future, Shanghai is now striving to turn itself into a "First Class City". The notion of a First Class City is rather vague, and its definition varies in the literature, but reflects much of what has been said in recent years about enhancing the service sector in the economy and building Shanghai into a world financial centre.

Education reforms are very much part of this endeavour, reflected in the slogan "First Class City, First Class Education" (Hu and Jiang, 2002). Implicit in the slogan is a strong sense of preparing manpower as the core value of educational planning. This is true for the whole of China, where education development and reform are often expressed in the Chinese term *peiyang rencai*. "*Peiyang*" means cultivation, as in growing a plant. "*Rencai*" literally means "human talents", referring to people who are "useful" because of their skills. It is similar to the notion of human resources, except that *rencai* is a more comprehensive term not always confined to economic interpretations. Here, human beings are valued according to their usefulness to society. This value system is quite common to the collective cultures of Confucian societies.

In the Shanghai context, the emphasis is now on how to foster "integrated talents" (*fuhexing rencai*). The term reflects a new conceptualisation of human resources adapted to the challenges of the future. Sometimes it refers to multi-tasking abilities, or adaptability to changing requirements, or the ability to master a range of different expertise. The notion of integrated talents is used quite often in the literature, and especially in policy documents. There is much in the discourse about the cultivation of integrated talents, and education is regarded as the essential means for such cultivation. The notion of integrated talents is further developed in the recent national education blueprint *Outline for Medium and Long-term Development and Reform of Education* (*Outline 2020*), announced in July 2010 (Ministry of Education of the PRC, 2010b; Box 6.6). This calls for the cultivation of "selected top-notch creative talents", and adds the elements of "competitiveness" and "creativity" into previous definitions of talents. This perhaps represents that official definition of the new talents which future society will need, and for this it will need a new form of education.

If we add all these together, a comprehensive approach is emerging, bound together by a consistent philosophy which, as with Chinese culture in general, is not always explicit in the documents:

- Education has to serve the needs of national development (and municipal development for that matter). In today's world, such needs involve "top-notch creative talents". This requires individuals who are creative, competitive, integrative and able to multi-task. These talents for the future can only be cultivated in an education system which is liberalising and empowering in its outlook.
- The foremost task in achieving such an education system is to liberate students from the undue workload caused by the public examinations. This is being achieved not so much by reducing examinations, but by changing the aims and modes of publication examinations and internal assessments.
- The strategic first step is to expose teachers to new assessment concepts. Shanghai reformers have borrowed heavily from PISA's goals and design The existing system of teachers' professional development plays a crucial role in disseminating and practising the basics.
- Students are already changing their learning styles, and have much broader learning experiences than the formal curriculum offers.

HONG KONG'S EDUCATION SYSTEM: ONE COUNTRY, TWO SYSTEMS

Hong Kong was originally a small fishing island that was ceded to the British government in 1842 after China's defeat in the Sino-British War ("The Opium War"). In further treaties in the late 19th century, China also lost the Kowloon Peninsula and the New Territories to Britain on a 99-year lease. Hong Kong maintained its colonial status at the end of the Second World War when all other "unequal treaties" with China were terminated. In 1997 the 99-year lease ended. Following a surprise suggestion from Deng Xiaoping to British Prime Minister Margaret Thatcher, Hong Kong's sovereignty was returned to China under the "one country, two systems" notion.

Under this arrangement, China resumed its sovereignty over Hong Kong in 1997, but Hong Kong remained a separate jurisdiction, governed by a "Basic Law" and enjoying autonomy in all areas except military defence and diplomatic relations. As a Special Administrative Region of China (SAR), Hong Kong maintains policies of its own, independent from the national government in Beijing. In the case of education, for example, Hong Kong maintains its own system of education under an Education Bureau (EDB) which reports only to the Hong Kong government and Hong Kong taxpayers, without direct relations with the Ministry of Education in Beijing. Meanwhile, Hong Kong is free to engage in bilateral relations with other jurisdictions and assume membership in other international organisations for finance, commercial, education, culture and so forth. Hong Kong's education system has been and remains quite distinct from that of the rest of China, with a unique history, structure and reform trajectory.

Hong Kong has a population of around 7 million living in a small area of 1 000 square kilometres with an average GDP per capita (2008) USD 39 062 (Figure 6.3), putting it among the world's top ten richest nations on most lists.[16] The service sector of the economy accounts for 92% of Hong Kong's economic growth (Census and Statistics Department of Hong Kong, 2010a). Across the border on the Chinese mainland, an estimated 80 million people work for Hong Kong investors.

The population is predominantly ethnic Chinese who increasingly come from mainland China, either as immigrants who stay on or as tourists or migrants who reside in Hong Kong temporarily. Small but significant portions of the population are from Indonesia and the Philippines, mostly with temporary permits to work as domestic helpers. Traditionally, long-term residents of South Asian origin include businessmen from India, manual or service workers from Pakistan and former Ghurkas from Nepal. The Caucasians from Western countries living in Hong Kong mostly work for influential multinationals or as professionals or academics. Hong Kong residents, both men and women, have life expectancies that are among the longest in the world.

Hong Kong's education system comprises around 1 100 schools. However, the number is shrinking because of dramatic declines in population. Each age cohort has declined from around 9 000 members in the early 1980s to around 4 000 in recent years. The fertility rate is around 0.9 children per woman far less than the "replacement" level of 2.1 children per woman (Census and Statistics Department of Hong Kong, 2010b and c).

The education system in Hong Kong has not followed the national pattern on the mainland. It is very much part of the British colonial legacy. Not only does Hong Kong follow the British O-Level and A-Level system, it has even adopted various policy changes made in England and Wales. However, since the 1970s, there has been a strong tendency to develop a more local identity, and policies began to depart from British trends. In a way, that prepared Hong Kong for the major reforms started in 1999 after the return of Hong Kong to Chinese sovereignty in 1997. The following are diagrams of the Hong Kong education system, before and after 2012 which is the dividing line for the reform in the structure.

In 2009, when PISA was conducted, Hong Kong's education system was still very much part of the British colonial legacy. The school system still maintained the British approach of five-year secondary schooling (Forms 1-5) culminating in a Certificate of Education Examination. The certificate is a gateway for all young people, either to work or further study. It is followed by a two-year matriculation education (known as Forms 6 and 7) in preparation for the A-Level examinations for admissions to higher education. However, this system is undergoing major re-structuring from the British 6+5+2+3 approach to a 6+3+3+4 approach, similar to many other systems in the region (Figure 6.2). This will be further discussed below.

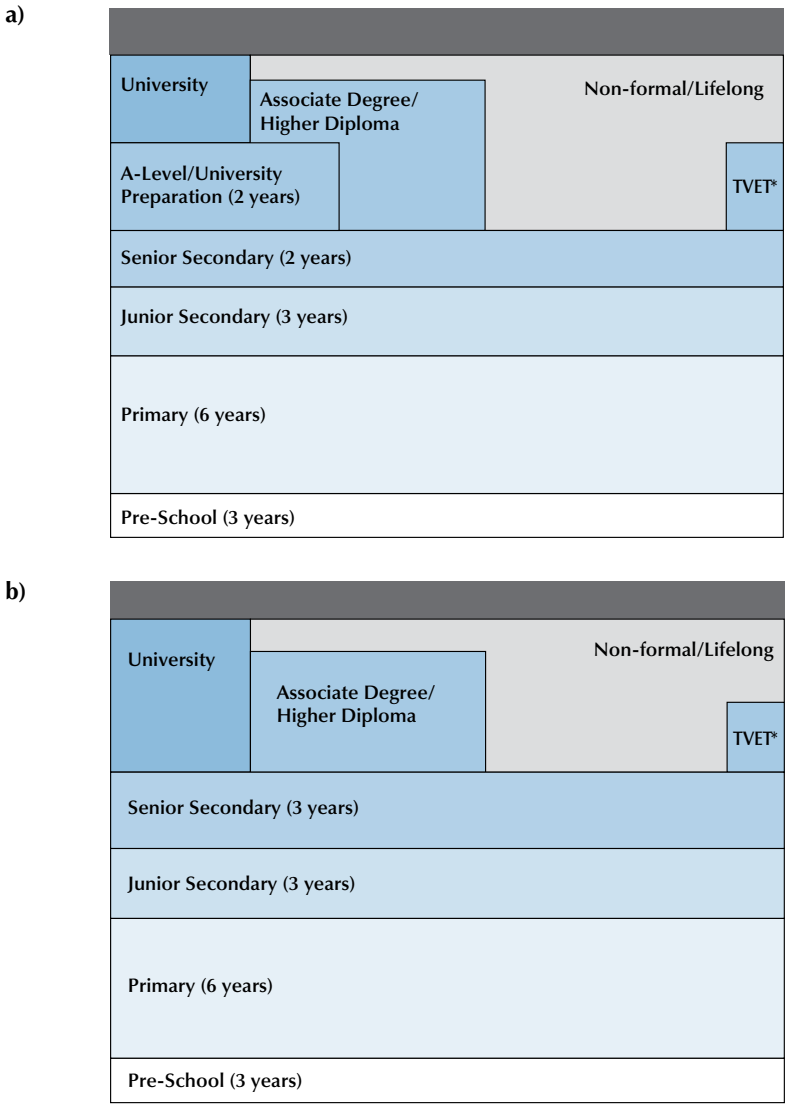
Evolution of Hong Kong's education system

Whilst the school system on the Chinese mainland only began following the abolition of the Civil Examinations in 1905, Hong Kong already had schools in place long before that and they were not influenced by changes on the mainland. The leading elite Hong Kong schools followed the model of the British "public" (i.e., private) schools, although the schools have largely been adapted to Chinese culture. This was also facilitated by localisation policies among the British colonies, particularly after the Second World War. Hence, it is fair to say that the Hong Kong education system is very much a hybrid of Chinese culture and British traditions and schools enjoy the best of both worlds.

Hong Kong moved into universal 6-year primary education in 1970, compulsory 9-year education in 1979, and free 11-year education in 2000. There is a small but strong vocational education component, under the Vocational Training Council, catering for post-compulsory as well as post-secondary young people. Attendance in secondary education is universal. Higher education

■ Figure 6.2 ■

Hong Kong's education system: (a) before 2010 and (b) following reforms in 2012



* Technical and Vocational Education and Training.

remained elite until the 1960s. There was only one university, the University of Hong Kong, and the enrolment ratio was only around 1%. The ratio in 2009 was around 65%, with 18% in Type A programmes, and there were seven universities, one Institute of Education, one Open University and one private university. The enrolment in higher education is still low compared with similar cultures, where there is "oversupply" of higher education places, such as in Taiwan, China, South Korea and Japan.

There have never been many government schools in Hong Kong. However, from the 1950s, the government started subsidising non-government, school-sponsoring bodies (mainly churches, charitable organisations and other associations or agencies) and with them formed a public school system. Many such schools once operated under marginal conditions (such as on the rooftops of public housing), but were given land and buildings in the 1970s and 1980s. Now they enjoy state-of-the-art facilities. In brief, the Hong Kong government provides most of the capital cost and almost the full recurrent cost of public schools, but expects the non-government sponsoring bodies to run them. The sponsoring bodies abide by a Code of Aid, a kind of contractual agreement with the government.

School quality varies, as is evident in the PISA findings in various years. There are attempts to provide the better schools with a "direct subsidy", which is the same amount as given to other public schools, but direct subsidy schools are given more autonomy in spending, fee-charging and admissions. The direct subsidy schools are similar to the US concept of charter schools, except that there is no contract about performance.

Significant autonomy

The Hong Kong school system provides a textbook case of how school autonomy and teacher professionalism shape a culture among schools that is conducive to effective student learning. They also illustrate the kinds of challenges and problems that can arise from such an approach.

Over recent decades, Hong Kong has developed a culture of "school-based" orientation, which gives schools substantial autonomy over governance, curriculum design, appointment of principals and teachers, and the admission and graduation of students. In the last two decades there have been further changes to the system, so that administrative inspections (by inspectors) have been replaced by periodic reviews (by peers); approval of curricula is no longer required by law; and political censorship has been removed from the law. This has been further reinforced in recent years by making school governance boards legal entities.

Hong Kong's school system has always cherished its freedom and autonomy. The school-based culture and orientation are the major impetus for the energetic and diverse innovations that take place in Hong Kong schools. Despite the traditional culture of conformity and the pressure of a uniform examination system, few schools in Hong Kong look alike, and this trend is growing with the new reforms. The autonomy of schools has provided fertile ground for teachers to develop their professional self-esteem and self-motivation for continuous and voluntary renewal and improvements. However, the flip-side is that teachers complain about being bogged down by administrative chores and meetings that would be unnecessary in a centralised system with standard procedures. In addition, disparity grows with diversity. The culture and the system do not allow easy government intervention, such as in handling poor performing schools. There is never an expectation that the government would directly interfere in a school's affairs.

Hong Kong still has quite a few elite schools whose graduates are favoured candidates for admission to the best universities in the world. It is notable that such students are not necessarily from wealthy families. Hong Kong strongly exemplifies the Chinese belief that young people achieve because of hard work, regardless of family background. However, its schools are not only strong in academic achievements; often they are also champions in sports and music. Many graduates of these schools have become leaders in higher education, mainly because of their training in self-governance in student organisations at schools. The Hong Kong schools breed leaders.

Private schools, many of them for-profit, mushroomed in the 1970s in response to the shortage of school places. Such schools tended to offer low-quality education and as a result gradually disappeared during the 1980s because of expansion in the public sector. Since the turn of the century, however, a new breed of elite private schools has been established as international schools, though admitting mainly local students.

Hong Kong's schools have not always been so successful, however. The section which follows charts the reforms that have led to this strong situation in which the city find itself today.

The drive for reform

In the late 1990s the discourse in Hong Kong shifted from one of expansion to one of "what should education offer." The comprehensive education reform that began in 1999 emerged at a time of widespread dissatisfaction with the education system. Parents were not satisfied with the education schools were providing and many children were doing homework until almost midnight, and most of what they did was little more than regurgitation. They subjected their children, unwillingly, to tough competition in order to move to better schools. Those who could afford it sent their children to the international schools that were more liberal in their philosophies and where children seemed happier. Teachers in turn were dissatisfied with their students, thinking standards and motivation were declining. Employers were also dissatisfied with the quality and calibre of graduates from local institutions, finding them less prepared to engage in an increasingly complex workplace. They were starting to recruit returnees from overseas.

In hindsight, this dissatisfaction can be explained by a few crucial factors. First, schools were unprepared for an intake that suddenly changed from a select few to almost everybody. The system now had greater student "mixability", but teachers still maintained approaches generally used for teaching the elite, in which only the capable students would benefit and the slower students were abandoned. Second, the sense of responsibility changed following the introduction of compulsory education. Students had been blamed for performing poorly in schools they had struggled to enter. When education became compulsory, blame was laid on schools and teachers, for not helping students to achieve. Third, although there had been successful reforms in curriculum and pedagogy, the general environment still favoured a conventional curriculum and didactic teaching. This was reinforced by the highly competitive public examinations and keen selection process for higher education. Fourth, and perhaps most fundamental, employment patterns had undergone major changes. While young people with only a nine-year education could previously easily find employment as blue-collar unskilled labourers in manufacturing plants, such factories had mostly moved across the border into southern China where labour costs were much cheaper (thanks to China's open policies). The corresponding expansion of Hong Kong's service sector was accompanied by an expectation of greater knowledge in its labour force.

In sum, at the end of the 20th century, Hong Kong's education system faced a multitude of structural crises, partly due to the efforts to accommodate more children and partly due to changes in society's expectations for education. Seen from this perspective, the apparent failure of the system at that time was less a problem of government incompetence or ill-management than a demonstration of the widening gap between a rapidly changing society and the static approaches to education. The solution was not to do more and better of what schools had been doing, but to put education in a different framework. That was the starting point for Hong Kong's comprehensive education reform which began in 1999 and continues today.

Matching reform to the needs of the workplace

The reform was led by the Education Commission, the overseeing advisory body in education policies. The reform started with a "mobilisation phase". Some 800 community leaders were invited to a major gathering to air their concerns. The meeting started with a presentation titled "Questioning Education," which asked over 100 questions with no answers. Participants assumed the roles of parents, employers and corporate citizens, and expressed such anger that they fuelled the Education Committee with determination to never go back to the old ways. A subsequent campaign encouraged every school to establish a paper "tree of hope" onto which students hung tags with statements beginning, "I have a hope: Education should be …"

The design phase followed. A document was published that asked questions about the "Aims of Education". It described recent changes in society and proposed a list of fresh aims for education. Upon public invitation, more than 40 000 suggestions were submitted. It became a community campaign and greatly enriched the Education Commission's understanding of how society was changing and its implications for education.

Meanwhile, as part of the learning process, the Education Commission carried out a series of innovative consultations to aid their decision making. Major professional bodies were interviewed to solicit their views. A typical example was the Society of Accountants, which suggested that the best action for a university to take towards accounting was to "not teach it".[17] Another study looked at manpower aspirations among the small and medium enterprises that were becoming the backbone of Hong Kong's economy. This was a genuine learning process for the Education Commission, which was discovering that fundamental changes were occurring in society and the workplace, but that the general design for education had not kept pace.

The Education Commission also studied education reform in other systems, as well as patterns of lifelong learning in OECD countries,[18] and supply and demand in the local market for lifelong learning. The commission looked at ways to retrain the newly unemployed and visited trade unions in order to understand the trends of employment in various industries.

This preparatory process brought about the following realisations:

- Society has changed and is still changing. The economy is changing so quickly and so precariously that it would be impossible and irresponsible to conceive an education system that could prepare the specific manpower needed for economic development. Instead, education should concentrate on developing individuals' generic capacity so that they are able to face any future challenges.
- The need for a focus on "individual development" and "generic capacity" was substantiated by a new understanding of the workplace. Most of the registered companies in Hong Kong are small: 94% of them have fewer than 20 employees. Strict rules and procedures are no longer the norm in small work units. Combined with a growing diversity in products and services, and the customisation of production, individuals now have to tackle much more wide-ranging and complex tasks, for which specific skills are not required. Furthermore, individuals change jobs and careers with incredible frequency.
- In this context, preparing individuals for a particular occupation or training them in a particular skill will not ensure a sustained and healthy working life. There is ample evidence that an increasingly large percentage of university graduates go for jobs unrelated to their study. Rather than seeing this as "waste", employers look for rich generic capacities in their recruits that can support the multiple and varying tasks they are expected to do. These generic capacities include effective communication skills, good human relations, willingness and capability to learn, senses of responsibility, ability for self-management, preparedness for risks and unplanned challenges, and creativity and innovation. Less explicit in these expectations is the importance of integrity. Individuals are now, more than ever, exposed to ethical decisions and moral dilemmas, which they would have previously been shielded from by bureaucratic protocols in huge industrial set-ups.

The move towards learning

The Education Commission's first response was to set education targets for individuals to become "happy to learn, effective in communications, ready to commit, bold at innovations". The adoption of individual development as the starting point for reform represented a paradigm shift in education policies. There has always been a dichotomy between national development and economic needs on the one hand, and individual needs and personal growth on the other. In a collective culture, policy thinking is often tilted towards national and economic needs. However, the paradigm shift is less a matter of submitting to the ideology of

individualism, than a pragmatic consideration of how education can realistically contribute to societal advancement, including economic growth.

The decision makers became convinced that education is about learning, and that learning is a matter of experience, not transmission of knowledge. In 2001, a crucial reform document was published – *Learning to Learn* (Curriculum Development Institute, 2001). The title carries two major messages: the change of focus from "teaching" to "learning", and a new emphasis on the process of learning rather than memorising facts. This document, still the basic reference for the entire reform effort, was informed by the contemporary theories of learning. In layman's language, these theories hold that:[19]

- Learning is the active construction of knowledge by the learner.
- Learning is a process, achieved through activities called learning experiences.
- Similar experiences may lead to the construction of different kinds of knowledge, i.e. people learn differently.
- Learning is for understanding.
- Understanding is demonstrated by the effective application of the knowledge thus constructed.
- Effective learning experiences often require integration of knowledge.
- Learning is therefore best in real-life experiences with actual effects.
- Learning is also a social action, best achieved in groups.

The reform exercise in Hong Kong incorporates the main theories about learning, rather than committing itself to any particular school of "constructivism." However, it is very much underpinned by the notion of constructive learning.

In 2001, as a major step in the reform, public assessments after primary schooling were abolished with immediate effect. This caused some confusion among school principals and teachers, who had to seek new frames of reference. However, the move has proved critical to primary schools, allowing teachers to develop more relevant school-based learning activities and changing the general discourse in primary schools from one of examinations and drills to one of learning. As a result, in less than a decade, secondary schools are seeing more active learners coming out of primary schools. Student reading literacy has improved according to international assessments. For example, in PIRLS (Progress in International Reading Literacy Study), Hong Kong's primary schoolchildren's reading literacy performance was elevated from 14th in 2001 to 2nd in 2006 in the international rankings (Mullis et al., 2006). At the secondary school level, PISA measures for 15-year-olds show fairly consistent and high results across the three skills tested, including reading (Table 6.2; OECD, 2010).

Table 6.2 Hong Kong-China's mean scores on reading, mathematics and science scales in PISA

	PISA 2000	PISA 2003	PISA 2006	PISA 2009
	Mean score	Mean score	Mean score	Mean score
Reading	525	510	536	533
Mathematics		550	547	555
Science			542	549

Source: OECD (2010a).

The impact of the reform on secondary schools and higher education

Although the curriculum changes occurred at all levels, the consequences have been most noticeable at senior secondary level:

- The secondary school curriculum is now designed according to what learning experiences students need, rather than being guided by manpower needs in the economy.
- The curriculum is decided in secondary schools before seeking endorsement from universities. The latter's concern is to select the best students, while the curriculum reform aims for lifelong benefits for all students.
- The curriculum is framed around eight "key learning areas", rather than subjects: Chinese language, English language, mathematics, science and technology, social science and humanities, sports and arts, applied learning (to allow students to gain real-life workplace experience) and other learning experiences, including service learning, workplace visits and overseas experience. The latter two are new to both teachers and schools.

Following a long process of negotiation with higher education institutions, a compromise was reached in which secondary school students going on to university are expected to perform in four areas: Chinese, English, mathematics, and a new subject called liberal studies (Box 6.5). Institutions and programmes may also ask for one other "subject." This reflects a change among higher education

institutions: previously they had based their student selections on the number of subjects studied, as if that would guarantee better academic performance; now they understand the benefit of requiring fewer subjects, but broader learning experiences.

In higher education, the focus now is how to make the best use of the additional year in the new system (Figure 6.2b). Almost all institutions have decided not to extend specialised studies to the additional year but to offer alternative learning experiences, following the spirit of the reform in secondary curricula. Such alternative learning experiences include a new common core curriculum, all kinds of experiential learning and expansion of overseas exchanges.

Box 6.5 **Liberal studies for critical thinking and innovation**

The new subject of liberal studies has introduced a new area of assessment in secondary education in Hong Kong. It involves a learning experience with timetabled slots but no syllabus – only broad topics. Assessment is meant to be flexible. In effect, teachers allow students to design their own learning schemes in which they rely mostly on current affairs and non-textbook information, and develop high-order or critical thinking. This includes asking sensible questions; finding directions for analysis, synthesis and conceptualisation; and proposing hypotheses or theories. Higher education institutions have agreed to take liberal studies as a necessary subject for admissions. That has given some weight to the programme. The freedom of design had caused some confusion among teachers, but is now gradually understood as an opportunity to exercise their professional discretion, and to indeed open students' minds for independent and critical thinking. Nonetheless, since it is a new approach to learning, its design has taken a lot of energy among teachers.

It is conceivable that after 2012, the higher education scene will be very different. After years of discussion and design, the New Senior Secondary (NSS) curriculum was launched towards the end of 2009 in anticipation of a new public examination in 2012, when university entrance requirements will change accordingly. As this chapter is being written, both secondary and higher education institutions are busy preparing for the change.

Critical to the reform is construction of a new assessment system to facilitate the changes in curriculum and pedagogy. This is underway, and faces the dual task of reflecting the new philosophy of learning and gaining international recognition for university admissions.

Key factors in managing the reform

The Hong Kong education reform has benefited from a long lead time, well-designed preparations and good perception management:

- From 2005, four years before implementation of the new curriculum, the government organised meticulous activities to prepare schools. These included whole-day information "retreats" covering all the schools, and middle managers, such as subject department heads. These eased schools into the changes, allowed them to develop ownership of the reforms, and minimised unnecessary resistance during the long reform process. This was essential given that the increased workload and disturbance for schools were by no means trivial. The bulk of preparation for the reform stayed with the schools. The reform could be seen as a combination of centralised design, school-based implementation and professional support.
- The media has been involved in the entire process, with seminars held for reporters on the fundamental principles of the reform philosophy and constant interactions with chief editors.
- The public's focus has been kept on societal change and the need for student learning through documents, sustained discussions, seminars and conferences.

However, there is no uniform model of reform implementation for schools. Indeed, its very core was respect for individual needs, and hence the evolution of schools into more autonomous entities. Under the general theme, and with the pulling force of the public and university entrance exams, schools have developed rather diverse approaches to implementing the reform. Nonetheless, because of the change led by the reform, schools across the board have developed their own mechanisms of collective decision making and division of labour which respect their individual school cultures.

Achievements and challenges

The Hong Kong education system has been reformed several times, but people tended to shun the word "reform" until the most recent overhaul. Overall, the Hong Kong government is known for its philosophy of "positive non-intervention", although that has often been challenged in recent years. In the two decades after the war, the Hong Kong government did not intervene in the school system beyond providing subsidies. Even in later years, when government action in developing and reforming education

became significant, the general understanding remained that government intervention should be minimal. This philosophy could be called the "governmentality" of Hong Kong, to use Foucault's term.[20] This is fundamentally different from other jurisdictions where governments see themselves as the comprehensive controllers of all things happening in schools.

The net result of this philosophy of non-intervention is to provide schools ample room for professional judgement and professional decisions on how to educate students in their respective schools. It could be seen as a empowerment of the teaching profession, but in the professional rather than political sense. However, it is also a challenge because it means great disparity among Hong Kong's schools. Another consequence is that unlike practices in Shanghai and Singapore, where weaker schools are identified and measures taken to strengthen them, Hong Kong is reluctant even to rank schools. The result has been that some public schools receive standard public funding yet deliver sub-standard educational services. Parents see this as unfair. Changing the situation may not be straightforward, however, because it will mean allowing the government to actively intervene.

Nevertheless, Hong Kong's comprehensive reform is succeeding because of its strong rationale: fundamental change in society requires new ways of looking at human learning. The reform challenges the very basics of student learning and how such learning can best be achieved.

LESSONS FROM SHANGHAI AND HONG KONG

Shanghai and Hong Kong represent two different approaches to education, which makes it worth looking at them separately. Yet despite the differences, the students of both cities consistently perform well in international comparisons, as the PISA results testify. It is interesting to compare some of the common features of the two cities: they share a cultural heritage that treasures education, yet their students suffer from tremendous examination pressure. They share a colonial past, although colonial rule in Hong Kong lasted much longer. Both are major metropolitan centres in China, and indeed in Asia, and both prosper because of the vibrant cultures produced by highly-educated citizens.

While both cities launched major reforms more or less at the same time, they have followed very different development paths over the past six decades. Shanghai became a major industrial centre under the government of the People's Republic, and later, at the opening of China, saw remarkable development in the service sector. Before 1997, Hong Kong remained outside China, and hence was relatively immune from its political fluctuations. It still hosts the country's freest market and has become the centre of finance and management for the whole of Asia.

Shanghai belongs to an organised society and approached education reform in an organised way. It would be inaccurate to describe the Shanghai reform as top-down, because unmistakable and remarkable initiatives emerged from the grassroots. However, the municipal government not only designed the reform but also intervened in the process, such as by running schools and improving teaching.

Hong Kong has adopted almost the opposite approach. Its provides schools with a platform, supports them with resources and modifies the public examination as well as university admissions, but leaves the process of reform to the schools. Teachers may have found this challenging because changes in the curriculum and examinations have upset their familiar habits. But the reform has pushed schools and teachers to take a professional stand, exercise autonomy and adapt the changes to best fit their respective student bodies.

Building legitimacy

Both Shanghai and Hong Kong aim high in their educational ambitions. They both use moralistic statements and slogans to guide their reforms. In the 1990s, Shanghai used the slogan of "first class city, first class education". Although vague, the concept has driven the development of education and kept education high on the policy agenda.

Hong Kong has always felt insecure in international competitions, and much of its competitive edge is being challenged by mainland China and by other jurisdictions in the vicinity, such as Singapore, Malaysia, and even Macao. Hong Kong has identified "six pillars" for its further development, and building an "education hub" is one of them.[21]

The sustained emphasis on education carried in these statements attracts the attention and support of the entire society. It underpins the allocation of substantial government resources to education and helps mobilise community resources. And as good education cannot be achieved only by teachers, the statement is an appeal to support from all parts of society. In other words, a consistent continuous movement creates and reinforces the legitimacy of educational development (Box 6.6).

However, legitimacy means very different things in other societies and systems. There are diverse ways that governments can build and enhance the legitimacy of their policies. While the approaches in Shanghai and Hong Kong may not apply to other societies, the attention they give to building legitimacy for education is of crucial importance.

Box 6.6 **Building support for the latest reforms**

China's *Outline of the Medium and Long Term Plan for Development and Reform of Education* (Ministry of Education of the PRC, 2010b) is a blueprint for education in 2020 and perhaps beyond. The initial "consultation" draft, published in February 2010, took more than 18 months to produce. The process involved thousands of professionals and experts and more than 23 000 seminars and forums for brainstorming, and was accompanied by technical reports totalling more than five million words. It received 2.1 million submissions from all walks of society.

After the consultation draft launch in February, further discussion and revisions included provisional plans for interpretation and implementation. The exercise was chaired by Prime Minister Wen Jiabao and went through the State Council and then received endorsement from the Central Committee of the Chinese Communist Party and eventually the Politbureau, just to make sure of its high priority in the political arena. Such a strong effort in legitimacy-building is unusual, but will guarantee that the educational reform movement will carry huge momentum.

Breaking away from tradition

It is difficult to say which of the factors behind these cities' successes are due to cultural heritage and which are due to policy interventions and practices. They are intertwined. However, in both Shanghai and Hong Kong, cultural traditions involving education, such as the emphasis on exams, were perceived as impediments to modernisation, to the move from elite to mass education, from emphasis on teaching to emphasis on learning, from fact memorisation to development of learning capacities, and from economic to individual needs. In both cities, the change in the nature and orientation of the entire education system has involved a struggle against culture and tradition.

This has also been the experience in Singapore (Chapter 4), which started its comprehensive education reforms in the late 1990s, and was also the intention of the reforms in Japan (Chapter 2) and South Korea[22] in the mid-1980s. The degrees of success in these reforms vary, but intolerance of the ill effects of cultural heritage was a common factor.

Root and branch reform *versus* superficial improvement

These cases demonstrate that reform is much more than simply improvement. "Improvement" means doing what the system has been doing all along, but better. "Reform" involves paradigm shifts. In other words, it entails an awareness that further development of education is not only a matter of remedying perceived shortcomings; it means tackling more fundamental issues to allow education to catch up with changes in society. Without such an understanding, any "improvement" of the system and practices only reinforces what might have gone wrong. This is perhaps the problem with education policies in many other systems. Often, there is more worry about students' under-performance in such areas as language and mathematics than concern that the entire curriculum and pedagogy might be obsolete. Any improvement without reform would mean the repetition and reinforcement of obsolete approaches to education.

A focus on learning

A key factor behind the good performance of the two cities' systems is that they took *learning* as the core concern in their educational reforms. It might sound odd that educators and policy makers must sometimes be reminded that learning should be the core business of education. However, reforms in some other systems emphasise systemic planning or finance, school management or accountability, without actually looking at the causes, environments and processes of student learning. It is easy to forget that structure, policy, standards, finance and so on make no difference at all unless they affect what and how students ultimately learn. In this sense, both systems are to be congratulated for moving away from the tradition in which education based on examination preparation is reaffirmed without actually understanding the process of learning.

In a typical industrial society, the prime function of education was to prepare manpower and provide the relevant credentials. Once in the workplace, individuals were protected by orders, procedures, rules and regulations, regardless of their personal knowledge and characteristics. This function is now diminishing as the pyramidal structure is being replaced by small work units where individuals have to directly face clients, solve problems, design products or solutions, endure risks and face moral and ethical dilemmas. It is notable that in both Shanghai and Hong Kong, the attention to learning is not so much a matter of puritan educational ideals but rather an awakening to the future needs of society. Attention to social change and attention to learning are two sides of the same coin.

Equally, both systems have made tremendous efforts to understand human learning. These include: a community of scholars concentrateing on the "sciences of learning"; a framework based on learning that shapes the curriculum; professional discussions

among educators in the form of debates, seminars, forums, conferences and experiments, where theories of learning are interpreted and translated into grassroots practices; effective methods of dissemination, such as slogans in Shanghai, among grassroots teachers; and perception management to convince parents and the media of the value of the changes. All these efforts have to be strategically co-ordinated and synchronised, which requires champions who are committed to the concepts.

One issue that merits special attention is the usual confusion of student *learning* with *teaching* or *instruction*. It is true that good teaching is a necessary condition of good learning. However, there is ample evidence that a lot of learning occurs outside teaching, with no teaching, or with minimal teaching. The appeal in Singapore (Chapter 4) to "Teach less, learn more" has much resonance in Shanghai and Hong Kong, where the net effect of education reform is often evidenced by active and independent learning by students. Shanghai's powerful slogan: "return the time to students" has changed the classroom scene. In Hong Kong, the best schools are characterised by strong student self-governance, rather than the highest scores.

A holistic approach

Education reforms in the two cities do not concentrate only on certain aspects of education; they involve developing the student as a whole. Students' academic achievements are not separate from the other aspects of their personal development. Extra-curricular experiences, for example, are treated in both systems as essential elements in students' comprehensive learning experiences and their holistic development.

The reforms also try to mobilise all sectors of society and are seen as an undertaking that concerns everyone. Both societies positioned education as a core element in the city's future. Hence, the reforms not only received priority consideration on the governments' agenda, but all sectors of society were expected to participate and give support.

Accountability

The term accountability, sometimes known as quality assurance, is pervasive in the literature on education policies. However, often people may assume that the existence of quality assurance procedures is an assurance of quality. This may not be true at all. First, as noted above, defining quality and the standards we expect should precede methods for assuring this quality. In other words, if we set low quality standards, any quality-assurance mechanism will only assure low quality. Second, quality assurance only works in a culture that has internalised high quality as a norm. This is the only way that there will be active efforts towards and understanding of quality across the board.

Shanghai and Hong Kong both have social norms that value quality in education. First, both have systems of quality assurance in the managerial sense. There is no shortage of performance indicators and appraisal mechanisms. Second, both education systems are basically transparent. While parents in these societies are not used to intervening in school activities as they do in many Western societies, they do have a very powerful influence over schools, either through their choice of schools or through the media, which run constant reports comparing schools. The vibrant cyber-community has added to the tremendous pressures on schools to maintain a high quality of education. In Shanghai, schools and parents have very close relations, and information flows both ways on cell phones.

Principals and teachers therefore face a daily struggle to balance administrative accountability, client accountability and professional accountability. Dealing with the larger environment is not seen as an extra chore but as an integral part of professional responsibilities. This sense of accountability is built into programmes of teacher preparation, teachers' continuing professional development and training for school leadership. Hence, unlike in other cultures, accountability in Shanghai and Hong Kong is not regarded as a separate machinery to assure quality. Instead, accountability is built into the system as social expectations, as fundamental in school leadership, as well as an essential part of teachers' professionalism. It is not about procedures and indicators.

FINAL OBSERVATIONS: EDUCATION FOR ECONOMIC SUCCESS

China entered the global economy very late in the game, but has been making breakneck progress ever since. Both Hong Kong and Shanghai aim high and aspire to perform well in many areas of social development. Their ambitions are augmented by their prospering economic and financial sectors. Both societies also regard human resources as the only resources they can rely on, and hence they have made substantial investments in education. This is a virtuous circle. Their spectacular reforms in education have made possible a no less spectacular economic success, which has in turn made it possible to continue to ratchet up the quality of their education systems. Their cultural heritage has played an important role in these successes, but that heritage has been constantly modernised.

In all these ways, the experience in the two cities reflects the kind of reform in education that appears to be necessary and essential worldwide as the economy advances.

■ Figure 6.3 ■

Shanghai-China and Hong Kong-China: Profile data

Language(s)	Official: Standard Mandarin (Shanghai) Standard Cantonese; English (Hong-Kong)
Population	1 328 million (2008)[23] 12 million (2007)[24] (*Shanghai*) 7 018 million (2008)[25] (*Hong Kong*)
Youth population	20.5%[26] (OECD 18.7%; World 27.4%)
Elderly population	7.9%[27] (OECD 14.4%; World 7.4%)
Growth rate	0.63%[28] (OECD 0.68%; World 1.19%)
Foreign-born population	0.1% Immigrants (2010)[29]
GDP per capita	USD 5 962 (2008)[30] USD 11 361 (2009)[31] (*Shanghai*) USD 39 062 (2008)[32] (*Hong-Kong*)
Economy-Origin of GDP	Manufacturing, mining, utilities and construction 48.6%; Services 40.1%; Agriculture, forestry, fishing 11.3% (2008)[33] Manufacturing, auto making, chemical processing, steel manufacturing, biomedicine (*Shanghai*)[34] Manufacturing, finance, trade, other services, other sectors (*Hong Kong*)[35]
Unemployment	5.7%[36] (OECD average 6.1%)[37]
Expenditure on education	3.3% of GDP (OECD average 5.2%)[38] *3.3% of GDP* (*Hong Kong*)[39] 16.3% of total government expenditure (OECD average 13.3%)[40] *23% of total government expenditure* (*Hong Kong*)[41]
Enrolment ratio, early childhood education	44% (2008) (regional average 49%)[42]
Enrolment ratio, primary education	113% (2008) (regional average 110%)[43]
Enrolment ratio, secondary education	76% (2008) (regional average 77%)[44]
Enrolment ratio, tertiary[45] education	23%[46] (regional average missing)
Students in primary education, by type of institution or mode of enrolment[47]	Public: 93.8% (OECD average 89.6%) Government-dependent private: 6.2% (OECD average 8.1%) Independent, private (included in "Government-dependent private" figure) (OECD average 2.9%)
Students in lower secondary education, by type of institution or mode of enrolment[48]	Public 92.9% (OECD average 83.2%) Government-dependent private: 7.1% (OECD average 10.9%) Independent, private (included in "Government-dependent private" figure) (OECD average 3.5%)
Students in upper secondary education, by type of institution or mode of enrolment[49]	Public: 85.9% (OECD average 82%) Government-dependent private: 14.1% (OECD average 13.6%) Independent, private (included in "public" figure) (OECD average 5.5%)
Students in tertiary education, by type of institution or mode of enrolment[50]	Tertiary type B education: missing data[51] (OECD average public: 61.8% Government-dependent private : 19.2% Independent-private: 16.6%) Tertiary type A education: missing data[52] (OECD average Public: 77.1% Government-dependent private : 9.6% Independent-private: 15%)
Teachers' salaries	Average annual starting salary in lower secondary education: no data (OECD average USD 30 750)[53] Ratio of salary in lower secondary education after 15 years of experience (minimum training) to GDP per capita: no data (OECD average: 1.22)[54]
Upper secondary graduation rates	Data missing (OECD average 80%)[55]

Interview partners (Shanghai)

Shanghai Academy of Educational Science

Lu Jing, Associate professor, Vice director, Shanghai Institute for Basic Education Research and Shanghai PISA Centre, Shanghai Academy of Educational Sciences.

Gu Ling-yuan, professor, master teacher, former vice director of Shanghai Academy of Educational Sciences. He was honoured Shanghai Education Hero in 2003.

Dr. Wang Jie, Associate Professor, Director of Teacher Education Centre, Shanghai Academy of Educational Sciences.

Interviews at China Pu Dong Cadre College

Shen Zu-yun, Director of Shanghai Educational News Centre.

Wang Mao-gong, Director of Education Bureau in Xuhui District, a central district in Shanghai.

Yin Hou-qin, Vice director general, Shanghai Municipal Education Commission.

Zhang Min-sheng, professor, Shanghai Education Society, former Vice Director General of Shanghai Municipal Education Commission.

Dr. *Zhang Min-xuan*, Professor, Vice Director General, Shanghai Municipal Education Commission, PGB and NPM of Shanghai PISA 2009.

Zhu Jian-wei, Director of Education Bureau in Minhang District, a suburb district in Shanghai.

Shanghai Teaching Research Institute

Tan Yi-bin, Assistant Director, master teacher, teaching researcher in Chinese, Shanghai Teaching Research Institute, Leading Expert of PISA 2009 Reading Expert Group in Shanghai.

Xu Dian-fang, Director, Shanghai Teaching Research Institute.

Teachers and Principals

Bai Bin, principal, Chinese teacher, Wen Lai Middle School, PISA School Co-ordinator in PISA 2009 Field Trial, which is held on April 25, 2008.

Ding Yi, Vice Principal, Middle School affiliated to Jing 'an Teacher Education College.

Li Xiao-yu, vice principal charges on teaching, Chinese teacher, Qibao High School.

Qiu Zhong-hai, Master teacher and master principal, Shanghai Qibao High School, he was honoured Shanghai Education Hero in 2008.

Shi Ju, mathematics teacher, Wen Lai Middle School.

Wang Hong, Chinese teacher, Wen Lai Middle School.

Xu Feng, vice principal, politics teacher, Wen Lai Middle School.

Mr Zhou. Vice Principal, Wen Lai High School.

Zhou Ming-jun, English teacher, Wen Lai Middle School.

(Hong Kong)

The material for the section on Hong Kong is based on the experience of Professor Kai-ming Cheng, Chair of Education, University of Hong Kong (1995 to present), Senior Advisor to the Vice-Chancellor, University of Hong Kong (2003 to present), and former Vice-Chancelor, University of Hong Kong (1997-2003).

Notes

1. In this chapter we use the term "Confucius society" as a convenient shorthand for an array of jurisdictions: Japan, South Korea, North Korea, Vietnam and the Chinese communities (Mainland China, Taiwan, Hong Kong, Macao). While Singapore shares the same cultural heritage, it is also influenced by the Malay and Indian cultures. See more detailed discussions in Cheng (2011).
2. Researchers have found that the oldest candidate was 104.
3. In most dynasties, women were excluded from the exercise.
4. Gross enrolment ratio is used here because of age staggering at that level.
5. See more detailed discussion in Yang 2004.
6. This is comparable with South Korea and Japan, where the number of places in higher education exceeds the number of high school graduates.
7. Institutes in Shanghai belong to different categories in terms of their relations with the central and municipal governments, with different degrees of sponsorship from the two authorities. Accordingly, they are assigned admission quotas of different mixes between local and national candidates.
8. The best presentation of this cultural assumption is by Fei Hsiao-tung, a student of Malinovsky and the first renowned anthropologist in China. According to Fei, society is perceived by the Chinese in a "hierarchical configuration" that is vertical and structured, as opposed to the Western view of society as an "association configuration" that is flat and ad hoc. This was best presented in the lecture series Earthbound China (1947).
9. The curriculum reform reduced a class period to 35 minutes for primary school and 40 minutes for secondary school in Shanghai. In most of the other provinces in China, a class period is 40 minutes for primary school and 45 minutes for secondary school (Ding, 2010).
10. The following three sections are extracted and modified from a commissioned paper by Ding (2010).
11. See *http://wljy.sherc.net/kgpt/*
12. This is a policy started in 2002, widely quoted. One of the most recent discussions can be found in Shao, 2010.
13. These are extracted and modified from Ding (2010).
14. Data from a group interview with good public school leaders.
15. This is from an interview with Mr Gu Lingyuan, a nationally famous mathematics teacher turned researcher, who is influential in education reforms in Shanghai.
16. For example, it is 7th according to the International Monetary Fund (Economy Watch (2010). Data: Economic Statistics Database).
17. The Society of Accountants' representative made the point that what had been taught in universities was not useful in the workplace, and hence graduates have to unlearn what they have learned. They'd rather they were not taught accounting, which they could learn on-the-job in a matter of months. The interview was carried out in 2000.
18. Including a special session with Dr Albert Tuijmann, then member of the OECD education team, in June 2000.
19. For the best summaries of these theories see Sawyer (2006) and Bransford et al (2000).
20. This is a concept development by Foucault in his later years. A brief introduction to the concept can be found in *www.policyaddress.gov.hk/08-09/eng/policy.html*
21. This is one of the main themes of the Chief Executive's Policy Speech in 2009 (Tsang, 2009).
22. South Korea launched a few reforms in the 1980s which went against the elitist tradition of calling for equalisation of secondary schools and mass admission to higher education. See Cheng 2010.
23. OECD (2010b), *OECD Economic Surveys: China 2010*, OECD Publishing.
24. OECD (2010b), *OECD Economic Surveys: China 2010,* OECD Publishing. Non-agricultural and total inhabitants (year of reference – 2007).
25. World Bank, World Development Indicators.
26. OECD (2010c), *OECD Factbook 2010*, OECD Publishing. Ratio of population aged less than 15 to the total population (data from 2008).
27. OECD (2010c), *OECD Factbook 2010*, OECD Publishing. Ratio of population aged 65 and older to the total population (data from 2008).
28. OECD (2010c), *OECD Factbook 2010*, OECD Publishing. Annual population growth rate (data from 2007).
29. China is a sending country, with an estimated diaspora of 35 million worldwide (International Organisation for Migration, *www.iom.int*).
30. OECD (2010b), *OECD Economic Surveys: China 2010*, OECD Publishing. PPP (data from 2008).

31. National Bureau of Statistics of China, *www.stats.gov.cn/english/*.
32. In current US dollars, derived from World Bank national accounts data, and OECD National Accounts data files. World Bank, World Development Indicators.
33. OECD (2010b), *OECD Economic Surveys: China 2010*, OECD Publishing. Percentage of GDP 2008.
34. Shanghai municipal government.
35. Hong Kong Census and Statistics Department, *www.censtatd.gov.hk*.
36. OECD (2010d), *Employment Outlook 2010*, OECD Publishing. Measured as a percentage of the estimated urban non-agricultural labour force (data from 2008).
37. OECD (2010c), *OECD Factbook 2010*, OECD Publishing. Total unemployment rates as percentage of total labour force (data from 2008).
38. OECD (2010e), *Education at a Glance 2010: OECD Indicators*, OECD Publishing (year of reference – 2007).
39. UIS Statistics in Brief: Hong Kong (China) SAR 2010 (year of reference – 2008).
40. OECD (2010e), *Education at a Glance 2010: OECD Indicators*, OECD Publishing (year of reference – 2007).
41. UIS Statistics in Brief: Hong Kong (China) SAR 2010 (year of reference – 2008).
42. UNESCO-UIS (2010), *UIS Statistics in Brief: China*. Percentage represents gross enrolment rate for MF; 2008 (regional average 49%).
43. UNESCO-UIS (2010), *UIS Statistics in Brief: China*. Percentage represents gross enrolment rate for MF; 2008 (regional average 110%).
44. UNESCO-UIS (2010), *UIS Statistics in Brief: China*. Percentage represents gross enrolment rate for MF; 2008 (regional average 77%).
45. The OECD follows standard international conventions in using the term "tertiary education" to refer to all post-secondary programmes at ISCED levels 5B, 5A and 6, regardless of the institutions in which they are offered. OECD (2008), *Tertiary Education for the Knowledge Society: Volume 1*, OECD Publishing.
46. UNESCO-UIS (2010), *UIS Statistics in Brief: China*. Percentage represents gross enrolment rate for MF; 2008.
47. Data from UNESCO Institute for Statistics, Data from 2008, cited in OECD (2010) *Education at a Glance 2010: OECD Indicators,* OECD Publishing.
48. Data from UNESCO Institute for Statistics, Data from 2008, cited in OECD (2010) *Education at a Glance 2010: OECD Indicators,* OECD Publishing.
49. Data from UNESCO Institute for Statistics, Data from 2008, cited in OECD (2010) *Education at a Glance 2010: OECD Indicators,* OECD Publishing.
50. Data from UNESCO Institute for Statistics, Data from 2008, cited in OECD (2010) *Education at a Glance 2010: OECD Indicators,* OECD Publishing.
51. Data missing from *Education at a Glance 2009: OECD Indicators,* OECD Publishing.
52. Data missing from *Education at a Glance 2009: OECD Indicators,* OECD Publishing.
53. Starting salary/minimum training in USD adjusted for PPP, *Education at a Glance 2010: OECD Indicators,* OECD Publishing.
54. Starting salary/minimum training in USD adjusted for PPP, *Education at a Glance 2010: OECD Indicators,* OECD Publishing.
55. OECD (2010e), *Education at a Glance 2010: OECD Indicators*, OECD Publishing. Sum of upper secondary graduation rates for a single year of age (year of reference for OECD average – 2008).

References and further reading

Altbach, P.G., L. Reisberg, and **L.E. Rumbley** (2009), "Trends in global higher education: Tracking an academic revolution", a report prepared for the UNESCO 2009 World Conference on Higher Education, UNESCO, Paris.

Bransford, J.D. (ed.) (2000), *How People Learn: Brain, Mind, Experience, and School,* National Academy Press, Washington, DC.

Bray, M. (2009), *Confronting the Shadow Education System: What Government Policies for What Private Tutoring?* UNESCO/International Institute for Educational Planning, Paris.

Census and Statistics Department of Hong Kong (2010a), 2009 Economic Background and 2010 Prospects.

Census and Statistics Department of Hong Kong (2010b), Hong Kong Annual Digest of Statistics.

Census and Statistics Department of Hong Kong (2010c), Hong Kong Population Projections 2010-2039.

Cheng, K.M. (1987), *The Concept of Legitimacy in Educational Policy-making: Alternative Explanations of Two Policy Episodes in Hong Kong*, PhD Thesis, University of London Institute of Education, London.

Cheng, K.M. (1996), *The Quality of Primary Education: A Case Study Of Zhejiang Province, China*, UNESCO/International Institute for Educational Planning, Paris.

Cheng, K.M. (1997), "The Meaning of Decentralisation: Looking at the Case of China", in W.K. Cummings & N.F. McGinn (eds.), *International Handbook of Education and Development: Preparing Schools, Students And Nations For The Twenty-first Century*, Pergamon, Oxford.

Cheng K.M. (2000), "Education and Development: The Neglected Dimension of Cross-Cultural Studies", in R. Alexander, M. Osborn and D. Philips (eds.), *Learning From Comparing: New Directions in Comparative Educational Research,* Vol 2: Policy, Professionals and Development, Symposium Books, Oxford, pp. 81-92.

Cheng, K.M. (2004), "Turning a Bad Master into a Good Servant: Reforming Learning in China", in I. Rotberg (ed.), *Balancing Change and Tradition in Global Education Reform*, Scarecrow Education, Washington, DC.

Cheng, K.M. (2007), "Reforming Education Beyond Education", in Y.M. Yeung (ed.), *The First Decade of the HKSAR*, The Chinese University Press, Hong Kong, pp. 251-72.

Cheng, K.M. (2010), "Developing education beyond manpower", in UNDP (2010), *Capacity is Development, UNDP,* New York, available at *www.capacityisdevelopment.org/doccs/capdev_research/Developing%20Education%20Beyond%20Manpower.pdf*

Cheng, K.M. (2011), "Confucius education", in J. Banks (ed) *Encyclopedia of Diversity*, Sage, Thousand Oaks.

Cheng, K.M. and **H.K. Yip** (2007), "Facing the Knowledge Society: Reforming Secondary Education in Shanghai and Hong Kong", working paper, World Bank, Washington, DC.

Curriculum Development Institute (2001), *Learning to Learn: The Way Forward in Curriculum*, Curriculum Development Institute, Hong Kong, available at *www.edb.gov.hk/index.aspx?langno=1&nodeID=2365*.

Ding, X. (2010), "Educational Reform and Development in Shanghai", paper commissioned by the Shanghai Academy of Education Research for this study.

Elman, B.A. (2000), *A Cultural History of Civil Examinations in Late Imperial China,* University of California Press, Berkeley.

Fei, H.T. (1947), *Xiang Tu Zhong Guo* (Earth-bound China), reprinted 2006, Shanghai People's Press, Shanghai. English translation: G.G. Hamilton, and Z Wang (1992), *From the Soil: The Foundations of Chinese Society*, University of California Press, Berkeley.

Hu, R. and **M. Jiang** (2002), "First-rate City and First-rate Education", Shanghai Education Press, in Chinese.

Illich, I. (1971), *Deschooling Society*, Calder and Boyars, London.

Information Office of Shanghai Municipality and Shanghai Municipal Statistics Bureau (2010), *2010 Shanghai Basic Facts*, Shanghai Literature and Art Publishing Group, Shanghai.

Ji.L. (2010), "From integration to fusion", in *Shanghai Education*, 7(4A), 12-19.

Jin, Ke (2003), *The Project of Standardization of Primary and Secondary Schools was Completed in Three Years and 1569 Schools were Upgraded,* in Chinese, SINA, Beijing, available at *http://sh.sina.com.cn/news/20030102/08432422.shtml*

Min, W. (2008), "Higher Education Financing in East Asia: Policy Implications for China", in J.Y. Lin and B. Pleskovic (eds.), *Higher Education and Development*, World Bank, Washington, DC, pp.41-46.

Ministry of Education of the PRC (2001), *Guidelines for Curriculum Reform in Basic Education,* draft, Ministry of Education, Beijing.

Ministry of Education of the PRC (People's Republic of China) (2010a), *National Statistics of Education Development in China 2009,* Ministry of Education, Beijing, available at *www.moe.edu.cn/publicfiles/business/htmlfiles/moe/moe_633/201008/93763.html*

Ministry of Education of the PRC (2010b), *National Outline for Medium and Long-Term Education Reform and Development 2010-2020*, in Chinese, Ministry of Education, Beijing, *www.gov.cn/jrzg/2010-07/29/content_1667143.htm*

Mullis, I.V.S. et al. (2006), *PIRLS 2006 International Report: IEA's Progress in International Reading Literacy Study in Primary School in 40 Countries,* International Association for the Evaluation of Educational Achievement (IEA), Boston College, Chestnut Hill, Massachusetts.

OECD (2010a), *PISA 2009 Volume I, What Students Know and Can Do: Student Performance in Reading, Mathematics and Science*, OECD Publishing.

OECD (2010b), *OECD Economic Surveys: China 2010*, OECD Publishing.

OECD (2010c), *OECD Factbook 2010*, OECD Publishing.

OECD (2010d), *Employment Outlook 2010*, OECD Publishing.

OECD (2010e), *Education at a Glance 2010: OECD Indicators*, OECD Publishing

Sawyer, K. (ed.) (2006), *The Cambridge Handbook of the Learning Sciences,* Cambridge University Press, Cambridge.

Shanghai Municipal Education Commission (2004), *Shanghai Education Yearbook 2004,* Shanghai Educational Publishing House, Shanghai.

Shanghai Municipal Education Commission (2008), *Shanghai Education Yearbook 2008,* Shanghai Educational Publishing House, Shanghai.

Shanghai Municipal Government (2010), *Shanghai Yearbook 2009*, Shanghai Municipal Government, Shanghai.

Shanghai Municipal Statistics Bureau (2010), *Shanghai Statistical Yearbook 2010*, China Statistics Press, Shanghai.

Shao, S. (2010) "Social Stratification and the Education of Migrant Children: A Sociological Analysis of the Policy Decisions of "Two Mainly", *Research in Education Development*. 2010(*11*), available at *www.cnsaes.org/homepage/html/magazine/jyfzyj/jyfzyj_jyysh/2674.html*

Solomon, R.H. (1971), "Confucianism and the Chinese Life Cycle", in *Mao's Revolution and the Chinese Political Culture*, University of California Press, Berkeley, pp. 28-38.

Stevenson, H.W. and **J.W. Stigler** (1992), *The Learning Gap: Why Our Schools are Failing and What We Can Learn from Japanese and Chinese Education,* Summit Books, New York.

Tsang, D. (2009), *Embracing New Vhallenge,. Policy Address 2009-10,* Hong Kong Government, available at *www.policyaddress.gov.hk/08-09/eng/policy.html*

UNESCO Institute of Statistics (2009), *Global Education Digest, 2009: Comparing Education Statistics Across the World,* UNESCO, Paris.

Yang, R. (2004), "Toward Massification: Higher Education Development in the People's Republic of China since 1949," in J. Smart (ed.) *Higher Education: Handbook of Theory and Research*. Springer, Dordrecht.

7

Policy Lessons from and for Japan

This chapter reviews Japan's history of education reform. It also summaries the key strengths of the country's education system and suggests what other countries could learn from Japan's example. Given the fundamental changes occurring in Japan's demographic and economic profile and the effects of globalisation, the chapter also recommends some policy reforms that could help maintain the country's excellence in education.

INTRODUCTION

As shown in Chapter 2, the performance of Japan's students in mathematics and science compared with that of students in other OECD countries is impressive, and their performance in reading literacy, though not in the very top ranks, is also high. There is nothing new about this consistently good performance: Japan has placed at or near the top of the international rankings on all such surveys since they began. What is new is that Japan has, over recent years, seen improvements in students' ability to creatively use and apply the knowledge they have acquired, areas in which educators have traditionally seen weaknesses in Japanese education. Similarly, in the PISA 2009 assessment Japanese students showed much higher levels of engagement and enjoyment of reading and learning than was the case in 2000.

Japan also provides a comparatively equitable distribution of learning opportunities, but social disparities among schools have increased considerably over the past decade.

It is tempting to believe that these results are due to the achievement of only a small elite of students, but that is not the case: 95% of the age cohort completes high school in Japan, the highest proportion among the G8 nations.

All of this has repercussions in daily life. Universal literacy and high levels of academic achievement mean that newspaper editors in Japan can and do routinely assume that their readers can understand sophisticated statistical tables and highly technical scientific topics. Factory managers distribute manuals that assume knowledge of calculus to teams that include recent high school graduates. The advantage of this level of knowledge and skill to a country, in both citizenship and economic terms, is incalculable.

This chapter begins with a review of Japan's education reform trajectory as a backdrop to current reform efforts. It then summarises key strengths of the Japanese education system – from which other countries can learn – and analyses policy challenges that facing the country – where Japan can learn from other education systems.

JAPAN'S PAST REFORM TRAJECTORY

Japan is a mountainous island nation. The proportion of arable land to population is among the lowest in the industrialised world. Its inhabitants crowd together in the mountain valleys and along the coasts in densely populated enclaves. Japan is also subject to regular and frequent disasters, such as typhoons and earthquakes, and the regular possibility of crop failure. These islands contain very little in the way of readily extractable natural resources; instead, the country has achieved a high level of success through its education system.

A long history in such a challenging environment has had a profound effect on Japanese culture; people developed very strong co-operative ties as a collective survival mechanism. Society recognised early on that a lack of natural resources meant that the best way to succeed was through developing human capital. The result is a culture in which great value is placed on education and skills on the one hand, and on the group and social relations on the other. There is a shared belief that if the individual works tirelessly for the group, the group will reciprocate. But if one flouts the group, one can expect very little from society.

The Tokugawa era: 1603 to 1868

Prior to the Tokugawa era, Japanese culture had been one of warriors, in which the Samurai had the highest social status in the nation. During the Tokugawa era, which lasted for about 250 years until the middle of the 19th century, Japan was at peace. From the middle of the 19th century, the Samurai, while retaining their social status, replaced their swords with pens and became the bureaucrats who ran the country. Largely isolated from the outside world, Japan prospered and enjoyed a rich culture. By 1850, an estimated 40% of Japanese were literate, putting the country on a par with Europe, although it lagged behind the Europeans in technology and finance.

The American Admiral Matthew Perry's "Black Ships" appeared in 1853, demanding that Japan open itself to trade on terms favourable to the West. The Tokugawa regime was overthrown in 1868 by a rebellion led by lower-ranked bureaucrats and eventually the emperor was restored to the throne in the Meiji Restoration.

The first great education reform

The new government applauded Western achievement, particularly in advanced education, science and technology, recognising that these were the factors that had led to the West's imposition of an "open" Japan. Japan became determined to match the achievements of the West in these fields and to upgrade its military. With almost total consensus across leaders from all sectors, Japan set out to modernise the country in order to survive in the new world order. Today, Japan continues to compare itself to its competitors, making national benchmarking arguably one of the most important reasons for Japan's success in education. The so-called "temple schools" found all over Japan at the end of the Tokugawa era, as well as the elite schools created for the children of the Samurai bureaucrats, provided a strong base on which the new leaders could build the world-class education system to which they aspired.

Meiji Japan borrowed the administrative scheme for its new education system from the French. That scheme could be characterised as centralised and very orderly. From Germany they adopted the idea of an educational system built around national universities. England provided Japan with a model of schools founded on strong national moral principles (such as "public" schools like Eton and Harrow). And the United States provided a pedagogical paradigm in the teachings of John Dewey – an American philosopher, psychologist and educational reformer – that resonated deeply with the Japanese notion that a school should be responsible for developing the whole child (Dewey, 1902).

The new government, moving quickly to make a modern nation state, decreed universal, compulsory education and abolished the rigid class distinctions in the education system that were believed to have crippled the old regime. Japan was determined to ensure that every Japanese citizen would be as well educated as possible[1]. Therefore, there would be no tracking or segregation of students by ability or social class in Japanese education. This turned out to be a critical decision, laying the basis for what would become arguably one of the world's most meritocratic societies.

In the 1880s there was a reaction against the Meiji government's determination to implement ideas from elsewhere in the world. Critics feared that the essence of what it meant to be Japanese would be lost. The *Imperial Rescript of Education*, released in 1890, was a ringing declaration of the primacy of Japanese values in guiding the evolution of the new compulsory education system. Emphasising the Confucian virtues of loyalty, respect for one's elders, the importance of relationships with other family members, one's spouse and friends, it reminded its readers of the importance of modesty and moderation, the obligation to educate oneself to the fullest, and the duty to obey the constitution and laws.

Ever since the *Rescript* was issued, education policy in Japan has been anchored by both benchmarking Japan against the world's best education systems and by a firm grounding in traditional Japanese values. This issue will be taken up when the chapter outlines the third great education reform below.

The second great education reform

After World War II fundamental reforms were initiated throughout Japanese society in order to foster a democratic and peaceful nation. Educational reforms were a cornerstone of this effort.

The most fundamental reform was brought about by the new Japanese Constitution and the Basic Act on Education. The new Japanese Constitution established, for the first time, the right of individuals to compulsory education. The Basic Act on Education sought to make education a resource for a democratic and peaceful nation and provided important principles, including the full development of personality as a goal of education and achieving equity and compulsory education for nine years.

In line with these laws, the structure of the school system was simplified and access was made more equitable. Previously, secondary schools and institutions for tertiary education had been differentiated by field of study and admission to college had been limited to small numbers of graduates from special high schools. It had also been difficult especially for women to enter college as they had no access to those special high schools. With the new law, all secondary schools were divided into lower and upper secondary schools with equal access to both male and female students. Compulsory education was extended to six years in primary schools and to three years in lower secondary schools.

Also the approach to teacher training was modified. Previously, graduates from specific teacher education institutions, located in the system between secondary and tertiary education, could apply for the teaching profession. In contrast, the reforms required students to gain designated credits at colleges in order to apply for the profession. Students could now gain those credits while continuing to major in other fields of study without limiting their studies to teacher-related subjects. The implementation of these reforms posed major challenges, as Japan had to train about six hundred thousand teachers in-service to upgrade their skill within a few years.

While the educational reforms that were introduced during this periods did not always take Japanese cultural and customs into consideration and caused considerable confusion among stakeholders which had to implement them quickly and with limited resources, they succeeded in breaking down important barriers that had obstructed educational change in Japan, and set the stage for a new era in the development of the modern educational system.

The third great education reform

By the 1980s, Japan could declare that it had caught up with the most advanced industrialised nations, both economically and with regard to its education system. When the Fundamental Law on Education was revised in 2006, much had changed since the law was adopted in 1947. Life expectancy for men had risen from 50 to 79 years, and for women from 54 to 85 years. The fertility rate had dropped from 4.5 to 1.3. The high school attendance rate had grown from 43% to 98%. University attendance had climbed from 10% to 49%. From a context in which 49% of workers were employed in agriculture and 30% in manufacturing and related industries, fewer than 5% of workers were now employed in agriculture and more than 67% were employed in manufacturing and related industries.

But catching up with the rest of the world and emulating others is easier than charting a country's own future. That may contribute to the explanation why there was a growing chorus of criticism about Japan's education system during the 1980s.

▪ Figure 7.1 ▪

Japan's Reform Trajectory

Major Developments in Japan's Education Reform Trajectory

1603

Beginning of Tokugawa Era

In addition to the formal education system for Samurai that was administered by each territory, widespread teaching practices of basic subjects such as reading, writing and arithmetic using abacus for commoners in local communities (Terakoya) made it possible to achieve rapid modernisation in later years.

1868

Beginning of Meiji Era

1872

The Educational System Order (Gakusei) was proclaimed with the purpose of establishing a modern nationwide school system for the first time, emphasising primary education for all and the development of higher education to catch up with Western states in terms of technology and culture.

- Learning from Western systems, it provided one uniform educational system regardless of social class or geographical location.

1908

Compulsory education of six years was achieved with an attendance rate exceeding 97%.

1945

End of World War II

Post-war Occupation of Japan by the Allied Powers

1947

1948

Imperial Rescript on Education was repealed by the National Diet, in addition to a notice issued by MEXT in 1946 to dissuade the belief that it provided the foundation for education.

1950

Start of the Nikkei Stock Average calculation

1951

The free distribution of textbooks was partially initiated.

Draft Course of Study, which was prepared for the immediate needs of post-war reforms, was revised altogether and implemented.

1952

End of the Post-war Occupation

1953

A number of laws were established in order to achieve equity in education throughout the country such as laws regarding financial support to local governments for teachers' salaries and facilities, laws to provide special financial support to remote areas and etc.

1954

Japan begins offering international technical assistance and development aid to developing countries starting with its support of the Colombo Plan for Co-operative Economic Development in South and Southeast Asia

Major Developments in Japan's Education Reform Trajectory

Imperial Rescript on Education helped to centralise Japanese education.

International benchmarking of Japanese education and reforms to modernise education practice and provide universal education.

The Imperial Rescript on Education (Kyoiku Chokugo), which lists a set of guidelines for moral conduct and becoming a productive citizen in society, was issued and widely used in schools to maintain national values in the time of westernisation.

Fundamental Law of Education and School Education Law were established, with the educational objective of "character building», providing a simpler and more equitable school system from early childhood education to university including nine years (six in primary and three in lower secondary) of free compulsory education.

Draft Course of Study was published, setting out standards at each grade on class hours per year and on curriculum.

The Japan Teachers Union (JTU) was formed. With 86.3% of public school teachers and staff joining in 1958, it has remained the largest teachers' union and its members have been politically active and influential throughout the post-war era. The membership rate has decreased over the years to 26.2% in 2011.

Education boards were introduced in every Prefecture and Municipality, aiming to achieve decentralisation and democratisation of educational administration. The boards were in charge of educational administration and its members were elected by local residents, whereas in the past governors or mayors who were under strong control of the central government were in charge.

The Central Council for Education, an advisory organisation that reviews and discusses important educational policies, was established and convened.

More than half of students who completed compulsory education entered upper secondary schools.

1955

The Sony Corporation produces and markets an innovative transistor radio that transformed the Japanese electronics industry image

One in ten high school graduates attended a university or junior college.

1956

A nationwide assessment survey was started and conducted for 6th and 9th grades each year to acquire the data necessary to improve the teaching methods and physical conditions of schools up until 1966.

The selection process for members of education boards was reformed from the election by local residents to the appointment by the governors or mayors mainly due to political conflicts within education boards linked to public elections.

1957

Toyota starts to export its cars to the United States

1958

The Course of Study was revised, and implemented from 1961. It aimed to help build basic knowledge and introduced independent sessions on moral education, with each subject more systematically organised.

1959

In order to solve the problem of overcrowded classes, a standard class size was set by law to 50 students per class and the First Teaching Staff Deployment plan (1959-1963) was implemented to achieve it.

1963

A law on Free Textbooks in Compulsory Schools was established.

1964

Japan hosts the summer Olympic games

Introduction of the Shinkansen high-speed rail network

The First International Mathematics Study (FIMS) was conducted across 12 countries by the International Education Association (IEA).

- Japanese 8th grade students ranked second out of 12 participating countries.

The Second Teaching Staff Deployment plan (1964-68) was implemented to achieve a standard class size of 45 students (successive plans were subsequently implemented to achieve smaller classes or deploy needed teachers or staff).

1967

The Japanese economy ranks second in the world according to their GDP

1968

The Course of Study was revised, and implemented from 1971. The content of subjects was improved to keep up with rapid changes in society with the longest class hours and the most subjects ever taught in the post-war era until now.

1970

Expo 1970 held in Osaka

The OECD Reviews of National Policies for Education: Japan cited accomplishments but was critical of centralisation, standardised content and overemphasis on university entrance exams.

1971

The Japanese Yen moves to a floating exchange rate

The Central Council for Education made a comprehensive policy recommendation on school education (46 Toshin), which had long-standing impacts on many reforms in later years. Realised policies include a teachers' pay raise in 1974, a revision of the Course of Study in 1980, future Teaching Staff deployment plans, a plan to increase access to early childhood education, the establishment of education-specialised colleges and a plan to fully enforce compulsory education for students with intellectual disabilities, physical disabilities and health impairments.

1973

First world oil crisis

1974

Law Concerning Special Measures for Securing of Capable Educational Personnel in Compulsory Education Schools for Maintenance and Enhancement of School Education Standards established, with many talented graduates pursuing other professions in the context of rapid economic growth.

- Raised teachers' salaries about 25%, but the value of this increase has been diminishing over time.

More than 90% of students who completed compulsory education entered upper secondary schools.

1976

Chief teachers, whose role is to lead and co-ordinate school education plans or educational activities of each grade, were formally incorporated in the management structure of schools to meet growing needs for better teaching methodology and school management.

12% of primary school students and 38% of lower secondary school students attended private "cram" schools (Juku) according to the MEXT survey.

1977

The Course of Study was revised, and implemented from 1980. It carefully selected basic subjects and reduced class hours, aiming to nurture well-rounded students in a less strenuous and fulfilling school life.

1979

Introduction of the Sony Walkman to the world market

1984

In response to the decline in learning environments relates to problems such as school violence, bullying, and too much competition, and as social solidarity weakened and the educational function of the family declined due to the dispersal of the nuclear family and growing urbanisation, the National Council on Educational Reform was established and convened to discuss a comprehensive reform for the 21st century, reporting directly to the Prime Minister.

- A number of policy recommendations were made regarding the principle of respect for individual's educational needs, transition to a lifelong learning system and response to internationalisation and the information society until its final report in 1987, setting out strong policy directions in later years.

1985

In response to reports about rising incidences of school bullying (Ijime), MEXT convened a study group on school bullying and issued a notice and a statement from the Education Minister to tackle this problem.

16.5% of primary school students and 44.5% of lower secondary school students attended private "cram" schools (Juku), according to a MEXT survey. It was attributed to too much competition to get into good schools and parents' lack of confidence in formal public schooling among other things. MEXT was concerned about its detrimental effects on sound development of students and held a dedicated study group and issued notices on how to better address this situation to education boards and other stakeholders in 1987.

1989

The Course of Study was revised, and implemented from 1992. Its end goal was to lay the foundation for lifelong learning and the cultivation of independent and well-rounded individuals prepared for the challenges of the 21st century. In addition, it created a new subject called 'life environmental studies' instead of social studies and science for 1st and 2nd grades which aimed to cultivate attitudes for learning and environments through direct experience (ex. Growing vegetables).

The Nikkei Stock Average hits an all-time high

1991

A standard class size of 40 students was achieved after successive Teaching Staff Deployment plans.

End of the economic bubble and start of a long stagnation

1992

MEXT issued a notice to ask education boards and other stakeholders to address the problem of school truancy in response to reports on an increasing number of truant students.

1993

23.6% of primary school students and 59.5% of lower secondary school students attended private "cram" schools (Juku) according to the MEXT survey.

1994

Even though the number of cases of school bullying appeared to decline, the MEXT study group on school bullying made an urgent statement to the public in response to a student suicide as a result of bullying. MEXT conducted an extensive survey on this matter and issued notices to education boards to better address school bullying.

1996

"The Model for Japanese Education in the Perspective of the 21st Century," a set of reports published by the Central Council for Education this year and the next year, proposed "Zest for Living" as the main objective of education in the course of the next century, which meant fostering rich humanity and physical health by nurturing the ability to uncover problems, learn, and act independently in a rapidly changing society.

1997

The Asian financial crisis

1998

In response to the shocking murder of a teacher by a student, the Education Minister made an urgent appeal to students and the public. The prevalence of reports on cases of school violence remained stable or was slightly on the rise. The Course of Study was revised, and implemented from 2002. It was built on the last revision and aimed to nurture students' «Zest for Living» through learning carefully selected solid basic subjects with reduced class hours, and through the introduction of an «integrated learning» class to stimulate students' ability to learn by their own initiative and to think creatively.

1999

MEXT started to distribute Home Education Handbooks to assist parents in raising their children mainly with respect to disciplinary matters at home.

2000

A number of reforms were introduced in order to promote the initiatives of local education boards in line with a comprehensive decentralisation reform plan that included all the departments.

The National Commission on Educational Reform was established to discuss fundamental issues in education with the aim to encourage student creativity in the 21st century. Its proposal included the revision of the Fundamental Law on Education and comprehensive education policy planning.

2001

PISA 2000 results released.

- Japanese students were one of the top performers in mathematics and science and next to top performers in reading.

2002

The Education Minister presented "Exhortation toward Learning", which acted as a key reference for schools implementing a revised Course of Study, and asked schools to act proactively in order to improve the academic performance of students with individual differences in mind, in reaction to questions raised about the revision to ensure high academic performance.

The Course of Study 1998 and a full 5-day school week were implemented.

2003

In line with the proposals from the National Commission on Educational reform, the Central Council for Education made a policy recommendation to review the Fundamental Law of Education and create an action plan promoting education.

The Course of Study was revised partially and implemented. It emphasised that the Course of Study was a minimum requirement and that advanced curriculum could be developed for fast-learners.

2004

PISA 2003 results released.

- Japanese students were at about OECD average in reading while they remained one of the top performers in mathematics and science.
- The decline in the nation's reading score showed that Japanese students were not at world top level and provided strong evidence for prioritising the improvement of academic capabilities as one of the major policy issues in coming years and in the next revision of the Course of Study.

2005

In reaction to the PISA 2003 results, MEXT encouraged education boards and schools to improve PISA-type reading literacy by setting major objectives at the level of the ministry, education boards and schools and by providing a document on teaching methods to improve teacher-quality.

2006

In order to rebuild an education system suitable for the 21st century, the Education Rebuilding Council was established by the Prime Minister, to provide input for the next revision of the Course of Study or reforms in later years including those in 2007.

A special statement against bullying was made by the Education Minister in response to a series of unprecedented letters to the Minister threatening suicide due to bullying.

The Fundamental Law of Education was amended to include "respect for tradition and culture" and "public-spiritedness" as educational objectives while keeping the existing "character building" objective as well and to establish the Basic Plan for the Promotion of Education.

2007

The National Assessment of Academic Ability was conducted to better monitor student learning outcomes and background information (and continued annually until now) in order to review and improve education policies in response to a policy recommendation by the Central Council on Education that acknowledged the declining performance of students in several surveys including PISA 2003, TIMSS 2003 and other domestic surveys.

In line with the amended Fundamental Law of Education, a series of reforms was introduced, which included amending the objectives of each school type, mandating the renewal of teacher certificates every 10 years, etc.

PISA 2006 result were released.

- Japanese students were at about OECD average in reading, better than the average in mathematics and next to top performers in science.
- The mathematics score fell from PISA 2003.

Toyota's sales surpasses those of General Motors, making Toyota the number one automotive company in the world

2008

The tuition-free high school program commenced as a part of the manifesto promised by an opposition party that took power for the first time by the national election in the post-war era with the aim to support the attendance of upper secondary schools.

2010

PISA 2009 results released:

- Japanese students were next to top performers in reading and science, better than the OECD average in mathematics, showing improved performance especially in reading.

Japan's population starts to shrink with declining birthrates and rapid aging and the Japanese economy declines to third in the world as China's GDP grows

The Course of Study was revised, and implemented from 2011.

With the aim, rather than a dichotomy between "room to grow" and "cramming," to harmonise learning fundamental knowledge and skills and nurturing creative thinking, good decision-making skills and self-expression, alongside increased class hours and improved subject contents. In addition, it introduced a foreign language class for the first time for 5th and 6th grades.

Based on the amended Fundamental Law of Education, the Basic Plan for the Promotion of Education was agreed upon by Cabinet members, for the first time a plan of this kind involving the whole government in the promotion of educational policies in a comprehensive and planned manner, providing achievement objectives for the coming 10 years.

2011

A standard class size for 1st grade was reduced from 40 to 35 to enable meticulous, individually-targeted teaching in order to improve learning performance and ensure a smooth transition to primary school.

The Great East Japan Earthquake

A rising chorus of concerns about education

Since the 1980s, many Japanese perceived a decline in the educational functions of the family, resulting in bullying, disruptions in the classroom, student absenteeism and violence in schools. While the incidence of these kinds of student behaviour remains small compared to most Western countries, their increased presence in Japan was being noticed. In the words of the Ministry:

> [There is]…a spreading tendency among youth to neglect society. This tendency is not totally unrelated with young people's declining association with society. It can be traced partially to a social trend placing too much emphasis on individual freedom and rights….At home children have their own private room and… mobile phones and other information equipment allow them to avoid getting closely involved with family members… There seems to be increasingly less time spent in peer groups outside and more time spent playing video games at home. This phenomenon of the thinning socialisation of children is thought to be leading to a decline in young people's sense of respect for rules and models and further aggravating their tendency to neglect society or recede into a "world of solitude". (Ministry of Education, Culture, Sports, Science and Technology, 2002)

It is interesting to note that the widely discussed "collapse of class discipline" (*Gakyu Hokai*) or school violence is not reflected in internationally comparative data. If anything, data from PISA show improvements in disciplinary climate and in teacher-student relationships since 2000. However, the media have played a key role in questioning class discipline and the well-being of students, reporting on parents' lack of respect for teachers ("monster parents") and deviant teacher behaviour. All of this has led to some erosion of the cultural and institutional legitimacy of teachers, schools and learning itself in Japanese society.

The Japanese also became concerned that their continued dominance in generating and exploiting advanced technologies was under threat. They noted that while Japanese students continued to do as well as ever in international comparisons of achievement in mathematics and science, they seemed to enjoy science less than other students elsewhere as they progressed through schooling (Ministry of Education, Culture, Sports, Science and Technology, 2002). These findings were also reflected in results from the PISA 2003 mathematics assessment, which showed high levels of student anxiety about mathematics and low levels of interest in and enjoyment of the subject.

Concerns about a loss in moral standards and declining student motivation coincided with a perceived decline in Japan's edge in innovation. While many experts from Western nations have visited Japan to learn from its success in education, many Japanese became worried that high student performance might no longer translate into success in business and in life. Where, they asked, are our Nobel Prize winners? Where are the people with the kinds of breakthrough ideas that could create a new Microsoft or Apple, or even whole new industries? These concerns led the Japanese to wonder whether they should find out how Western nations teach creativity.

However, the difference between Japan and Western nations is not in how they teach creativity; it is that, unlike Asian nations, Western countries emphasise the individual over the group. This notion can be uncomfortable to Asians. They value social order highly and see the high crime rates and general social disorder in many Western nations as simply unacceptable. On the other hand, many people in the West are not willing to pay the price Asians pay for their high levels of student achievement if it means giving up their "personal freedom". This analysis may be oversimplified. It may be true that Asians are less likely than people from some Western countries to chart new courses for their industry or even create new industries. And this might well be because Asians typically defer to their elders and superiors publicly, even if they have private reservations about their superiors' judgement, wait to take their moment in the sun until after their superiors are gone, do not like to criticise others openly, prefer to be modest rather than broadcast their achievements, and value contribution to the group more highly than solo achievements. In Asia there is a saying that "the nail that sticks out gets hammered down". This said, Japan has built one of the best educated, most flexible, fastest learning and uniformly high-calibre workforces in the world. The nation is brilliant at continuously improving products and processes and is capable of very high-quality production on a vast scale. Who is to say which is more important, the occasional breakthrough or continuous improvement? And Japan ranks very high on the Global Innovation Index, falling just behind South Korea and the United States (INSEAD, 2010). Still, Japan is responding to the criticism by demanding even higher student achievement and greater capacity for creativity and innovation.

Emergence of the "risk society"

The emerging concerns about education and the reforms pursued in response to these need to be understood in the context of a period of rapid transformation in the relationship between the state, the economy and civil society that reshaped the role played by education in Japanese society.

Throughout the 1990s, Japan underwent a series of socio-economic and political reforms. The prolonged economic recession that followed the burst of the economic bubble in the early 1990s, along with the intensification of global economic competition, motivated Japanese multinational corporations and the political elite to seek changes to the status quo of deeply-rooted socio-economic and political arrangements. In particular, multinational corporations demanded that the interventionists economic

policies from which they had benefitted throughout the post-war period of "compressed" economic growth be abandoned. This challenged the Liberal Democratic Party's support for regulatory policies and the Party's subsidy politics that had protected vulnerable industries and the rural population, the Party's traditional electoral base.

In the mid-1990s, the rapid globalisation of the economy and the prolonged economic recession created the conditions for structural reforms to create a "small and efficient state". Such reforms were introduced by Prime Ministers Riyutaro Hashimoto (1996-98) and Junichiro Koizumi (2001-05). This included labour-market reforms that, in turn, led to a rise in fixed-term contracts and widening income gaps.

Reforms of post-war arrangements – ranging from corporate welfare, which included life-time employment, automatic salary progression and family wage, through developmentalist state intervention, the gender division of labour, and the "pipeline link" between schools and the labour-market – that had served as a source of material and cultural stability and established an equitable distribution of wealth, led to a breakdown of post-war certainties and the emergence of what became known in Japan as the "risk society". Even though employees in Japan still enjoy relatively long employment tenures and a career progression based on seniority more than in other OECD countries, the recent reforms have had a tangible effect on public perceptions of job market uncertainty and insecurity.

While the motivation for Japan's educational reform has often been portrayed as being of a philosophical and educational nature, strengthening the capacity of individuals to act autonomously and to assume greater individual responsibility for effective lifelong and lifewide learning in order to succeed in the 'risk society' contributed in important ways to driving the liberal reform agenda in the field of education.

Departure from the post-war political settlement

An important outcome of these economic developments was also that the post-war political settlement over the state, economy and society as well as the role of education - with a clear separation between the left, on the one the one hand, and liberal conservatives, on the other - no longer provided a viable framework of the political landscape in Japan. Since the 1980s, the dominant political agenda of deregulation, privatisation and market mechanisms challenged labour movements and led to the fragmentation and decline of the political left. This was also reflected in the breakup of the Japan Teachers' Union (JTU) through which the union lost considerable influence on the education policy agenda.

But similar fragmentation was also apparent at the other side of the political spectrum. While part of the political right focused on economic liberalisation, the emerging "risk society" and the context of social dislocation gave cultural nationalists considerable support. As described by Takayama (Takayama, 2011), their call for greater emphasis on national history, traditional gender norms, patriotism, "back to basics" and "zero tolerance" in schools gave people something to cling to in a rapidly changing society. What emerged alongside the liberal social and transformations "from above" were nationalistic social movements "from below". These movements gained political momentum in the late 1990s, when nationalistic politicians and associated intellectuals articulated moralising discourses on discipline, traditional gender roles and patriotism. Since then, both liberalism and cultural nationalism, the two predominant movements of the political right, have co-existed in an alternately tense and complementary relationship.

A new agenda for education reform

The changes to thepost-war socio-economic and political arrangements were mirrored in educational reform. Fundamental reform in education was initially proposed in the 1980s by Prime Minister Yasuhiro Nakasone and his Ad Hoc Council of Education (*rinji kyōiku shingikai)*. In keeping with the liberal economic and labour-market reforms pursued during those years, the recommendations of the Ad Hoc Council of Education included expanded school choice, a renewed emphasis on Japanese ethnic identity, the privatisation of education, and the simultaneous devolution and centralisation of educational administration (Takayama, 2011; Okano and Tsuchiya, 1999).

The spirit of change established by the Ad Hoc Council of Education guided the gradual reforms that shaped Japanese education in the late 1980s, 1990s and 2000s, marking a clear break from what many observers had long taken for granted about Japanese education. While acknowledging how much had changed, the reforms reaffirmed Japanese values. They also reaffirmed the characteristically Japanese approach – so evident in the Meiji reforms – of learning what those countries with the best education systems are doing to adapt to changing requirements, and bringing attractive ideas back and adapting them to the Japanese context while remaining faithful to Japanese values.

Some observers have concluded that the reforms of the 1980s had no major impact. However, such conclusions can only be warranted if one reduces the analysis to changes in the legal framework that would require the approval by the Parliament. But most of the policy changes were, in fact, implemented through "administrative guidance" by MEXT.

The most conclusive evidence of change is perhaps that, as outlined below, many of the reforms in educational policy are closely mirrored in changes in outcomes in PISA and other internationally comparative benchmarks.

"Zest for living"

In 1996, MEXT began to apply a new philosophy to education that was intended to enhance students' ability to act autonomously and think creatively. *Ikiru chikara*, or "zest for living", emphasised key competencies, independent thinking, and problem-solving skills. A key part of this reform was to set the conditions that would enable students to develop a well-rounded personality and promote the development of the cognitive and non-cognitive competencies that are needed in Japan's changed economy and society. In the words of the Ministry:

> The standardisation of education due to excessive egalitarianism and the cramming of too much knowledge into children has tended to push aside education geared more to fit the individuality and capabilities of children…,making classroom lessons boring to children with a quick understanding and difficult for children who need longer to understand. (Ministry of Education, Culture, Sports, Science and Technology, 2002)

Zest for living was a reaction against the Japanese's previously strict insistence on uniformity, specificity and direction from the top. The so-called *yutori-kyoiku*, or "relaxed education", approach was announced as part of this agenda in 1998 and implemented four years later. Its aims were to reduce the intensity of the school curriculum; move away from rote memorisation and test preparation; expand elective offerings to cater to a broader range of student interests, career perspectives and levels of proficiency; and support innovative pedagogy. In order to maintain enthusiasm for mathematics and science, the reform also put more emphasis on experiential, problem-solving learning through observations, experiments and project studies; reached out to universities, research institutes and museums for help in engaging students' interest in science; and made the images of leading scientists and engineers more visible and appealing to students thinking about what careers they might pursue.

National curriculum guidelines changed not only qualitatively but also quantitatively, to the extent that the volume of elementary and lower secondary school curricula was reduced by 30%. Though the set curriculum has been shrunk overall as part of these changes, an important new required course has been added at all school levels: the Period of Integrated Study. The intention of this course was to prompt substantial changes in instructional methodology and in students' views about learning. MEXT describes the aim of this programme as to:

> … foster children's ability and quality to find a theme, think, judge and solve a problem on their own; and enable children to think about their own life, urging them to explore subjects with creativity and subjectivity and to solve problems through their own ways of learning and thinking. To this end, the Period of Integrated Study actively introduces experiential learning such as experience in nature, social life experience, observations, experiments, field study and investigation as well as problem-solving learning to learn about cross-sectional, comprehensive subjects like the environment, international understanding, information, health and welfare as well as subjects that interest students. (Ministry of Education, Culture, Sports, Science and Technology, 2002).

With the aim of encouraging teachers to assume ownership of the programme of integrated study, MEXT kept its directives for this programme to a minimum, and encouraged schools to determine the volume of learning time and the subjects covered in the programme. Teachers were meant to act as co-ordinators of projects for integrated study rather than as disseminators of knowledge. However, that potential strength of the programme turned out to be also one of its weaknesses, since the rapid implementation of the programme with limited time and room for building capacity at the frontline left many teachers stranded in their new freedom. In particular, the inquiry-based, student-centred model of learning that the reform was promoting left many teachers uncertain about their role as educators. Scholars have often noted that Japanese teachers minimise their contribution to learning activities so that students assume more responsibility for their own learning; but this overlooks that even when Japanese teachers act as facilitators in the classroom, they typically follow a detailed plan of how learning activities should unfold. These issues seem not to have been taken into account when the reforms were designed.

Perhaps even more importantly, while the intentions of the integrated course of study were generally welcomed by primary teachers, for high school teachers the institutional contexts as well as deeply-rooted beliefs about the role that secondary education plays in the trajectory of a students' career posed major obstacles for an effective implementation, even for teachers embracing the intentions of the reform.

This resistance may have contributed to the backlash against the *yutori* curricular reform not just by the general public but also by educators. The media exploited any opportunity to raise doubts about the success of the reform. The latter included the selective use and interpretation of results from international comparisons, including the PISA 2003 assessment, as suggesting a general deterioration of educational performance in Japan. The debate was only partly motivated by substantive educational issues. Other motives included the more ideological stance of nationalist intellectuals who criticised the reform for its excessive emphasis on individuality, choice and entrepreneurship and for a perceived lack of respect for order, discipline and teaching of national history and tradition. The bottom line was that, in 2011, MEXT began rebalancing the reform. While the emphasis on critical thinking

remains and key competencies will be taught in new ways through the "zest for living" philosophy, the changes reflected a return to a more traditional and prescriptive curriculum.

All this said, a comparison of the results from the PISA 2000 and 2009 assessments suggests that much of the reform agenda has, in fact, been implemented with success: Between 2000 and 2009 Japanese students reported greatly improved teacher-student relations and this coincided with the period of implementation of the *yutori* reform. Contrary to suggestions that the quality of education declined over the same period, PISA 2009 results do not show evidence of such a decline. On the contrary, as noted above, student performance on tasks requiring open-ended, higher-order thinking skills – those that are of increasing importance in modern knowledge-based economies – have improved since the reform. PISA 2009 also shows significant improvements in student engagement with learning, with more students in Japan now reporting that they read for enjoyment. In fact, Japan was the only OECD country where the proportion of both boys and girls who read for enjoyment increased between 2000 and 2009; in all other countries that saw an increase in the proportion of students who read for enjoyment, that increase occurred only among girls.

A new conservative agenda

Increasing pressures for devolution, privatisation and downsizing facilitated education reforms based on choice and autonomy that clearly moved away from post-war policies. Conservative demands for abandoning the single-track education system in favour of a more differentiated and selective system had traditionally been contested by moderates in the Liberal Democratic Party, unions and education authorities, which had been concerned about an intensification of competition among schools and resulting dissatisfaction among students and parents who failed to get into their preferred schools. The same holds for other long-standing conservative agendas that demanded that Japanese values and moral/patriotic teaching be incorporated into the curriculum.

But, as described by Takayama (Takayama, 2011), that political gridlock eased significantly in the 1990s when, for the reasons explained above, the influence of the political left was diminished and the Liberal Democratic Party lost its half-century political monopoly. As post-war education policy eroded, the conservative agendas, which would have fallen outside the post-war political settlement, increasingly became the focus of public policy in education. For example, MEXT was able to mandate "appropriate" enforcement of the use of the national anthem and the flag in school ceremonies; in 2006 it amended the fundamental law of education by adding patriotism as one of the nations educational goals.

As another important component, the integrated six-year junior high school was introduced in 1999. While the integrated six-year junior high schools did not completely replace the traditional approach, their introduction eroded the post-war philosophy of an egalitarian 6-3-3 single-track system. In line with the overall liberal reform agenda, ability grouping and expanded school choice were established in the late 1990s and early 2000s. The introduction of "diversity" and "flexibility", most notably through the integrated six-year junior high school and expanded school choice, primarily targeted top-performing students and responded to demands for more investment in elite education. These changes may have contributed to improvements at the top end of the distribution in reading literacy performance, the rise in performance variation among senior high schools, and closer links between social background and student and school performance that became apparent in the PISA 2009 assessment.

The policy changes led to intense debates among political conservatives. Though the economic interests of business communities had often collided with the philosophy of cultural traditionalists, the reforms sparked open confrontations. As noted above, nationalist intellectuals criticised the reform for its emphasis on individuality, choice and entrepreneurship and for its lack of respect for order, discipline and the teaching of national history and tradition.

Over the past decade, teachers' salaries in Japan have declined relative to those of other officials with similar qualifications and, while they remain higher than on average in OECD countries the differential has declined. This decline is mainly the result of policies implemented between 2001 and 2006, that devolved part of financial responsibilities for teachers' salaries to prefectural governments. For the 50 years prior to the reform, the prefectures and MEXT shared the financial responsibility for teacher salaries, with MEXT and the prefectures each paying half of the cost. MEXT also established the standards for teacher salaries and class sizes with the aim to foster equity in education by ensuring sufficient numbers of qualified teachers throughout the country. After the reform, MEXT only provided one-third of teacher salaries with prefectures paying for the remainder, with increased local tax revenue to amend the balance of state and local taxes. Local governments were now also permitted to deviate from national standards for teacher salaries and class sizes and reallocate funds to other purposes which resulted in lower overall spending and larger regional disparities.

However, the much-discussed decline in the status of the teaching profession is only partially explained with financial aspects. Equally important is a perceived decline in the traditionally high level of professional autonomy of teachers and their high social status. One concern that is often expressed by teachers as an explanation for the decline in the status of the teaching profession is a perceived loss of public mission, with liberal discourses redefining the role of teachers less than one of public or social responsibility than one of a service to tax payers and educational consumers. Data from MEXT in 2006 showed that more than 60% of teachers now quit before retirement age.

Devolution of responsibilities for education decision-making

As part of the liberal reform agenda, which included marked devolution in government functions, the early 2000s saw a rise in the number of prefectural governors and municipal school boards that introduced a series of reforms that did not necessarily reflect national plans. For example, in 2000, the superintendent in Shinagawa-Ward in Tokyo introduced quasi-market reforms to promote school choice, standardised assessments, differentiated school budgeting and integrated junior high schools.

In 2002, MEXT redefined its national curricular standards (*gakushū shidō yōryō*) as minimum criteria to be supplemented with curricula developed by local school boards. MEXT also reduced the minimum credits to graduate from high schools from 80 to 74, the credits for required courses from 38 to 31 and the school week from six to five days, while increasing the amount of time devoted to optional courses.

Schools were given greater discretion over their budgets and personnel. New measures were taken to evaluate teachers, and, especially, to commend and reward excellent teachers while transferring teachers with questionable track records to non-teaching positions.

By PISA measures, which reflect the situation in senior high schools, Japan's senior high-school system shows one of the highest levels of competition among schools. While 76% of students in OECD countries attend schools that compete with at least one other school for enrolment, only in Japan, the Netherlands, Australia, Belgium and the Slovak Republic do over 90% of students attend such schools. PISA shows that, within countries, competition among schools and performance are related; but once the socio-economic profile of students and schools are taken into consideration, the relationship weakens, since privileged students are more likely to attend schools that compete for enrolment. This may reflect the fact that socio-economically advantaged students, who tend to achieve higher scores, are also more likely to attend senior high-schools that compete for enrolment, even after accounting for location and attendance in private schools. In Japan, however, school competition is not related to performance, even after accounting for the socio-economic and demographic background of students and schools.

By PISA measures, Japan has also a much greater prevalence of private schools than across OECD countries. An average of 15% of 15-year-olds students across OECD countries are enrolled in privately-managed senior high schools that are either privately or government funded; but in Japan, 29% of students are. On average across OECD countries, privately-managed schools show a performance advantage of 30 score points on the PISA reading scale. However, once the socio-economic backgrounds of students and schools are accounted for, public schools come out with a slight advantage of seven score points, on average across OECD countries. Public and privately-managed schools in Japan show no performance difference before accounting for socio-economic background; but after accounting for students' and schools' socio-economic backgrounds, public schools in Japan outperform private schools. This may be largely because parents of students who did not pass the entrance tests of prestigious public schools then opt for private alternatives.

Overall, the reforms have made a very rigid system more flexible; but the overall structure is still very much in place and the move towards more freedom has been made cautiously. This said, the shift in the distribution of responsibilities for education decision-making from central to prefectural and local levels is clearly apparent in the OECD education indicators, which now show the Japanese school system more on the side of the more devolved, rather than the more centralised, education systems if not with regard to the management of resources than certainly with regard to educational content and school policies.

KEY STRENGTHS OF EDUCATION IN JAPAN AND POLICY CHALLENGES TO MAINTAIN THESE STRENGTHS

Japan's education system continues to produce outstanding results. As noted in Chapter 2, Japan is one of the top-performing countries in PISA while total spending on education – public and private (excluding outlays for after-school instruction) – as a share of GDP is below the OECD average. Japan's strong commitment to education fuelled the sustained period of rapid economic growth in the post-war period, and high-quality human capital has made Japan one of the key players in the production of high-technology, high value-added products.

But PISA also shows a fair number of countries and economies with performance levels close to or higher than Japan's. Japan therefore needs to ensure that its stock of human capital remains competitive with that of other countries and economies around the world and in the region – such as Shanghai-China, Korea, Hong-Kong China and Singapore.

That is particularly important in the context of the dramatic demographic challenges the country now faces. Since the end of the Second World War, improved health outcomes in Japan have increased life expectancy from just over 50 years to approximately 80 years, and Japan's population now enjoys the greatest longevity in the world. At the same time, fertility rates have dropped to below replacement levels and the rate continues to decline. As a result, Japan's under-15 population has fallen from 35% of the total population just after the war to 13.3% today, and projections show that that proportion will decrease to just 8.6% by 2050. Such shifts are significant not only because they affect the numbers of schools and teachers needed, but also because they will have a significant impact on future revenue streams to finance education. Indeed, over the past two years, tax revenues have failed to fund even half of Japan's public spending; and it is estimated that Japan's national debt will hit 213% of gross domestic product (GDP) in 2011 (OECD, 2011).

The following summarises key strengths of the Japanese education systems that offer lessons for other countries. In turn, the examination of current threats to these strengths offers policy lessons for Japan.

A commitment to education

Most nations assert that education is important. But the test comes when the commitment to education is weighed against others. How does a country pay its teachers, compared to other highly-skilled workers? How are its education credentials weighed against other qualifications when people are being considered for jobs? Would you want your child to be a teacher? How much attention do the media pay to educational outcomes as opposed to the sports league?

In the past, Japan's citizens have made choices that show they value education more than other things and, by implication, that they value the future more than current consumption. Japan's commitment to children has not just been rhetorical, but a concrete and enduring priority, for which students, parents, educators and the nation as a whole were prepared to make real sacrifices. This commitment is the foundation of the Japanese system. It is the main reason why Japan has access to a first-rate teaching force, Japanese students are superbly supported at home, and schools are well resourced.

Maintaining strong demand for high-quality education on the part of parents and the general public will be a formidable challenge as some of the motivating forces are weakening. Prioritising investment in education faces similar challenges, as pressure on public resources grow, both in the short time - because of the massive reconstruction effort in the aftermath of the tsunami - and in the longer term - because of spending priorities associated with a rapidly aging population. Some of the material incentives in the education system have already deteriorated over recent years. For example, salaries for teachers as compared with those for other public servants or with those in the private sector have declined, as additional resources invested in education have mainly been devoted to reducing class size or, in some prefectures, been redirected to other priorities.

A conviction that all students can achieve at high levels

Placing a high value on education has only been part of the equation. Another aspect of the Japanese success in education is the deep belief that all children can achieve. In some countries, students are separated into different tracks at an early age, reflecting a notion shared by teachers, parents and citizens that only a subset of the nation's children can or need to achieve world-class standards. But PISA shows that systems that track students in this way tend to be plagued with large social disparities. In contrast, the Japanese education system delivers strong and equitable learning outcomes across different socio-economic contexts, encouraging educators to exploit the extraordinary talents of ordinary students and leaving them with few options to redirect disadvantaged or challenging students to programmes with lower performance expectations. As a result, a very small proportion of Japanese students perform below the PISA baseline Level 2.

The Japanese, like most East Asians, believe that academic achievement is more a matter of effort than of luck or natural (genetically-endowed) ability. They therefore demand that this effort be made and have high expectations for all their students. That is important since international comparisons show that the percentage of students who reported that to do well in mathematics or science they needed good luck, rather than hard work, is negatively related to student performance in these subjects, both within and across countries (Boe, et al. 2002).

Like most East Asian countries and many OECD countries, only about half of Japan's student cohort is assigned to special education. Some experts in the West have decried this as inattention to students who need and deserve extra help. But there is considerable evidence that many students assigned to special education classes in the West have very low levels of achievement, despite being the recipients of much more spending, simply because their teachers have very low expectations for them (see Gartner and Lipsky, 1989). In contrast, the Japanese approach to classroom instruction makes it clear that Japanese teachers work hard to adjust instruction to individual needs. In many ways, Japan has been practicing inclusive education long before it became a policy goal in the West. The underlying assumption is that *all*, or very nearly all, students can meet high standards. In many other OECD countries, some students who could be achieving at much higher levels do not do so because they are given a more diluted curriculum. In the case of special education students, this can be taken to an extreme.

The belief that all students can succeed is mirrored in Japan's post-war commitment to put equity of educational opportunities and educational outcomes at the forefront of its policy agenda and to provide high-quality education to all its citizens. But while PISA shows that Japan allocates more teachers per student to disadvantaged schools, Japan has been less successful than, for example, Shanghai-China, in attracting the most talented teachers to the most challenging classrooms and in recruiting the best principals to the most disadvantaged schools (see the Chapter on China). This is also reflected by a fairly close relationship between the *aggregate* social background of schools and their performance, as shown in PISA. It is true that the *individual* relationship between the social background of students and student performance is only weak to moderate in Japan, but that is mainly because the share of students from disadvantaged social backgrounds is comparatively low. Widening social disparities in the Japanese population could quickly change that dynamic and therefore warrant attention to equity-related issues.

Similarly, while the comparatively large performance differences among Japanese schools shown in PISA are partly a result of the fact that the PISA assessments are undertaken in the first year of Japanese senior high school, trend data show that variability in school performance has significantly increased since 2000. Together with Japan's greater policy focus on competition and school choice, such emerging disparities, combined with the widening income and social disparities in Japans population, could pose significant long-term challenges to Japan's traditionally high standards of equity in education.

While a policy focus on equity is important and would most likely foster greater social cohesion and increased labor-force participation, it is also important for Japan's role as a global economic leader to ensure that it educates a large number of students that are among the best in the world. In comparison with Japan, Shanghai-China, New Zealand, Singapore and Finland have higher proportions of students who perform at PISA proficiency Level 5 or 6 in reading; and over 50% of students in Shanghai-China and over 30% of students in Singapore and Hong Kong-China are top performers in mathematics, as compared to 21% in Japan. Systems such as those in Shanghai-China and Finland demonstrate that it is possible to educate a high proportion of top performers regardless of the social backgrounds of students and schools; in other words, it is possible to combine excellence with equity. Results from PISA show that Japan is off to a good start in this regard. Japan is one of the few countries that managed to increase the proportion of students performing at proficiency Levels 5 or 6 in reading by almost four percentage points since 2000.

An emphasis on values

Many lessons drawn from Japan's experience with education are useful for analytical purposes, but risk obscuring a very important aspect of the Japanese educational system. The system is designed not only to develop students' cognitive capacities, but also to inculcate the society's values of ethical behaviour, meritocratic advancement and social cohesion in those students. The response of Japan's society to the recent natural disaster, not just in the affected areas but throughout the country, provides a powerful demonstration of this.

In many different ways, students are taught to respect their elders and their teachers, to do what is right, to be orderly and organised. Everywhere in schools there is evidence of efforts to reward hard work and persistence, praise students who take on a challenge, encourage students to serve their school and fellow students and take responsibility for helping others, reward modesty, and give others credit for one's own good work. It is not hard to imagine how this sort of attention to behaviour can affect many aspects of social life, from business ethics to health care, sustainable environment to crime, and it is worth considering what might happen to a country that ignores this aspect of their children's education.

All this means that Japanese teachers are expected not only to look after the cognitive development of children, but also to their affective and physical development and to provide career guidance. At the same time, current evaluation and assessment systems in Japan do not consider those wider outcomes. As those instruments have increasing prominence both in the education system and in public debate, improving the alignment between educational goals and their measures will be of key importance.

Ambitious educational standards that are shared across the system and aligned with high-stakes gateways and effective instructional systems

Japan has clear and ambitious academic standards across the board, and provides a strong and coherent delivery chain through which curricular goals translate into instructional systems and practices, and student learning.

The national curriculum, which is revised every ten years is one the key strengths of the Japanese education system. In theory, the curriculum is set by the Japanese Ministry of Education, Culture, Sports, Science and Technology (MEXT) with advice from the Central Council for Education. In practice, the key figures involved in setting the curriculum are university professors and ministry staff. While the curriculum defined by MEXT is only for "guidance", the prefectures are also funded by MEXT and closely follow the guidance. The guidance curriculum is long and detailed, so MEXT also publishes explanatory booklets, subject by subject, by school level.

The curriculum is coherent, carefully focused on core topics and their deep conceptual exploration, thoughtfully sequenced, and set at a very high level of cognitive challenge, even if it follows more the tradition of subject-based syllabus than a competency-based approach. It progresses step by step in a very logical fashion from year to year, concentrating in each year on the topics that must be mastered in order to understand the material presented in the following year. Essential subjects are given plenty of time. Each topic is carefully developed and in great detail. In mathematics and science, the emphasis throughout is on the fundamental underlying concepts, which are presented clearly and straightforwardly. The subject-matter curricula could be characterised as focused but very deep. The attention to detail has not gone lost in the devolution of curricular responsibilities in which local authorities and schools now have considerable responsibility for instructional policies and practices.

Textbooks in Japan are lean and compact compared to their counterparts in other OECD countries. They are also inexpensively produced paperbacks. There is a separate book for each semester, each under 100 pages. The central feature of these textbooks is their attention to the core concepts underlying the course. All textbooks continue to be approved by MEXT but the policies established by the Ad Hoc Council of education in the 1980s reduced the role of the ministry to ensuring that the texts are neutral

in content and that they treat the correct topics for the grade level for which they are written. However, given the clear, detailed and coherent nature of the Japanese curriculum, it is not surprising that textbook publishers still stick very closely to it.

Until recently, there was very little flexibility in the Japanese curriculum, and very little time in the school day for anything but the official national curriculum. In most Japanese high schools, roughly 70% of total available time was devoted to just five subjects: Japanese, social studies, mathematics, science, and foreign language (mostly English). The remaining hours were devoted to gym, music, art, homeroom and other elective subjects. This curriculum, combined with the fact that Japanese students spend more time learning, means that Japanese students have much more time to go into greater depth in these core subjects than students in most other OECD countries do. They are also more focused on the core subjects in the curriculum because they are not distracted by subsidiary courses.

In addition, throughout the country, teachers actually teach based on the national curriculum standards. They also do not pick which parts of the textbook they will use; they are expected to teach the entire textbook, which is the surest sign that all Japanese students are expected to learn to the same standards. The faithful implementation of this curriculum in every corner of Japan makes it much easier for everyone to hold the system accountable for results. The fact that *all* students are expected to master this very challenging curriculum, and at the same pace, adds to this transparency. The education system thus does not vary in the educational objectives it pursues, but rather in how teachers adapt the content and their methods to students' individual needs.

As a result of all of this, everyone – students, teachers and parents – knows what is required to get a given qualification, both in terms of the content studied and the level of performance needed to earn it. Students cannot go on to the next stage – be it in work or in further education – unless they show that they are qualified to do so. They know what they have to do to realise their dream, and they put in the work that is needed to achieve it. It is impossible to do well in Japanese exams without working very hard, over long periods of time. This takes discipline and persistence. Many countries talk about the importance of "learning to learn." Japan has done much more than talk about it; the country seeks to build its education system around it. From the youngest age, Japanese students – and adults –have very strong incentives to take tough courses and work hard at them. Doing well in exams is a paramount requirement both for entering the university of choice and for getting a good job. In some ways, this is the heart of the Japanese education system. If those incentives were not in place, Japan's educational outcomes might be very different.

Three points emerge that help to define the context of education in Japan.

The first is that in a meritocratic society, the high-school and university entrance exams represent gateways to status in Japanese society. The Japanese widely believe that doing well in these exams depends much more on studying hard than on innate intelligence. Exam success does not only reflect on the individual, but also on the student's parents, other family members and teachers. This constellation of support assumes the responsibility for failure and creates the expectation to succeed. The result is the high levels of student performance seen in PISA.

The second point is that these high-stakes gateways are now under threat. On the one hand, the rapid decline in the student-age population has significantly widened the gateways into the education system, making entry into high schools and universities less competitive. To compensate, Japan will need to consider alternative incentive structures to maintain students' and society's commitment to education. Furthermore, traditionally the first job after formal education was a job for life, which made it particularly important to get into the best educational institution possible. However new entrants in the labour market will now be expected to change jobs and employers more frequently than in the past, even if career paths remain more stable in Japan than in other countries). This will have implications for Japan's education system as it will no longer be solely the educational institutions that are determining an individual's economic and social future, but other factors, including an individual's performance in the workplace, as well.

Third, while other East Asian countries provide equally strong incentives for their students to take tough courses and work hard in school, they do not have students who are as engaged in learning and in school as Japanese students are. However, results from PISA also suggest that Japanese student engagement in learning is still low compared with OECD standards. Fostering students' interest in and engagement with learning and improving their awareness of effective approaches to learning will therefore be of continued importance for Japan, particularly as rapid changes in demands for skills and dramatically changing demographics make lifelong learning an ever more important priority for Japan. It is only when knowledge and skill combine with the capacity and motivation for continued learning that Japan will become a nation full of people who want to learn throughout their lives. As explained in the first part of this chapter, this has been one of the central objectives of Japanese curricular reform since the 1980s. The significant improvements that PISA has shown for Japan since 2000, in the student performance on open-ended tasks requiring the creative use and application of knowledge, in student engagement with reading, and in student-teacher relations suggest that "zest for living" is slowly becoming a reality.

However, further progress will also be needed if Japan is to match the world's best-performing education systems not just in the cognitive development of its students but also in students' will and desire to learn. Experience with the integrated course of study shows that success will depend not just on curricular innovations, but on how well teachers are trained to use them. Further

development of the curriculum is also needed if Japan wishes to fulfil its ambition of shifting emphasis from a traditional subject-matter based approach towards a competency-based approach in the curriculum.

Effective approaches to instruction

At first glance, the Japanese approach to instruction violates the most common-sense principles. Classes are large by OECD standards – 35 to 45 students in a class – and most instruction is for the whole class. There is less instructional technology than in many other countries and fewer instructional aids of other kinds. Students are generally not separated into ability groups; there are no special classes for the gifted, nor are students pushed ahead by a grade or more if they are perceived to be exceptionally able. Similarly, students are not held back if they are having difficulty. Many students requiring special education are also assigned to the heterogeneous, regular classrooms. The job of the teacher is to make sure that all students keep up with the curriculum, and they manage to do this. Teachers meet frequently with one another to discuss students who are having difficulty; they provide as much individual attention to those students as they can within the regular school day. It is not unusual for students who are not doing well in certain subjects to get extra instruction after school.

And yet, these classroom produce some of the highest-performing students in the world. How do they do it? The primary goal of Japanese teachers is to involve students in deep learning. Many people outside Japan imagine Japanese schools as quiet, intense places where students copy down everything the teacher says. But that is not the reality. In recent years, visitors to Japanese elementary schools have consistently reported that the level of noise is often well above that found in other OECD classrooms, and the sound of laughter and intense conversation fills the school. Students can often be heard talking excitedly with one another as they tackle problems together. The visitor walks down the halls of these schools seeing students acting in plays, playing musical instruments alone or in ensembles, or working through a tea ceremony.

Japanese teachers put a great deal of thought into their lesson planning (see box below). They spend comparatively little time on drills or lecturing to their classes. The drilling is done at home or in cram schools. An important feature of Japanese instruction, which also has implications for the use of whole-group instruction, is the approach to mistakes. In many other OECD countries, mistakes are something to be avoided. Students who produce right answers quickly are rewarded and those who do not are often ignored or punished. In Japan, a teacher will present a problem and ask her students to work on it. As they do so, students may discuss the approaches in small groups. The teacher then looks at how the students try to solve the problem. After a while, the teacher may call on several children to go to the front of the classroom and copy their work onto the blackboard. Some of those the teacher picked will produce the right answer and some will not. The teacher will ask other students in the class to offer their views on the approaches displayed on the blackboard. If a student thinks the approach will not work, that student is asked why and must give an answer that is grounded in substantive reasoning. The students discover that some answers are wrong for interesting reasons, and these reasons are discussed at length. Sometimes they discover that there is more than one approach to answering the question and they discuss why some solutions are more efficient than others, but others might be more interesting. In this way, they arrive at a much deeper understanding of the mathematics underlying the solution to the problem and so become much more adept at using mathematics to solve problems.

One might wonder how it could be possible for one teacher to involve 35 or more students in a wildly heterogeneous classroom when it is so hard for teachers in many other parts of the world to engage 25 students in more homogeneous classrooms. The answer is one of the keys to the success of Japanese education. Unlike teachers in the Western world, many Japanese teachers accept comparatively large classes because more students are likely to come up with a wider range of problem-solving strategies from which other students can learn. And the variety of ideas generated by more students can be used to spark lively discussions. In science classes, for example, there will be a wider range of outcomes from lab experiments that also can be used to explore problem-solving strategies and promote deeper understanding of the topics under study. This also makes it possible for Japanese teachers to have more time to plan, work with other teachers, work one-on-one with students who need individual help, and engage in lesson study, all of which also improve the outcome for students.

All this said, over the past decade, Japanese policy makers have tried to reduce class size to be closer to the OECD average. To some extent, this is motivated pedagogically; but it also simply reflects changing demographics and the difficulties in adjusting the size of the teaching force to the rapid decline in student numbers, given Japan's inflexible teacher labour market and limited mobility into careers outside of teaching.

There is, of course, no doubt that past and current reductions in class size present an opportunity for Japan to promote innovative teaching methods and experiment with new pedagogical approaches, including greater emphasis on co-operative work, project-based learning and greater interaction between students and teachers. At the same time, international comparisons do not lend much support to the belief that reductions in class size represent the most effective use of additional resources. In fact, results from PISA suggest that high-performing nations generally prioritise the quality of teaching over the size of classes. The issue is that the reductions in class size in Japan have absorbed much of the additional public investment in education. This has left limited room for other investments that are key to shaping learning outcomes and the attractiveness of the teaching profession, most notably teachers' pay (which has declined markedly, compared with other professional salaries since the 1990s), the balance between

Box 7.1 **Student learning in Japanese classrooms**

Harold Stevenson and Jim Stigler, in their classic book *The Learning Gap* (1992), describe the beginning of a fifth-grade Japanese mathematics class this way:

> "The teacher walks in carrying a large paper bag full of clinking glass. Her entry into the classroom with a large paper bag is highly unusual, and by the time she has placed it on her desk, the students are regarding her with rapt attention…. She begins to pull out items… She removes a pitcher and a vase. A beer bottle evokes laughter and surprise. She soon has six containers lined up on her desk. The children watch intently. The teacher…poses a question: 'I wonder which one would hold the most water?'"

The rest of the class is devoted to answering that question. The students decide that the only way to answer it is to fill the containers with something, and they decide on water. They fill up buckets with water and the teacher asks what they should do next. Eventually the students decide that they should identify a small container and then find out how many small containers full of water it will take to fill each of the containers the teacher brought to class. They settle on a drinking cup. The teacher then divides the class into smaller groups. Each group fills its cups, measures how many cups it takes to fill the containers and records the results in a notebook. The teacher then records the answers in the form of a bar drawn to scale under each of the containers she brought to class. The bars form a bar graph when she is done. She never defines terms. She did not use the class to illustrate a concept or procedure she had already put on the blackboard.

As Stevenson and Stigler say:

> The lesson almost always begins with a practical problem [either of the sort just described] or with a word problem written on the blackboard….It is not uncommon for a…teacher to organise an entire lesson around a single problem. The teacher leads the children to recognise what is known and what is unknown, and directs the student's attention to the critical parts of the problem. Teachers attempt to see that all the children understand the problem, and even mechanics, such as mathematical computation, and are presented in the context of solving the problem. Before ending the lesson, the teacher reviews what has been learned and relates it to the problem she posed at the beginning of the lesson.

The point of a Japanese teacher's questions is not to get the right answer but to make her students think. The point of the lesson is not to cover the ground for the test—there is no test—but to stimulate real understanding.

Source: Stevenson, H. and J. Stigler (1992), The Learning Gap, Summit Books, New York.

instructional and non-instructional working time of teachers (the total workload for Japanese teachers is far heavier than that in most other OECD countries), and sustained professional development for teachers.

Given the comparatively low overall public investment in education in Japan, and the comparatively small increase in educational spending over the past decade, the growth rate in public spending on educational institutions has been less than half of that observed on average across OECD countries. To some extent, this was compensated by the decline in student numbers means so that public spending *per student* is closer to the OECD average. The high level of private spending and the willingness of Japanese teachers to work long hours beyond their statutory working time have also played an important role. However, it may be difficult to sustain the commitment of teachers to their students and families' ability to invest in private education indefinitely.

A high-quality teaching force

Many observers note that crucial to the quality of education in Japan is the quality of its teachers. When the Meiji Restoration began and the state modernised the education system, most of the teachers were Samurai from Samurai schools, members of Japan's upper classes. In the Confucian tradition, great honour accrued to teachers. As the modern era began and egalitarian schools were created for the first time, those schools were staffed in significant numbers by members of the upper classes, and from that time on, teaching has been a desirable occupation in Japan.

This has been made manifest in financial rewards. According to Teiichi Sato, "After WWII, as incomes began to rise across the board, the government worried that respect for teachers would decline. Prime Minister Tanaka decided to raise compulsory school

teacher salaries to 30% higher than other public servants. While this has gradually eroded, teachers' salaries are on par with other civil servants. This made a difference in the quality of teachers ever since."

Despite the recent declines in teacher pay described above, teachers are still, by law, among the better paid of Japan's civil servants. But it is not the pay alone that attracts competent young people to teaching; it is primarily the high regard in which teachers are held. Teaching continues to be a highly desirable job: there are seven applicants for every teaching position in Japan.

To become a teacher, students must attend a ministry-certified teacher-education programme at a university or junior college. Japan also has some national teacher training universities with model schools attached to support teacher training for new teachers. Teaching practice is a common part of all teacher-education programmes.

Prefectures, like other employers in Japan, are prepared to make major investments in their new teachers to make sure they have the skills needed to succeed. They assume that these new employees come to them with the necessary applied intelligence, but not necessarily the required job skills. So, as do other employers, they take responsibility for providing an induction programme that offers a sustained opportunity to apprentice with experienced master teachers before new teachers are expected to teach full time. The induction period lasts a full year, and the master teachers are given the year off from their teaching jobs to supervise their apprentices. Once a teacher is inducted into the regular teaching work force, the law requires teachers to take certain additional training after ten years of service. Teachers can also apply for paid leave to earn master's degrees at graduate schools. The ministry also offers various training programmes for prefectural trainers at its national centre.

The most interesting aspect of teacher development occurs on the job. In fact, Japan is a laboratory for the idea of continuous improvement of teaching practice. The incarnation of that idea in Japanese schools is lesson study. This practice undoubtedly contributes to the high quality of instruction in Japanese schools. As Stevenson and Stigler note:

> [From the time they begin their career right to its end, Japanese teachers] are required to perfect their teaching methods through interaction with other teachers….Experienced [teachers] assume responsibility for advising and guiding their young colleagues. Head teachers [principals] organise meetings to discuss teaching techniques…. Meetings at each school are supplemented by informal district-wide study groups… [Teachers work together designing lesson plans.] After they finish a plan, one teacher from the group teaches the lesson to her students while the other teachers look on. Afterward, the group meets again to evaluate the teachers' performance and to make suggestions for improvement…Teachers from other schools are invited to visit the school and observe the lessons being taught. The visitors rate the lessons, and the teacher with the best lesson is declared the winner. (Stevenson and Stigler, 1992)

This practice is entirely consistent with the way teams work in Japan's private industry. It also reflects the Japanese focus on relying on groups to get work done. This has a profound impact on the practice of teaching. Indeed, it is the best hope for the continual, sustained improvement of teaching practice. It brings the work of teaching out from behind the closed door of the classroom and the individual teacher and opens it up for inspection and critique by colleagues. There is very strong teacher accountability in Japan, not in the form of formalised accountability to the bureaucracy, but instead through an intimate and very real accountability to one's colleagues. Teachers work hard to develop superior lesson plans, teach them well, and provide sound and useful critiques when it is their colleague's turn to demonstrate their lesson plans.

All this said, as in other countries, the demands placed on Japanese teachers continue to rise. Teachers are asked to equip students with the competencies they need to become active citizens and workers in the 21st century. They are asked to personalise learning experiences to ensure that every student has a chance to succeed and to deal with increasing diversity in their classrooms and differences in learning styles. And they need to keep up with innovations in curricula, pedagogy and digital resources. To address these demands, Japan will need to rethink many aspects of its approaches to teacher development, including how to optimise the pool of individuals from which teacher candidates are drawn; recruiting systems and the ways in which staff are selected; the kind of initial education recruits obtain before they start their jobs, how they are monitored and inducted into their service, and the continuing education and support they receive; how their compensation is structured; and how the performance of struggling teachers is improved and the best-performing teachers are given opportunities to acquire more status and responsibility.

First, Japan needs to work hard to remain successful in attracting qualified graduates into the teaching force. Competitive pay levels can be part of this equation. However, countries that have succeeded in making teaching an attractive profession have often done so not just through pay, but also by offering real career prospects, and giving teachers responsibility as professionals and leaders of reform. The most impressive example here comes from Finland, which has made teaching one of the most prestigious occupations by raising entry standards and giving teachers a high degree of professional autonomy within a strong collaborative culture, and by providing them with the support and working conditions that their peers enjoy elsewhere. Teacher candidates are selected, in part, according to their capacity to convey their belief in the core mission of public education in Finland, which is deeply humanistic as well as civic and economic. Finnish teachers have earned the trust of parents and the wider society by their demonstrated capacity to use professional discretion and judgement in the way they manage their classrooms and respond to the challenge of helping

virtually all students become successful learners. In line with this, the Finnish system of accountability was redeveloped entirely from the bottom up.

Second, like most nations, Japan needs to further develop its teaching force. Again, Finland is a model in this respect, with its rigorous, research-based teacher-education programmes that prepare teachers in content, pedagogy, and educational theory, and improve their capacity to do their own research and craft creative pedagogical solutions for teaching. It enables teachers to assume considerable authority and autonomy, including responsibility for curriculum design and student assessment, which engages them in the ongoing analysis and refinement of practice. The preparation Finnish teachers receive is designed to build a powerful sense of individual responsibility for the learning and well-being of all the students in their care.

But no matter how good the pre-service education for teachers is, it cannot be expected to prepare teachers for all the challenges they will face throughout their careers. Data from OECD's first Teaching and Learning International Study (TALIS) show that more effective forms of development tend to be welcomed by teachers themselves who, in many countries, are even willing to contribute to the cost of such education in money and time. As noted before, Japan has a strong tradition to teacher development through collaboration among teachers and lesson study in schools. But education is still far from being a knowledge industry, in the sense that its own practices are being continuously transformed by greater understanding of their efficacy. While in many other fields, people enter their professional lives expecting that what they do and how they do it will be transformed by evidence and research, this is far less true in education. Effective development of teachers in service demands different forms of professional development and appropriate career structure and diversity. In seeking to meet teachers' professional development requirements, policy makers and practitioners need to consider both how to support and encourage participation and how to ensure that opportunities match teachers' needs. This needs to be balanced with the cost in terms of both finance and teachers' time. OECD research identifies several aspects as central to successfully bridging the gap between the ideal learning environment and day-to-day practice:

- Well-structured and -resourced induction programmes can support new teachers in their transition to full teaching responsibilities before they obtain all the rights and responsibilities of full-time professional teachers. In some countries, once teachers have completed their pre-service education and begun their teaching, they begin one or two years of heavily supervised teaching. During this period, the beginning teacher typically receives a reduced workload, mentoring by master teachers, and continued formal instruction.
- Effective professional development needs to be on-going, include training, practice and feedback, and adequate time and follow-up support should be offered. Successful programmes involve teachers in learning activities that are similar to those they will use with their students, and encourage the development of teachers' learning communities.
- Teacher development needs to be linked with wider goals of school and system development, and with appraisal and feedback practices and school evaluation.
- There is a need to re-examine structures and practices that inhibit inter-disciplinary practice and to provide more room for teachers to take time to learn deeply. Inquiry- and group-based approaches, especially in the core areas of curriculum and assessment, should be employed.

Singapore provides one of the most impressive models for nurturing teaching talent. Strong academic ability is viewed as essential, as is commitment to the profession and to serving diverse student bodies. Interest in teaching is seeded early through teaching internships for high school students; there is also a system for mid-career entry, which is seen as a way of bringing real-world experience to students. Singapore monitors occupational starting salaries and adjusts the salaries for new teachers accordingly. In effect, the country wants its most qualified candidates to regard teaching as just as attractively compensated as other professions. After three years of teaching, teachers are assessed annually to see which of three career paths would best suit them – master teacher, specialist in curriculum or research or school leader. Each path has its own salary scale. Teachers with potential as school leaders are moved to middle-management teams and receive training to prepare them for their new roles. Middle managers' performance is assessed for their potential to become vice principals, and later, principals. Each stage involves a range of experience and training to prepare candidates for school leadership and innovation. Young teachers are continuously assessed for their leadership potential and given opportunities to demonstrate and learn by, for example, serving on committees, then being promoted to head of department at a relatively young age. Some are transferred to the ministry for a period. Potential principals are selected for interviews and go through leadership situational exercises.

Third, the development of an effective system of teacher evaluation will be essential for improving the performance of individual Japanese teachers and the performance of the education system as a whole. Designing teacher-appraisal methods is not easy, and requires that the objectives of improvement and accountability be carefully balanced. Combining the improvement and accountability functions into a single teacher-appraisal process raises many challenges, and comparative research on the effectiveness of different models is just beginning to emerge. For example, when evaluation is oriented towards improving practice within schools, teachers are typically willing to reveal their weaknesses, in the expectation that conveying that information will lead to more effective decisions on developmental needs and teacher education. However, when teachers are confronted with potential consequences of evaluation on their career and salary, they are less inclined to reveal weaknesses in their performance,

and the improvement function, which builds on trust in the relationship between appraiser and the appraised, may be jeopardised. In practice, countries usually use some combination of these approaches that integrates multiple purposes and methodologies. Due attention will need to be paid to the criteria against which teachers are appraised. These should include, but not be limited to, student performance. Also important are the degree to which teachers improve their professional skills and, crucially, the part they play in improving the school and system as a whole. In this way, evaluation and appraisal need to be well aligned with the process of system change. However, it is not enough to appraise the right things; the ways in which appraisal is followed through will determine its impact. At present, many teachers across the OECD area feel that appraisal has no or little consequence. School leaders need to become more skilled at using appraisals intelligently, and evaluation needs to be more closely connected with career development and diversity. TALIS data show that, at present, most teachers do not feel that school leaders use appraisal to recognise good performance, which suggests that a key component of appraisal is appropriate training for those conducting the appraisals.

Finally, since learning outcomes at school are the result of what happens in classrooms, only reforms that are successfully implemented in classrooms can be expected to be effective. Teacher engagement in the development and implementation of educational reform is therefore crucial, and school reform will not work unless it is supported from the bottom up. It is therefore essential to build a constructive political process in which teachers share with policy makers and administrators the main goals of reform. This does not mean that the specific interests or concerns of particular groups can be ignored: there will always need to be compromise in making changes to well-established systems, particularly when some individuals are bound to be threatened by change. However, around the world, collaborative models of educational reform have been shown to be highly effective. This requires that those responsible for change both communicate their aims well and involve the stakeholders who are affected. It also requires teachers to be the architects of change, not just its implementers.

Ontario's example is instructive. Its deputy minister meets quarterly with the major teachers' unions, superintendents' organisations, and principals' associations to discuss ongoing reform strategies. The ministry has also created the Ontario Education Partnership Table where a wider range of stakeholders meets with ministry officials two to four times a year. From this gathering, smaller groups of stakeholders worked on particular issues in more detail. In 2005, four-year collective bargaining agreements between the four major teachers' unions and provincial trustee associations were signed. These agreements, the result of a set of provincial dialogues convened by the government, created a framework that advanced the government's educational improvement strategy while addressing teacher workload issues.

A centralised education system in some ways, but one that is decentralised where it matters

The Japanese education system is often described as highly centralised. As PISA shows, however, the reality is far more nuanced. MEXT, the central authority responsible for developing and implementing national education policy, distributes public resources for education at the national, prefectural, and municipal levels, and guides national curriculum standards, textbook development, and teacher training. Each of the country's 47 prefectures has its own board of education responsible for co-ordinating education in its own geographic area. These boards are responsible for establishing and closing institutions and for certifying teachers. In addition, each of the approximately 1 700 municipalities in Japan has its own board of education responsible for selecting school textbooks. Teachers in Japan are largely responsible for how the curriculum is taught, and are given authority over instruction and actual classroom practice.

By PISA measures, Japan can be characterised as offering below-average school and local autonomy in decisions relating to resource allocations. In contrast, Japan grants significant school autonomy over curricular and assessment policies. This reflects the way in which education governance is structured in Japan, with the central government largely guiding financing, prefectures largely guiding teacher selection and evaluation, municipalities given authority over textbooks, and teachers given significant freedom to innovate classroom practice. This is important because PISA shows these factors to be more closely related to educational performance than decision-making responsibilities concerning resource allocation. For example, school systems, like Japan's, that provide schools with greater discretion in making decisions regarding student-assessment policies, the courses offered, course content and the textbooks used, tend to perform at higher levels in PISA. In PISA, some 98% of 15-year-olds in Japan are in schools whose principals reported that only principals and/or teachers have considerable responsibility in establishing student-assessment policies (the OECD average is 66%); 94% are in schools whose principals reported that only principals and/or teachers have considerable responsibility in deciding which courses are offered (the OECD average is 50%); 93% are in schools whose principals reported that only principals and/or teachers have considerable responsibility in determining course content (the OECD average is 45%); and 89% are in schools whose principals reported that only principals and/or teachers have considerable responsibility in choosing which textbooks are used (the OECD average is 78%).

All in all, the analysis suggests that the challenge for Japan lies less in changing the formal distribution of responsibilities for decision making between central, prefectural and local/school authorities than in enabling school and local authorities to actively assume the decision-making responsibilities they already have. In this respect, the policy experience from Finland, which emphasises informality, quick decision making, and freedom to act so that local education authorities and schools can react to changing

situations and the surrounding environment, can serve as a model. Finland's education-management system is not only less hierarchical than that of many other education systems, it is decidedly anti-hierarchical, with the aim of encouraging creativity, entrepreneurship and personal responsibility. Singapore provides another model that combines strong central capacity with local authority to act. The Ministry of Education in Singapore is staffed by knowledgeable, pragmatic individuals, trained at some of the best universities in the world. They function in a culture of continuous improvement, constantly assessing what is and isn't working using both data and practitioner experience. They respect, and are respected by, professionals in the schools.

Maintaining a balanced approach to accountability

"It's always about what students are learning, agreeing on that, and holding yourself accountable and each other accountable by engaging in meaningful reviews of how students are doing," said Jim Stigler during an interview for this report. The Japanese education system is a system with a great deal of accountability, but it is not a system of administered accountability. The Japanese have virtually none of the trappings of formal Western accountability systems and they do not need them. According to the MEXT White Paper 2007, Japan finally instituted a national assessment of every student at sixth grade and the ninth grade for the first time after it stopped conducting those nationwide assessment forty four years ago. But Japan since decided to administer the assessment only to a sample of students in 2010.

The only tests are the entrance exams for high school and university. Everything hinges on a student's performance in these tests. Because newspapers publish results regularly everyone knows the rankings of these institutions and the record of each compulsory and junior high school in getting their students into the right high schools and universities. The newspapers are full of statistics for each school, much like the statistics for popular sports teams in other parts of the world. Magazine articles are written about changes in the rankings and what they mean and why they occurred. Other stories are written about students who succeeded against all odds in the exams and others who did not.

But that is only half the story. As pointed out earlier, in Japanese society the burden of a student's fate is partly shouldered by the family, the teachers, the faculty and even the students' classmates. Teachers' reputations among their peers rest on the success of their students in a way that has no parallel in many Western countries.

The system of homeroom teachers brings another level of accountability. Because these teachers follow the students through the grades, and because they are involved in their students' lives outside of school and are in constant communication with parents, they are accountable to the parents in a unique way. This cannot be duplicated in countries where teachers do not follow students throughout their school careers and where they are responsible for only one or a few subjects.

Some countries provide very strong incentives to students to take tough courses and to study hard in school, others do not; many are somewhere in between. Japan is a leader in the first camp, and most observers believe that this one of the reasons why Japan has consistently high rankings in international education league tables.

The Japanese system creates clear, powerful and tangible rewards for student academic success. In the short term, these come from parents, whose praise is highly valued by children. In the medium term, they come in the form of admission to the right high school or university, which is of paramount importance to the student and to everyone around her. And, finally, in this highly meritocratic society, they come from the value that employers and the society at large place on academic achievement.

All of this, of course, contributes mightily to "exam hell", the well-known pressure cooker that young people in Japan go through at exam time. People elsewhere in the world vow never to institute such high-stakes exams because of the pressure it places on individual students. The Japanese themselves say they don't like exam hell and would like to stop it. Achieving this without losing the benefits in terms of student motivation and meritocracy will be one of the major challenges facing Japan and many other East Asian countries. The examples of Finland and Ontario suggest that alternatives are possible.

Developing accountability through social norms

Japan's challenging environment and living conditions may have shaped the Japanese value of the welfare of the group over that of the individual (White, 1988). In this environment, individuals gain esteem by doing things that the group values. If a person's actions threaten group harmony, social sanctions follow with wide-ranging repercussions. If one loses the respect of one group, establishing respect with other groups can be more difficult. This cultural factor explains why the Japanese work hard to maintain good relations with the groups to which they belong. It also lies behind the good educational performance in Japan.

In Japan a school's reputation depends on the academic performance of the students and on their behaviour. Society holds the school responsible for both aspects in a way that has no parallel in the West. For example, if a student violates the law, the law enforcement authorities call that student's homeroom teacher, and all faculty members apologise for the student's behaviour. It is not surprising then that Japanese students tend to develop a strong sense of obligation to the faculty, and strive to perform well academically and to stay within the limits of the law when not in school. Indeed, the same idea applies to a student's relationship to the other students at school. To fail is to let the group down. Therefore most members of this society will work hard to do as well

as possible, and are always working towards higher goals, because that is the way to earn acceptance and gain status. The same values permeate the workplace.

Unlike many societies where advancement depends mainly on connections and clans, Japan is steadfastly meritocratic. While children from wealthier families are statistically more likely to get higher paying jobs than less wealthy children, in Japan this trend is less pronounced than in many other OECD countries and seems to be due to greater financial investment in a child's education and less due to social connections. Up until recently, people worked their entire adult life for the same firm they joined after school or university. A person's employment in a particular firm is usually a function of the high school or university they attended prior to joining that firm; this is unusual elsewhere. In turn, the high school or university a person attends is based entirely on how a student does in entrance exams.

In Japan, a mother is judged on her success in supporting the education of her children. In practice, a mother is judged first by the high school that her son or daughter gets into, and then the university to which her child is admitted. Though the trend is changing, it is less common for Japanese mothers to work outside the home than Western mothers. Sociologists describe how society expects Japanese mothers to make sacrifices for their children who, in return, are expected to perform well in school.

Thus advancement in Japan is a function of merit and determined by examination. This ought not to work, because there are many other important skills that are not measured by Japanese examinations. The exams emphasise memorising and accumulating facts, and mastering procedures, rather than analytical thinking, creativity or the capacity for innovation. However, this system does work because Japanese employers are mainly interested in three things: applied intelligence, the capacity to learn, and the capacity to work hard and persist in the face of difficulty.

Some outside observers believe that Japan has no formal accountability system because, as noted before, it does not use the national assessment of academic ability to enforce accountability (the test-based system of accountability). But the above mechanisms provide for strong accountability in Japan. Students are accountable to teachers and parents. Teachers are accountable to each other in a system in which all the teachers in the school know just how good or bad the other teachers' performance is because of lesson-study processes. Everyone knows how the high schools and universities are ranked and so everyone knows how to rank the institutions and teachers who prepare students for those high schools and universities. Student performance on those entrance exams is made public.

All this said, since the 1980s there has been a decline in one of the key assets of the Japanese education system: the high level of trust in schools and teachers. Building and maintaining trust in education is crucial for many countries. Trust cannot be legislated. The strong role that trust plays in the relationship between government and teachers in Finland has suggested to some that lessons from Finland may be less relevant to other countries, especially if one views trust as a precondition for the kinds of deep institutional reforms embodied in the development of the comprehensive school. But the Finnish experience also shows that trust is at least as much a consequence of policy decisions as it is a pre-existing culture. In Finland it is assumed that students will perform at their best when their teachers' morale is high, and teachers' morale will not be high if they perceive themselves to be under attack by the authorities. Trust in this case means eliciting teachers' views on what needs to be done to improve student performance, acting on those views to the greatest extent possible, and working hard to help teachers develop the capacity required to meet their students' needs. Given the respect that teachers have historically enjoyed in Finland, there was a solid base on which to build reforms. But Finnish teachers only latterly gained their high level of autonomy over curriculum, assessment and other decisions. This granting of trust from the government, coupled with their new-found status as university graduates from highly selective programmes, empowered teachers to practice their profession in ways that deepened the trust accorded them by parents and others in the community.

Investing in education from the start

Japanese parents do not only demonstrate an exceptional commitment to the education of their children in school, but they have also traditionally provided for a strong educational start prior to the enrolment of their children. However, social changes together with adjustments in labour demand driven by changing demographics will put an increasing premium on the participation of women in the labour force. This will require Japan to strengthen early childhood education and care in ways that other high-performing education systems have already done.

Currently, early childhood education in Japan is provided by two types of institutions: childcare centres (*hoikuen*) and kindergartens (*yochien*), with kindergartens oriented towards learning while childcare centres focus on care. These two systems have developed independently and remain largely independent, with different facilities and different objectives. Childcare centres accept children below primary-school age and have care as their main objective, while kindergartens are educational in nature and cater to children between the ages of three and six.

PISA results indicate that Japanese students who attend early childhood education perform at significantly higher levels in PISA than those who do not attend any form of early childhood education. Despite these clearly visible benefits, Japan remains among the countries with the lowest levels of public spending on early childhood education and care, leaving parents with a significant

financial burden for attendance in the mainly privately provided childcare centres. Affordable, high-quality early education for children will thus be a priority for Japan.

However, it is not just an issue of funding. Japan's efforts to integrate childcare centres and kindergartens into an integrated system (*Yoho Ittai Ka*) in the new Child/Child-Rearing System (*Kodomo Kosodate Shin System*) is equally important, as the new system will combine the strengths of the centres and kindergartens in order to provide all children, regardless of their socio-economic background, with the best possible start in life. The system will also reduce the economic burden child-caring and child-rearing, and will help to make it easier for women to participate in the labour force and to contribute to economic growth and innovation. As similar efforts in countries like Sweden, Finland, Denmark, New Zealand, Slovenia and Chile have shown, success will partly depend on political leadership combined with a coherent reform agenda and a realistic implementation plan, stakeholder buy-in, an appropriate balance between child and parental needs, and adequate resources.

A common curriculum, which is a key strength of the current school system, could be equally beneficial for early childhood education and care. The planned child curriculum (*kodomo shishin*) can provide the educational foundation for children aged 3-5 if it is aligned with the school curriculum to ensure a smooth transition from early childhood education to school, and overcome the "Grade One Problem" (*shouichi problem*) of school entry.

Effective school-home communication

Japanese students spend an hour a day in homeroom. The homeroom becomes that student's family in the school. Japanese homeroom teachers at elementary schools teach all subjects, except specialised subjects like music and crafts. These homeroom teachers typically follow their classes for several years. They are required to visit their students' families regularly. Students participating in extracurricular activities spend time with teachers who coach them in their basketball team or brass band after school and also on weekends. In the upper grades, the teachers are expected to provide academic and career counselling.

Teachers at elementary schools maintain communication with parents through a notebook that students shuttle between school and home. Even if a student has a non-academic problem, the teacher will communicate the nature of the problem to the parents, who are expected to provide appropriate support at home. If that is not sufficient, the teacher will advise the parents to consult other services available at municipal offices.

This entire approach is based on the belief that effort and not ability is what primarily explains student achievement. If a student falls behind, it is not because he or she is not good at school work; it is because he or she is not working hard enough and the system has a way to change this. It is also based on the idea that many people, not just the student, are responsible for a student's poor performance and that poor performance reflects badly on those people, too. This motivates both parents and teachers to do everything possible to make sure the student gets back on track.

During the American occupation of Japan after the Second World War, the Americans required Japan to start Parent-Teacher Associations of the kind that are common in the United States. In the ensuing years, while these organisations have weakened in the United States, in Japan they have become a dominant player in the school system, providing parents with a real voice in education policy and local practice. They are not only organised at the school level, but also at prefectural and national levels, with a seat on the Central Council on Education. With a reform introduced in 2004, it is now also possible for parents and community residents to participate in school management with a certain degree of authority and responsibility as members of school management councils (e.g. school management councils can approve basic plans for school management, or express opinions to boards of education, the appointing authority, concerning the appointment of teachers and school staff). The number of this new type of schools, called "community schools", continues to rise.

This said, the voice of parents has remained a conservative force in educational reform, with parents naturally placing greater emphasis on the immediate incentives the education system offers for the education of their children than on the longer-term benefits of changes in the system.

Even so, parental involvement in school is evolving. For instance, with a reform introduced in 2004, it is now possible for parents and community residents to participate in public school management with a certain degree of authority and responsibility as members of school management councils (e.g. school management councils can approve basic plans for school management, or express opinions to boards of education, the appointing authority, concerning the appointment of teachers and school staff). The number of this new type of schools, called "community schools", has witnessed a gradual but stable increase since it was first introduced in 2004.

Balanced resource-allocation priorities

Japan spends less public money on education than most OECD countries, but it gets more for that money. One of the many reasons for this is the careful way Japan allocates that money, and the capacity of the system to channel resources to where they can make most difference. Compared to other OECD countries, Japan spends more on teachers and less on school buildings and facilities, non-teaching staff, central office specialists and administrators, full-colour, glossy textbooks, and so on. Japanese schools are built

to ministry designs: they are perfectly functional but very plain. They are not architectural symbols of community pride and lack many of the special features found in schools in other advanced industrial countries. School administration is typically confined to a principal, an assistant principal, one janitor and a nursing teacher and a clerical officer. There is often no cafeteria – students serve the meals from a central kitchen to their teacher and classmates in the classroom. The students are also responsible for cleaning their classrooms. As noted above, textbooks are very simply produced in paperback format and are much smaller than in many other industrialised countries. At every point, the Japanese have made sure that the money they spend on educating their children goes as much as possible towards teachers and instruction; so it is no surprise that a much greater proportion of total funding is spent on them than is the case in many other countries (Stevenson and Stigler, 1992).

At the same time, the goal of equity in education has become somewhat more difficult to attain, as the devolution of responsibilities for educational finance has opened a widening gap in resourcing levels that is mirrored in growing performance differences among schools. Similarly, the investment in teachers has suffered over the past decade when compared with other educational investments.

When comparing the resources invested in education and spending choices, it is important to keep in mind the significant share of private investment in education. A large percentage of Japanese students attends private, after-school classes. Such instruction often takes place in institutions known as "*juku*", but is also delivered as home-based tutoring and distance learning. While home based tutoring is the primary way in which students who are behind invest extra time and effort to catch up, the primary purpose of the after-school classes is to offer more advanced study than is available in the public school, to prepare for school lessons and to prepare for school entrance exams through one-to-one or small-group tutoring. The high level of participation in such activities is driven by the intense competition to enter the country's top universities.

On the one hand, *Juku* can work as a stimulus for the formal education sector by fostering innovation and child-centered pedagogical approaches. The growing investment in *Juku* also suggests that they positively influence students' school performance and their success rate on school entrance exams, while developing students' study habits and interest in learning.

On the other hand, one of the major concerns related to *Juku* is the financial cost for families, which inevitably raises issues of equity, because students from disadvantaged backgrounds may not afford the high fees required to attend *juku* and the financial burden associated with child-rearing in a country with low fertility rates. There are other factors important to consider as well. For example, the *Juku* system creates and perpetuates inequality, given that the high cost limits use by low-income families. The *Juku* also unduly dominates children's lives and restricts their leisure activities in ways that may be detrimental to their well-rounded development. To the extent they duplicate school curricula, *Juku* may also use resources that could be used more efficiently elsewhere. In some cases, *Juku* substitute for schools, crowding out school lessons. Last but not least, *Juku* can disrupt classroom learning by upsetting the sequence of learning and exacerbating disparities between students, causing some to lose interest in classroom activities.

On balance, reducing an overly heavy reliance on the *Juku* system could help improve equity in schooling outcomes in the long term. In the meantime, better integration of after-school activities with school teachers, personnel and facilities may activate a virtuous cycle between the two sectors, ensuring that best practices are shared and that there is an alignment of educational objectives and practices. Learning time may thus have a multiplying effect rather than simply an additive effect.

Careful attention to school-to-work transition

Japan has an unusual and highly effective system for moving students into the workforce. The idea of lifetime employment, although weakened in recent decades, makes it worthwhile for employers to invest heavily in the continued education and training of young people joining their workforce fresh from school or university. This system results in comparatively low rates of youth unemployment – even if they are high in the eyes of many Japanese who compare current unemployment rates against past standards – and works well because students are already accustomed to working hard.

It also produces workers who are used to being loyal team members, working collaboratively with others, showing up on time and working to deadlines. It produces students who know how to learn and are eager to learn and come to work with a prodigious set of skills. Other nations interested in workforce development might consider exploring, in detail, how this system works.

Because Japanese firms generally believe that they will employ people for a long time, there is a strong willingness to invest heavily in the continuing education and training of employees. It is not uncommon for a Japanese firm to send new university recruits overseas during their early years of employment to pursue a foreign graduate programme or to be interns in a foreign plant. Research shows that Japanese firms value candidates who are not just highly intelligent, but ready to learn whatever they need to learn.

Maintaining these strengths as the link between workers and their employers weakens is one of the challenges Japan faces.

CONCLUDING REMARKS

International comparisons show Japan's school system to be among the world's top-performing systems, with regard to the quality of learning outcomes, with regard equity in the distribution of learning opportunities, and with regard to value for money. Japan's strong commitment to education fuelled the sustained period of rapid economic growth in the post-war period, and high-quality human capital has made Japan one of the key players in the production of high-technology, high value-added products. But PISA also shows a fair number of countries and economies with performance levels close to or higher than Japan's. Japan therefore needs to ensure that its stock of human capital remains competitive with that of other countries and economies around the world and in the region – such as Shanghai-China, Korea, Hong-Kong China and Singapore. That is particularly important in the context of the dramatic demographic challenges the country now faces.

One of Japan's main assets is the high value society continues to place on education which provides the country with access to a first-rate teaching force and ensures that Japanese students are superbly supported at home and that schools are well resourced. But maintaining strong demand for high-quality education on the part of parents and the general public will be a formidable challenge as some of the externally motivating forces are weakening.

Another aspect of the Japanese success in education has been the traditional belief that all children can achieve, which is mirrored in the comparatively weak impact that social background has on educational outcomes. However, the significant rise in the performance variation among senior high schools witnessed by PISA suggests that these high standards of equity are beginning to be challenged and that Japan's efforts to devolve responsibilities for educational decision-making to schools and local authorities need to be accompanied with equity-related policies that attract the most talented teachers to the most challenging classrooms and the most capable principals to the schools most in need for effective leadership.

Japan has seen a significant shift from one of the more centralised to one of the more decentralised education systems in the OECD area. The challenge for Japan lies now less in further changes to the formal distribution of responsibilities for decision making between central, prefectural and local/school authorities than in enabling school and local authorities to actively assume the decision-making responsibilities they already have. This will require effective school leadership, some emphasis on informality, quick decision making, and freedom to act so that local education authorities and schools can react to changing situations and the surrounding environment.

Many nations envy Japan for its clear and ambitious academic standards across the board, and for coherent delivery chains through which curricular goals translate into high-quality instructional systems and practices, and student learning. However, the rapid decline in the student-age population has significantly widened the gateways into the education system, reducing the motivating impact which high-stakes gateways have traditionally had. Japan will therefore need to consider alternative incentive structures to maintain students' and society's commitment to education. Also, as individuals change jobs and employers more frequently, an individual's performance in the work place has now a greater impact his or her economic and social future than just the school or university attended. Perhaps most importantly, while PISA shows that Japan has made significant progress in fostering students' interest in and engagement with learning and improving their awareness of effective approaches to learning, this is an area where Japan still lags significantly behind many advanced education system. Curriculum reform will be central if Japan wishes to fulfil its ambition of shifting emphasis from a traditional subject-matter based approach towards a competency-based approach in the curriculum and to match the world's best-performing education systems not just in the cognitive development of its students but also in students' will and desire to learn. Experience with the integrated course of study shows that success will depend not just on curricular innovations, but on how well teachers are trained to use them.

Many observers note that crucial to the quality of education in Japan is the quality of its teachers. But the demands placed on Japanese teachers continue to rise. Teachers are asked to equip students with the competencies they need to become active citizens and workers in the 21st century. They are asked to personalise learning experiences to ensure that every student has a chance to succeed and to deal with increasing diversity in their classrooms and differences in learning styles. And they need to keep up with innovations in curricula, pedagogy and digital resources. To address these demands, Japan will need to rethink many aspects of its approaches to teacher development, including how to optimise the pool of individuals from which teacher candidates are drawn; recruiting systems and the ways in which staff are selected; the kind of initial education recruits obtain before they start their jobs, how they are monitored and inducted into their service, and the continuing education and support they receive; how their compensation is structured; and how the performance of struggling teachers is improved and the best-performing teachers are given opportunities to acquire more status and responsibility. Over the past decades, Japan has tended to prioritise reductions in class sizes over investments in the quality of teachers. This balance may now require adjustment and this report provides a range of examples for how this could be achieved.

Last but not least, since learning outcomes at school are the result of what happens in classrooms, only reforms that are successfully implemented in classrooms can be expected to be effective. Teacher engagement in the development and implementation of educational reform is therefore crucial, and school reform will not work unless it is supported from the bottom up.

Note

1. At the time this commitment did not extend to women.

References and further reading

Boe, E.E., May, H., Barkanic, G., Boruch, R.F. (2002), *Predictors of national differences in mathematics and science achievement: data from TIMSS for eighth grade students*. University of Pennsylvania Graduate School of Education Research Report.

Dewey, J. (1902), *The Child and the Curriculum*, The University of Chicago Press, Chicago.

Gartner, A. and **D. Lipsky** (1989), *The Yoke of Special Education: How to Break It*, monograph, National Center on Education and the Economy, Rochester, New York.

INSEAD (2010), *Global Innovation Index Report 2009-2010*, INSEAD Business School and the Confederation of Indian Industry, INSEAD, Fontainebleau, France.

MEXT (Ministry of Education, Culture, Sports, Science and Technology) (2002), *Japanese Government Policies in Education, Culture, Sports, Science and Technology 2001. Educational Reform for the 21st Century*, Ministry of Education, Culture, Sports, Science and Technology, Japan.

OECD (2011), *Economic Survey of Japan*, OECD Publishing.

Okano and Tsuchiya, (1999) *Education in contemporary Japan: inequality and diversity*. Cambridge: Cambridge University Press.

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

Takayama (2011), *Extended book review: Other Japanese Educations* and *Japanese Education Otherwise,* Asia Pacific Journal of Education.

White, M. (1988), *The Japanese Educational Challenge: A Commitment to Children*, The Free Press, New York.

Annex A

KEY FEATURES OF PISA 2009

Content

- The main focus of PISA 2009 was reading. The survey also updated performance assessments in mathematics and science. PISA does not consider students' knowledge in these areas in isolation, but in relation to their ability to reflect on their knowledge and experience and to apply them to real-world issues. The emphasis is on mastering processes, understanding concepts and functioning in various situations within each assessment area.
- For the first time, the PISA 2009 survey also assessed 15-year-old students' ability to read, understand and apply digital texts.

Methods

- Around 470 000 students completed the assessment in 2009, representing about 26 million 15-year-olds in the schools of the 65 participating countries and economies. Some 50 000 students took part in a second round of this assessment in 2010, representing about 2 million 15 year-olds from 10 additional partner countries and economies.
- Each participating student spent two hours carrying out pencil-and-paper tasks in reading, mathematics and science. In 20 countries, students were given additional questions via computer to assess their capacity to read digital texts.
- The assessment included tasks requiring students to construct their own answers as well as multiple-choice questions. The latter were typically organised in units based on a written passage or graphic, much like the kind of texts or figures that students might encounter in real life.
- Students also answered a questionnaire that took about 30 minutes to complete. This questionnaire focused on their personal background, their learning habits, their attitudes towards reading, and their engagement and motivation.
- School principals completed a questionnaire about their school that included demographic characteristics and an assessment of the quality of the learning environment at school.

Outcomes

PISA 2009 results provide:

- A profile of knowledge and skills among 15-year-olds in 2009. This consisted of a detailed profile for reading, including digital literacy, and an update for mathematics and science.
- Contextual indicators relating performance results to student and school characteristics.
- An assessment of students' engagement in reading activities, and their knowledge and use of different learning strategies.
- A knowledge base for policy research and analysis.
- Trend data on changes in student knowledge and skills in reading, mathematics, science; on changes in students' attitudes and in socio-economic indicators; and on changes in the impact of some indicators on performance results.

The results of PISA 2009 are presented in six volumes:

- **Volume I**, *What Students Know and Can Do: Student Performance in Reading, Mathematics and Science*, summarises the performance of students in PISA 2009. It provides the results in the context of how performance is defined, measured and reported, and then examines what students are able to do in reading. After a summary of reading performance, it examines the ways in which this performance varies on subscales representing three aspects of reading. It then breaks down results by different formats of reading texts and considers gender differences in reading, both generally and for different reading aspects and text formats. Any comparison of the outcomes of education systems needs to take into consideration countries' social and economic circumstances, and the resources they devote to education. To address this, the volume also interprets the results within countries' economic and social contexts. The volume concludes with a description of student results in mathematics and science.
- **Volume II**, *Overcoming Social Background: Equity in Learning Opportunities and Outcomes,* starts by closely examining the performance variation shown in Volume I, particularly the extent to which the overall variation in student performance relates to differences in results achieved by different schools. The volume then looks at how factors such as socio-economic background and immigrant status affect student and school performance, and the role that education policy can play in moderating the impact of these factors.
- **Volume III**, *Learning to Learn: Student Engagement, Strategies and Practices*, explores the information gathered on students' levels of engagement in reading activities and attitudes towards reading and learning. It describes 15-year-olds' motivation, engagement and strategies to learn.
- **Volume IV**, *What Makes a School Successful? Resources, Policies and Practices*, explores the relationships among student, school and system characteristics, and educational quality and equity. It explores what schools and school policies can do to raise overall student performance and, at the same time, moderate the impact of socio-economic background on student

performance, with the aim of promoting a more equitable distribution of learning opportunities.

- **Volume V**, *Learning Trends: Changes in Student Performance Since 2000*, provides an overview of trends in student performance in reading, mathematics and science from PISA 2000 to PISA 2009. It shows educational outcomes over time and tracks changes in factors related to student and school performance, such as student background and school characteristics and practices.
- **Volume VI**, *Students On Line: Digital Technologies and Performance,* explains how PISA measures and reports student performance in digital reading, and analyses what students in the 19 countries participating in this assessment are able to do.

Future assessments

- The PISA 2012 survey will return to mathematics as the major assessment area; PISA 2015 will focus on science. Thereafter, PISA will begin another cycle, starting once again with reading.
- Future tests will place greater emphasis on assessing students' capacity to read and understand digital texts and to solve problems presented in a digital format, reflecting the importance of information and communication technologies in modern societies.

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

The OECD is a unique forum where governments work together to address the economic, social and environmental challenges of globalisation. The OECD is also at the forefront of efforts to understand and to help governments respond to new developments and concerns, such as corporate governance, the information economy and the challenges of an ageing population. The Organisation provides a setting where governments can compare policy experiences, seek answers to common problems, identify good practice and work to co-ordinate domestic and international policies.

The OECD member countries are: Australia, Austria, Belgium, Canada, Chile, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. The European Commission takes part in the work of the OECD.

OECD Publishing disseminates widely the results of the Organisation's statistics gathering and research on economic, social and environmental issues, as well as the conventions, guidelines and standards agreed by its members.

OECD PUBLISHING, 2, rue André-Pascal, 75775 PARIS CEDEX 16
(98 2011 06 1 P) ISBN 978-92-64-11851-5- No. 59733 2011

Strong Performers and Successful Reformers in Education

Lessons from PISA for Japan

For decades Japan has remained at or near the top of international assessments of student learning; and in the past decade, students in Japan have become more engaged in learning. However, the government aspires to improve learning outcomes even further. *Strong Performers and Successful Reformers in Education: Lessons from PISA for Japan* focuses on how Japan is reforming its education system not only to produce better learning outcomes, but to equip students with the skills they need to navigate through the unpredictable labour market of the future and to participate in society as active citizens.

This is the second in a series of reports examining how education systems are handling the challenge of preparing their students for a world of interconnected populations, rapid technological change, and instantaneous availability of vast amounts of information. Like the first volume, *Strong Performers and Successful Reformers in Education: Lessons from PISA for the United States*, this report presents examples from other countries with consistently high-performing education systems or countries that, by redesigning policies and practices, have been able to improve their education outcomes, as measured by the OECD Programme for International Student Assessment (PISA), the world's most comprehensive and rigorous survey of students' skills and attitudes towards learning.

Contents

Chapter 1. How is Technology Changing Demand for Human Skills?

Chapter 2. Viewing Education in Japan through the Prism of PISA

Chapter 3. Finland: A Non-Competitive Education for a Competitive Economy

Chapter 4. Singapore: Thinking Ahead

Chapter 5. Ontario: Harnessing the Skills of Tomorrow

Chapter 6. Shanghai and Hong Kong: Learning to Learn

Chapter 7. Policy Lessons from and for Japan

Please cite this publication as:

OECD (2012), *Lessons from PISA for Japan,* Strong Performers and Successful Reformers in Education, OECD Publishing.
http://dx.doi.org/10.1787/9789264118539-en

This work is published on the *OECD iLibrary,* which gathers all OECD books, periodicals and statistical databases. Visit ***www.oecd-ilibrary.org***, and do not hesitate to contact us for more information.

OECD*publishing*
www.oecd.org/publishing

ISBN 978-92-64-11851-5
98 2011 06 1 P