



THE LEARNING CURVE

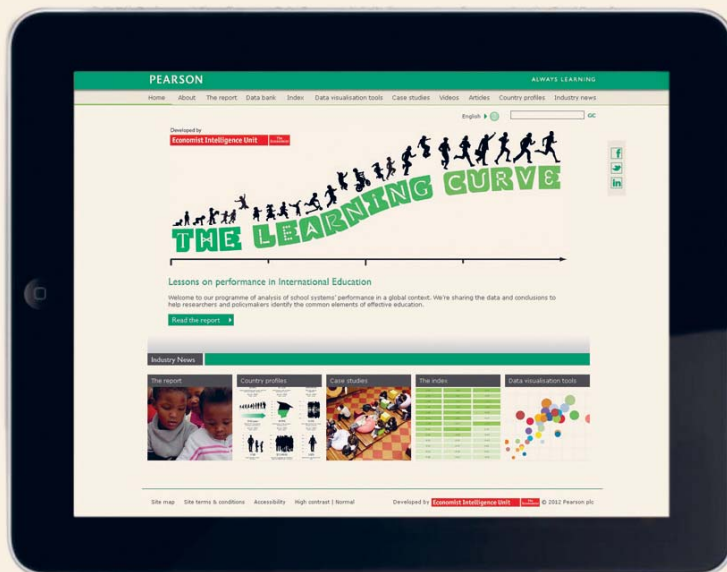
LESSONS IN COUNTRY
PERFORMANCE IN EDUCATION

Published by Pearson

2012 REPORT

Developed by the Economist Intelligence Unit

Learn more, explore the data and join the discussion
at The Learning Curve website...



- › Full report online and in PDF
- › The Learning Curve databank
- › Case studies
- › Country profiles
- › Video interviews
- › Data visualisations

www.thelearningcurve.pearson.com

PEARSON



FT

Pearson is the world's leading learning company. We provide learning materials and services to educators and students of all ages; business information through the *Financial Times* and the world's best books and ebooks through Penguin.

www.pearson.com

Developed by **Economist Intelligence Unit** **The Economist**

The Economist Intelligence Unit wrote all sections of this report with the exception of the Foreword.

The Economist Intelligence Unit (EIU) is the world's leading resource for economic and business research, forecasting and analysis. It provides accurate and impartial intelligence for companies, government agencies, financial institutions and academic organisations around the globe, inspiring business leaders to act with confidence since 1946. EIU products include its flagship Country Reports service, providing political and economic analysis for 195 countries, and a portfolio of subscription-based data and forecasting services. The company also undertakes bespoke research and analysis projects on individual markets and business sectors. More information is available at www.eiu.com or follow us on www.twitter.com/theEIU


Disclosure: The Economist Intelligence Unit is part of The Economist Group. Pearson owns a 50% stake in The Economist Group.

Overview	Foreword By Sir Michael Barber, Chief education advisor, Pearson	02
	Preface An explanation of the research context, objectives and its contributing experts	04
	Executive summary A summary of the report's findings and its conclusions	06
Research and analysis	Education inputs and outputs: it's complicated Assessing the evidence for correlations between education inputs and outputs as well as socio-economic outcomes	12
	The tangible and intangible: income, culture and education outcomes The relevance of wealth and cultural attitudes to education performance	18
	Getting teachers who make a difference How does the quality of teaching that children receive affect their future prospects?	22
	School choice and accountability: caveat scholasticus Why expanding choice has positive effects in some circumstances but not others	26
	Returns to schooling: education, labour market and social outcomes Highlighting the key personal, social and economic benefits of a better educated population	33
	Towards an index of education outputs Creating a comparative index, to identify common factors in countries' education success	38
	Conclusion and recommendations for further study Next steps, and a call for more research	44
	Methodology Methodology for Quantitative Components of The Learning Curve programme	46
Appendix 1		
Appendix 2	Select bibliography	49



Foreword

Over the last decade, international benchmarking of education systems has become ever more prevalent. More importantly, it has become increasingly influential in shaping education policy at local, regional and national levels. As studies by OECD-PISA and TIMSS become more sophisticated and longitudinal time sequences develop there is ever more to learn about what successful education systems look like and how success can be achieved.



In the early days of international benchmarking, education ministers and other leaders tended to worry more about the media impact than the implications for policy. However, once the regular routine of published PISA results was established, in 2001, this changed. Germany, for example, found itself much further down the first PISA rankings than it anticipated. The result was a profound national debate about the school system, serious analysis of its flaws and then a policy response to the challenges that were identified. A decade later, Germany's progress up the rankings is visible to all.

Now, in fact, we are beyond the phase of individual country reactions. Increasingly what we see is a continuous dialogue among education ministers and top officials around the world about the evidence from international benchmarking and the implications for education reform. Education ministers in places such as Singapore are constantly monitoring and visiting other countries to learn what they might do better. Arne Duncan organised a series of international

dialogues with fellow ministers and union leaders about the future of the teaching profession around the world. Meanwhile Michael Gove, Secretary of State for Education in the United Kingdom has shown more interest in international benchmarking than any of his predecessors.

The continuous benchmarking series also enables more sophisticated analysis of what works in education, which leaders from around the world can draw upon. I have been involved in a series of three publications which have explored the lessons in depth. The first of these, written with colleagues at McKinsey, *How the World's Best-Performing School Systems Come Out on Top*, examined the lessons from the most successful school systems, and highlighted the importance of recruiting, training and developing great teachers.

The second, also written with colleagues at McKinsey, *How the World's Most Improved School Systems Keep Getting Better*, took a new angle and looked not at what great systems do, but at how, over time, systems come to be successful. The third, published earlier this year with colleagues from Pearson, *Oceans of Innovation*, went a step further and asked whether achieving educational success as measured by PISA and TIMSS was sufficient to ensure a country was on track for economic and social success in the 21st century. The work of Eric Hanushek has likewise connected PISA and TIMSS outcomes to the wider goals of society, especially GDP growth. Eric has demonstrated a strong correlation between the quality of school systems and economic growth.

Increasingly what we see is a continuous dialogue among education ministers and top officials around the world about the evidence from international benchmarking and the implications for education reform.

His work points directly to the reason we supported the Economist Intelligence Unit (EIU) in the development of *The Learning Curve*. Here we have assembled in one place a wide range of data sets which will enable researchers and policymakers to correlate education outcomes with wider social and economic outcomes more easily than ever before.

In assembling these data sets we looked at a wide range of correlations and have been, judiciously I believe, cautious in interpreting the results. This avoids significant pitfalls, including, of course, the fact that correlation does not imply causality. Nevertheless there are some clear messages. For example, the report highlights the importance of culture and teacher quality in education. We should note that even if we can be clear, for example, that better education leads to less crime, there is still an issue about how long after the school system improves we would see the reduction in crime.

And of course the data sets themselves are by no means perfect. One of the reasons we are making them available in this format is that we believe this will encourage those responsible to address the data quality issues that are raised. Our intention is that the data sets available through *The Learning Curve* will be updated as new data appears. We are therefore making available an open, living database which we hope will encourage new research and ultimately enable improved education policy. In this way, we hope to promote a growing and welcome trend around the world towards evidence-

informed education policy. The challenge then for policymakers is less knowing what they should do than having the courage to act on the evidence. For example, acting on the clear message that reducing class size is expensive and has little or no impact on system performance.

This report includes a number of country rankings. These always generate interest and should be seen in the context of the issues raised here about the quality of data available. This is particularly the case with graduation rates which for the moment are based on national data sets involving a range of different definitions. We hope by publishing this particular ranking we will generate debate about how to improve data consistency as well as about the underlying policy issues.

We hope this research programme prompts a lively conversation on how we learn more about learning. If you have any comments or reflections on the issues raised in this report, please visit us online at thelearningcurve.pearson.com or via email at thelearningcurve@pearson.com

Sir Michael Barber, Chief education advisor, Pearson



Preface

This report, published by Pearson and written by the Economist Intelligence Unit, is part of a wide-ranging programme of quantitative and qualitative analysis, entitled *The Learning Curve*.

It seeks to further our understanding of what leads to successful educational outcomes – both economic and social. The design and execution of the programme has benefited from the ongoing advice of some of the world’s leading educational scholars.

This report itself outlines the main findings from analysis of a large body of internationally comparable education data – The Learning Curve Data Bank. It also draws on extensive desk research, as well as in-depth interviews conducted with 16 experts in education. The research was conducted entirely by the Economist Intelligence Unit, and the views expressed in the report do not necessarily reflect those of Pearson. The report was written by Dr Paul Kielstra, and edited by Denis McCauley of the Economist Intelligence Unit.



Sincere thanks go to the interviewees for sharing their insights on this topic. These include the following individuals:

Nahas Angula

Prime Minister of Namibia

Paul Cappon

Former President of the Canadian Council on Learning

Claudia Costin

Municipal Secretary of Education, Rio de Janeiro

Chester Finn

President, Thomas Fordham Institute

Eric Hanushek

Paul and Jean Hanna Senior Fellow, Stanford University

Lee Sing Kong

Director, National Institute of Education Singapore

Anthony Mackay

Chair, Australian Institute for Teaching and School Leadership

Mamadou Ndoye

Former Minister of Basic Education, Senegal

Vibha Parthasarathi

Educationalist and former Chair, National Commission for Women, India

William Ratteree

Former education sector specialist, International Labour Organisation

Andreas Schleicher

Deputy Director for Education, OECD

Robert Schwartz

Francis Keppel Professor of Practice of Educational Policy and Administration, Harvard Graduate School of Education

Brian Stecher

Associate Director, RAND Education

James Tooley

Professor of Education Policy, Newcastle University

Ludger Woessmann

Professor of Economics, University of Munich

Yong Zhao

Associate Dean for Global Education, University of Oregon

The Learning Curve programme has additionally benefited from counsel provided at various stages by an Advisory Panel consisting of prominent education experts. These include:

Sir Michael Barber

Chief education advisor, Pearson

Paul Cappon

Former President of the Canadian Council on Learning

Eric Hanushek

Paul and Jean Hanna Senior Fellow, Stanford University

Helen Joyce

São Paulo Bureau Chief and former International Education Editor, The Economist

Vibha Parthasarathi

Educationalist and former Chair, National Commission for Women, India

Pamela Sammons

Professor of Education, University of Oxford

Andreas Schleicher

Deputy Director for Education, OECD

Executive summary



The goal of improving education today enjoys great prominence among policymakers and other stakeholders in societies worldwide. Although they may not be able to quantify it, governments in most countries recognise a link between the knowledge and skills with which young people enter the workforce and long-term economic competitiveness. For this reason, interest is intense in research which explores the factors that seem to lead in some countries to outstanding educational performance, and ultimately to better qualified workforces.

Although they may not be able to quantify it, governments in most countries recognise a link between the knowledge and skills with which young people enter the workforce and long-term economic competitiveness. This report is aimed at helping policymakers, educators, academics and other specialists to identify some of these factors.

This report, and the broader *The Learning Curve* programme of which it is part, is aimed at helping policymakers, educators, academics and other specialists to identify some of these factors. At its heart is a significant body of quantitative research. The Learning Curve Data Bank (LCDB), which is accessible online, brings together an extensive set of internationally comparable data on education inputs and outputs covering over 50 countries. This in turn has enabled a wide-ranging correlation analysis, conducted to test the strength of relationships between inputs, outputs and various socio-economic outcomes. It also underpins an initiative to create a comparative index of educational performance which, as will become apparent, is anything but a straightforward exercise.

Educators might hope that this or other similar bodies of research would yield the 'holy grail': identification of the input, or set of inputs, that above all else leads to better educational results wherever it is applied. Alas, if this report makes nothing else clear, it is that no such magic bullets exist at an international level – or at least that they cannot, as yet, be statistically proven. Nonetheless, our research – which is also based on insights gathered from experts across the world – provides some definite signposts. Following are its highlights:

Strong relationships are few between education inputs and outputs

The research examined a wide range of education inputs, both quantitative – such as spending on pupils and class size – as well as qualitative – such as level of school choice. It also looked at numerous potential outcomes, ranging from inculcation of cognitive skills to GDP growth. A number of inputs show a statistical link over time with certain outputs, notably between income and results. These are discussed in the chapters that follow, but the most striking result of the exercise is how few correlations there are. Education remains very much a black box in which inputs are turned into outputs in ways that are difficult to predict or quantify consistently. Experts point out that simply pouring resources into a system is not enough: far more important are the processes which use these resources.

Income matters, but culture may matter more

On the surface, money and education seem to create a virtuous circle, with rich countries – and individuals – buying good education for their children who, in turn, benefit economically. A closer look, though, indicates that both higher income levels and better cognitive test scores are the result of educational strategies adopted, sometimes years earlier, independently of the income levels existing at the time. More important than money, say most experts, is the level of support for education within the surrounding culture. Although cultural change is inevitably complex, it can be brought about in order to promote better educational outcomes.



There is no substitute for good teachers

Good teachers exercise a profound influence: having a better one is statistically linked not only to higher income later in life but to a range of social results including lower chances of teenage pregnancy and a greater tendency to save for their own retirement. The problem is that there is no agreed list of traits to define or identify an excellent teacher, let alone a universal recipe for obtaining them. That said, successful school systems have a number of things in common: they find culturally effective ways to attract the best people to the profession; they provide relevant, ongoing training; they give teachers a status similar to that of other respected professions; and the system sets clear goals and expectations but also lets teachers get on with meeting these. Higher salaries, on the other hand, accomplish little by themselves.

When it comes to school choice, good information is crucial

Recent research indicates that countries with greater choice of schools have better education outcomes. Presumably, allowing parents to choose the best schools rewards higher quality and leads to overall improvement. In practice, however, finding the mechanism to make this happen is difficult. Extensive studies of voucher programmes and charter schools in the United States indicate that, while both can be beneficial, neither is a magic formula. On the other hand, for-profit private education is providing students in some of the least developed areas of the world an alternative to poor state provision and showing the potential benefits of choice and accountability. Ultimately, as in any market or quasi-market, the real value of choice comes from people having the right information to select the option that is truly superior.

There is no single path to better labour market outcomes

Education seems to correlate with a host of personal benefits, from longer life to higher income. At a national level, too, education and income appear to go together. Finding the type of education that leads to the best economic outcomes, however, is far from straightforward. Different strategies have distinct pros and cons. For example, some countries – but far from all – place considerable emphasis on vocational training as preparation for employment. Similarly, education systems cannot simply educate for the present: leading ones look at what skills will be needed in future and how to inculcate them.

A global index can help highlight educational strengths and weaknesses

An important output of *The Learning Curve* programme is the Global Index of Cognitive Skills and Educational Attainment. Covering 40 countries, it is based on results in a variety of international tests of cognitive skills as well as measures of literacy and graduation rates. The top performers in the Index are Finland and South Korea. In some ways, it is hard to imagine two more different systems: the latter is frequently characterised as test-driven and rigid, with students putting in extraordinary work time; the Finnish system is much more relaxed and flexible. Closer examination, though, shows that both countries develop high-quality teachers, value accountability and have a moral mission that underlies education efforts.

... both countries [at the top of the Index] develop high-quality teachers, value accountability and have a moral mission that underlies education efforts.









Five lessons for education policymakers

1. There are no magic bullets

The small number of correlations found in the study shows the poverty of simplistic solutions. Throwing money at education by itself rarely produces results, and individual changes to education systems, however sensible, rarely do much on their own. Education requires long-term, coherent and focused system-wide attention to achieve improvement.

2. Respect teachers

Good teachers are essential to high-quality education. Finding and retaining them is not necessarily a question of high pay. Instead, teachers need to be treated as the valuable professionals they are, not as technicians in a huge, educational machine.

3. Culture can be changed

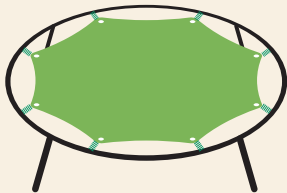
The cultural assumptions and values surrounding an education system do more to support or undermine it than the system can do on its own. Using the positive elements of this culture and, where necessary, seeking to change the negative ones, are important to promoting successful outcomes.

4. Parents are neither enemies nor saviours of education

Parents want their children to have a good education; pressure from them for change should not be seen as a sign of hostility but as an indication of something possibly amiss in provision. On the other hand, parental input and choice do not constitute a panacea. Education systems should strive to keep parents informed and work with them.

5. Educate for the future, not just the present

Many of today's job titles, and the skills needed to fill them, simply did not exist 20 years ago. Education systems need to consider what skills today's students will need in future and teach accordingly.



Education inputs and outputs: it's complicated...

Education has always mixed the local and the global. The survival of Latin in Europe as a language of learning, long after its disappearance almost everywhere else in society, reflected an ideal of the universality of knowledge. On the other hand, state education provision has long been closely associated with local needs and the preservation of local cultures: in many federal systems, it falls to the state or province rather than the national government. As currently delivered, says Andreas Schleicher, the OECD's Deputy Director for Education, "education is very inward looking, a very local activity. A lot of walls exist between countries."

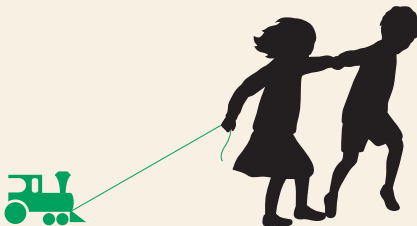
Since the 1990s, the interaction between the parochial and the international has taken on a new form. Comparative tests such as Progress in International Reading Literacy Study (PIRLS), Trends in International Mathematics and Science Study (TIMSS), and the Programme for International Student Assessment (PISA) manifest a growing emphasis on benchmarking the performance of different systems and on understanding what sets apart the highest achievers. In Professor Schleicher's words, education debates are no longer about "improvement by national standards. Best performing countries now set the tone."

He also believes that PISA has fundamentally challenged the idea that education should be valued largely on the volume of spending and other inputs, and the premise that more investment is always better. "The shift from inputs to outcomes [as the focus of study] has been a significant impact" of the tests, he says. Such research has also made clear that, for policymakers, more than children's grades are at stake: economists have found a close relationship between economic growth and certain population-wide outputs of education such as cognitive skills.¹

The Data Bank and what it reveals

The Learning Curve Data Bank (LCDB) – created by the Economist Intelligence Unit as part of the broader Learning Curve programme – is an effort to advance study in this area. It is a purpose-built, substantial collection of data which includes more than 60 comparative indicators gathered from over 50 countries. Many of these indicators in turn rely on multiple pieces of information, so that, even with some inevitable gaps, the LCDB encompasses over 2,500 individual data points. These go well beyond traditional education metrics, such as teacher-student ratios and various spending metrics, to cover a broad range of educational inputs and possible outputs, from the degree to which parents demand good results of schools to the proportion of adults who end up in jail. The appendix to this report describes the LCDB and the rest of the Quantitative Component, and the methodology behind it, in detail.

¹ Eric A. Hanushek and Ludger Woessmann, "Education and Economic Growth", in Dominic J. Brewer and Patrick J. McEwan, eds. *Economics of Education* (2010).

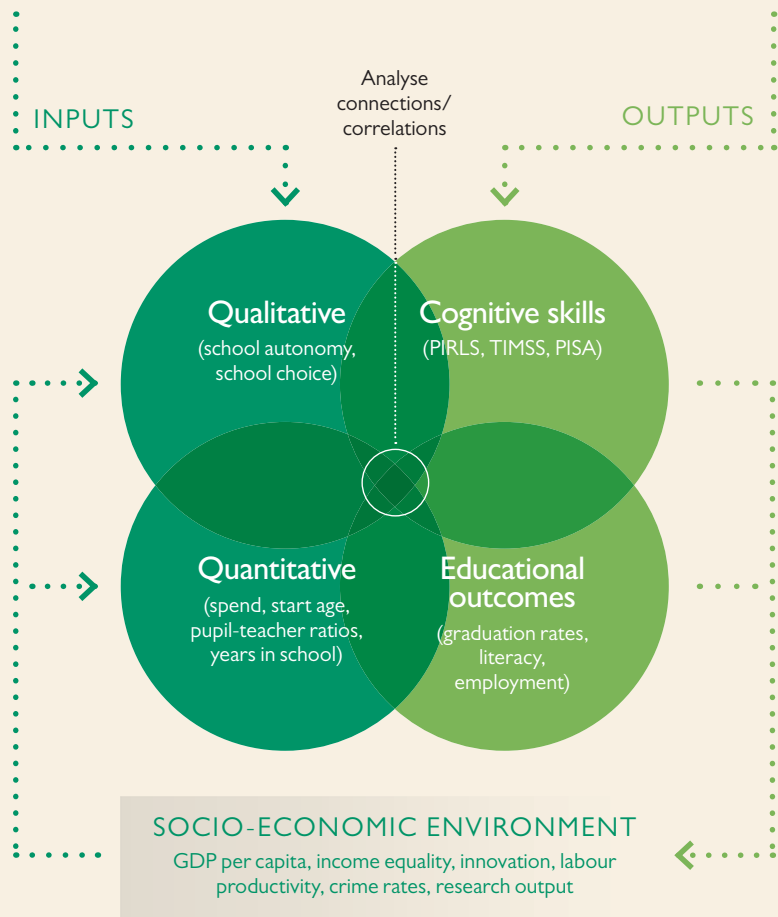


“The shift from inputs to outcomes [as the focus of study] has been a significant impact of the tests.”

— Andreas Schleicher, Deputy Director for Education, OECD



STRUCTURE OF THE LEARNING CURVE QUANTITATIVE COMPONENT





Beyond providing a useful tool for researchers, a goal of the Quantitative Component and Data Bank has been to make possible a search for correlations between inputs and outputs that endure over time. The ultimate hope is to uncover, where possible, any interventions which might have a positive effect not only on the development of cognitive skills and scholastic achievement, but also on societal outcomes such as higher employment. The methodology appendix also describes how these correlations have been sought.

The data suggest a small handful of strong links. Two correlations show a connection between national income and aspects of academic success: higher GDP seems related to better Grade 8 PISA results; and a better score on the Human Development Index (of the United Nations Development Program – UNDP) and its Income Index are associated with higher upper secondary graduation rates. LCDB data also suggest a link between more years in school on average and higher labour productivity in a country. (One apparently strong link – that the higher a country’s average school life expectancy, the greater the proportion of students will graduate – is almost tautological given the time requirements involved in most diplomas and degrees.)

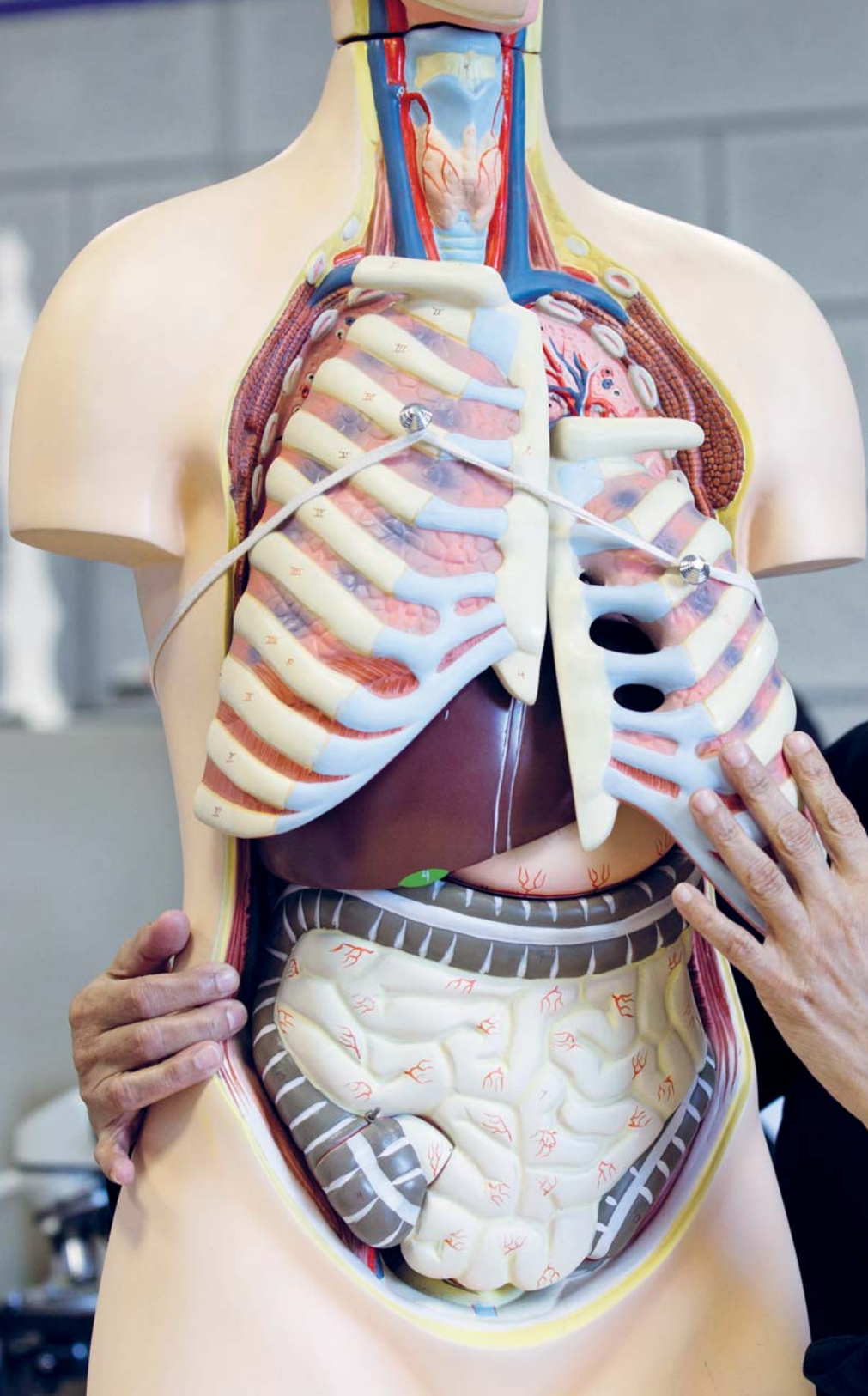
Still a black box

These findings will be discussed in the chapters that follow, but the most striking result of the search for correlations is the overall paucity of clear linkages. In this, our study is not alone. Ludger Woessmann,

Professor of Economics at the University of Munich, explains that a lack of “any relationship between inputs and outputs mirrors the extensive academic literature on this topic. If you try to go beyond simple correlations, the general result is nearly always the same.” Chester Finn, President of the Thomas Fordham Institute, an education research organisation, and former United States Assistant Secretary of Education, agrees. “What works,” he says, “takes place inside a black box that has inputs coming in and outputs going out; but the inputs do not predict the results and what goes on in the black box is hard to quantify.”

The research does, though, at least point to some of the difficulties of seeing inside the black box. The first, says Paul Cappon, former President of the Canadian Council on Learning, is that in the study of education “we measure just a few things, usually inputs more than outputs because they are simpler and easier to measure, not because they are more significant – they are not.” Vibha Parthasarathi, a distinguished Indian educationalist, adds that successful outcomes arise from “the interplay of several factors, some tangible, others intangible. What I’ve seen in any number of surveys is you measure what is measurable. The softer inputs of education get left out.” These inputs, however, can be crucial, such as the cultural context in which education occurs.





SELECTED STRONG RELATIONSHIPS FROM THE CORRELATION ANALYSIS

VARIABLE 1	VARIABLE 2	TYPE
GDP per capita (US\$PPP)	Grade 8 PISA – overall reading literacy	Positive
	Grade 8 PISA	Positive
UN Human Development Index	Upper secondary graduation rate	Positive
UN Income Index	Upper secondary graduation rate	Positive
School life expectancy (primary to tertiary)	Overall productivity of labour (GDP at US\$PPP per worker)	Positive
Ratio of maximum teacher salary over average gross wage at primary level	Upper secondary graduation rate	Negative
Ratio of maximum teacher salary over average gross wage at secondary level	Upper secondary graduation rate	Negative

Note: Strong correlations, such as those shown here, are above a threshold of 0.65. Correlation tests were conducted between two variables over time (on an annual basis). Each correlation refers to a minimum of 15 countries out of the sample.

Source: Economist Intelligence Unit.



Second, straightforward correlations are difficult to find because education involves complex, interrelated processes rather than simple activities. Nahas Angula, Prime Minister of Namibia who, as education minister, oversaw the post-apartheid reconstruction of that country's education system, says that achieving good outcomes "is not really a question of spending money, money, money. The question is how to get the most out of the money you have spent." Dr Finn agrees: "Processes, more than inputs, are important. It is like having a good cook versus a bad one: the ingredients might be identical, but one produces something worth eating." If education itself is so complex, teasing out its impact on broader societal phenomenon, like economic growth, is harder still.

This does not mean that education is a complete mystery. Some key elements are apparent. Professor Schleicher explains that "We have a good sense of what makes a good education system. That doesn't answer how you do it, but you can say these are the key factors." The rest of this study will explore the most important of those factors, bearing in mind that there is no single best way to address them in every country. As with cuisine, a variety of approaches may bring success. For example, as we will discuss later, education in Finland and South Korea – two of the world's top-performing countries in many benchmarks – seem to have few similarities other than high academic achievement.

The main message of the lack of strong correlations, though, should be humility. Brian Stecher, Associate Director at RAND Education, says: "We use jargon that seems to explain student behaviour, but we really don't understand the way students learn and the complex mix of inputs – family, community and learning – that lead to skills and temperaments. If you compare research in education to research in healthcare, you see a dramatic difference in our knowledge of cause and effect." Claudia Costin, Rio de Janeiro's Municipal Secretary of Education, adds that "Reforming education requires more than figures and analysis. You need to avoid arrogance and the feeling of having a technocratic approach."

Rather than being able to pronounce the last word, then, education research is still learning how to promote better outcomes. The Data Bank itself is only one step in an effort that is hoped to last many years. The discussion which follows will look at several major issues relating to successful educational outcomes, including national income, culture, teaching quality and questions of choice and accountability. In doing so, it seeks to be part of an ongoing deepening of knowledge about education, and to illuminate the key issues meriting further investigation.

The tangible and intangible: income, culture and education outcomes

Income and test results: a virtuous circle or common offspring?

Two correlations from the quantitative analysis indicate a link between a country's income and its educational outcomes: higher GDP is associated with better overall PISA scores, and the UNDP's Income Index is a predictor of national secondary school graduation rates. Similarly, PISA results correlate with national GDP and Income Index scores in the years following the tests being administered. In both cases, however, the causation is not clear. In relation to the second link, for example, those who were age 15 in 2009 and 2006 have had so little time in the labour force that the contribution of their skills is unlikely to have had much effect yet on national income. That said, Professor Schleicher reports that PISA's extensive longitudinal data on test-takers indicates that the test's predictive power of ease of transition to work and initial income is high.

On the surface, this suggests a virtuous circle – money buys good education, which instils higher earning power. This seems to parallel an often observed link between socio-economic status and academic results within countries. If anything, this association is growing in the United States,² but it is far from an American phenomenon. It is present in European countries, such as the United Kingdom and Italy, as well as, according to a 1999 study by a World Bank researcher, in 43 largely developing nations.³

Money, for both countries and individuals, does bring obvious advantages. As Ms Parthasarathi notes for families, “wealth gives you access to schools where you assume there are better teachers, etc, [and] ... people who don't have the means miss out on a lot of opportunities.” The wider link to educational results, however, is far from straightforward. Ms Parthasarathi points out that, at the individual level, even something as basic as student motivation can be greatly affected by economic background.

More generally, a recent OECD report indicates that a commitment to equity within an education system can greatly diminish the correlation between family income and educational outcomes. It points to Finland, Canada and South Korea, among others, as examples of success in this area.⁴ This is consistent with research conducted by the Canadian Council on Learning, says Mr Cappon. “Our composite learning index showed no direct correlation between the wealth of a community and its learning environment. It is not a given that you simply get a higher result with higher income levels.”

Similarly, the tie between GDP per capita and PISA results is far from linear. For countries with incomes under \$20,000 per person, economic growth appears to bring rapidly improving educational results. After that point, however, the gains become much less obvious.⁵ This type of result is common in economics, appearing in areas such as the impact of national income on life expectancy: up to a certain point, the need is so great that almost any spending brings gains; thereafter the way that the money is spent becomes much more significant.



² See Greg J. Duncan and Richard Murnane, eds. *Whither Opportunity? Rising Inequality, Schools, and Children's Life Chances*, 2011.

³ Deon Filmer, “Inequalities in Education: International Experience”, in Ismail Sirageldin, *Human Development in the Twenty First Century*.

⁴ *Equity and Quality in Education: Supporting disadvantaged students and schools*, 2012.

⁵ “Does money buy strong performance in PISA”, *PISA in Focus*, February 2012.

PISA RESULTS AND GDP GROWTH PER HEAD SELECTED COUNTRIES

	Grade 8 overall PISA, 2009	Average GDP growth per head, 2007-11 (%)		Grade 8 overall PISA, 2009	Average GDP growth per head, 2007-11 (%)
Hong Kong	545.57	3.0	Poland	501.12	4.2
Finland	543.49	0.5	United Kingdom	500.10	-0.5
Singapore	543.20	2.4	France	496.88	-0.1
South Korea	541.16	3.1	United States	496.41	-0.4
Japan	529.43	0.1	Sweden	495.60	0.7
Canada	526.58	0.1	Russia	468.50	3.0
New Zealand	524.06	0.3	Chile	439.30	2.6
Australia	518.84	0.8	Mexico	419.89	0.3
Netherlands	518.82	0.6	Brazil	400.99	3.1
Germany	510.16	1.3	Argentina	395.72	5.7

Note: The overall PISA score is an aggregate of the test scores in reading, mathematics and science literacy. It is calculated by the EIU, utilising OECD data.

Sources: Economist Intelligence Unit and OECD.



Eric Hanushek, the Paul and Jean Hanna Senior Fellow at Stanford University, explains: “It is more important how resources are used than how much. In some places school systems and countries seem to know how to spend wisely, in others they don’t.”

For most experts, however, talking of GDP’s effects on outcomes reverses causality. Professor Hanushek states that “it is not quite a chicken-and-egg thing. It doesn’t look like faster growth leads to higher PISA scores, but there is substantial evidence to suggest that if you can find a way to get higher PISA scores you will get higher growth.” In other words, both current GDP and high levels of cognitive skills in students are results of the same education-policy decisions made sometimes many years earlier. Professor Schleicher agrees, citing the

experiences of South Korea and China which decades ago, with lower GDPs than many countries, made strategic decisions to focus investment on education. They have seen both national incomes and test scores surpass many others as a result. “It is not a question of if you are rich, you can afford a good education system,” he concludes. “You may need to build a 40-year time gap between investment and economic outcomes, but the causality of the link is established.”



“... If there is no positive re-enforcement of educational achievement taking place outside the school – if, for example, the larger culture glorifies celebrities who can barely read – you will have huge trouble.”

—Dr Chester Finn, President,
Thomas Fordham Institute

Culture: an unquantifiable essential

Money as a driver of education outcomes has the advantage of being measurable. Many experts interviewed for this study, however, identify something far less concrete as far more important. Robert Schwartz – Francis Keppel Professor of Practice of Educational Policy and Administration at the Harvard Graduate School of Education – underscores a difficulty in analyses of educational inputs and outputs: “How do you disentangle deeply embedded cultural values from social and educational policies?”

The issue of culture is relevant across the world. Dr Finn says of the US: “The typical young American, upon turning 18, will have spent 9% of his or her life in school [assuming perfect attendance]. That can accomplish a lot, but is relatively weak in terms of overall effect. If the 91% is co-operating with the 9%, then you have a good recipe. If there is no positive re-enforcement of educational achievement taking place outside the school – if, for example, the larger culture glorifies celebrities who can barely read – you will have huge trouble.”

In parts of Africa, culture can bring significant challenges, says Mamadou Ndoeye, former Minister of Basic Education in Senegal. “School as it exists is not a product of the internal development of Africa,” he explains. “It was imposed from outside. In many countries, the community [still] think of school as a foreign object, which is a problem for local ownership.” In Asia, on the other hand, the success of schools “has more to do with society and culture than the school system,” says Professor Yong Zhao, Associate Dean for Global Education at the University of Oregon. “In Asian countries, even if you can’t succeed, you have to hang in there.” Anthony Mackay, Chair of the Australian Institute for Teaching and School Leadership, adds: “In East Asian countries, where learning is held to be both a moral duty and social duty, you would not even have the conversation about the need for high expectations about young people’s learning.” Nor are national cultures monolithic. Mr Cappon notes that “in North America, you see that depending on the culture of origin, there are massive discrepancies. If they [students’ families] come from Hong Kong or Singapore, they do well; if from Latin America or Haiti, they don’t.”

If culture is seen as somehow inherent and immutable, such insights might seem of little value to education policymakers. Indeed, they would suggest that educational success is almost predetermined. Culture, however, is changeable if addressed properly. Respect for teachers, for example, is ingrained in certain cultures such as those in Finland and South Korea. However, it can also be built in a society through policy choices. Professor Sing Kong Lee, Director of Singapore’s National Institute of Education, recalls that when the government wished to attract better teaching candidates, it realised that the recognition of value of the profession in the country needed to be strengthened. This was done through introducing policies such as setting the salaries of beginning teachers equal to those of beginning engineers and accountants entering the civil service, thereby sending out a clear message that the importance of the teaching profession is equal to that of other professions.

Another way of addressing the situation, says Professor Lee, was that “the government recognised the contribution of teachers by defining their mission: to mould the future of the nation. What can be more noble than that?” It also established 1 September as National Teachers’ Day, on which the President invites teachers to the Istana (Presidential Office) to recognise those who do good work with awards. Students usually get a day off as well. Professor Lee credits such steps with raising the profile of the profession greatly.

These steps might not work in every country, but they do show that existing cultures can be changed in a way that assists educational outcomes. In this the education system itself has an important role. As Professor Stecher notes: “Schools are both recipients and creators of cultural patterns: over the long term they help to shape norms for the next generations.”



Getting teachers who make a difference



“... the single most important input variable [in education] is the quality of teaching.”

— Professor Robert Schwartz, Francis Keppel Professor of Practice of Educational Policy and Administration, Harvard Graduate School of Education

Teachers matter ...

One point of broad agreement in education is that teachers matter greatly. Students of certain teachers simply do better in a way that has a marked effect on social and economic outcomes. For example, a recent study drawing on data covering about 2.5 million US children found that, after correcting for other factors, pupils assigned to teachers identified as delivering better educational results “are more likely to attend college, attend higher-ranked colleges, earn higher salaries, live in higher [socio-economic status] neighbourhoods, and save more for retirement. They are also less likely to have children as teenagers.”⁶ Professor Schwartz believes that “the single most important input variable [in education] is the quality of teaching.” However, teacher quality, notes William Rattree – until recently, education sector specialist at the International Labour Organisation – “is a mix of factors which are difficult to pin down.”

Much of the research in this area has focused on what education systems can do to ensure that they find teachers who add value. Even here, though, says Professor Hanushek, “the rules tend to be country-specific.” McKinsey’s 2010 report, *How the World’s Most Improved School Systems Keep Getting Better*, argues that the best interventions even depend on the current state of the school system. In McKinsey’s view, systems currently marked by ‘fair’ levels of performance should focus on teacher accountability, while ‘good’ systems are likely to benefit more from enhancing the status of the teaching profession.

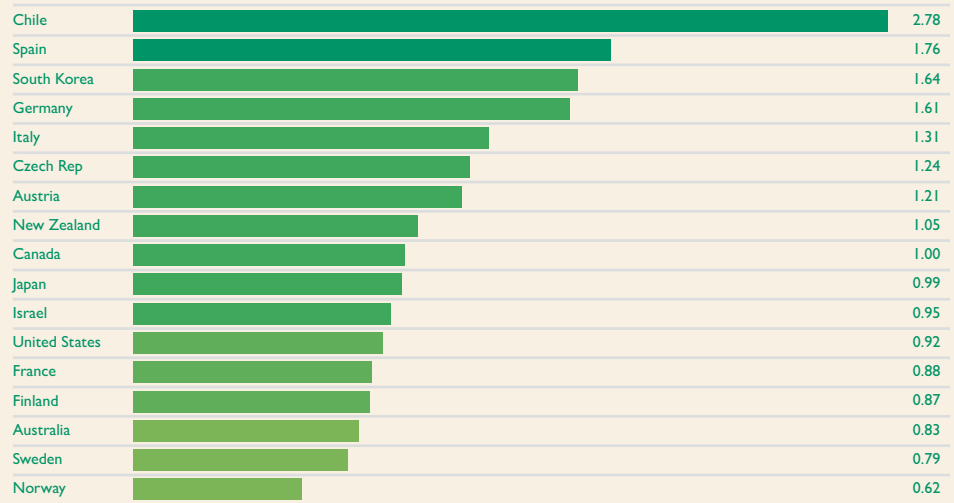
... But what matters for getting good teachers?

Despite such variation, a number of insights are broadly applicable. The first is that teacher pay has surprisingly little relevance to education results. In LCDB data, minimum and maximum instructor salaries at all education levels – measured as a percentage of average national income – have no long-term link to the inculcation of cognitive skills, as measured by standard international tests.



⁶ Raj Chetty, John N. Friedman, Jonah E. Rockoff, *The Long-term Impacts of Teachers: Teacher Value-added and Student Outcomes in Adulthood*, National Bureau of Economic Research Working Paper 17699, December 2011, <http://www.nber.org/papers/w17699>.

RATIO OF AVERAGE TEACHER SALARY AT PRIMARY, LOWER AND UPPER SECONDARY LEVELS OVER THE AVERAGE GROSS WAGE SELECTED COUNTRIES, 2010



Sources: Economist Intelligence Unit and OECD.

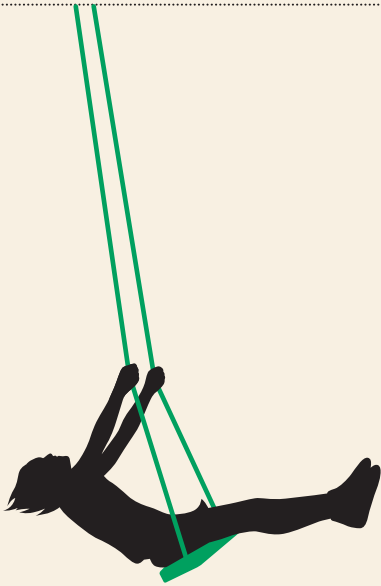
Indeed, the only statistical correlation between pay and educational outcomes is a tendency of higher maximum salaries – as a percentage of the national average – at a number of teaching levels to lead to lower secondary school graduation results. A closer look at this counter-intuitive result reveals that – within the data set available – higher GDP countries do not pay teachers as high a percentage of the average wage as lower GDP ones. In other words, as economies grow, teacher salaries do so at a slower rate. Thus, the implicit correlation actually reveals again the link between higher GDP and certain better educational results.

The lack of correlations in this area is consistent with much detailed research on the link between pay and results, which is typically found to be weak or non-existent.⁷ Performance-based pay is an exception: it does tend to lead toward better outcomes.⁸ On the other hand, in some cases high salaries without quality differentiation create problems. Mamadou Ndoye recalls that, when he was Minister of Basic Education in Senegal, the level of pay made it impossible to hire more teachers, so he had to engage in difficult negotiations to be allowed to bring in volunteers to help. Overall, in the words of Mr Cappon, “Teachers must be reasonably well paid, but this pales in comparison with other factors.”

⁷ One notable exception is P. Dolton and O. D. Marcenaro-Gutierrez, “If you pay peanuts do you get monkeys? A cross-country analysis of teacher pay and pupil performance”, *Economic Policy* (2011) 26: 5–55.

⁸ David N. Figlio and Lawrence Kenny, *Individual Teacher Incentives and Student Performance*, National Bureau of Economic Research Working Paper 12627, October 2006, <http://www.nber.org/papers/w12627>; Ludger Woessmann, “Cross-Country Evidence on Teacher Performance Pay”, *Forschungsinstitut zur Zukunft der Arbeit Discussion Paper 5101*, July 2010.





Experts interviewed for this study repeatedly point to several of these other factors which are essential in promoting teacher quality:

- › **Attracting the best people to the profession:** Getting good teachers begins with recruiting talented individuals. Finland and South Korea – two perennially cited examples of education success and the top countries in our Index – obtain their annual teacher intake from the top 10% and 5% of graduating students respectively. The key to such success is the status in which teaching is held culturally. Here money can have some effect, not just as a simple inducement but as a signal of status. The South Korean government uses high levels of teacher pay in this way both to compensate for large class sizes and to indicate the importance it accords to the profession.
- › **Providing the right training:** The training of these new recruits has to be appropriate to the conditions in which they will work. This varies by country. The Finnish system, for example, benefits from teachers having graduate degrees. On the other hand, Nahas Angula, Prime Minister of Namibia, points out that his country’s policy of requiring all teachers to have an undergraduate degree may be driving up the cost of education when other training would suffice for primary grades. Teacher training also needs to be ongoing. This has a very practical reason – that no teacher’s college course will maintain complete relevance across decades of work – but also a demonstrative one. As Mr Cappon notes, “teachers need to be lifelong learners themselves. You can’t inculcate a love of learning unless you live it.” Effective professional development needs to address not just upgrading the knowledge of teachers – providing, for example, a better understanding of new technology and teaching strategies – but also allow them to advance along their career path into more senior positions where relevant.

› **Treating teachers like professionals:** Consistent with the need to promote the status of teaching is its treatment as a profession. Mr Ratteree notes that “things like continual professional development and professional autonomy can be powerful incentives for better learning outcomes.” Mr Cappon agrees: “Teachers must be seen as professionals who exercise judgement, not just technicians.”

› **Implementing clear goals and effective oversight, and then letting teachers get on with it:** Professors Hanushek and Woessmann both point to this combination of accountability and independence as consistently correlated with improved outcomes. Says the latter: “Education economists emphasise the need to think about incentives for people in the system to use resources efficiently. These are mostly framed by the surroundings of the education system, the accountability system and whether schools can act autonomously. There is clear evidence of strong relations between these and improved outputs.” Professor Schleicher agrees. High-performing school systems, he says, combine demanding standards, low tolerance of failure, and clear articulation of expectations with “a lot of professional responsibility within a collaborative work organisation at the front line,” for both teachers and schools.

None of these on their own is enough. Instead, they form an overlapping, and mutually supporting, set of strategies to provide the high-quality teachers that are so important for education and to use them in the most effective ways.⁹

⁹ For a similar discussion of the key success factors in teacher development see Michael Barber and Mona Mourshed, *How the World’s Best-Performing School Systems Come Out on Top*, McKinsey and Co., 2007, pp 15-23.

School choice and accountability: caveat scholasticus

The choice debate

In the English city of Guildford in 2011, every final-year student in the Royal Grammar School earned at least three A-levels, the highest secondary-school subject qualification. The equivalent figure for the city's Kings College for the Arts and Technology was just 69%. Neither figure was a surprise, nor is such variation exceptional. In most places, it is simply accepted that specific schools – like individual teachers – have different results which tend to persist over time. A natural conclusion is that giving parents, and through them students, the ability to choose better performing schools should lead to better outcomes.

Unfortunately, this issue is far more complex and not just because of the range of systems through which choice operates across the world – including both publicly and privately funded options. Whatever their specific strong and weak points, all these arrangements need accurate information. Getting it wrong can be harmful. A study of Beijing parental selection of primary schools found that excessive optimism about place availability at better schools led parents to use up application choices on schools that were already full. Less optimistic

parents snapped up places at the next tier of schools, leaving only markedly worse ones for the children of those making the initial mistake.¹⁰ On the other hand, researchers in North Carolina found that better, clearer information on local schools increased the number of low-income parents taking advantage of school choice, and that the children so placed performed better.¹¹ As in any quasi-market, for choice to work, schools have to reveal how well they are doing: choice and accountability must go hand-in-hand.

Any accountability system, however, requires some decision on what should be measured. Demographic differences between the children in the two Guildford schools above might explain the gap in results far better than the education provided. Mr Cappon notes of Canada: “Social class and school choice tend to go together.” Indeed, much of the choice and accountability debate continues because such other issues cloud the picture.



¹⁰ Fang Lai, Elisabeth Sadoulet, Alain de Janvry, “The Adverse Effects of Parents’ School Selection Errors on Academic Achievement: Evidence from the Beijing Open Enrollment Program”, *Economics of Education Review* (2009) v28 n4: 485-496.

¹¹ Justine S. Hastings and Jeffrey M. Weinstein, “Information, School Choice, and Academic Achievement: Evidence from Two Experiments”, *The Quarterly Journal of Economics*, (2008): 1373-1414.



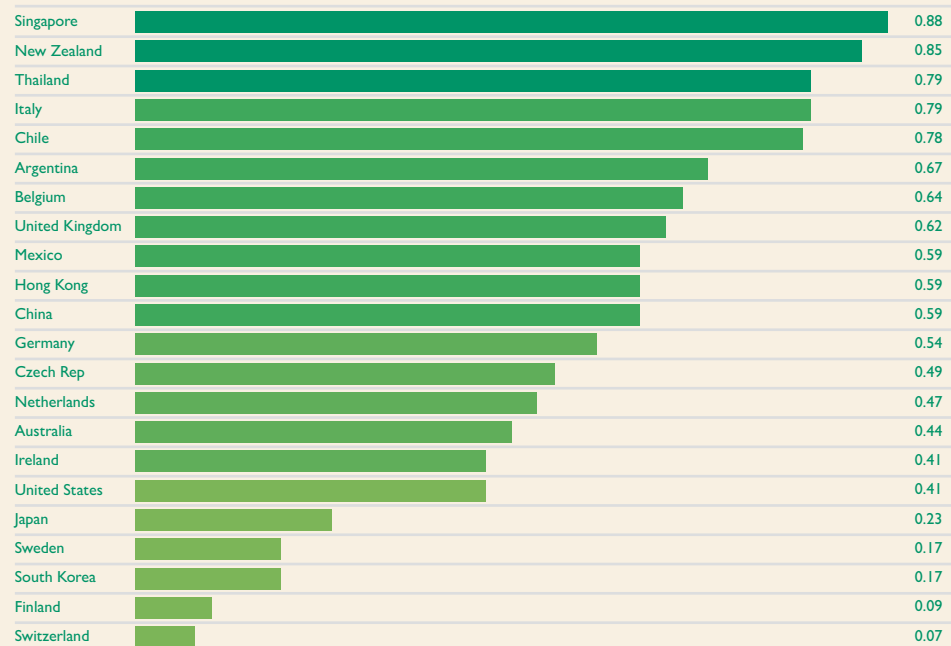
Recent research suggests that, at the system-wide level, the potential for informed choice helps raise educational outcomes and reduces costs. In particular, a cross-country comparison of the number of private, often faith-based, schools – an indication of the degree of choice – with the 2003 PISA results found that, even after controlling for other factors, ‘the share of schools that are privately operated has an economically and statistically significant positive effect on student achievement in mathematics, science, and reading.’¹²

The benefits were greater than average for students with a lower socio-economic status where such private schools were publicly funded, as in Belgium and the Netherlands. Professor Woessmann, one of the authors, explains: “If there is more choice for parents, and more non-governmental school operators so that schools are not managed by one big state monopoly, countries perform much better.”

“... the share of schools that are privately operated has an economically and statistically significant positive effect on student achievement in mathematics, science, and reading.”

— Ludger Woessmann and Martin West, “Competition from private schools boosts performance system-wide”

SCHOOL CHOICE SELECTED COUNTRIES, AGGREGATED SCORE, 2009



Note: The score, which is on a scale of 0 to 1, is an aggregate of the following indicators: enrolment choices (freedom of enrolment choice at primary and lower secondary education), the level of school choice (percentage of pupils living in an area with more than two schools), parental expectations, and financial choice and information (availability of school vouchers and government responsibility for informing parents on school choices (primary and lower secondary)).

Source: Economist Intelligence Unit and OECD.

¹² Ludger Woessmann and Martin West, “Competition from private schools boosts performance system-wide”, Vox, <http://www.voxeu.org/article/competition-private-schools-boosts-performance-system-wide>.

How this choice drives the system to better results in practice, however, is a matter of no little debate. Indeed, any discussion involving market-like mechanisms and education inevitably leads to contentious, often politicised, debate. Unfortunately, the resultant heat has shed little consistent light.

Vouchers and charter schools

Some of the most investigated choice initiatives operate in the US. Voucher programmes provide funding – generally assigned by lottery as the programmes are almost invariably oversubscribed – that pay for the private education of underprivileged children. A 2008 review by Patrick Wolf, Professor of School Choice at the University of Arkansas, looked at the ten best studies of these programmes and found widely varying results.¹³ In general, all or some students who used vouchers did better academically in certain fields, especially maths. A more recent study by Mr Wolf of the long-standing Milwaukee voucher system brought further variability: voucher students there outdid peers in reading but underperformed in maths.¹⁴

The impact of such programmes on abilities tends to be unpredictable, but that may not be the point. Parents almost invariably are satisfied with them, although perhaps for reasons quite apart from grades. Given the public options available to some of these students, physical safety is an issue: one study found no academic differences for voucher users, but they did have lower arrest rates.¹⁵

Another possible impact of choice is to create competition so that all schools improve, especially where they are made to give data on results. Debate on the extent to which this has taken place and whether competition was the driver of perceived change is also ongoing.¹⁶ The one clear point is that vouchers, and choice, do not seem to hurt existing school systems.¹⁷

A more widespread US experiment in using choice and accountability to improve education has been the growth of charter schools. These autonomous, privately-run but publicly-funded schools open to all students – capacity permitting – exist in 41 states. In return for autonomy, these institutions are made accountable. Charters are granted with binding requirements to achieve certain levels of academic success among students.

As with vouchers, the success of charter schools as a whole is the focus of intense debate. The largest review to date of research presents a mixed picture. The Center for Research on Education Outcomes looked at research from 15 American states and the District of Columbia. It found that, on average, students in these schools tended to do slightly worse than those in nearby public schools. But the broader message was variety: 17% of charter schools do better, 46% are just as good, and 37% do worse. Moreover, the success of the schools depends on the way they are regulated. Roughly even numbers of states had schools where students on average did better than in traditional schools and schools where students did worse.¹⁸



¹³ "School Voucher Programs: What the Research Says About Parental School Choice", *Brigham Young University Law Review*, (2008): 415-446.

¹⁴ *The Comprehensive Longitudinal Evaluation of the Milwaukee Parental Choice Program: Summary of Final Reports*, February 2012, <http://www.uark.edu/ua/der/SCDP/Research.html>.

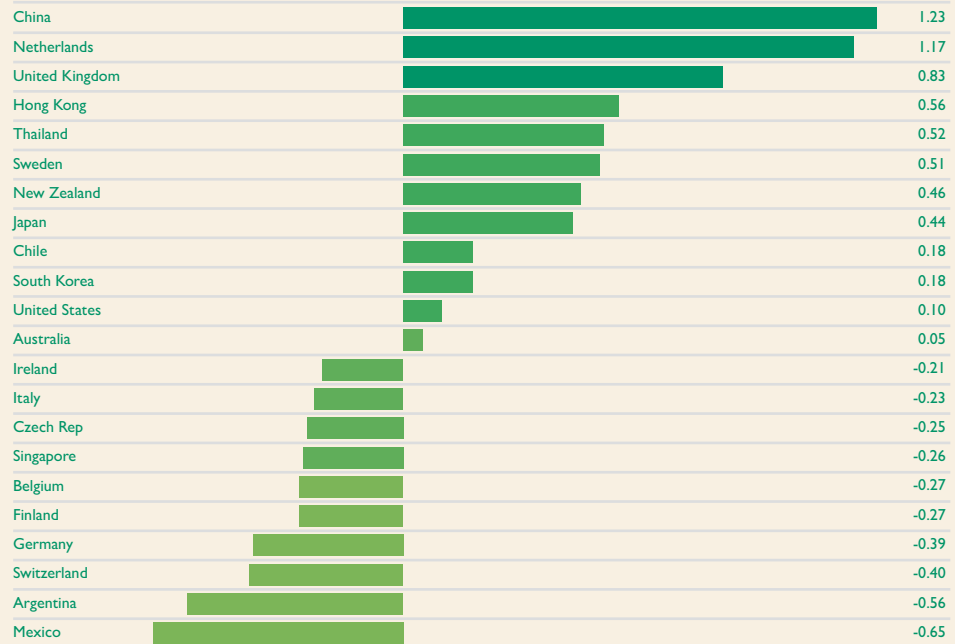
¹⁵ Julie Berry Cullen, Brian A. Jacob, and Steven Levitt, "The Effect of School Choice on Participants: Evidence From Randomized Lotteries", *Econometrica*, (2006), 74: 1191–1230.

¹⁶ See: Caroline Hoxby, *School Choice and School Productivity: (Or Could School Choice Be A Tide That Lifts All Boats?)*, 2002, NBER Working Paper 8873, an influential, article advocating this argument, <http://www.nber.org/papers/w8873>; Greg Forster, *A Win-Win Solution: The Empirical Evidence on School Vouchers*, 2011; David N. Figlio and Cecilia Elena Rouse, *Do Accountability and Voucher Threats Improve Low-performing Schools?*, 2005, NBER Working Paper 11597.

¹⁷ Research on voucher programmes in Chile have produced similarly contrasting results to those in America (Francisco Gallego, "School Choice, Incentives, and Academic Outcomes: Evidence for Chile", paper 39, Econometric Society 2004 Latin American Meetings; Chang-Tai Hsieh and Miguel Urquiola, "The effects of generalized school choice on achievement and stratification: Evidence from Chile's voucher program", *Journal of Public Economics* (2006) 90: 1477–1503).

¹⁸ Center for Research on Education Outcomes, *Multiple Choice: Charter School Performance in 16 States*, June 2009.

SCHOOL RESPONSIBILITY AND AUTONOMY AVERAGE SCORE, 2009



Note: The score is the average of 'index of school responsibility for resource allocation' and 'index of school responsibility for curriculum and assessment'. These indexes have an OECD mean of 0 and a standard deviation of 1. Positive values on these indexes indicate relatively more responsibility for schools than the local, regional or national education authority.

Source: Economist Intelligence Unit and OECD.



Dr Finn believes that greater autonomy and accountability are needed within US schools, but he also remarks that “one of the sobering lessons of the last 15 years is that hanging a sign with the word ‘charter’ in it on the front door does not make it a better school. In any state, some of the best and worst schools are charter schools, except perhaps in Massachusetts because it only gave charters to people who knew what they were doing.”

Indeed, the wide variety is probably a predictable result of how these schools provide value. According to Professor Stecher, “the strength of charter schools seems to be that they permit innovation outside of bureaucracy, for good or for ill. The movement needs to be accompanied by careful monitoring to protect the

welfare of kids, but it is leading to some really interesting opportunities and models of reform.” He cites Aspire Public Schools, a California non-profit charter school system that, even though three-quarters of students come from impoverished families, had average scores that exceeded the state’s overall mean by more than 5%.

The broader lesson seems to be an obvious one. In the words of a study by Harvard academics, “school choice can improve students’ longer-term life chances when they can gain access to schools that are better...”¹⁹ The key, as in any market situation, is deciding which ones are: sometimes choice means opting for existing provision, but this does not negate its value.

¹⁹ David Deming, Justine Hastings, Thomas Kane, and Douglas Staiger, *School Choice, School Quality and Postsecondary Attainment*, 2011, NBER Working Paper 17438.



School choice in developing countries

Where such provision is poor, however, choice and accountability can be essential. James Tooley, Professor of Education Policy at Newcastle University, has done extensive research into the huge number of unofficial private schools used by economically underprivileged students in developing countries. In many cases, rather than trusting state provision, families are willing to spend often a substantial part of their income to send children to these unregistered schools. The reason is simple: parents know that education is important but public provision is sub-standard or illusory. Professor Tooley ascribes parents' decisions in this area to their mistrust of state-school teachers, who are accused of absenteeism, poor teaching habits and poor attitudes toward students themselves.

As with any unofficial activity, it is hard to assess its full scope. Professor Tooley notes that the best data from India shows around a quarter attending private schools in rural areas, and other research indicates around 65–70% do so in urban areas. He therefore estimates the overall total at around 40% or more – a figure consistent with his own, less detailed research in communities in Ghana, Kenya, and Nigeria.²⁰

These schools exist because they provide results: Professor Tooley's research in a variety of locations has found significantly better reading, mathematics, and English skills. Similarly, World Bank-supported researchers from the Learning and Educational Attainment in Punjab Schools (LEAPS) project found that in that Pakistani state, students in such private

schools were on average 1.5 to 2.5 years ahead of counterparts in government schools, even though the latter spent three times as much per pupil.²¹

What makes these private schools so much more effective is not immediately clear, says Professor Tooley. They typically have fewer resources, class sizes vary widely and often the teachers are not as well trained or do not have as much teaching experience. He concludes that “there is a missing ingredient [from public schools that exists] in private schools. It must be accountability. The teachers have to teach, otherwise they get removed; the schools need to please parents.”

The extreme situation faced by these parents gives the same message as the correlation between PISA outcomes and private-school numbers: choice and accountability can have an important impact on results. On the other hand, the experience of school choice in the US shows that the way these mechanisms work are complex, require parents to have as much information as possible and can penalise wrong choices as much as reward right ones. Rio de Janeiro's Ms Costin points out, however, that the effort needed to bring in parents is worth it even in the poorest areas: “They are not second-class citizens. Their opinion is important. Parents know which school is a good school. Social pressure for quality can be exerted even by illiterate parents.”

²⁰ It should be noted for disclosure purposes that Pearson, who commissioned this report from the Economist Intelligence Unit, is a minority investor in a chain of schools in Ghana co-founded by James Tooley.

²¹ James Tooley, Yong Bao, Pauline Dixon, John Merrifield, “School Choice and Academic Performance: Some Evidence From Developing Countries,” *Journal of School Choice*, 2011, 5: 1–39; Baladevan Rangaraju, James Tooley, Pauline Dixon, *The Private School Revolution in Bihar: Findings from a survey in Patna Urban*, 2012; World Bank, *Learning and Educational Achievement in Punjab Schools Report Summary*, 2008.





Returns to schooling: education, labour market and social outcomes



22 Hans van Kippersluis, Owen O'Donnell, and Eddy van Doorslaer, "Long Run Returns to Education: Does Schooling Lead to an Extended Old Age?", *Journal of Human Resources* (2009): 1–33.

23 Philip Oreopoulos, Kjell G. Salvanes, *How large are returns to schooling? Hint: Money isn't everything*, National Bureau of Economic Research Working Paper 15339, September 2009.

24 Tazeen Fasih, *Linking Education Policy to Labor Market Outcomes*, World Bank, 2008, see also Tazeen Fasih, et al, *Heterogeneous Returns to Education in the Labor Market*, World Bank Policy Research Working Paper 6170, August 2012.

25 Thomas S. Dee, *Are There Civic Returns to Education?* National Bureau of Economic Research Working Paper 9588, March 2003; Craig Riddell, "The Impact of Education on Economic and Social Outcomes: An Overview of Recent Advances in Economics", Canadian Policy Research Network, 2006.

The individual benefits

On a personal level, education is good for you – literally. In most countries, levels of academic attainment correlate with life expectancy, and some research suggests that this link is causal rather than coincidental.²² Other apparent personal benefits statistically related to time spent in education include, according to one extensive literature review, promoting better decisions on "marriage, and parenting. It also improves patience, making individuals more goal-oriented and less likely to engage in risky behaviour."²³ For some, learning itself is fun.

The most researched aspect of personal gains from education is the economic one, referred to as the returns to schooling. Since Gary Becker published *Human Capital* in the mid-1960s, a host of studies have calculated the financial benefit in various countries of time spent in school. These typically reveal a gain in annual earnings of between 8% and 10% for every additional year of education.

It is not, however, straightforward to use such insight in order to improve a country's average earning potential. Education may not even be the cause of individual higher wages: instead it could be that educational success signals to employers the presence of other valuable qualities. Moreover, returns to education vary, on occasion widely, in a number of ways. For one thing they tend to be higher in less developed countries.

In wealthier nations benefits tend to accrue more at the tertiary level, while in poorer ones they have been shifting from the primary to the secondary level. Time in school beyond that required for the occupation which the student eventually takes up – known as 'over-education' – yields substantially lower returns. Results also differ by geography, or even city, within countries, and often also between gender.

Just why these differences appear is not always clear, but simply keeping everyone in the black box of education a few years longer will not yield magic results. Above all, the quality of education matters: one World Bank study suggested that the apparent decline in the returns to primary education in developing countries may arise from the length of time it takes to teach even basic literacy and numeracy in a number of those countries.²⁴

Getting the best at national level

Good education may, in most cases, help the individuals being educated, but does it help their society as well? A substantial literature sees behavioural impacts on educated individuals that have positive societal impact – for liberal democracies at least – including, to name just a few, better health for the relatives of those educated, lower arrest rates, higher voter participation and even a greater tendency to support free speech.²⁵



RELATIONSHIP BETWEEN SCHOOL LIFE EXPECTANCY AND LABOUR PRODUCTIVITY 1990–2011

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
1991	0.78	0.80	0.84	0.85	0.87	0.83	0.81	0.79	0.82	0.81	0.80	0.78	0.75	0.74	0.73	0.74	0.74	0.72	0.74	0.70	0.69
1992	0.79	0.80	0.83	0.85	0.86	0.83	0.81	0.80	0.83	0.81	0.80	0.78	0.75	0.73	0.72	0.73	0.74	0.73	0.74	0.70	
1993	0.79	0.79	0.83	0.84	0.86	0.83	0.82	0.80	0.83	0.81	0.80	0.78	0.74	0.72	0.72	0.73	0.75	0.72	0.73		
1994	0.78	0.79	0.83	0.84	0.86	0.84	0.82	0.80	0.82	0.81	0.80	0.78	0.74	0.72	0.71	0.74	0.74	0.72			
1995	0.77	0.78	0.82	0.84	0.86	0.83	0.82	0.80	0.82	0.81	0.79	0.77	0.74	0.71	0.72	0.73	0.73				
1996	0.76	0.77	0.82	0.85	0.86	0.84	0.81	0.79	0.82	0.80	0.79	0.77	0.74	0.72	0.71	0.72					
1997	0.75	0.77	0.83	0.85	0.86	0.83	0.81	0.79	0.82	0.80	0.78	0.77	0.74	0.71	0.70						
1998	0.75	0.78	0.83	0.85	0.86	0.83	0.80	0.78	0.81	0.79	0.78	0.77	0.74	0.70							
1999	0.76	0.79	0.84	0.84	0.86	0.82	0.80	0.78	0.81	0.79	0.79	0.78	0.74								
2000	0.77	0.79	0.82	0.84	0.85	0.82	0.79	0.78	0.81	0.79	0.79	0.77									
2001	0.78	0.77	0.82	0.83	0.85	0.81	0.79	0.78	0.81	0.80	0.79										
2002	0.78	0.77	0.81	0.83	0.84	0.81	0.79	0.78	0.82	0.80											
2003	0.77	0.77	0.81	0.82	0.84	0.81	0.80	0.79	0.82												
2004	0.77	0.76	0.81	0.82	0.84	0.81	0.80	0.79													
2005	0.77	0.76	0.80	0.82	0.84	0.82	0.80														
2006	0.77	0.76	0.81	0.83	0.85	0.82															
2007	0.76	0.77	0.81	0.83	0.85																
2008	0.77	0.77	0.81	0.83																	
2009	0.77	0.77	0.82																		
2010	0.77	0.77																			
2011	0.78																				

School life expectancy (primary to tertiary)

Note: The scatter matrix shows the correlation of school life expectancy for all years against all possible future years for overall productivity of labour. The correlation in each set of years is well above our threshold for "strong" correlations of 0.65.

Source: Economist Intelligence Unit and UNESCO.

In considering country-level benefits, the more common area of study has also been economic. On a basic level, education helps. Our correlation analysis shows a strong link between average years in school – or school life expectancy – and labour productivity. This does not surprise Namibia's Mr Angula: "A well-educated nation is likely to be innovative. I don't think that you have to go to the statistical evidence to find that. People are able to use knowledge for economic development." It is not simply that better educated people themselves are more productive. Extensive research has found a spill-over effect from education, with benefits arising both from how the educated share their knowledge with others and how they are better able to pick up new skills themselves by building on their existing education.

The difficulty for policymakers, though, is deciding what sort of education works best when so many factors affect the economy. Predictably, quality appears to be more important than duration. In one analysis, Professors Hanushek and Woessmann found that when cognitive skills, as measured by PISA scores, are correlated with GDP, then the impact of total years of schooling becomes irrelevant. In other words, how long it took to learn was less important than that learning had occurred.²⁶ This may seem obvious, but it is directly applicable to decisions such as starting primary education a year earlier or using the same resources for teacher training.

²⁶ Eric A. Hanushek and Ludger Woessmann, "Education and Economic Growth", in Dominic J. Brewer and Patrick J. McEwan, eds. *Economics of Education* (2010).



RELATIONSHIP BETWEEN SCHOOL LIFE EXPECTANCY (IN 1995) AND LABOUR PRODUCTIVITY (IN 2010)



Note: The scatter chart shows the correlation of school life expectancy in 1995 against overall productivity of labour in 2010 for 37 countries. The correlation is 0.817, well above our threshold for "strong" correlations of 0.65.

Source: Economist Intelligence Unit and UNESCO.

More complicated than quality is the question of what sort of content in an education system will yield the best labour market and economic outcomes. For example, some countries prize strong vocational school programmes while others prefer more unified systems. One advocate of vocational education is Professor Schwartz, who says of the US that "having a system focused entirely on preparing students for four-year colleges and universities is a major problem. Only 30% of young Americans actually get a four-year degree by their mid-twenties, and many of those wind up in jobs that didn't require a degree. The consequence of not having a strong post-secondary vocational system is that most young Americans reach their mid-twenties without the skills and credentials needed for success in a technology-driven economy."

Mr Angula, whose country is looking to bolster its vocational education system, adds that systems "need to create linkages between the school and the community, and the school and the economy, so that education should have a meaning in the context that it is practised. Sometimes it is hard for students to apply their knowledge or skills." Without seeing any relevance, they might simply leave education.

“No education system can remain static. The world is changing rapidly. Technology is transforming our lives. The skills needed in the future will be very different from those needed today.”

— Lee Hsien Loong, Prime Minister of Singapore



Softer skills

The questions of the appropriate education content to best ensure future economic growth and how best to equip students to face an uncertain future are also at the core of reforms in some of the more successful school systems, particularly in Asia. Singapore's Professor Lee explains that “of today's job titles compared to those of 1995, many are very new; the skills are very new. We anticipate that evolution will be fast into the future.” For over a decade, his country's Ministry of Education has engaged in future scanning to identify the likely skills needed in the coming years, and adjusted its offerings to students accordingly. More important, since 1997, says Professor Lee, Singapore has shifted away from teaching rote knowledge to a firm foundation in the basics of maths, science, and literacy combined with an inculcation of how to understand and apply information. “We feel it contributes toward the students acquiring knowledge and skills of cognition and creativity attributes which are very important in the 21st century landscape.”

Both of these developments reflect an attitude that education systems need to be prepared for ongoing change rather than seek a single, best end state. “No education system can remain static,” writes Singapore's Prime Minister, Lee Hsien Loong, in the foreword to a recent report on education and geopolitics in the 21st century. “The world is changing rapidly. Technology is transforming our lives. The skills needed in the future will be very different from those needed today.”²⁷

Singapore is not alone. Shanghai students finished first in the latest PISA tests, but China is also shifting toward a much greater emphasis on creativity. Professor Zhao explains that the country's leadership believes “the economy is moving quickly from a labour-intensive one to a knowledge economy. It needs creative talent.” Indeed, he finds it ironic that China is moving more in the direction of Western models even while politicians in those countries sometimes praise that of traditional Asian education. South Korean schools, meanwhile, are now being encouraged to develop “creativity, character and collaboration”.

Teaching people how to work together is indeed of growing relevance to the economy. According to Ms Parthasarathi, “A lot of education in the second half of the 20th century has made children fiercely

²⁷ Foreword to Michael Barber, Katelyn Donnelly and Saad Rizvi, *Oceans of innovation: The Atlantic, the Pacific, global leadership and the future of education*, 2012.

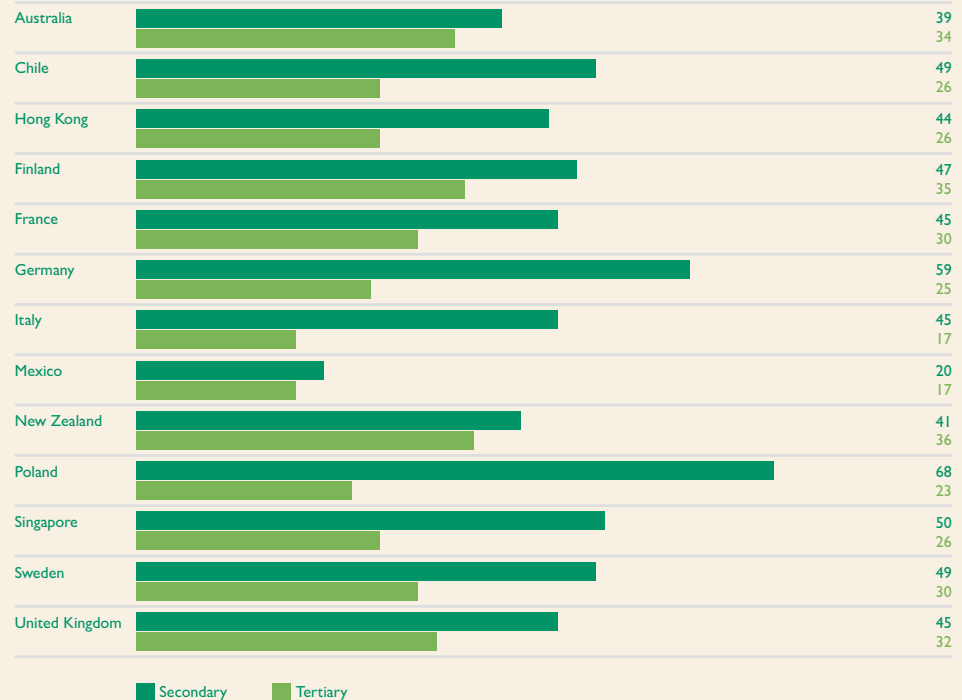


individualistic, not good in a team, but these team skills – an ability to interact with respect with people; to empathise; to be innovatively adventurous – are essential for certain types of creativity.” In order to drive the teaching of collaborative skills, the Assessment and Teaching of 21st-Century Skills project – a multi-stakeholder group that includes the education ministries of the US, Australia, Singapore, Finland, the Netherlands and Costa Rica – has been seeking to develop metrics to test such abilities. These will be integrated into the PISA 2015 tests – a sign, Professor Schleicher says, that “the kinds of skills that matter in life are changing.”

Education can clearly deliver substantial social and economic outcomes. Understanding how it does so, however, and maximising those results are still works in progress for educational leaders. Says Mr Mackay, Chair of the Australian Institute for Teaching and School Leadership: “None of the countries you might think would be complacent are complacent at all: they are investing in new metrics.”



PERCENTAGE OF LABOUR FORCE REACHING SECONDARY AND TERTIARY ATTAINMENT, SELECTED COUNTRIES, 2008 (%)



Source: International Labour Organization.

Towards an index of education outputs



In addition to the Data Bank, an important goal of The Learning Curve project has been to create a comparative index of educational performance – the Global Index of Cognitive Skills and Educational Attainment. The results are meant not only to be interesting in themselves, but to help identify likely sources of good practice.

First, a caveat

The exercise has not been simple. One hurdle was determining how to measure performance. While it would have been desirable to include broader labour market and social outcomes on which education arguably has an impact, this proved impossible. Even were it demonstrably clear that education played a definite role in these areas, it is impossible to determine a way – consistent across time and geography – to isolate and measure the impact of that effect.

While more direct measures of educational results abound, robust, internationally comparative ones are rare. PISA, TIMSS and PIRLS testing has had such an impact in part because of the void it helped to fill. The Index therefore, through necessity, takes a view of educational performance based on where reasonably good data exist. The first such area, drawing on the results of the aforementioned tests, is the inculcation of cognitive skills. The second is a broader measure of educational attainment, which relies on literacy levels and graduation rates.

This focus does not eliminate data issues. Education systems are local: international comparability will never be perfect. Canada's tertiary graduation rate, for example, is modest in the calculations for this Index because they draw on university results. If one includes graduates from Canada's community colleges, though – tertiary type-B institutions to use the international classification – the graduation rate becomes one of the highest in the OECD. A lack of data on the results for type-B colleges, though, makes it impossible to do so generally. Moreover, metrics selected for the Index suffer from data lacunae. Singapore's low educational attainment score in the Index – 33rd out of 40 – arises largely from a complete lack of available data on graduation rates²⁸. Finally, combining results from different tests in a meaningful way required rebalancing of the existing data.

Ultimately, these data are inevitably proxies for broader results, and far from perfect ones. As Dr Finn points out of graduation rates, “they are complicated. You can raise your graduation rate by lowering academic expectations.” On the other hand, such rates, like literacy levels, do indicate in a rough way the breadth of education in a country. Similarly, Professor Hanushek notes that “countries that do well on PISA do well on tests of deeper knowledge.”

²⁸ Singapore is one of 14 countries in the Index for which internationally comparable graduation data are lacking. (The countries were nonetheless included in the Index because they met all the other data inclusion criteria.) They were thus assigned the mean z-score of the entire country sample for the given graduation rate indicators. This represents an opportunity for further and improved data collection that will be reflected in later versions of The Learning Curve.

制冷循环。

用中温绝热。制冷剂

P_0 吸气行



GLOBAL INDEX OF COGNITIVE SKILLS AND EDUCATIONAL ATTAINMENT – OVERALL RESULTS

GROUP 1 AT LEAST ONE STANDARD DEVIATION ABOVE THE MEAN

COUNTRY	Z-SCORE	RANK
FINLAND	1.26	1
SOUTH KOREA	1.23	2

GROUP 2 WITHIN HALF TO ONE STANDARD DEVIATION ABOVE THE MEAN

COUNTRY	Z-SCORE	RANK
HONG KONG–CHINA	0.90	3
JAPAN	0.89	4
SINGAPORE	0.84	5
UNITED KINGDOM	0.60	6
NETHERLANDS	0.59	7
NEW ZEALAND	0.56	8
SWITZERLAND	0.55	9
CANADA	0.54	10
IRELAND	0.53	11

GROUP 3 WITHIN HALF A STANDARD DEVIATION ABOVE OR BELOW THE MEAN

COUNTRY	Z-SCORE	RANK
DENMARK	0.50	12
AUSTRALIA	0.46	13
POLAND	0.43	14
GERMANY	0.41	15
BELGIUM	0.35	16
UNITED STATES	0.35	17
HUNGARY	0.33	18
SLOVAKIA	0.32	19
RUSSIA	0.26	20
SWEDEN	0.24	21
CZECH REPUBLIC	0.20	22
AUSTRIA	0.15	23
ITALY	0.14	24
FRANCE	0.13	25
NORWAY	0.11	26
PORTUGAL	0.01	27
SPAIN	-0.08	28
ISRAEL	-0.15	29
BULGARIA	-0.23	30
GREECE	-0.31	31

GROUP 4 WITHIN HALF TO ONE STANDARD DEVIATION BELOW THE MEAN

COUNTRY	Z-SCORE	RANK
ROMANIA	-0.60	32
CHILE	-0.66	33

GROUP 5 AT LEAST ONE STANDARD DEVIATION BELOW THE MEAN

COUNTRY	Z-SCORE	RANK
TURKEY	-1.24	34
ARGENTINA	-1.41	35
COLOMBIA	-1.46	36
THAILAND	-1.46	37
MEXICO	-1.60	38
BRAZIL	-1.65	39
INDONESIA	-2.03	40

Note: The Index scores are represented as z-scores. The process of normalising all values in the Index into z-scores enables a direct comparison of country performance across all the indicators. A z-score indicates how many standard deviations an observation is above or below the mean of the countries in the Index.

Source: Economist Intelligence Unit.

The methodology appendix describes in more detail the Index's construction and relevant data issues. The broader message of this lengthy disclaimer is that the Index is very much a first step. We hope that, as understanding of the outcomes of education grows, the Index will become more complex and nuanced as well as be populated with more robust and varied data. For now, however, it is better to light a candle than curse the statistical darkness.

What the leaders have – and don't have – in common

Given the attention paid to the results of international education tests, the leading countries in the cognitive skills category of the Index come as no surprise. The top five – Finland, Singapore, Hong Kong, South Korea and Japan – all score more than one standard deviation above the norm in this part of the Index. The educational attainment category, based on literacy and graduation rates, tells a slightly different story. Here South Korea leads, followed by the UK, Finland, Poland and Ireland, with Japan, Hong Kong and Singapore further down the table. Because of their strength in both measures, then, Finland and South Korea are the clear overall leaders of the Index.

These results mirror the conventional wisdom: already in 2007, the BBC referred to the two countries as 'among the superpowers of education.'²⁸ But what do these have in common that might help to identify the keys to educational success? On the face of it, there is remarkably little.

In many ways, it is hard to find two education systems more different. South Korea's schools are frequently described as test-driven, with a rigid curriculum and an emphasis on rote learning. Most striking is the amount of time spent in study. Once the formal school day is over, the majority of students go to private crammer schools, or *hagwons*. According to OECD data, of 15-year-old students for whom data was available in 2009, 68% engaged in private study of the Korean language, 77% in mathematics, 57% in science and 67% in other subjects. In later years, students typically do far more privately.

The government has become so worried about the extent of these studies that it has banned *hagwons* from being open after 10pm, but still needs to send out patrols to shut down those which mask illegal, after-hour teaching by posing as self-study libraries.

On the other hand Finland, in the words of Professor Schwartz, "is a wonderful case study. Kids start school later; school hours are shorter than most others; they don't assign homework; their teachers are in front of kids less. By one estimate, Italians go to school three years longer." The PISA data shows that very few Finns take out-of-school lessons either, and those who do typically do worse on standardised tests, suggesting that this is largely remedial help. Finally, the system has a reputation for being focused on helping children understand and apply knowledge, not merely repeat it.

The existing data also paint a picture of two distinct approaches. In some cases, the systems are widely different: average teacher salaries in South Korea are over twice the national average, while those in Finland are almost exactly average; pupil-teacher ratios, on the other hand, are much higher in South Korea. Where the two systems are similar, they are usually near the average for all countries in the Index. The only difference is school choice, where both are highly restrictive. That said, the vast amount of after-school private education in South Korea brings into question the relevance of that metric.

The two systems, though, do share some important aspects when examined closely. "When you look at both, you find nothing in common at first," says Professor Schleicher, "but then find they are very similar in outlook." One element of this is the importance assigned to teaching and the efforts put into teacher recruitment and training. As discussed above, the practices of the two countries differ markedly, but the status which teaching achieves and the resultant high quality of instruction are similar. Professor Schleicher adds that both systems also have a high level of ambition for students and a strong sense of accountability, but again these are "articulated differently. In South Korea, accountability is exam driven; in Finland, it is peer accountability, but the impact is very similar."



²⁸ "Finland stays top of global class", 4 December 2007, <http://news.bbc.co.uk/1/hi/7126562.stm>



Finally, there are cultural parallels. The two societies are highly supportive of both the school system itself and of education in general. Of course, other countries are also highly supportive of education, but what may set Finland and South Korea apart is that in both, ideas about education have also been shaped by a significant underlying moral purpose.

Although discussions of Korean attitudes to education frequently reference Confucian ideals, under a quarter of South Koreans were even literate by the end of the Korean War. In the decades that followed, education was not just about self-improvement: it was a way to build the country, especially as the Japanese colonial power had restricted the access of ethnic Koreans to schooling. The immediate cause of this drive has disappeared, but it has helped inculcate a lasting ethic of education which only strengthened the more widespread attitude in Asia that learning is a moral duty to the family and society as well as a necessary means of individual advancement.

In Finland, the ethos is different but no less powerful. As Mr Mackay explains, that country has made “a commitment as a nation to invest in learning as a way of lifting its commitment to equity. They wish to lift the learning of all people: it is about a moral purpose that comes from both a deeper cultural level and a commitment at a political-social level.” In other words, education is seen as an act of social justice.

Both of these moral purposes can cause difficulties in different ways. The high expectations and pressure mean that studies regularly find South Korean teenagers to be the least happy in the OECD. In Finland, the egalitarian system seems less effective at helping highly talented students to perform to the best of their ability than at making sure average results are high. Nevertheless, the power of these attitudes in shaping cultural norms and political decisions in ways that help education attainment overall are undeniable. Mr Angula, after many years as a teacher, Minister of Education, and Prime Minister, believes that “the key ingredient [in creating a successful education system] is for everybody to be committed and to understand that they are doing a public good.”



The two societies [that score highest] are highly supportive of both the school system itself and of education in general.

Conclusion and recommendations for further study



“I don’t detect many similarities other than high standards, solid curriculum, competent teachers and a supportive culture that is education-minded.”

—Dr Chester Finn, President, Thomas Fordham Institute

The lessons of the Index broadly reflect much which comes out of this study. The understanding of what inputs lead to the best educational outcomes is still basic, which is not surprising given that robust international benchmarking figures are few and often of recent date. Moreover, education remains an art, and much of what engenders quality is difficult to quantify.

General lessons to be drawn, then, are often still basic as well. Dr Finn says of studies looking at high-performing school systems, “I don’t detect many similarities other than high standards, solid curriculum, competent teachers and a supportive culture that is education-minded.” Other research might point to the importance of school choice and school autonomy.

These insights are valuable, but only up to a point. Education systems are local; so too are their problems and solutions. What Professor Hanushek says of improving autonomy and choice applies generally: “Local countries and institutions are extraordinarily important. Each country has its own system. It is difficult to take any of the specifics and apply them elsewhere.” In seeking those solutions, officials also need a dose of humility, remembering that formal education can do only so much. As Professor Woessmann notes, “a lot of these things [determinants of academic success] are not amenable to government action. They are really within families and how society operates.” Moreover, as the differing approaches of Finland and South Korea show, there are diverse paths to success.

While the local matters greatly, the universal still has an important contribution to make. This study, like others, ends with an appeal for more research. Both relatively straightforward work and more complex tasks lie ahead. The former includes the generation of basic information on inputs and outcomes in a number of countries; the assessment of a wider range of skills using standardised tests; and finding appropriate ways to compare dissimilar educational systems in various countries. The more complex challenges involve assessing the impact of culture on education and the value of different means of changing cultures; determining the attributes of those teachers that add the most value; and understanding in more detail how accountability and choice can interact in positive ways. Such studies might involve innovative new metrics, new approaches or both.

The other important plea is that what is known not be ignored. Too often, the world’s innumerable education reforms draw on assumptions and ideology rather than solid information. International comparisons of educational inputs and outputs have already awakened countries to their own strengths and deficiencies, as well as pointing toward possibly fruitful sources of solutions. The LCDB and Index are offered as tools toward furthering this understanding. It is hoped that they will be useful as researchers and analysts seek deeper and more nuanced insight in the years to come.



Appendix I: Methodology for the Quantitative Component of The Learning Curve

As part of The Learning Curve programme, the Economist Intelligence Unit (EIU) undertook a substantial quantitative exercise to analyse nations' educational systems' performance in a global context. The EIU set two main objectives for this work: to collate and compare international data on national school systems' outputs in a comprehensive and accessible way, and for the results to help set the editorial agenda for The Learning Curve programme.

The EIU was aided by an Advisory Panel of education experts from around the world. The Panel provided advice on the aims, approach, methodology and outputs of The Learning Curve's quantitative component. Feedback from the Panel was fed into the research in order to ensure the highest level of quality.

The EIU developed three outputs as part of the quantitative component of The Learning Curve. These are an exhaustive data bank of high quality national education statistics, an index measuring national cognitive skills and educational attainment, and research on correlations between educational inputs, outputs and wider society. Each is described in more detail below.

The Learning Curve Data Bank

The Learning Curve Data Bank (LCDB) provides a large, transparent and easily accessible database of annual education inputs and outputs and socio-economic

indicators on 50 countries (and one region – Hong Kong) going back to 1990 when possible. It is unique in that its aim is to include data that are internationally comparable. The user can sort and display the data in various ways via the website that accompanies this report.

Country selection

Country selection to the Data Bank was on the basis of available education input, output and socio-economic data at an internationally comparable level. A particularly important criterion was participation in the international PISA and/or TIMSS tests. Forty countries (and Hong Kong) were included as 'comprehensive-data' countries within the Data Bank, and ten countries as 'partial-data' countries, according to availability of data.

Indicator selection

The EIU's aim was to include only internationally comparable data. Wherever possible, OECD data or data from international organisations was used to ensure comparability. For the vast majority of indicators, the EIU refrained from using national data sources, and when possible, used inter- and extrapolations in order to fill missing data points. Different methods for estimations were used, including regression when found to be statistically significant, linear estimation, averages between regions, and deductions based on other research. The source for each and every data point is cited in the Data Bank. The data were last collected and/or calculated in September 2012.

Over 60 indicators are included, structured in three sections: inputs to education (such as education spending, school entrance age, pupil teacher ratio, school life expectancy, teacher salaries, among others), outputs of education (such as cognitive skills measured by international tests such as PISA, literacy rates, graduation rates, unemployment by educational attainment, labour market productivity, among others) and socio-economic environment indicators (social inequality, crime rates, GDP per capita, unemployment, among others). The Data Bank's indicators were used to create the Index and conduct a correlations exercise.

Global Index of Cognitive Skills and Educational Attainment

The Global Index of Cognitive Skills and Educational Attainment compares the performance of 39 countries and one region (Hong Kong is used as a proxy for China due to the lack of test results at a national level) on two categories of education, cognitive skills and educational attainment. The Index provides a snapshot of the relative performance of countries based on their education outputs.

Country and indicator selection

For data availability purposes, country selection to the Index was based on whether a country was a 'comprehensive-data' country within the Data Bank. Guided by the Advisory Panel, the EIU's goal in selecting indicators for the Index was to establish criteria by which to measure countries' output performance in education.

Initial questions included: What level of cognitive skills are national education systems equipping students with, and how are students performing on internationally comparable tests at different ages? What are levels of reading, maths and science in these countries? How successful are national education systems at attaining a high level of literacy in the population? How successful are national education systems at educating students to secondary and tertiary degree level?

Based on this set of questions, the EIU chose objective quantitative indicators, grouping them into two groups: cognitive skills and educational attainment. For cognitive skills, the Index uses the latest reading, maths and science scores from PISA (Grade 8 level), TIMSS (Grade 4 and 8) and PIRLS (Grade 4). For educational attainment, the Index uses the latest literacy rate and graduation rates at the upper secondary and tertiary level. Data for some countries were more recent than others; when the latest available data point was five years older than the latest, the EIU chose not to include it, although this was very rarely found to be an issue.

The EIU made estimations when no internationally comparable data were available. For example, a number of countries' Grade 8 TIMSS Science scores were estimated by regression with PISA Science scores, when the regression was found to be statistically significant. In addition, when OECD data were not available for graduation rates,

national ministry or statistics bureau data were sanity-checked and then used if deemed internationally comparable.

Calculating scores and weightings

In order to make indicators directly comparable across all countries in the Index, all values were normalised into z-scores. This process enables the comparison and aggregation of different data sets (on different scales), and also the scoring of countries on the basis of their comparative performance. A z-score indicates how many standard deviations an observation is above or below the mean. To compute the z-score, the EIU first calculated each indicator's mean and standard deviation using the data for the countries in the Index, and then the distance of the observation from the mean in terms of standard deviations.

The overall Index score is the weighted sum of the underlying two category scores. Likewise, the category scores are the weighted sum of the underlying indicator scores. As recommended by the Advisory Panel, the default weight for the Index is two-thirds to cognitive skills and one-third to educational attainment. Within the cognitive skills category, the Grade 8 tests' score accounts for 60% while the Grade 4 tests' score accounts for 40% (Reading, Maths and Science all account for equal weights). Within the educational attainment category, the literacy rate and graduation rates account for equal weights. The user can, however, change the weightings and recalculate scores according to personal preference via the website that accompanies this report.

Areas for caution

Because indexes aggregate different data sets on different scales from different sources, building them invariably requires making a number of subjective decisions. This index is no different. Each 'area for caution' is described below.

Z-scores for PISA, TIMSS and PIRLS

It is important to note that, strictly speaking, the z-scores for PISA, TIMSS and PIRLS are not directly comparable. The methodology applied both by the OECD and the International Association for the Evaluation of Educational Achievement (IEA) to calculate the performance of the participating countries consists of comparing the performance of the participating countries to the respective mean performance. (The countries' 'raw' test scores before normalisation are not published; just their scores in comparison to the other participants.) Thus, which countries participate in each test and how well they perform in comparison to the other participants has a direct impact on the resulting final scores. Given that the sample of countries that take the PISA, TIMSS and PIRLS tests are not exactly the same, there are limitations to the comparability of their scores.

The EIU has chosen not to change these scores to account for this lack of direct comparability; however, it did consider other options along the way. The main alternative suggestion from the Advisory Panel was to use a pivot country in order to transform the z-scores of other countries in comparison to that pivot

country's z-score. Although this method is used in some studies, after substantial consideration, the EIU decided not to employ this method for the purpose of an index. The resulting z-scores after transformation depend heavily on the choice of pivot country; choosing one country as a pivot over another affects countries' z-scores quite substantially. The EIU did not feel it was in a position to make such a choice. Despite these limitations to test scores' direct comparability, the EIU believes that the applied methodology is the least invasive and most appropriate to aggregate these scores.

Graduation rate data

Some members of the Advisory Panel questioned the use of graduation rates in the Index in that it is not clear whether they add value as a comparative indicator of education performance. Unlike test results and literacy rates, standards to gaining an upper secondary and tertiary degree do differ across countries. Notwithstanding, the EIU believes that graduation rates do add value in evaluating a national educational system's performance, as there is common acceptance that national education systems should aim for their citizens to gain educational qualifications, especially at the secondary level. Including graduation rate data in the Index therefore awards countries that have put this aim into practice, albeit at varying levels of quality.

Because of the variation in how countries measure graduation rates, the EIU followed the Panel's suggestion in using

OECD graduation rate data, which use one main definition. When OECD data were not available, national ministry or statistics bureau data were sanity-checked and then used if deemed comparable. In some cases, no data on graduation rates were available. In this case, the EIU awarded the country the mean score for this indicator. One disadvantage of giving a country the mean score is that if in reality it performs worse than the average in this indicator, the Index boosts its score, and vice versa.

The EIU used the most recent data available. Because graduation rates are based on the pattern of graduation existing at the time, they are sensitive to changes in the educational system, such as the addition of new programmes or a change in programme duration. As an extreme example, Portugal's upper secondary graduation rate increased from a range between 50% and 65% in the early 2000s to 2008, to 104% in 2010, as a result of the government's 'New Opportunities' programme, launched to provide a second chance for those individuals who left school early without a secondary diploma. In order to treat countries consistently, the Index takes the 2010 figure. Although this inflates Portugal's score in this indicator, this inflation should eventually fall out of the Index should it be updated on an annual or bi-annual basis. Given the limitations of graduation rate data, the EIU followed the Panel's suggestion of giving a smaller weighting (one-third) to educational attainment.

It is also important to note that the tertiary graduation rate indicator covers only tertiary-type A programmes. Tertiary-type B programmes are not included. This methodology was chosen largely because not all countries collect data and organise their education systems along the lines of A and B. As per the OECD, tertiary-type A programmes are largely theory-based and are designed to provide qualifications for entry into advanced research programmes and professions with high requirements in knowledge and skills. These programmes are typically delivered by universities, and their duration ranges from three to five years, or more at times. Tertiary-type B programmes are classified at the same academic level as those of type A, but are often shorter in duration (usually two to three years). They are generally not intended to lead to further university-level degrees, but rather to lead directly to the labour market.

Although excluding tertiary-type B programmes makes for a more relevant comparison among countries, it also slightly disadvantages a number of countries that have particularly high type B graduation rates (as these rates are not included). These countries are Canada, Ireland, Japan and New Zealand. Nonetheless, this exclusion has a limited impact on these countries' ranking in the Index.

Other indicators

The EIU had wanted to include other education performance indicators in the Index, such as how well national education systems prepare students for the labour market and the performance of vocational studies. However, data availability was a limiting factor. The EIU found that sufficient data were not available that isolates educational attainment within labour market outcomes; and internationally comparable data on vocational studies covering all countries in the Index were not readily available either.

Correlations

With the 'comprehensive-data' countries data from the Data Bank, a correlations exercise was undertaken in order to test relationships across countries between education inputs, outputs and wider society. The EIU tested for correlations between the inputs to and outputs of education, the inputs to education and socio-economic environment indicators (as a proxy for wider society), and the outputs of education and socio-economic environment indicators.

Definition of a correlation and thresholds used

The correlation coefficient is a measure of the degree of linear relationship between two variables. While in regression the emphasis is on predicting one variable from the other, in correlation the emphasis is on the degree to which a linear model may describe the relationship between two

variables. Importantly, the presence of a correlation does not imply causality.

In order to ensure that relationships being found were indeed strong, the EIU looked for at least a 0.65 level of correlation (the higher it is, the stronger the relationship). It is important to acknowledge that some social science research uses a lower level of correlation, but the EIU wished to maintain a high level to avoid finding relationships between indicators that might not be significant.

Calculating correlations

Correlation tests were conducted on an indicator-by-indicator basis, between two variables over time (on an annual basis) and at three-year growth rates (for example, the three-year growth rate of 1999 (1996–99) against the three-year growth rate of 2007 (2004–07)). For the latter tests, adjustments were made to include TIMSS and PIRLS tests even though these are not taken every three years (they are taken every four and five years respectively). The EIU used the same time lags across countries on the same indicator, as per the Panel's suggestions.

When looking for evidence of a strong correlation, the EIU sought a strong relationship over time. For example, although there may have been evidence of a strong correlation between one input variable in 1990 and an output variable in 2005; a strong level of correlation would also need to be found

for 1991 and 2006, 1992 and 2007, and so on, for at least a number of years. In addition, correlation tests were only run if there were at least 15 countries with relevant data for both of the indicators being assessed.

Factors affecting the correlations

The EIU did not find a great number of strong relationships. Given the complexity of education, this was not totally surprising. However, other factors may also account for the lack of correlations. For one, not all indicators were available going back 15–20 years in time. There was also a lack of data availability for some countries (some of this due to the Data Bank's focus on ensuring that data being used were internationally comparable). Finally, other qualitative factors that are difficult to measure, such as culture and the quality of teaching, were not included in the Data Bank. These factors may have a significant impact on education outputs, but the EIU was not able to take these into account within the correlations exercise.

Appendix 2: Select bibliography

Barber, Michael, Katelyn Donnelly and Saad Rizvi. *Oceans of innovation: The Atlantic, the Pacific, global leadership and the future of education*, 2012.

Barber, Michael and Mona Mourshed. *How the World's Best Performing School Systems Come Out on Top*, McKinsey and Co., 2007.

Berry Cullen, Julie, Brian A. Jacob and Steven Levitt. "The Effect of School Choice on Participants: Evidence From Randomized Lotteries", *Econometrica*, (2006), 74: 1191–1230.

Center for Research on Education Outcomes, *Multiple Choice: Charter School Performance in 16 States*, June 2009.

Chetty, Raj, John N. Friedman and Jonah E. Rockoff. *The Long-term Impacts of Teachers: Teacher Value-added and Student Outcomes in Adulthood*, National Bureau of Economic Research Working Paper 17699, December 2011.

Dee, Thomas S. *Are There Civic Returns to Education?* National Bureau of Economic Research Working Paper 9588, March 2003.

Deming, David, Justine Hastings, Thomas Kane and Douglas Staiger. *School Choice, School Quality and Postsecondary Attainment*, 2011, NBER Working Paper 17438.

Dolton, P., and O. D. Marcenaro-Gutierrez. "If you pay peanuts do you get monkeys? A cross-country analysis of teacher pay and pupil performance", *Economic Policy* (2011) 26: 5–55.

Duncan, Greg J., and Richard Murnane, eds. *Whither Opportunity? Rising Inequality, Schools, and Children's Life Chances*, 2011.

Fasih, Tazeen. *Linking Education Policy to Labor Market Outcomes*, World Bank, 2008.

Fasih, Tazeen, et al. *Heterogeneous Returns to Education in the Labor Market*, World Bank Policy Research Working Paper 6170, August 2012.

Figlio, David N., and Cecilia Elena Rouse. *Do Accountability and Voucher Threats Improve Low-performing Schools?*, 2005, NBER Working Paper 11597.

Figlio, David N., and Lawrence Kenny. *Individual Teacher Incentives and Student Performance*, National Bureau of Economic Research Working Paper 12627, October 2006.

Filmer, Deon. "Inequalities in Education: International Experience", in Ismail Sirageldin, *Human Development in the Twenty First Century*.

Forster, Greg. *A Win-Win Solution: The Empirical Evidence on School Vouchers*, 2011.

Gallego, Francisco. "School Choice, Incentives, and Academic Outcomes: Evidence for Chile", paper 39, Econometric Society 2004 Latin American Meetings.

Hanushek, Eric A., and Ludger Woessmann. "Education and Economic Growth", in Dominic J. Brewer and Patrick J. McEwan, eds. *Economics of Education* (2010).

Hastings, Justine S., and Jeffrey M. Weinstein. "Information, School Choice, and Academic Achievement: Evidence from Two Experiments", *The Quarterly Journal of Economics*, (2008): 1373–1414.

Hoxby, Caroline. *School Choice and School Productivity: (Or Could School Choice Be A Tide That Lifts All Boats?)*, 2002, NBER Working Paper 8873.

Hsieh, Chang-Tai, and Miguel Urquiola. "The effects of generalized school choice on achievement and stratification: Evidence from Chile's voucher program", *Journal of Public Economics* (2006) 90: 1477–1503.

Lai, Fang, Elisabeth Sadoulet and Alain de Janvry. "The Adverse Effects of Parents' School Selection Errors on Academic Achievement: Evidence from the Beijing Open Enrollment Program", *Economics of Education Review* (2009) v28 n4: 485–496.

Mourshed Mona, Chinezi Chijioke and Michael Barber. *How the World's Most Improved School Systems Keep Getting Better*, McKinsey and Co., 2010.

OECD. "School autonomy and accountability: Are they related to student performance?", *PISA in Focus*, October 2011.

Oreopoulos, Philip, and Kjell G. Salvanes. "How large are returns to schooling? Hint: Money isn't everything", National Bureau of Economic Research Working Paper 15339, September 2009.

Rangaraju, Baladevan, James Tooley and Pauline Dixon. *The Private School Revolution in Bihar: Findings from a survey in Patna Urban*, 2012.

Riddell, Craig. "The Impact of Education on Economic and Social Outcomes: An Overview of Recent Advances in Economics", Canadian Policy Research Network, 2006.

"School Voucher Programs: What the Research Says About Parental School Choice", *Brigham Young University Law Review*, (2008): 415–446.

The Comprehensive Longitudinal Evaluation of the Milwaukee Parental Choice Program: Summary of Final Reports, February 2012.

Tooley, James, Yong Bao, Pauline Dixon and John Merrifield. "School Choice and Academic Performance: Some Evidence From Developing Countries," *Journal of School Choice*, 2011, 5: 1–39.

Van Kippersluis, Hans, Owen O'Donnell and Eddy van Doorslaer. "Long Run Returns to Education: Does Schooling Lead to an Extended Old Age?", *Journal of Human Resources* (2009): 1–33.

Woessmann, Ludger. "Cross-Country Evidence on Teacher Performance Pay", *Forschungsinstitut zur Zukunft der Arbeit Discussion Paper 5101*, July 2010.

Woessmann, Ludger, and Martin West. "Competition from private schools boosts performance system-wide", *Vox*.

World Bank, *Learning and Educational Achievement in Punjab Schools Report Summary*, 2008.

Learn more at www.thelearningcurve.pearson.com

Pearson plc
80 Strand
London
WC2R 0RL
T +44 (0)20 7010 2000
F +44 (0)20 7010 6060



Design and Production: Radley Yeldar (London) ry.com
Print: Pureprint Group

This report has been printed on Edixion Challenger Offset which is FSC® certified and made from 100% Elemental Chlorine Free (ECF) pulp. The mill and the printer are both certified to ISO 14001 environmental management system and registered to EMAS the eco management Audit Scheme. The report was printed using vegetable based inks by a CarbonNeutral® printer.