



# Skills in Ibero-America

## Insights from PISA 2015



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## *Foreword*

Ibero-America is a land of untapped potential. The region is young, facing a unique demographic opportunity. This demographic bonus opens a window of opportunity for inclusive growth in the region, with equitable and high-quality education being a potential driver of domestic growth to support future progress. The social and economic progress of the last decades raised expectations by increasing access to education, but much remains to be done to improve the parity and quality of that education.

The Organisation for Economic Co-operation and Development (OECD) has been working closely with Ibero-American countries on education and skills for over two decades. We are helping individuals and nations in the region to identify and develop the knowledge and skills that drive better jobs and better lives, generate prosperity, and promote social inclusion. We also encourage countries to compare their experiences and learn from each other, and we accompany them in the difficult process of policy implementation. Insights from the OECD Programme for International Student Assessment (PISA) and the Survey of Adult Skills (PIAAC) are instrumental in addressing many of the region's challenges. More recently, they have started to function as the leading yardstick for evaluating the quality, equity and efficiency of school systems. But the evidence base that PISA and PIAAC have produced goes well beyond statistical benchmarking. By identifying the characteristics of high-performing education systems, these international evaluations allow Ibero-American governments and educators to identify effective policies that they can then adapt to their local contexts.

This report uses the most recent OECD data, primarily from the PISA 2015 and PIAAC 2012 and 2015 cycles, and seeks to evaluate the Ibero-American experience of education in a bid to extend support to the policy makers of the region. This edition focuses on the progress made in the field of education and skill development as well as the large improvements needed for more inclusive and sustainable growth in the region. It provides in-depth analysis of the performance of Ibero-America's youth in education outcomes as measured by PISA 2015, emphasises the role of well-being of all involved especially the students and finally discusses the policy implications of what the data do and do not show. It complements this micro-level analysis of student performance indicators with a country-level macroeconomic analysis, highlighting the institutional barriers different countries in the region face and how they could learn from their more developed counterparts outside the region. The OECD will continue working with the Ibero-American region to support efforts to ensure that young people are equipped with the foundational skills to create and seize economic opportunities; this report is a first step in that direction.



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## *Editorial*

*By Andreas Schleicher*

### **Much to be done**

2.5 million students in the Ibero-American region taking the 2015 Programme for International Student Assessment (PISA) were not able to complete even the most basic reading, mathematics or science tasks – and this figure does not include the significant share of 15-year-olds no longer in school in these countries. It is also troubling that, in much of the Ibero-American world, where students live and their schools remains one of the most powerful predictors of the quality of their education. Contrast that with the learning outcomes among the 10% most disadvantaged students in Viet Nam, which now compare favourably to students' outcomes among the 10% wealthiest families in most of Latin America.

But the educational agenda is far too important for us to give up and not take a hard look at how to turn the page on this. That is what this book is about. And there are encouraging signs of change in the region that must not be overlooked. For a start, most Ibero-American countries have seen good progress in increasing school enrolment, resulting in improvements of up to 24% in Brazil, Colombia and Mexico between 2003 and 2015. More importantly, countries like Brazil, Colombia and Peru have been able to significantly increase the share of children getting access to secondary education – while still improving overall learning outcomes. Perhaps most intriguingly, in most countries in the region we find educational excellence among some of the most disadvantaged schools. So things can change. And, without the right education, people will languish on the margins of society, technological progress will not translate into social progress, and countries will not succeed in a modern and interconnected world. We simply can't develop fair and inclusive policies and engage all citizens if a lack of education prevents them from fully participating in society. So things must change.

In this environment, the Sustainable Development Goals set by the global community for 2030 provide a perspective for the well-being of the planet. These goals are a shared vision of humanity that provides the missing piece of the globalisation puzzle, the glue that can counter the centrifugal forces in the age of acceleration. How far that vision will become a reality will depend to no small part on what happens in today's classrooms; it is educators who hold the key to ensuring that the Sustainable Development Goals become a real social contract with citizens.

### **Preparing students for their future, not our own past**

Since Confucius and Socrates, educators have recognised the double purpose of education: to pass on the meaning and significance of the past and to prepare young people for the challenges of the future. So the challenge is not simply to deliver more of the same education, but to prepare students for a different world.



Digitalisation has connected people, cities, countries and continents, bringing together the majority of the world's population in ways that vastly increases our individual and collective potential. But the same forces have also made the world more volatile, more complex and more uncertain. The rolling processes of automation and hollowing out of jobs, particularly for routine tasks, have radically altered the nature of work and life.

For those with the right knowledge, skills and character qualities this has been liberating and exciting. But for those who are insufficiently prepared, it can mean the scourge of vulnerable and insecure work, and life without prospects. But the point is not just that digital technologies have disruptive implications for our economic and social structure – it is that they do not have predetermined implications. It is the nature of our collective and systemic responses to these disruptions that will determine their outcomes – the continuous interplay between an emerging technological frontier and the range of cultural, social, institutional and economic ingredients, including education, that we combine in response.

One dilemma for educators is that the kinds of things that are easy to teach and easy to test, are precisely the kind of things that are also easy to digitise and automate. A more detailed look at the PISA data for the Ibero-American countries shows that this is one of the greatest weaknesses of their school systems. Students are much stronger on tasks requiring the reproduction of subject matter content than on tasks involving complex problem-solving processes. Similarly, students in the Ibero-American countries tend to be stronger on content knowledge than on epistemic understanding. For example, they responded correctly to tasks relating to specific scientific content, but were often unable to demonstrate they could think like a scientist.

In today's schools, students typically learn individually and at the end of the school year, we certify their individual achievements. But the more interdependent the world becomes, the more we need great collaborators and orchestrators. Innovation is now rarely the product of individuals working in isolation but an outcome of how we mobilise, share and integrate knowledge. The well-being of societies also depends increasingly on their capacity to take collective action. Every day we see how the mere interaction of billions of individual humans, taking their own autonomous decisions, can combine to create systemic risks with potentially catastrophic consequences. Schools therefore need to become better at helping students to learn to understand the pluralism of modern living, and be able to join people from different backgrounds in life, work and citizenship. That means teaching and rewarding collaboration as well as individual academic achievement, enabling students to think for themselves and to act for and with others. Contrast this with the PISA results where, in every Ibero-American country except Costa Rica, students performed significantly lower on the assessment of collaborative problem-solving skills than in their ability to solve problems individually. Collaborative skills might have become a catchword in many education systems, but the reality is that students sit most of the time at their individual desks and there is limited time for collaborative learning.

These days, schools also need to prepare students for an interconnected world in which they need to understand and appreciate different perspectives and world views, interact successfully and respectfully with others, and take responsible action towards sustainability and collective well-being. It is a formidable scientific challenge to measure global competence, as such a construct of social and civic inclusion involves so many varied cognitive, social and emotional components. Even more striking is how difficult it proved to gather political support among the Latin American countries to take the PISA assessment of global competence forward.

## A different approach to teaching and learning

The challenge is that developing such capabilities requires a very different approach to learning and teaching and a different calibre of teachers. Where teaching is about imparting predetermined knowledge, countries can afford low-quality teachers. And when teacher quality is low, governments tend to tell their teachers exactly what to do and exactly how they want it done, using an industrial organisation of work to get the results they want. Today the challenge is to make teaching a profession of advanced knowledge workers who work with a high level of professional autonomy and within a collaborative culture.

But such people will not work as exchangeable widgets in schools organised as Tayloristic workplaces that rely mainly on administrative forms of accountability and bureaucratic command and control systems to direct their work. To attract the people they need, modern school systems need to transform the way they organise work in their schools into a professional form of work organisation in which professional norms of control replace bureaucratic and administrative forms of control. The past was about received wisdom, the future is about user-generated wisdom.

The past was also divided – with teachers and content divided by subjects and students separated by expectations of their future career prospects. And the past could be isolated – with schools designed to keep students inside, and the rest of the world outside, lacking engagement with families and reluctant to partner with other schools. The future needs to be integrated – with an emphasis on the integration of subjects and the integration of students. It also needs to be connected – so that learning is closely related to real-world contexts and contemporary issues and open to the rich resources in the community. Powerful learning environments constantly create synergies and find new ways to enhance professional, social and cultural capital with others. They do so with families and communities, with higher education, with businesses, and especially with other schools and learning environments. This is about creating innovative partnerships. Isolation in a world of complex learning systems will seriously limit potential.

While instruction in the past was subject-based, instruction in the future needs to be more project-based, building experiences that help students think across the boundaries of subject-matter disciplines. The past was hierarchical, the future is collaborative, recognising both teachers and students as resources and co-creators.

In the past, different students were taught in similar ways. Now school systems need to embrace diversity with differentiated approaches to learning. The goals of the past were standardisation and compliance, with students educated in age cohorts, following the same standard curriculum, all assessed at the same time. The future is about building instruction on top of students' passions and capacities, helping them to personalise their learning and assessment in ways that foster engagement and talents, and it's about encouraging students to be ingenious. School systems need to recognise more clearly that individuals learn differently from each other, and differently at different stages of their lives. They need to foster new forms of educational provision that take learning to the learner in ways that allow them to learn in the ways that are most conducive to their progress. We need to take to heart the idea that learning is not a place but an activity. As well as countering educational disadvantage, this will capitalise on the strengths of the most talented students.

In the past, schools were technological islands, with technology often limited to supporting existing practices, and students outpacing schools in their adoption and

consumption of technology. Now schools need to use the potential of technology to liberate learning from past conventions and connect learners in new and powerful ways with sources of knowledge, innovative applications and one another.

### Spending “more on the same” is not enough

Investing in better education will be key for the future of the Ibero-American countries. Among countries that invest less than USD 50 000 per student between the age of 6 and 15 – and that includes most of the Latin American countries – PISA shows an important relationship between spending per student and the quality of learning outcomes. On top of that, the first lesson I learned when researching the countries that came out on top of the PISA comparisons is that their leaders seem to have convinced their citizens to make choices that value education over other things. Chinese parents will often invest their last money in the education of their children, their future. These are also the type of countries where the focus of a town might be a well-equipped school rather than a shiny shopping centre. In much of the Ibero-American world, governments have started to borrow money from the next generation to finance their consumption today, and the debt they have incurred puts a massive brake on economic and social progress.

But it is wrong to equate better education simply with more money. More money only gets education systems so far. In fact, among the countries that invest more than USD 50 000 per student between the age of 6 and 15 the data show no further relationship between spending and the quality of learning outcomes. In other words, two countries with similarly high spending levels can produce very different results. So the Ibero-American countries also need to think harder about how they spend their resources. The PISA data suggest that whenever high-performing education systems have had to choose between a smaller class and a better teacher, they have gone for the latter. In many Ibero-American countries, investment choices have gone the other way round over the last decade.

### Levelling the playing field

If there is one takeaway from this book, it is the large educational inequalities that it reveals in Latin America. This needs to change. What wise parents want for their children is what governments should deliver for all children. Children from wealthier families will find many open doors to a successful life. But children from poor families often have just one chance in life, and that is a good school that gives them a chance to develop their potential. Those who miss that boat rarely catch up, as subsequent educational opportunities in life tend to reinforce early education outcomes.

Providing equitable educational opportunities is not actually a technically complex issue, and the data from PISA show that in some countries even the most disadvantaged children achieve very high performance levels. We often make it complex by injecting politics and vested interests that can massively distort what is in the best interest of children. It is those issues that countries need to tackle.

For a start, as this report shows, many Ibero-American education systems could do better at aligning resources with needs. When it comes to material resources, they have made some progress, but most of the countries continue to find it hard to attract the most talented teachers to the most challenging classrooms. Addressing that is not as simple as paying teachers who work in disadvantaged schools more, but it requires holistic approaches in which teachers feel supported in their professional and personal life when

they take on additional challenges, and when they know that additional effort will be valued in terms of public recognition and career progression.

The most impressive result of Shanghai's performance on PISA is not just its high average score, but the low variability in school performance despite considerable social and economic inequalities in the province. This has not come about by chance but can be seen in the context of determined efforts to improve the school system by converting "weaker schools" to stronger schools. These efforts include systematically upgrading the infrastructure of all schools to similar levels; establishing a system of financial transfer payments to schools serving disadvantaged students and establishing career structures that give high-performing teachers incentives to teach in disadvantaged schools; and pairing high-performing districts and schools with low-performing districts and schools.

There is nothing about this approach which is necessarily unique to China. In fact, when I visited the state of Ceara in Brazil, I saw how the highest-performing schools received a significant reward in terms of additional financial resources, which allowed them to hire more specialised teachers and experts. However, they were not allowed to deploy these additional resources in their own school but were required to use them to support the schools that struggle most. So everyone won: the high-performing schools gained additional prestige and an expanded team, the low-performing schools benefitted from the expertise of high-performing schools, something that may have been more valuable to them than additional money.

Perhaps even more so than in other parts of the world, countries in the region are struggling to reconcile their aspirations for greater flexibility and giving parents more opportunities to choose their child's school with the need to ensure quality, equity and coherence in their school systems. To succeed with this, they need to carefully devise checks and balances that prevent school choice from leading to inequity and segregation, and do whatever it takes so that all parents are able to choose the school they want. That also means governments and schools must invest more in developing their relationships with parents and local communities, and help parents make informed decisions. Not least, the more flexibility there is in the school system, the stronger public policy needs to be. While greater school autonomy, decentralisation and a more demand-driven school system seek to devolve decision making to the frontline, the authorities need to maintain a strategic vision and clear guidelines for education, and offer meaningful feedback to local school networks and individual schools. In other words, only through a concerted effort by central and local education authorities will school choice benefit all students.

### **Nothing will happen without effective system leadership**

Changing educational bureaucracies can be like moving graveyards: it is often hard to rely on the people out there to help, because the status quo has so many protectors. The bottom line is that school systems are rather conservative social systems. Everyone supports educational reform, except for their own children. Parents may measure the education of their children against their own educational experiences. Teachers may teach the way they were taught rather than the way they were taught to teach.

But the real challenge is not conservative followers but conservative leaders – leaders who stick to the curriculum of the world of today rather than adapting curricula and pedagogical practice to a changing world, or who invest in popular solutions like smaller classes when they know that what matters most is investing in the quality of teachers.

Effective leadership is central to virtually every aspect of education, and most importantly so when there is little coherence and capacity in education. There are many amazing teachers, schools and educational programmes in every education systems, but it takes effective leadership to build a great education system.

The education crisis, reflected in flat-lining educational outcomes despite rising costs is, at least in part, a leadership crisis. Finding adequate and forward-looking responses to the inter-related changes in technology, globalisation and the environment is ultimately a question of leadership.

Leaders wanting to see forward-looking changes in their school systems have to do more than issue orders and try to impose compliance. They need to build a shared understanding and collective ownership, to make the case for change and to offer support that will make change a reality, and to remain credible without being populist. They need to focus resources, build capacity, change work organisations and create the right policy climate with accountability measures designed to encourage innovation and development rather than compliance. And they need to go against the grain of competitive dynamics and hierarchical bureaucracies that still dominate educational institutions.

For schools to be entrepreneurial and able to adapt, system leaders need to be able to mobilise the human, social and financial resources needed for innovation; to work as social entrepreneurs both within and beyond their own organisations; and to build stronger linkages across sectors and countries, to establish partnerships with government leaders, social entrepreneurs, business executives, researchers and civil society.

Last but not least, education systems need to be prepared to look outwards. This is not about copying and pasting prefabricated solutions from other countries, but about looking seriously and dispassionately at good practice elsewhere to become knowledgeable about what works in what context and consciously applying it. This is likely to be a key differentiator between which countries make progress and which do not. The division may be between those teachers, schools and education systems that feel threatened by alternative ways of thinking and those that are open to the world and ready to learn from the world's best experiences.



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## *Acronyms and abbreviations*

ECEC	Early childhood education and care
ESCS	Economic, social and cultural status
GDP	Gross domestic product
ICT	Information and communications technology
IT	Information technology
MDG	Millennium Development Goals
MENA	Middle East and North Africa
PIAAC	Programme for the International Assessment of Adult Competencies, Survey of Adult Skills
PISA	Programme for International Student Assessment
PISA-D	PISA for Development
PPP	Purchasing power parity
SDG	Sustainable Development Goals
UNICEF	United Nations Children's Fund
VET	Vocational education and training



## *Executive summary*

Education – and, by extension, skills – are a key lever of sustainable development. Inclusive societies give all their citizens equitable access to effective and relevant learning throughout life, delivered through a variety of formal and informal settings. If education, learning and skills are to act as both enablers and drivers of inclusive and sustainable development, it is important to review the experience of education. This report takes a step in that direction for the Ibero-American region.

It starts by making the case for the importance of skill development and the added advantages the region could gain from increasing returns to education and skill development. Ibero-American countries have made great efforts to increase school enrolment, which have yielded improvements of up to 24% in Brazil, Colombia and Mexico between 2003 and 2015. However, education systems in the region suffer from a high degree of grade repetition, low relative expenditure on education and low performance levels among secondary students, all suggesting the need for reform to meet the demands of the changing times. Ibero-American countries need to ensure that their citizens acquire the necessary skills for boosting labour productivity, which in turn will enhance economic growth in the region.

The results from the 2015 Programme for International Student Assessment (PISA) raise questions of quality and equity in education in Ibero-America. In addition to OECD members Chile, Mexico, Portugal and Spain, seven Ibero-American partner countries participated in PISA 2015: Argentina, Brazil, Colombia, Costa Rica, the Dominican Republic, Peru and Uruguay. Although Spain and Portugal perform close to the OECD average, all the Latin American countries performed consistently below the OECD average in all three subjects: reading, mathematics and science. However, region-wide trends may disguise subtle cross-country differences due to institutional peculiarities and other unexplained idiosyncratic factors. The relative standing of Ibero-American countries has remained quite stable for reading and science. Mathematics appears to be the weakest of the subjects, while reading is generally the strongest. The region shows worrying gender inequity: in all Ibero-American countries taking part in PISA, except the Dominican Republic, the gap in reading performance in favour of girls is smaller than across OECD countries on average, while in four countries – Brazil, Chile, Costa Rica and Spain – the gap in mathematics in favour of boys is wider. Disadvantaged students also tend to perform less well than their advantaged peers; the data suggest that in Ibero-America, socio-economic status dampens disadvantaged students' chances of achieving at high levels more than it protects advantaged students from performing poorly.

An efficient and equitable allocation of educational resources is imperative for better learning outcomes for students. Ibero-American countries need to make better use of their resources – financial, material and human – to improve the academic and socio-emotional outcomes of their young students. Ibero-American countries devote similar resources to education compared to other countries with a similar degree of economic development

but they are still below the educational expenditure of most OECD countries. This lack of financial resources is reflected in concerns among school principals about the quantity and quality of the physical infrastructure and educational materials in their schools. Most Ibero-American countries rank low in the availability of educational material; Colombia and Costa Rica suffer the greatest shortages in the region, with more than 25% of students attending schools with significant material deficiency. Unsurprisingly, science scores tend to be higher among students who are enrolled in schools where principals are less concerned about the availability and quality of educational material. Advantaged schools tend to be better resourced than disadvantaged ones across countries, but the findings from PISA reveal that there is no apparent trade-off between the excellence of a school system and the equity in resource allocation; school systems that allocate relatively more resources to disadvantaged schools tend to display higher levels of academic performance overall. Allocating resources more equitably may thus benefit everyone, not just struggling students.

PISA not only provides a unique source of internationally comparable evidence of competency and cognitive skills among students towards the end of compulsory schooling, but it also a wide array of information about their subjective well-being, social attitudes and socio-economic background. Students in Ibero-America report relatively high levels of life satisfaction (7.8 out of a possible 10, compared with 7.3 on average for OECD countries) but the relationship of life satisfaction with performance is complex. Across OECD countries and in Spain, top-performing students report lower satisfaction than their lower-performing peers, while the opposite holds in Brazil, Colombia and Costa Rica. Across Ibero-American countries, performance and test anxiety are negatively correlated suggesting that anxiety might arise from the association students make between top grades and better career prospects. Worryingly, almost half of the variation in intergenerational social advantage is explained by the variation in income inequality and this in turn has an effect on students' well-being. Income inequalities are high at the societal level, suggesting that a more unequal society makes it possible for wealthy parents to pass on more of that advantage to their children. Parents and teachers can play a role in helping students improve their well-being which in turn could have a positive effect on their performance, helping to counteract the negative effect of a disadvantaged family background.

Ibero-American countries have been undertaking education improvements, offering some success stories that the rest of the region could emulate. OECD countries with high-performing and fast-improving education systems also offer lessons for the region.

Ibero-American countries need to further accelerate the ongoing systemic changes in their education systems, suggesting a three-pronged target strategy:

1. Ensure a larger population of students can access school and stay longer in education, while also addressing performance gaps.
2. Improve the quality of teaching and school leadership by offering the right incentives to attract and retain the best talent.
3. Devise overall/broad education system policies to help steer themselves towards higher-quality education.

## Chapter 1. Why skills matter in Ibero-America

*This chapter highlights the underlying factors behind skill development in the Ibero-American context at the national and individual level. Countries in the region need to look beyond the positive changes they have made and prepare themselves to take on the challenges they face if they are to accelerate their economic development. Despite credible improvements in school enrolment, education systems in the region suffer from a high degree of grade repetition, low relative expenditure on education and low performance levels among secondary students, all suggesting the need for reform to meet the demands of changing times. Finally this chapter examines what the Ibero-American countries stand to gain from ensuring all their student achieve basic skill levels and the impact not just on the social and economic outcomes of individuals, but also on the growth trajectory of the countries themselves – not only improving the social and economic outcomes of individuals but by also putting Ibero-America on a new, improved growth trajectory.*

## Introduction

Education and skills foster economic growth, social inclusion and strong institutions. In a knowledge-based global economy, adequate investment in human capital is an increasingly essential part of any inclusive growth strategy. Without enough investment in skills, new technologies and production processes are adopted more slowly and do not translate into new growth models with higher value-added activities. If there is one lesson we have learned from the global economy over the past few years, it is that we cannot simply bail ourselves out of an economic crisis, we cannot solely stimulate ourselves out of an economic crisis, and we cannot just print money to ease our way out of an economic crisis. We can only grow ourselves out of bad economic conditions and, in the long run, that depends more than anything on equipping more people with better skills to collaborate, compete and connect in ways that drive our societies forward – and on using those skills productively.

Poor skills severely limit people's access to better-paying and more rewarding jobs. However, skills affect individual's lives and well-being far beyond what can be measured by labour market earnings and economic growth. Skills have a positive effect on health and are related to civic and social behaviour affecting democratic engagement and business relationships. For countries, a skilled workforce is also associated with higher rates of economic growth (Hanushek and Woessmann, 2008). The quality of a country's schooling is a powerful predictor of the wealth that country will produce in the long run. Or, to put it the other way round, the economic output that is lost because of poor education policies and practices leaves many countries in what amounts to a permanent state of economic recession – and one that can be larger and deeper than the one resulting from the financial crisis at the beginning of the millennium, from which many countries are still struggling to climb (OECD, Hanushek and Woessmann, 2015).

What is more, achieving the development goal of universal basic skills has a complementary impact on reducing gaps in earnings that filter down into smaller income differences – all while also expanding the size of the economy. In this sense, it differs from simple tax and redistribution schemes that might change the income distribution but do not add to societal output. The more inclusive growth made possible through universal achievement of basic skills has tremendous potential to ensure that the benefits of economic development are shared more equitably among citizens.

Many of the economic and social challenges faced by the Ibero-American region<sup>1</sup> – such as low productivity, lack of social inclusion and high youth unemployment – can be linked directly to the poor quality of education and low skills development. Despite the fact that on average Ibero-America has made faster and better progress in school enrolment than the OECD countries between 2003 and 2012, the region still lags behind in overall educational performance, which is likely to affect the Ibero-American labour markets (OECD, 2016c) and the region's long-term economic growth.

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<sup>1</sup> We will refer in our analysis to Ibero-American countries that participated in PISA 2015: Argentina, Brazil, Chile, Colombia, Costa Rica, the Dominican Republic, Mexico, Peru and Uruguay (in Latin America); and Portugal and Spain (in Europe).

## Miles to go despite credible achievements

Many Ibero-American countries have slowly begun to place education and skills high on their policy agendas. Many have made significant changes to their educational laws and regulations. Most of them have introduced national assessments and monitoring tools. Educational expenditure has also risen. For example, between 2003 and 2012, the resources allocated to secondary school students increased by 2-5 percentage points in Argentina, Brazil, Chile and Colombia as well as in Portugal and Spain.

Access to schooling, which is a prerequisite for achieving inclusion and equity in education, has also risen considerably over the past decade in Ibero-America as evidenced by the Programme for International Student Assessment (PISA) 2015 report. To be eligible to participate in PISA, students must be aged between 15 years and 3 months and 16 years and 2 months at the beginning of the assessment period, and enrolled in an educational institution in Grade 7 or higher. PISA is not designed to estimate enrolment rates directly, but it provides a range of indices that measure its coverage of the population of 15-year-olds enrolled in Grade 7 or above in each country and economy. While having all eligible 15-year-olds enrolled in school does not guarantee that every student will acquire the skills needed to thrive in an increasingly knowledge-intensive economy, it is the first step towards building an inclusive and fair education system. Regardless of its average level of performance, any education system where a large proportion of 15-year-olds does not attend school cannot be considered an equitable system (OECD, 2016b).

Between 2003 and 2015, Mexico added more than 300 000 students to the total population of 15-year-olds enrolled in Grade 7 or above, an increase of 24%. Over the same period, Brazil added more than 493 000 students to those eligible to participate in PISA and Colombia added more than 130 000 students between 2006 and 2015, representing increases in enrolment of 21% and 24%, respectively. In Mexico, the number of enrolled students grew faster than the overall population of 15-year-olds, while in Brazil and Colombia, enrolment grew despite a shrinking population of 15-year-olds. This means that all of these countries increase their enrolment rates through improved capacity to retain students as they progress through higher grades (OECD, 2016b).

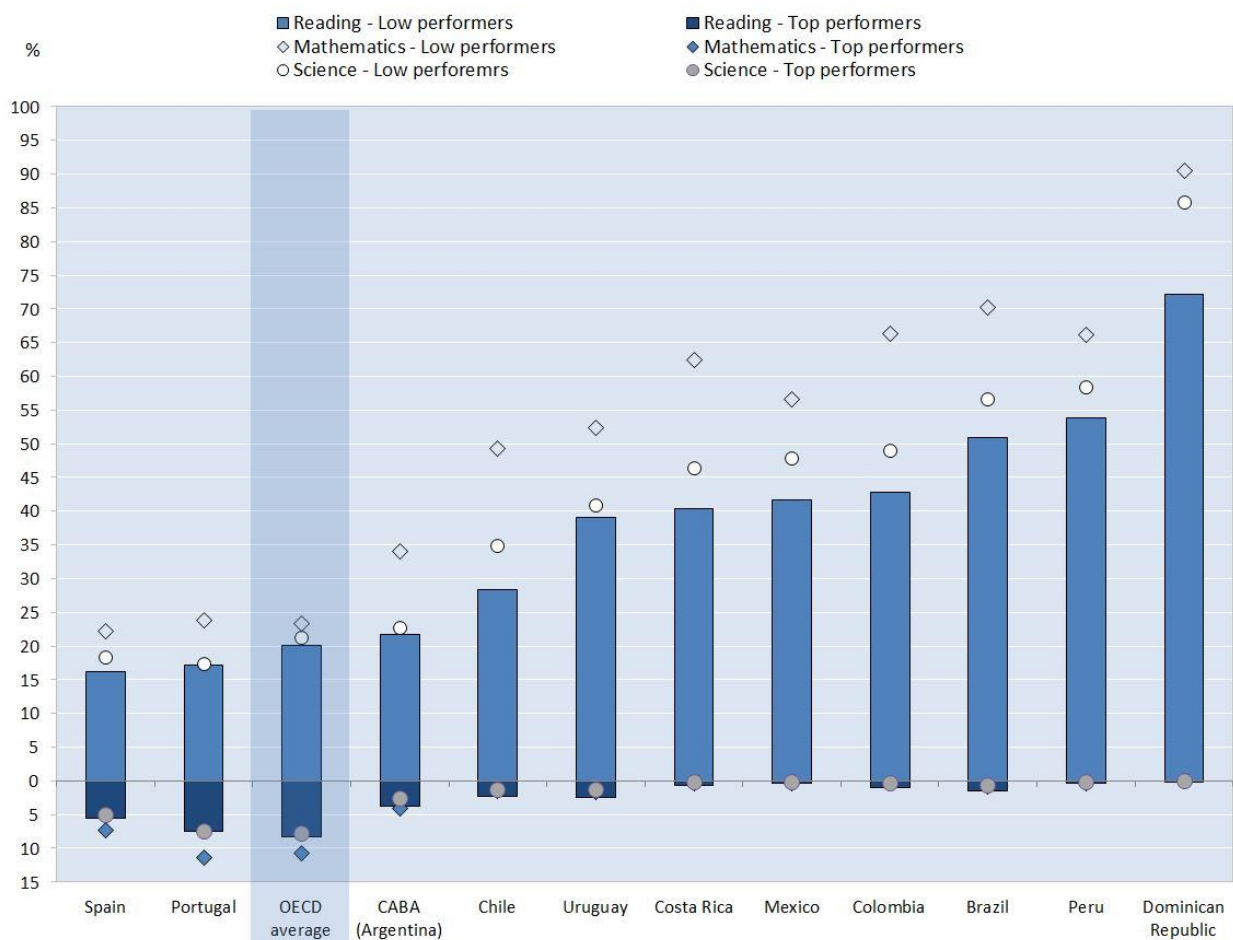
However despite these very encouraging improvements, the region's performance has been unsatisfactory when it comes to improving educational outcomes and achieving the highest degree of skill proficiency among the population. Analysis of PISA results shows that Latin American countries tend to perform worse than their Asian counterparts, which were claimed as the top performers in PISA (IDB, 2016), even after controlling for the level of gross domestic product (GDP) per capita or the cumulative level of expenditure on education for students aged 6 to 15. The very high level of grade repetition, together with high levels of school truancy, signals the inefficiency of Latin American education systems. Although Spain and Portugal performed relatively well in PISA 2012, performing close to the OECD average, issues of quality and efficiency should not be overlooked. Although their relative performance improves once GDP per capita and socio-economic background at the country level are taken into account, they still lag behind Korea, Japan, Poland and Slovenia, which have similar levels of expenditure per student. This suggests that Spain and Portugal have some room to increase the efficiency of the human and financial resources within their respective education systems.

Because of the implications of the performance of students at the age of 15 for their future skills (see below), several indicators of the performance of Ibero-American



students should be considered carefully, as they are likely to constitute a limitation on the development of a skilled workforce. First, among the Latin American countries (except for Chile), almost half of all students do not reach this basic level of competencies (Level 2 in the PISA scale). In the Dominican Republic only one in five students reach the basic level of skills. These numbers are much higher than in OECD countries (Figure 1.1). Since 2006, among the Ibero-American countries, only Colombia and Portugal have significantly decreased the percentage of students who did not reach Level 2: from 60.2% to 49.0% in Colombia and from 24.2% to 17.7% in Portugal. Students who do not reach this level are considered to be unable to understand basic concepts and procedures (OECD, 2016b), and are likely to face greater difficulties when learning more technical skills in the future.

**Figure 1.1. Share of low- and top-performing students in PISA 2015**



*Note:* Figure shows share of students not acquiring basic level proficiency (below Level 2) and share of top-performing students (Level 5 and above) in reading, mathematics and science in PISA 2015.

Countries are ranked in ascending order of the percentage of students scoring below Level 2 in reading.

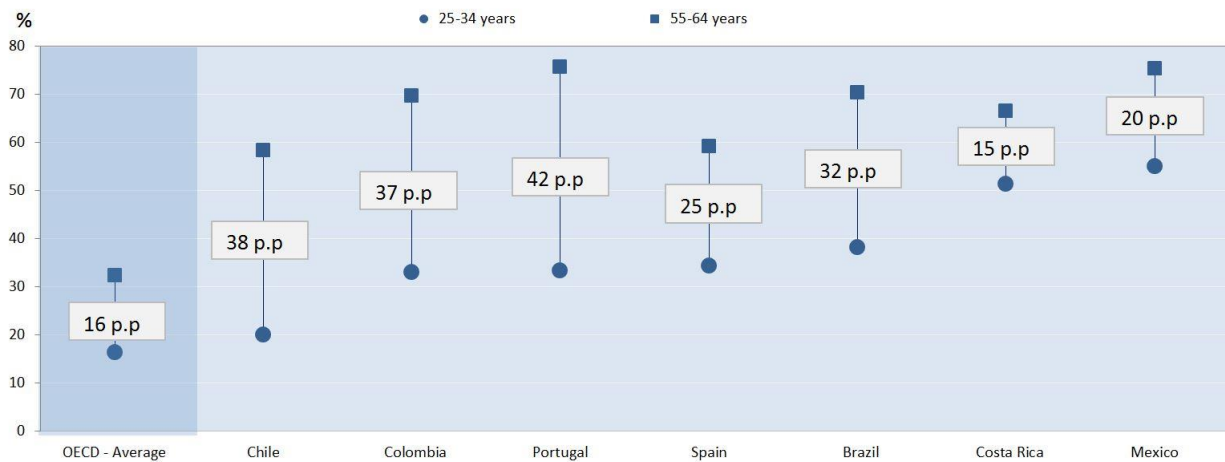
*Source:* OECD, PISA 2015 Database, [www.oecd.org/pisa/data/2015database/](http://www.oecd.org/pisa/data/2015database/).

Similarly, the lack of top-performing students in Ibero-American countries constitutes an additional constraint for the region. Across Latin American countries, less than 1% of students perform at the highest levels of proficiency in mathematics, reading or science, compared to 12% on average across OECD countries (Figure 1.1). Spain and Portugal

also both display lower levels of top-performing students than the OECD average (5.0% and 7.4% respectively). This is likely to impose a further obstacle to the development of more specific skills among the population. The small portion of top performers may also hamper innovation and entrepreneurship. It also presents a major challenge for Latin American countries that are transitioning into knowledge-based economies where citizens need to innovate, adapt and leverage advanced human capital (OECD/CAF/ECLAC, 2016).

There are also caveats over the school enrolment and education attainment rates observed in the PISA results. The share of people with upper secondary education has increased much faster in Ibero-American countries than the average in OECD countries, suggesting that the Ibero-American bloc seems to be catching up with the rest of the OECD in terms of academic qualifications and skills. As Figure 1.2 shows, countries like Brazil, Chile, Colombia and Portugal have made impressive progress in catching up with OECD average attainment levels. Still, all Ibero-American countries have a much larger share of young adults who did not complete an upper secondary education than on average across OECD countries. Spain is the only Ibero-American country with a similar share of tertiary-educated young adults (41%) to the OECD average of 42%. In Portugal, one in three young adults has a tertiary education, and in the rest of the countries the share is below 30%, the lowest being in Brazil (16%) and Mexico (21%) (OECD, 2017a).

**Figure 1.2. Percentage of adults without upper secondary education, 25-34 year-olds and 55-64 year-olds (2015)**



*Note:* Year of reference is 2014 for Brazil and 2013 for Chile. Figures in the chart represent the percentage-point difference (p.p.) between the percentage of older and younger adults with less than upper secondary education. Countries are ranked in ascending order of the percentage of 25-34 year-olds with less than upper secondary education.

*Source:* OECD, *Education at a Glance* (database), <http://stats.oecd.org>.

## Potential effects of quality education on growth and development

Anyone transported back to 1960 might well have expected Latin America to be on the verge of significant economic growth. At the time, both its level of school attainment and its income level were well ahead of East Asia and the Middle East and North Africa (MENA) region. But by 2000, East Asia had overtaken Latin America, while the MENA region had also jumped ahead to a lesser extent, leaving Latin America and sub-Saharan

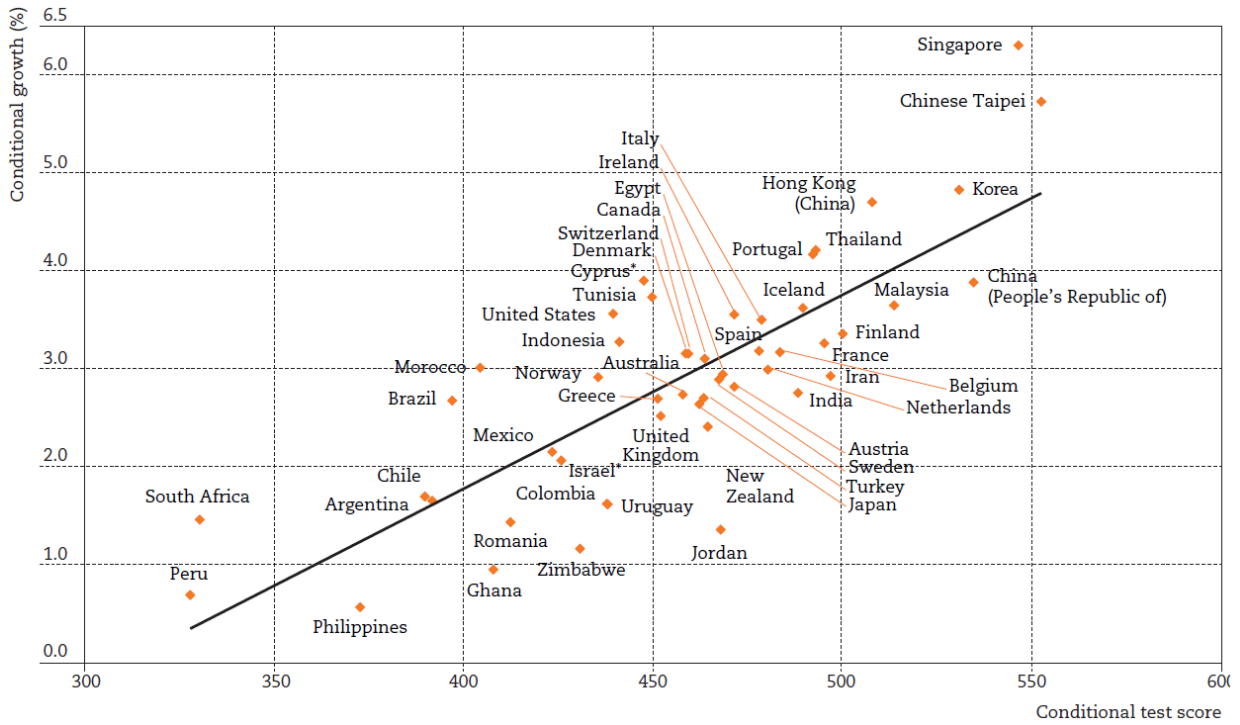
Africa at the bottom with very low growth rates and commensurately low income per capita (Hanushek and Woessmann, 2012). This outcome remains a puzzle by conventional thinking. Why did Latin America have such a poor growth performance relative to Asia and even the MENA, region given its high levels of education in 1960?

In simple terms, although Latin America has had reasonable school attainment levels, students' skills remain comparatively poor as illustrated by the PISA 2015 results discussed above. Student achievement in international tests in both Latin America and sub-Saharan Africa are near the bottom of the rankings, while those in the MENA region and especially in East Asia are much higher. Even though many things contribute to economic growth and development, the educational achievement of the population is extremely important for long-term growth. Moreover, when controlling for measures of educational achievement, school attainment does not even have a significant relationship with growth. This finding corroborates the discussion in the literature that countries' performance in terms of years of schooling is largely inconsistent with their growth performance (Bils and Klenow, 2000; Easterly, 2001; Pritchett, 2004, 2006), suggesting that considering acquired skills rather than time in school helps explain this inconsistency.

To restate the above argument more directly, growth is directly and significantly related to the skills of the population as measured by the aggregate test scores on international mathematics and science tests. The conclusion is that a population's knowledge capital, or collective cognitive skills, is by far the most important determinant of a country's economic growth. Perhaps the easiest way to see the relationship is to plot the marginal impact of knowledge capital on long-run growth (OECD, Hanushek and Woessmann, 2015). Figure 1.3 depicts the fundamental association graphically, plotting annual growth in real per capita GDP between 1960 and 2000 against average test scores on international student achievement tests, after allowing for differences in initial per capita GDP and initial average years of schooling. Countries align closely along the regression line that depicts the positive association between cognitive skills and economic growth.

As described briefly above, when compared with global peers with similar levels of GDP, Latin America did not perform well in PISA 2015, suggesting low cost-effectiveness and considerable room to reallocate resources towards education (see Figure 1.4). Increasing investment in education in the Ibero-American region is crucial if the region is to achieve a higher growth trajectory. Particularly for Latin American countries, achieving a level of basic skills for all youth would lead to sizeable economic gains. Previous work has found that the differences in performance in PISA between students from Latin America and other regions like East Asia explain the differential rates of economic growth (Hanushek and Woessmann, 2012). They found that skills accounted for between half and two-thirds of the differences in income between Latin America and the rest of the world. These results show that Latin American countries stand to gain enormously by ensuring that all of their 15-year-old students acquire at least basic skills in reading, mathematics and science, as measured by PISA.

**Figure 1.3. Knowledge capital and economic growth across countries**

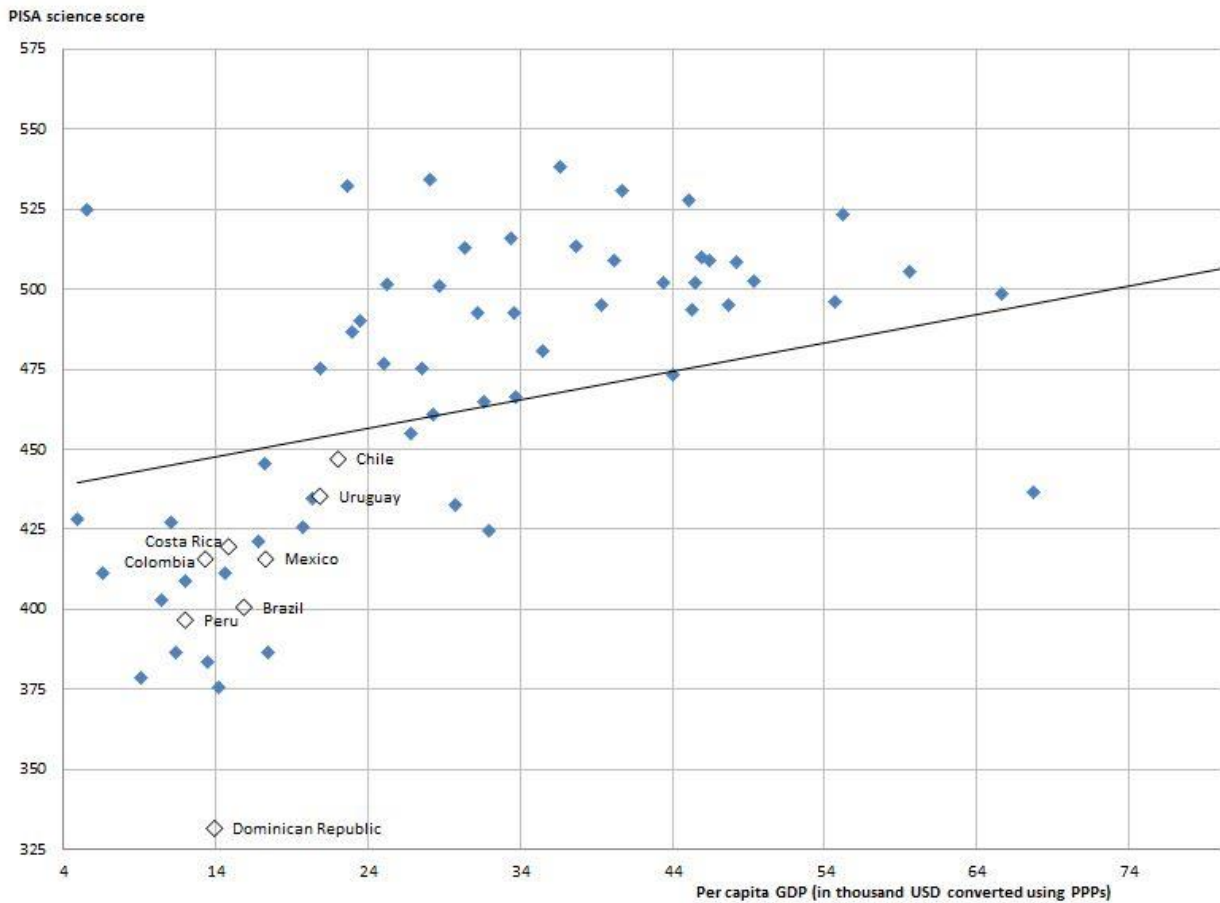


Note by Turkey: The information in this document with reference to “Cyprus” relates to the southern part of the Island. There is no single authority representing both Turkish and Greek Cypriot people on the Island. Turkey recognises the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and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

Note by all the European Union Member States of the OECD and the European Union: The Republic of Cyprus is recognised by all members of the United Nations with the exception of Turkey. The information in this document relates to the area under the effective control of the Government of the Republic of Cyprus.

Note: Variable plot of a regression of the average annual rate of growth (in %) of real per capita GDP from 1960 to 2000 on average test scores on international student achievement tests, average years of schooling in 1960, and initial level of real per capita GDP in 1960 (mean of unconditional variables added to each axis).

Source: OECD, Hanushek and Woessmann (2015), *Universal Basic Skills: What Countries Stand to Gain*, <http://dx.doi.org/10.1787/9789264234833-en>.

**Figure 1.4. Relationship between country incomes and their performance in PISA 2015**

*Note:* Countries above the trendline achieved better results than expected, given their GDP. Countries below the trendline achieved worse results than expected, given their GDP.

*Source:* OECD, PISA 2015 Database, [www.oecd.org/pisa/data/2015database/](http://www.oecd.org/pisa/data/2015database/).

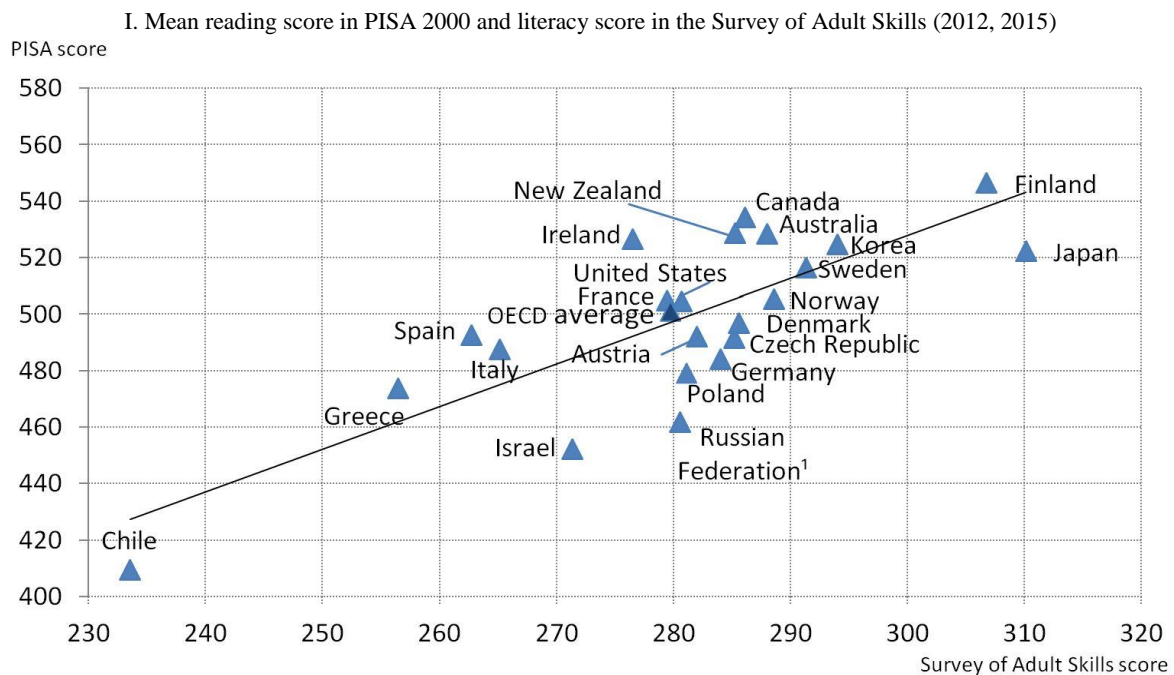
### From aggregate to individual outcomes: How basic skills affect students' adult lives

The OECD defines the concept of human capital, introduced by Becker (Becker, 1964), as “the knowledge, skills and competencies and other attributes embodied in individuals that are relevant to economic activity” (OECD, 1998). Empirically, ever since Mincer’s (1970, 1974) influential work, educational attainment or years of schooling have been used as a proxy for human capital, mainly because of the ready availability of data (information on education is collected in most social surveys), the importance of qualifications as a signal of skills in the labour market and the fact that educational qualifications provide a considerable amount of information about the breadth and depth of knowledge as well as the skills and competency of individuals. However, education captures only a subset of the skills individuals acquire over their lifetime. Using school attainment as a measure of human capital in an international setting also poses particular challenges, as it implicitly assumes that the quality of education and training offered at different stages is the same across and within countries over time. A second problem with using attainment to measure human capital is that it certifies the achievement of certain learning outcomes at a particular point in time as opposed to skills in general which can be lost or enhanced over time (OECD, 2016d). In this context, Hanushek and Woessmann

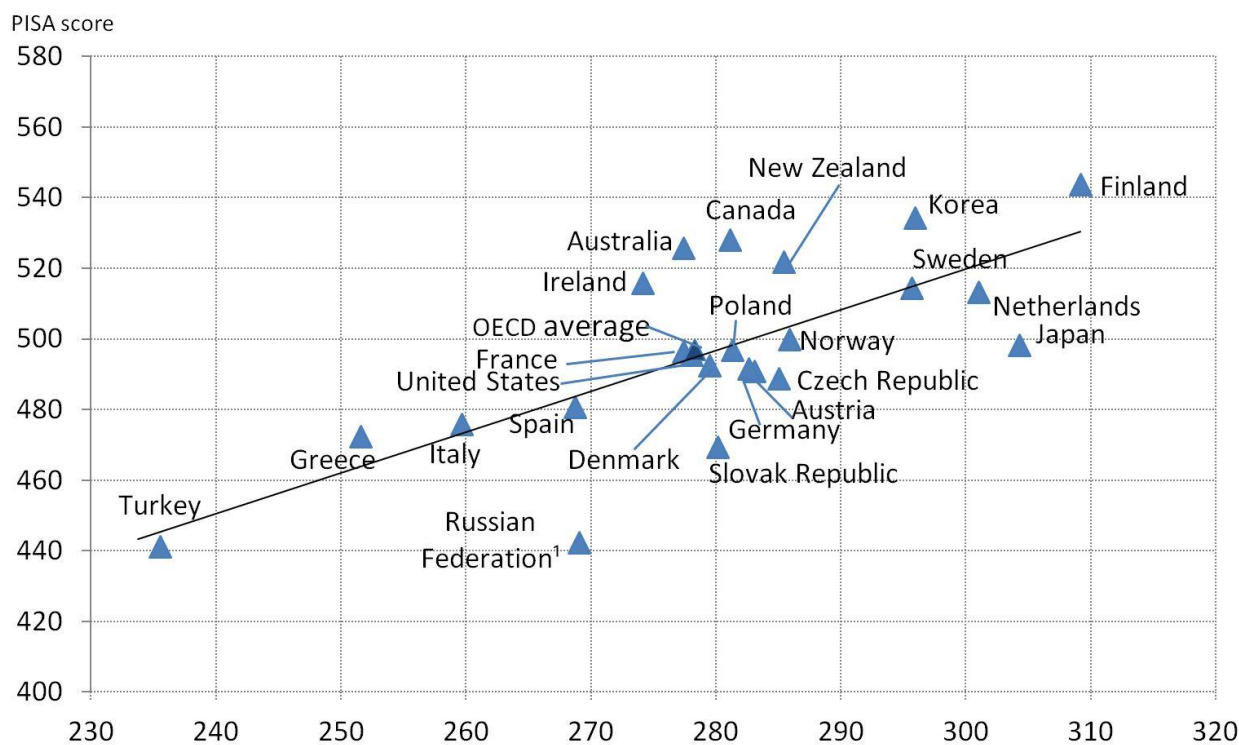
have argued that direct measures of human capital such as those shown in international assessments like PISA are better measures of human capital than quantity-based measures like years of schooling (Hanushek and Woessmann, 2011). The Survey of Adult Skills (PIAAC) directly measures adult proficiency in literacy, numeracy and problem solving in technology-rich environments. The survey covers 33 countries and economies (see Box 1.1), providing a broad range of information on the relationship between an homogenous measure of skills proficiency and the labour-market outcomes of individuals. By providing information on such direct measures as well as educational attainment, it highlights how direct measures of human capital can complement other indirect measures, rather than act as their substitute.

Empirically, it should be noted that PIAAC finds a highly positive correlation between students’ education and the skills of adults. Analysis of the PIAAC data found that foundation skills acquired when young enable individuals to pursue further education and acquire higher-order technical skills. Students’ performance in the PISA tests has been found to be related to their future level of information-processing skills as adults, as measured by PIAAC. At the country level, there is an association between countries’ performance in PISA in the 2000 and 2003 cycles, and the proficiency levels observed in PIAAC for individuals of the corresponding cohorts (see Figure 1.5). Moreover, longitudinal follow-ups of PISA participants have generally identified a strong link between reading, mathematics and science skills at the age of 15 and a smoother transition to work or further education (Borgonovi et al., 2017). For example, studies of participants from Uruguay in the PISA 2003 and 2006 editions found a strong association between mathematics performance in PISA and the likelihood of an individual completing upper secondary education (Cardozo, 2009) or dropping out of school (Ríos González, 2014). These results suggest that for a given country, its students’ performance in PISA can predict, to a certain extent, the future performance of its workforce.

**Figure 1.5. Mean literacy proficiency in PISA (2000 and 2003) and in the Survey of Adult Skills**



## II. Mean reading score in PISA 2003 and literacy score in the Survey of Adult Skills (2012, 2015)



1. The data from the Russian Federation are preliminary and may be subject to change. Readers should note that the sample for the Russian Federation does not include the population of the Moscow municipal area. The data published, therefore, do not represent the entire resident population aged 16-65 in Russia but rather the population of Russia excluding the population residing in the Moscow municipal area. More detailed information regarding the data from the Russian Federation as well as that of other countries can be found in the *Technical Report of the Survey of Adult Skills* (OECD, forthcoming).

2. 26-28 year-olds for countries that participated in the Survey of Adult Skills in 2012, 29-31 for those who participated in 2015.

3. 23-25 year-olds for countries that participated in the Survey of Adult Skills in 2012, 26-28 for those who participated in 2015

*Note:* A three-age band is used in the Survey of Adult Skills to increase size and reliability of estimates. The mix of countries contributing to the average in PISA and the Survey of Adult Skills differs, which may contribute to differences in countries' average scores relative to the overall averages in either study.

*Source:* Survey of Adult Skills (PIAAC) (2012, 2015), [www.oecd.org/skills/piaac/publicdataandanalysis](http://www.oecd.org/skills/piaac/publicdataandanalysis) and OECD, PISA 2000-2003 Databases, [www.oecd.org/pisa/data](http://www.oecd.org/pisa/data).

### Box 1.1. The OECD Survey of Adult Skills

The Survey of Adult Skills (PIAAC) assesses the proficiency of adults aged 16-65 in literacy, numeracy and problem solving in technology-rich environments. These are considered “key information-processing skills” needed for individuals to fully participate in society, and they constitute a foundation for the development of higher-order technical skills.

- The literacy assessment measures the ability to understand and use information from written texts in a variety of real-life situations. It covers a range of skills from the decoding of written words and sentences to the comprehension, interpretation and evaluation of complex texts (but not writing).
- The numeracy assessment measures the ability to access, use and interpret mathematical information and ideas in situations that arise in the daily lives of adults.
- The problem solving in technology-rich environments assessment measures the ability to use technology to solve problems and practical tasks by setting up appropriate goals, and accessing and making use of information through computers.

Designed to be valid across cultures and countries, PIAAC collects a broad range of information from the adults taking the survey. Each of the assessments yields results scaled from 0 to 500 points, divided into 6 proficiency levels ranging from below Level 1 (the lowest) to Level 5 (the highest). The assessment was administered either in computer-based or paper-based versions, and surveyed more than 200 000 adults in 33 countries and economies over 2 rounds of data collection. A third round of data collection is currently underway, and the list of countries surveyed will expand to 35 in 2019.

Source: OECD (2016a), *Skills Matter: Further Results from the Survey of Adult Skills*, <http://dx.doi.org/10.1787/9789264258051-en>.

In addition, skills proficiency has an independent and positive impact on individuals’ employment and earnings levels that complements the effect of formal education. Data from PIAAC show that, even when comparing individuals with the same level of education, a one standard deviation increase in literacy proficiency (around 48 points on the PIAAC scale) is associated with a 6% increase in hourly wages and almost a 1 percentage point increase in the likelihood of being employed. The PIAAC results show that employers reward highly proficient workers with a premium, even when they are compared with other employees with the same age, experience or level of education. This suggests that workers’ skills proficiency influences their productivity and, in competitive economies, constitutes an important determinant of their earnings (OECD, 2016a).

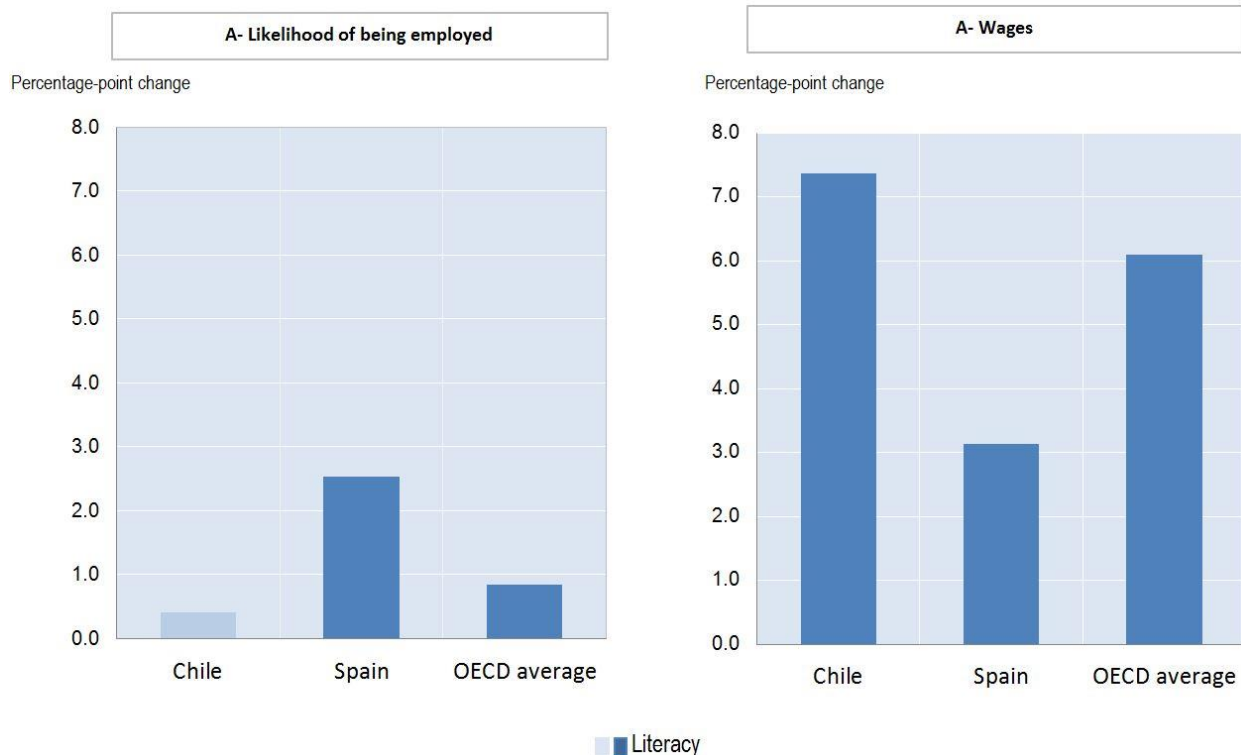
The wage premium paid to those individuals with higher skills varies across countries. For example, in Spain, a one standard deviation increase in literacy proficiency is associated with a 3% increase in hourly wages and a 2.5 percentage point increase in the likelihood of being employed (see Figure 1.6). In contrast, in Chile, the same increase in literacy does not significantly increase the chances of being employed but is related to a 7.4% increase in earnings – more than twice the increase in hourly wages in Spain and



higher than the increase observed in OECD countries on average. These differences in the returns on skills across countries may partially reflect the relative supply and demand of such skills in the economy (Machin and McNally, 2007), but may also reflect differences in labour market regulations (Hanushek et al., 2017) or in fiscal policies (OECD, 2017b).

**Figure 1.6. Effect of literacy on the likelihood of being employed, and on wages**

Marginal effects (as percentage point change) of a one standard deviation increase in literacy on the likelihood of being employed among adults not in formal education and on wages

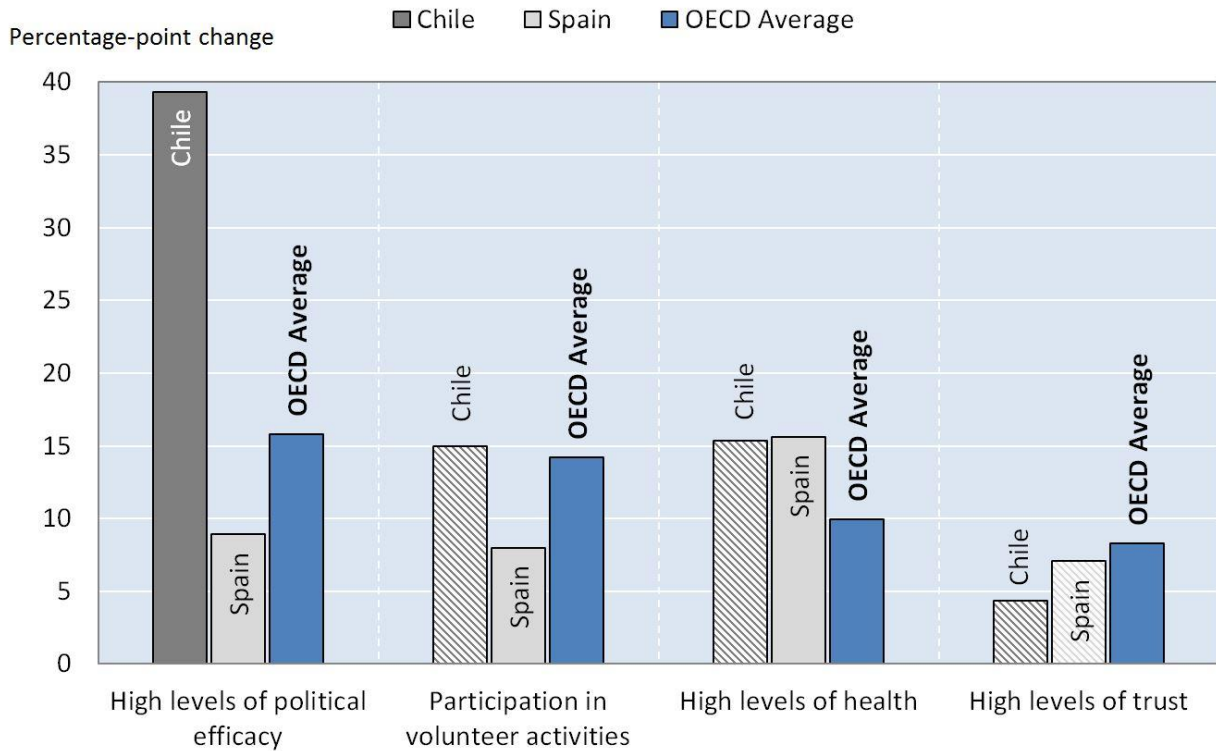


*Note:* Statistically significant values (at the 10% level) are shown in a darker tone. One standard deviation in proficiency in literacy for the working population is 47 score points. Panel A: The reference category is “unemployed”. Results are adjusted for gender, age, marital and foreign-born status. Panel B: Hourly wages, including bonuses, in PPP-adjusted USD (2012). Coefficients from the OLS regression of log hourly wages on proficiency are directly interpreted as percentage effects on wages. Coefficients adjusted for age, gender, foreign-born status and tenure. The wage distribution was trimmed to eliminate the 1st and 99th percentiles. *Source:* Survey of Adult Skills (PIAAC) (2012, 2015), [www.oecd.org/skills/piaac/publicdataandanalysis](http://www.oecd.org/skills/piaac/publicdataandanalysis).

Beyond their effect on economic outcomes, skills affect people’s lives and the well-being of nations in many different ways. Data from PIAAC show that adults with lower levels of literacy are far more likely to report poor health, not participate in volunteering activities, report less trust in others and perceive themselves as objects rather than actors in political processes. These relationships hold even when controlling for socio-demographic characteristics like age, gender or migrant background. As with wages, the strength of this association varies across countries. For example, in Chile, highly proficient adults – those scoring Level 4 or 5 in PIAAC – are 42 percentage points more likely to feel that they have an influence in the political process and 39 percentage points more likely to report that they engage in voluntary work than their less proficient peers – those who did not score above Level 1 (see Figure 1.7). These gaps are among the largest

differences observed in OECD countries. Spain also displays a strong relationship between skills proficiency and self-reported health status: 92% of highly proficient adults report being in good, very good or excellent health compared to less than 65% of low proficient adults. Even when comparing adults with similar ages or education levels, highly proficient adults are more than 15 percentage points more likely to say that they are in good health.

**Figure 1.7. Literacy proficiency and positive social outcomes**



*Note:* Statistically significant differences are marked in a darker tone. Adjusted differences (marginal effects) are based on a regression model and take account of differences associated with the following variables: age, gender, education, immigrant and language background and parents' educational attainment.

*Source:* Survey of Adult Skills (PIAAC) (2012, 2015), see Table A5.14(L), [www.oecd.org/skills/piaac/public-dataandanalysis](http://www.oecd.org/skills/piaac/public-dataandanalysis).

Overall, the results suggest that policies that increase the proficiency of adults, beyond expanding their access to formal education, may have a considerable impact on the economic and social outcomes of individuals, contributing to a more efficient functioning of economies and societies. Moreover, the benefits of increasing the skills of adults may persist across multiple generations, as previous evidence from the United Kingdom has found that children whose parents have higher levels of literacy and numeracy also display higher levels of skills themselves (de Coulon, Meschi and Vignoles, 2011).

## Conclusions

Improving the skills of young students has been found to have major consequences for the economic prosperity of countries. Ibero-American countries in particular stand to gain enormously from ensuring all their students achieve at least basic levels of competence in

reading, mathematics and science before they leave compulsory education. Foundation skills acquired when young enable individuals to acquire more technical skills, and pursue further levels of education. At the moment, Ibero-America has both a large share of low-performing students and few top performers, which constitutes a major constraint on the development of the region and a limitation that could undermine its potential growth.

Ibero-American countries need to ensure that their citizens acquire the necessary skills to fully participate in labour markets, as they will need sustained increases in productivity if they are to make their economic growth more inclusive. Evidence obtained from PIAAC shows that highly skilled and educated adults are more likely to find a job and earn higher wages than their less skilled peers. The relationship between skills and better labour market outcomes holds even when comparing individuals with the same level of education, showing employers reward and value skills proficiency, and is correlated with workers' productivity. Beyond the effect on economic outcomes, skills are found to be associated with better self-reported health, greater trust in others and more active participation in political and volunteering activities. These results suggest that policies that improve the proficiency of adults, beyond an increase in their access to formal education, may have a considerable impact on the economic and social outcomes of individuals.

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## Chapter 2. Quality and equity in education in Ibero-America: An overview of results from PISA 2015

*This chapter discusses the Programme for International Student Assessment (PISA) 2015 results in Ibero-America and what they reveal about the quality, equity and inclusion of education in the region. After a short overview of the participation of Ibero-American countries and students in PISA 2015, it discusses the results, starting with a comparison of the enrolment levels of 15-year-olds and their attainment, paying particular attention to the role of grade repetition. This provides important background for a comparison of student achievement in science, mathematics and reading across countries and across time, in order to gauge progress towards greater quality of education in Ibero-America. The chapter then presents the main indicators of fairness and inclusion, focusing on gender and socio-economic disparities. Finally, it assesses the contribution of education policies and practices to socio-economic inequality by comparing the school learning environments experienced by the most advantaged and the most disadvantaged students within each country.*

## Introduction

Equipping citizens with the knowledge and skills necessary to achieve their full potential, contribute to an increasingly interconnected world, and ultimately convert better skills into better lives is a central preoccupation of policy makers around the world. The measures of student proficiency included in the Programme for International Student Assessment (PISA) were developed to monitor how close countries are to achieving this goal.

Skill requirements and the contexts in which skills are applied evolve fast. For this reason, PISA revises the definitions and frameworks behind its literacy measures every nine years, to make sure they remain relevant and future-oriented. PISA also regularly adds new, innovative domains to its core measures of skills (see Box 2.1). By paying appropriate attention to the evolving nature of our societies, PISA invites educators and policy makers to consider quality of education as a moving target that can never be considered to have been acquired once and for all.

PISA provides more than an assessment of the quality of students' learning. It selects the participants who take the test through scientific sampling procedures, first choosing the schools to participate, and then selecting students within those schools. In order to be considered eligible for PISA and listed in sampling forms, 15-year-olds must therefore be enrolled in school; the PISA standards further restrict the target population to those students enrolled in Grade 7 and above. The information PISA collects for its sampling operations therefore also provides comparative indicators about the attainment of 15-year-olds in participating countries.

Furthermore, PISA indicators can also be used to evaluate the equity and efficiency of schools by analysing the outcomes of learning in light of the rich information available in the PISA database on students' background, learning experiences and school environments, and on country- and school-level resources, policies and practices.

Equity is a normative concept: the descriptive indicators that can be derived from PISA data must be informed by an idea of social justice, or, at least, a definition of the desirable properties of society, in order to inform an evaluation of equity. This chapter discusses equity in education with reference to two desirable properties of a society: inclusion and fairness.

An inclusive education system ensures that all young people reach at least the minimum level of attainment and achievement needed to participate in society. While barriers to attainment and achievement do not necessarily originate within educational institutions, a focus on inclusion requires that education policies remove these obstacles, where they exist, so that children can pursue what they value in life (Sen, 1999).

A fair education system is one that minimises the effect of personal and social circumstances that are outside individuals' control (such as gender, ethnic origin or family background) on their opportunities to acquire a quality education and, ultimately, on the outcomes they can potentially achieve (Roemer and Trannoy, 2016).

Equity is not an attribute of students or schools but of the system, and is best assessed by comparing the levels of inclusion and fairness to those achieved by other countries in comparable circumstances. International large-scale assessments therefore offer a unique opportunity for assessing the levels of equity in education outcomes. However, comparative equity can only be assessed by focusing on those characteristics and

circumstances that are relevant dimensions of diversity across a number of countries. As the perception of “diversity” is in part a cultural construction, in this chapter we limit the analysis to two dimensions – gender and socio-economic status – excluding other dimensions which are often relevant when equity and cohesion are discussed in national contexts (such as ethnic or geographic diversity). PISA has put great effort into constructing a comparable indicator of socio-economic status, known as the PISA index of economic, social and cultural status (see Box 2.2).

### Box 2.1. What does PISA measure?

Each round of PISA measures students’ proficiency in reading, mathematics and science, but the main focus of the assessment changes according to a rotating schedule. The PISA 2015 survey focused on science, with reading and mathematics as minor areas of assessment. In addition, there were two optional assessments. Countries that administered the test on computers (including all countries in Ibero-America except Argentina) were also offered a “collaborative problem solving” assessment, an innovative domain. There was also an assessment of financial literacy which 15 countries and economies participated in, including Brazil, Chile, Peru and Spain. The minor domains and the optional assessments are not administered to all students.

Science literacy, the focus of the PISA 2015 assessment, is defined as “the ability to engage with science-related issues, and with the ideas of science, as a reflective citizen” (OECD, 2017a). To succeed on the PISA science test, students had to display their mastery of three skills: explaining phenomena scientifically (based on knowledge of scientific facts and ideas), evaluating and designing scientific enquiry, and interpreting data and evidence scientifically.

As this definition makes clear, simply remembering that a free-falling object on Earth has an acceleration of  $9.8\text{m/s}^2$ , or the difference between bacteria and viruses, will not necessarily be rewarded with a high score in PISA (although it might be important to know those facts too). Rather, PISA emphasises that a science-literate person is one who uses that knowledge to navigate through today’s world; and that all of us sometimes need to “think like a scientist” – to weigh evidence and come to a conclusion, and to understand that scientific “truth” may change over time, as new discoveries are made, particularly when we engage with science-related issues.

Similarly, the frameworks for reading and mathematics, which were last revisited for the 2009 and 2012 assessments respectively, emphasise students’ capacity to apply knowledge and skills in real-life contexts: students need to demonstrate their capacity to analyse, reason and communicate effectively as they identify, interpret and solve problems in a variety of situations.

Source: OECD (2016a), *PISA 2015 Results (Volume I): Excellence and Equity in Education*, <http://dx.doi.org/10.1787/9789264266490-en>; OECD (2017a), *PISA 2015 Assessment and Analytical Framework: Science, Reading, Mathematics, Financial Literacy and Collaborative Problem Solving*, <http://dx.doi.org/10.1787/9789264281820-en>.



### Box 2.2. Definition of socio-economic status in PISA

Socio-economic status is a broad concept. PISA estimates a student's socio-economic status by using the PISA index of economic, social and cultural status (ESCS), which is derived from several variables related to students' family background: parents' education, parents' occupations, a number of home possessions that can be taken as proxies for material wealth, and the number of books and other educational resources available in the home. The PISA index of economic, social and cultural status is a composite score derived from these indicators via principal component analysis. It is constructed to be internationally comparable.

The ESCS index makes it possible to identify advantaged and disadvantaged students and schools within each country. In this report, students are considered socio-economically advantaged if they are among the 25% of students with the highest values on the ESCS index in their country or economy; students are classified as socio-economically disadvantaged if their values on the ESCS index are among the bottom 25% of their country or economy. Following the same logic, schools are classified as socio-economically advantaged, disadvantaged or average within each country or economy based on their students' mean values on the ESCS index.

The ESCS index also makes it possible to identify advantaged or disadvantaged students by global standards. By placing all students on the same ESCS continuum, it is possible to compare the situation of students with similar economic, social and cultural resources across countries. For example, more than half of the students assessed by PISA in Mexico and Peru are in the lowest 20% of students internationally (OECD, 2016a: p.219).

*Source:* OECD (2016a), *PISA 2015 Results (Volume I): Excellence and Equity in Education*, <http://dx.doi.org/10.1787/9789264266490-en>.

This framework for analysing PISA results through the lens of quality, inclusion, and fairness, links PISA directly to the Sustainable Development Goals (SDGs) adopted by the United Nations in September 2015. Goal 4 of the SDGs seeks to ensure “inclusive and equitable quality education and promote lifelong learning opportunities for all”. More specific targets and indicators spell out what countries need to deliver by 2030; the first target (Target 4.1), for example, urges countries to “ensure that all girls and boys complete free, equitable and quality primary and secondary education leading to relevant and effective learning outcomes”.

Goal 4 differs from the Millennium Development Goals (MDGs) on education, which were in place between 2000 and 2015, in the following ways:

- Goal 4 is truly global. The SDGs establish a universal agenda; they do not differentiate between rich and poor countries. Every single country is challenged to achieve the SDGs.
- Goal 4 puts the quality of education and learning outcomes front and centre. Where the MDGs focused exclusively on access, enrolment and attainment (Goal 2: “Achieve universal primary education”), the SDGs recognise that participation in education is not an end in itself; what matters for people and economies are the skills acquired through education. It is the competency and character qualities that are developed through schooling, rather than the qualifications and credentials gained, that make people successful and resilient in

their professional and personal lives. They are also key in determining individual well-being and the prosperity of societies.

The remaining sections of this chapter are organised as follows. After a short overview of the participation of Ibero-American countries and students in PISA 2015, the discussion of PISA 2015 results starts by comparing the enrolment levels of 15-year-olds and their attainment, with particular attention to the role of grade repetition. This provides important background information for comparing student achievement in science, mathematics and reading across countries and across time, in order to gauge progress towards greater quality of education in Ibero-America. The next section then presents the main indicators on fairness and inclusion, focusing on gender and socio-economic disparities. Finally, the chapter assesses the contribution of education policies and practices to socio-economic inequalities by comparing the school learning environments experienced by the most advantaged and the most disadvantaged students within each country.

## Ibero-America in PISA 2015

The latest PISA survey in 2015 encompassed the 35 OECD countries, and 37 partner countries and economies. In Ibero-America, the four OECD member countries – Chile, Mexico, Portugal and Spain – and seven partner countries participated: Argentina, Brazil, Colombia, Costa Rica, the Dominican Republic, Peru and Uruguay. Five more countries from the region are already lined up for future rounds of PISA: four participants in the PISA for Development pilot in 2017 (Ecuador, Guatemala, Honduras and Paraguay; see Box 2.3) and Panama, which will participate in PISA 2018.

Around 540 000 students completed the assessment in 2015, representing about 29 million 15-year-olds in the schools of the 72 participating countries and economies.

PISA's stringent standards for sampling limit the possible exclusion of students and schools and the impact of non-response (OECD, 2017b). However, because eligibility for PISA is determined by more than just date of birth, in many Ibero-American countries the PISA sample does not necessarily represent the entire population of 15-year-olds. PISA results thus reflect a combination of 15-year-olds' access to education and the quality of education that they have received up to that point.

Despite their best efforts, some countries fail to implement PISA according to standards that are intended to ensure fair comparisons of the results across countries. In PISA 2015, a significant fraction of the eligible population of students in Argentina was excluded from the assessment because an incomplete list of schools was used in the first sampling stage (OECD, 2017b). Because of this, the results for Argentina are not fully comparable to those of other participating countries or to results for previous years.

### Box 2.3. What is PISA for Development?

The OECD and its partners launched the PISA for Development (PISA-D) initiative to make PISA more accessible and relevant to low- and middle-income countries. PISA-D enables a wider range of countries to use PISA assessments to monitor progress towards nationally set targets for improvement; analyse the factors associated with student learning, particularly among poor and marginalised populations; build the capacity of national institutions; and to track progress towards international education targets set out in the SDGs adopted by the United Nations General Assembly in 2015.

In particular, PISA-D responds to the needs of low- and middle-income countries where a sizeable proportion of 15-year-olds are not enrolled in school. The project includes three technical strands that enhance the PISA framework. The first focuses the PISA test instruments on the lower levels of performance. The second enhances contextual questionnaires and data-collection instruments to capture the diverse situations of students in low- and middle-income countries. The third strand develops methods and approaches to incorporate out-of-school 15-year-olds in the assessment, because countries are interested in learning about the skills acquired by all children, not just those who are attending school.

Including out-of-school youth in the survey makes PISA-D unique in the landscape of large-scale international assessments. The project explores methodologies and data-collection tools for out-of-school youth both to assess their skills, competencies and non-cognitive attributes, and to obtain better actionable data on the characteristics of these children, the reasons why they are not in school, and on the magnitude and forms of exclusion and disparities.

If successful, this third strand of PISA-D will inform strategies, in future rounds of PISA, to measure the competencies of out-of-school 15-year-olds, providing a context for interpreting the in-school results for PISA-participating countries with sizeable proportions of out-of-school 15-year-olds. This enhancement would enable PISA to offer countries an important indicator of human capital in the population as a whole, not just among those who have attained Grade 7 and above by the time they are 15 years old. The enhancement would also help monitor progress towards the education Sustainable Development Goal 4, which emphasises ensuring that all children and young people achieve at least minimum levels of proficiency in reading and mathematics.

Source: OECD (2017d), “PISA for Development”, [www.oecd.org/pisa/aboutpisa/pisaforddevelopment.htm](http://www.oecd.org/pisa/aboutpisa/pisaforddevelopment.htm).

## Enrolment and attainment at age 15: A PISA perspective

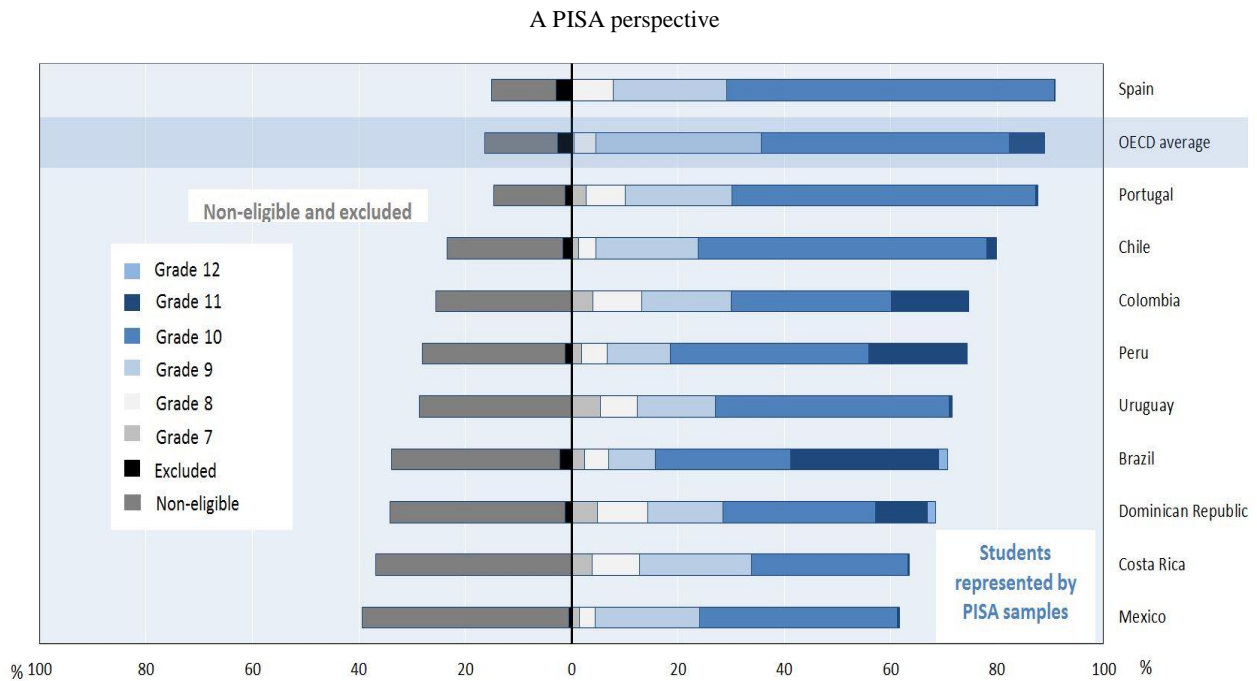
### *How many 15-year-olds does the PISA sample represent?*

When PISA 2015 chose the schools and students that would take the test, not all 15-year-old children were included in the lists from which the participants were drawn. As noted above, on top of a birth date in 1999, in order to participate in PISA 15-year-olds had to be enrolled in school at the time of testing, in Grade 7 or higher.

Figure 2.1 shows the resulting coverage of the 15-year-old population. This number, known as Coverage Index 3 (OECD, 2017b), is obtained by dividing the number of students represented by PISA samples (participating students, weighted by their sampling

weights), by the total number of 15-year-olds estimated from demographic projections. In Ibero-American countries this ranges from 62% in Mexico to 91% in Spain. While a small proportion of students in Grade 7 and above may be excluded from PISA because they are disabled, live in remote areas, or have limited language proficiency, the largest share of non-covered 15-year-olds is made up of children who are not in school, or who have been held back in primary school grades.

**Figure 2.1. Educational attainment at age 15**



*Note:* All percentages are presented as a share of the estimated total population of 15-year-olds in the country. Countries and economies are ranked in descending order of the percentage of 15-year-olds represented by PISA samples.

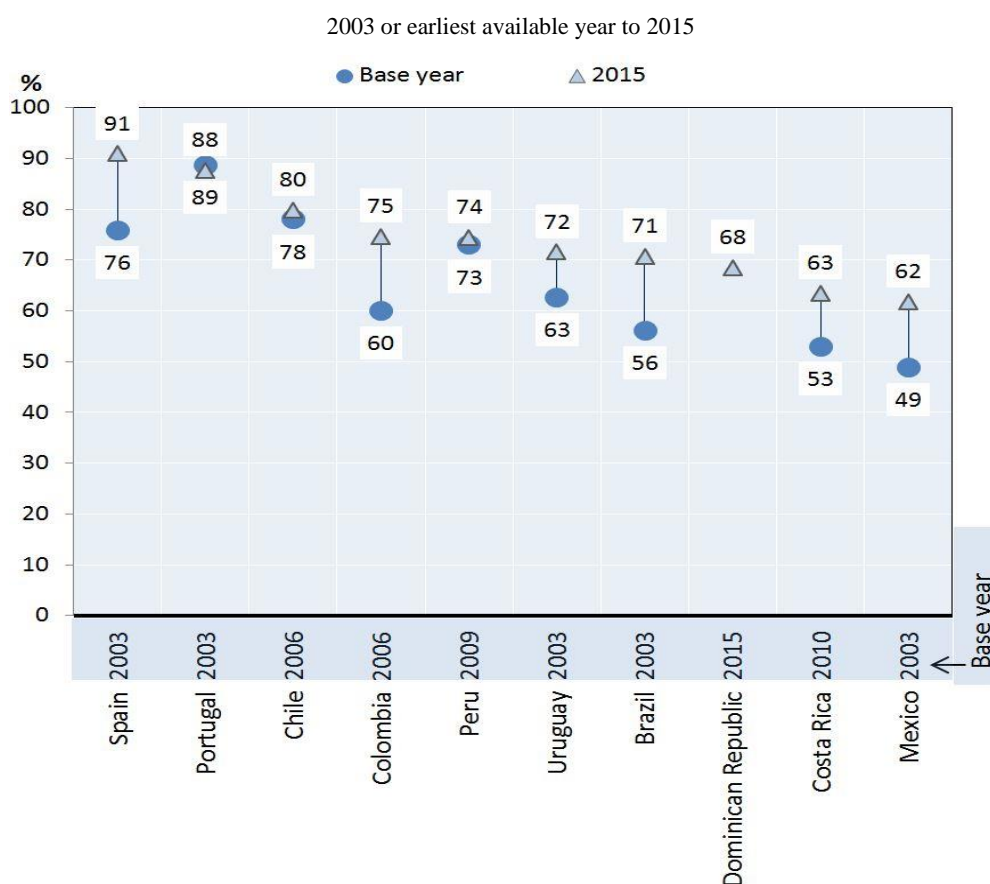
*Source:* OECD (2016a), *PISA 2015 Results (Volume I): Excellence and Equity in Education*, <http://dx.doi.org/10.1787/9789264266490-en>, tables A.2 and A.4a.

In general, comparisons of coverage rates in PISA over time or across countries are consistent with the enrolment rate trends for 15-year-olds that can be computed from administrative sources or household surveys, although administrative sources often report higher rates. Apart from the small percentage of enrolled, but excluded, students, discrepancies in enrolment figures can have several origins, including 1) differences in the primary source of data (households or schools); 2) differences in the methods used to collect the information (e.g. by asking schools for an overall number or a detailed list of students); 3) differences in definition of the target age; and 4) differences in the timing of collecting the information (PISA asks for student lists about one month before the assessment; administrative data may report enrolment as of the beginning of the school year).

Despite these differences, the global expansion of enrolment in secondary education over the past decades is well reflected in PISA data. Between 2003 and 2015, for instance, Brazil added nearly 500 000 students, and Mexico more than 300 000 students, to the total population of 15-year-olds eligible to participate in PISA. Over this same period, the

total number of 15-year-olds fell in Brazil and increased only moderately in Mexico. As a result, the coverage of PISA increased greatly. There were also large increases in coverage in Colombia, Costa Rica and Uruguay – all countries in which less than two-thirds of 15-year-olds were included in PISA samples when they first participated in PISA (Figure 2.2).

**Figure 2.2. Change in the percentage of 15-year-olds covered by PISA**



Source: OECD, PISA 2015 Database, Table I.6.1, <http://dx.doi.org/10.1787/888933433214>.

Several factors contributed to this expansion by lowering the social, economic or institutional barriers that had kept a large proportion of 15-year-olds out of school. Some countries, such as Brazil, raised the age at which students can leave compulsory education to over 15; many countries also introduced or strengthened support for at-risk families (e.g. in the form of conditional or unconditional cash transfers). Rapid changes in the economy and increased urbanisation in these countries may also have played a role.

Despite significant progress over recent decades, school dropout rates remain a major preoccupation of policy makers across Ibero-American countries. Young adults who have left school without attaining a formal qualification are at high risk of poor employment, suffer worse health conditions, and are over-represented among those committing crimes (Lochner, 2011; Machin, Marie and Vujić, 2011; Belfield and Levin, 2007).

The level of attainment and participation in education at the age of 15, reflected in coverage rates and in the distribution of PISA students across grades, provides important

contextual information for interpreting the mean performance and variation among the students assessed. At the same time, the expansion in education opportunities observed over the last decades makes it more difficult to interpret the changes in mean scores in PISA over time. Increases in coverage can lead to an underestimation of the real improvements that education systems have achieved. Household surveys often show that children from poor households, ethnic minorities or rural areas face a greater risk of not attending or completing lower secondary education. Typically, as populations that had previously been excluded gain access to higher levels of schooling, a larger proportion of potentially low-performing students will be included in PISA samples.

### *The distribution of PISA students across grades*

Figure 2.1 also highlights that 15-year-olds in Spain, Portugal and the Latin American countries participating in PISA may be found across a relatively wide range of school grades. In all of these countries except Spain, over 1.5% of the PISA participants in 2015 were in Grade 7; and in all countries, a greater share of students were held back in Grade 7 or Grade 8 than in OECD countries on average. At the same time, a significant number of Latin American countries have also sizeable proportions of students in Grade 11 and, in a few cases, in Grade 12 – one or two years ahead of track.

In other words, all countries in Ibero-America are characterised by high levels of vertical stratification. Stratification in education refers to the various ways in which schools and education systems organise instruction for students of varying ability, behaviour, interests and pace of learning (Dupriez, Dumay and Vause, 2008). In comprehensive systems, all students follow a similar path through education, regardless of their abilities, behaviour and interests. In vertically stratified systems, students of similar age are enrolled in different grade levels, for example due to grade repetition. The OECD (2016b: Figure II.5.2) presents an indicator of vertical stratification – the probability that two students, chosen at random, will be enrolled in different grades – and confirms that all ten countries in Ibero-America included in the analysis have stronger vertical stratification than the OECD average of 34%, with values ranging from 48% in Spain and Chile to more than 70% in Colombia and the Dominican Republic.

The vertically stratified nature of Ibero-American education systems also constitutes important context for interpreting PISA results in the region. By focusing on students of comparable age across countries, PISA enables the fair comparison of the skills of students who are about to enter adult life. However, it must be understood that these students might be at different points in their educational career, both across countries and within countries, and that the variation in PISA results therefore reflects, in part, the variety of educational trajectories of participating students.

### *Grade repetition in Ibero-America*

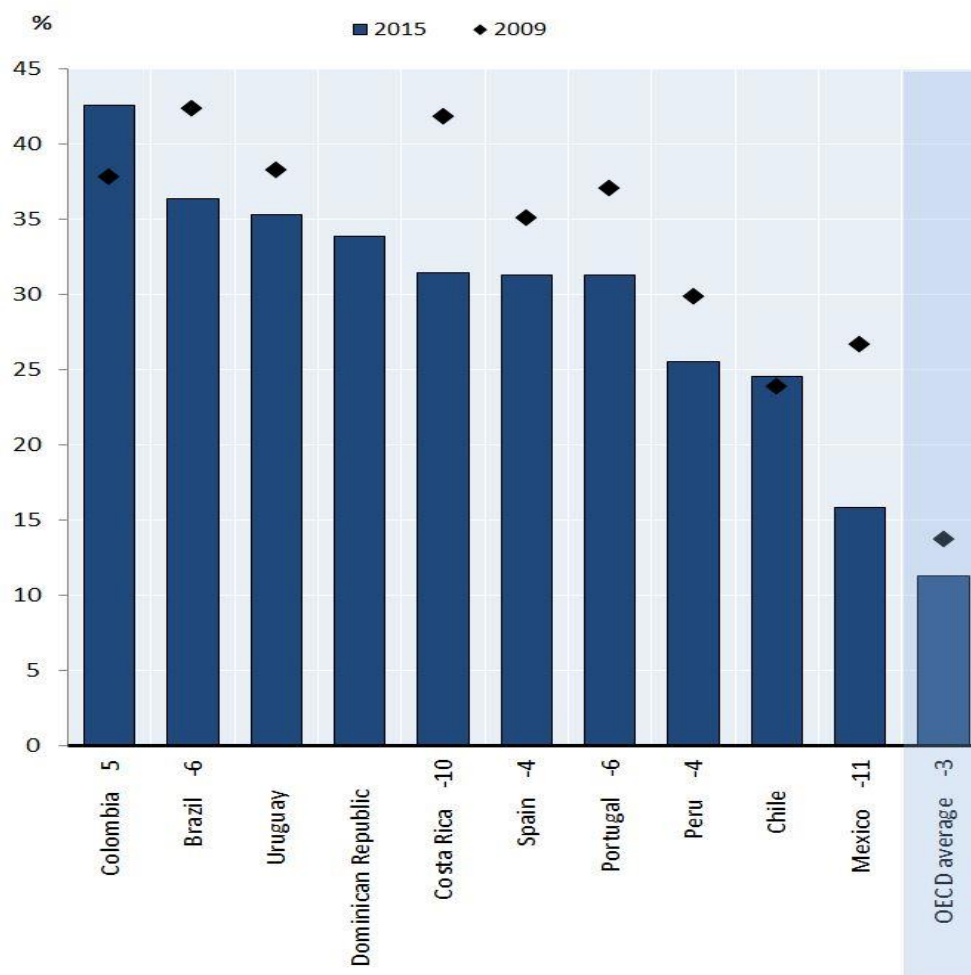
The vertically stratified nature education systems in Ibero-America noted above is largely due to the widespread practice of grade repetition which means students of the same age cohort can often be found in several grade levels.

Across Ibero-America, between 16% (Mexico) and 43% (Colombia) of students report having repeated a grade at least once in primary, lower secondary or upper secondary school, a higher percentage than on average across the OECD (11%) (Figure 2.3). While in theory, students might also be delayed in their schooling career without formally repeating a grade, e.g. because of sickness or because they are required to help out in the family business or to care after a family member, in practice, in all countries in Ibero-

America variation in grade levels is strongly associated with the experience of grade repetition (OECD, 2016b: Figure II.5.2): students who are behind track are most likely to report having repeated a grade.

**Figure 2.3. Change in grade repetition rates. 2009 and 2015**

Percentage of students who had repeated a grade in primary, lower secondary or upper secondary school



*Note:* Statistically significant differences are shown next to the country/economy name. For Costa Rica the change between the PISA 2009 and PISA 2015 represents change between 2010 and 2015 because Costa Rica implemented the PISA 2009 assessment in 2010 as part of PISA 2009+. Countries and economies are ranked in descending order of the percentage of students who had repeated a grade, in 2015.

*Source:* OECD, PISA 2015 Database, tables II.5.9, II.5.10 and II.5.11, <http://dx.doi.org/10.1787/888933436509>.

In seven out of ten countries in Ibero-America, at least 30% of students participating in PISA 2015 reported having repeated a grade at least once in primary or secondary school: Brazil, Colombia, the Dominican Republic, Portugal, Spain and Uruguay (Figure 2.3). In Brazil, Colombia and the Dominican Republic, more than one in five students reported having repeated a grade in primary school (OECD, 2016b: Table II.5.9). However, most countries in Ibero-America reduced the incidence of grade repetition over the period

2009-15 (Figure 2.3). The percentage of students who had repeated a grade in either primary, lower secondary or upper secondary school fell by a margin of 10 percentage points or more in Costa Rica and Mexico and by between 4 and 6 percentage points in Brazil, Peru, Portugal and Spain. Meanwhile, it increased by 5 percentage points in Colombia.

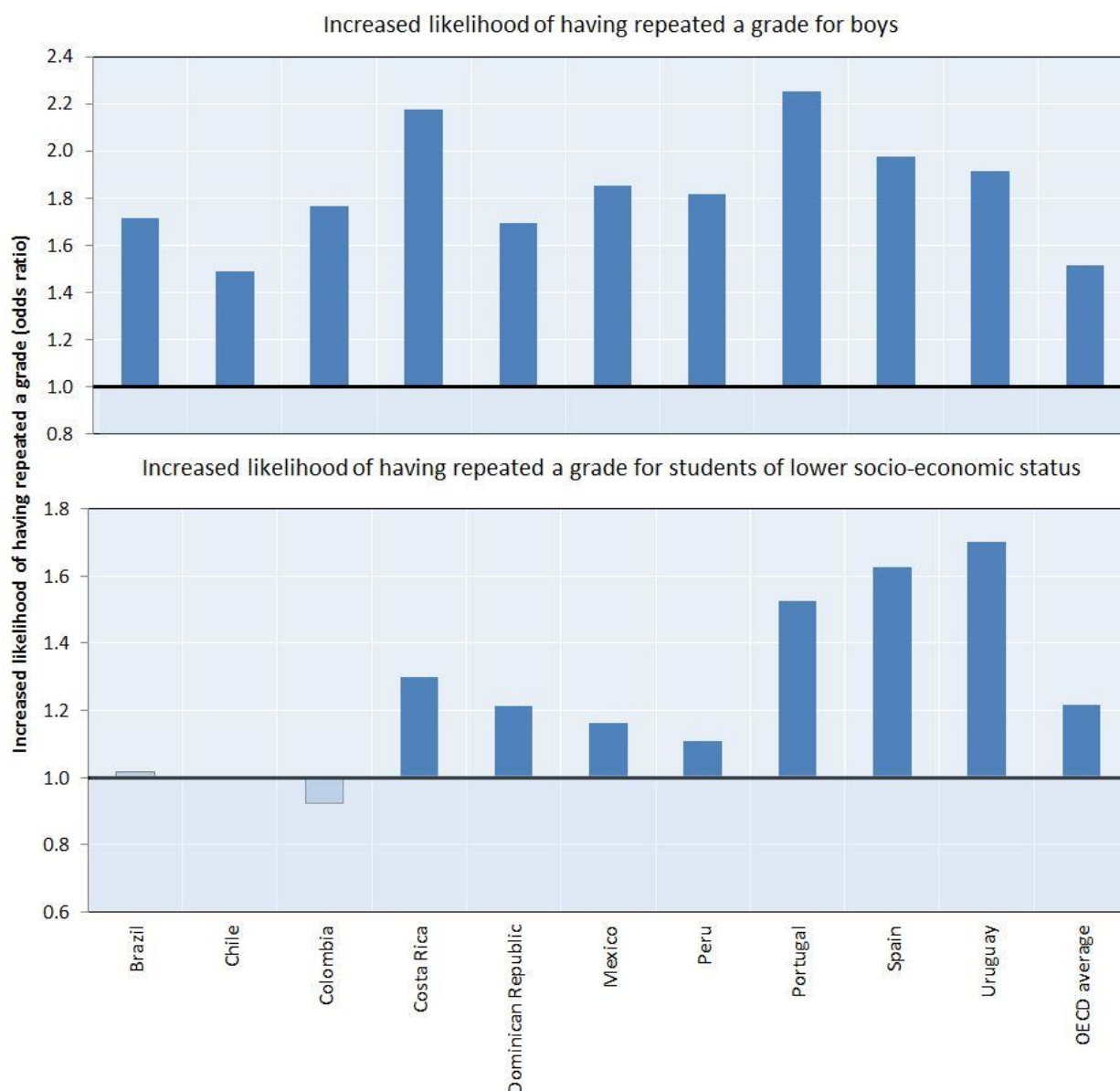
Grade repetition can be a costly policy, as it generally requires greater expenditure on education and delays students' entry into the labour market (OECD, 2013). In theory, repeating a grade gives students time to "catch up" with their peers if teachers believe they are not yet ready for more advanced coursework. If the curriculum is cumulative and further learning depends on a solid understanding of what has been previously learned, then promoting students regardless of their mastery of the content might place low-performing students in an increasingly difficult position at higher grades. If the practice is widespread, it might compromise performance in the school or school system as a whole.

However, reviews of research encompassing different disciplines and time periods have mainly found negative effects of grade repetition on academic achievement (Jimerson, 2001). Because grade repetition represent a visible marker of underperformance, it can stigmatise children. Students who have repeated a grade often also show more negative behaviour and attitudes towards school (Fin, 1989; Gottfriedson, Fink and Graham, 1994) and are more likely to drop out of school (Jacob and Lefgren, 2004; Manacorda, 2012). In addition, any positive short-term effects of grade repetition appear to decline over time (Allen et al., 2009).

What is more, the risk of grade repetition is much higher for some students. Many people would agree that performance, behaviour and motivation are legitimate reasons for deciding which students repeat a grade; and the data clearly show these associations. What is more troubling is that, even after accounting for students' academic performance, behaviour and motivation, students from a disadvantaged socio-economic background are significantly more likely than more advantaged students to have repeated a grade in Costa Rica, the Dominican Republic, Mexico, Peru, Portugal, Spain and Uruguay; and boys are significantly more likely than girls to have repeated a grade in all ten countries in Ibero-America (Figure 2.4).

Grade repetition is often unfair and is always costly, both for individual students who suffer from the stigma and for school systems as a whole. In addition, the practice of grade repetition reduces the incentive for teachers to diagnose and address underperformance in their classrooms. In systems where grade repetition is limited, teachers tend to assume greater responsibility for students' learning.



**Figure 2.4. Students' gender, socio-economic status and grade repetition**

*Note:* The logit regression model accounts for students' performance, truancy, motivation, gender and immigrant background. Students' socio-economic status is measured by the PISA index of economic, social and cultural status. Countries and economies are ranked in alphabetical order.

*Source:* OECD, PISA 2015 Database, Table II.5.13, <http://dx.doi.org/10.1787/888933436509>.

## Student achievement in Ibero-America

The easiest way to summarise student performance and compare countries' relative standing is through the mean performance of students in each country and domain assessed by PISA. But PISA also describes student performance by levels of proficiency; in particular, in each subject it identifies a baseline level of performance (called Level 2). In all three PISA core subjects, the baseline level is the level at which students are able to tackle tasks that require, at least, a minimal ability and disposition to think autonomously.

In reading, the baseline level of skills is defined as the level at which students can not only read simple and familiar texts and understand them literally, but also demonstrate, even in the absence of explicit directions, some ability to connect several pieces of information, draw inferences that go beyond the explicitly stated information, and connect a text to their personal experience and knowledge.

In mathematics, the baseline level of skills is defined as the level at which students can not only carry out routine procedures, such as an arithmetic operation, in situations where all the instructions are given to them, but can also interpret and recognise how a (simple) situation (e.g. comparing the total distance across two alternative routes, or converting prices into a different currency) can be represented mathematically.

In science, the baseline level of proficiency corresponds to the level at which students can draw on their knowledge of basic science content and procedures to interpret data, identify the question being addressed in a simple experiment, or identify whether a conclusion is valid based on the data provided.

Several other levels of proficiency have been described, to assist in the interpretation of PISA scores. Full descriptions can be found in *PISA 2015 Results (Volume I): Excellence and Equity in Education* (OECD, 2016a). Comparing the proportion of students above the baseline levels of proficiency and the proportion who reach the highest levels of proficiency, makes it possible not only to gauge the average quality of education (indicated by countries' mean scores), but also the capacity of a system to nurture excellence and to ensure minimum standards. The latter is an aspect of inclusiveness, i.e. an education system's success in guaranteeing children's capabilities to pursue what they value in life.

### Performance in science, reading and mathematics

**Table 2.1. Snapshot of performance in science, reading and mathematics**

	Science		Reading		Mathematics		Science, reading and mathematics	
	Mean score in PISA 2015	Range of ranks across all countries and economies	Mean score in PISA 2015	Range of ranks across all countries and economies	Mean score in PISA 2015	Range of ranks across all countries and economies	Share of top performers in at least one subject (Level 5 or 6)	Share of low achievers in all three subjects (below Level 2)
	Mean	rank is between...	Mean	rank is between...	Mean	rank is between...	%	%
OECD average	493		493		490		15.3	13.0
Portugal	501	18-25	498	6-27	492	21-31	15.6	10.7
Spain	493	25-31	496	19-28	486	29-34	10.9	10.3
Chile	447	44-45	459	41-43	423	47-51	3.3	23.3
Uruguay	435	46-49	437	46-49	418	49-55	3.6	30.8
Costa Rica	420	53-57	427	49-55	400	58-61	0.9	33.0
Colombia	416	55-60	425	50-55	390	60-63	1.2	38.2
Mexico	416	55-59	423	51-55	408	55-57	0.6	33.8
Brazil	401	62-64	407	57-61	377	64-65	2.2	44.1
Peru	397	63-64	398	61-64	387	61-64	0.6	46.7
Dominican Republic	332	70	358	65-67	328	70	0.1	70.7

*Note:* Countries and economies are ranked in descending order of the mean science score in PISA 2015. Cells shaded in blue indicate a mean performance/share of top performers above the OECD or a share of low achievers below the OECD average. Cells shaded in grey indicate a mean performance/share of top performers below the OECD average or a share of low achievers above the OECD average.

*Source:* OECD, PISA 2015 Database, figures I.1.1 <http://dx.doi.org/10.1787/9789264266490-en>, I.2.14, <http://dx.doi.org/10.1787/888933433171>, I.4.2 <http://dx.doi.org/10.1787/888933433195> and I.5.2, <http://dx.doi.org/10.1787/888933433203>

Table 2.1 shows the average performance of countries in Ibero-America across the three domains, in comparison to the OECD average, as well as their relative standing among the 70 countries and economies with valid and comparable results in PISA 2015.

Four main observations emerge from this table and from the comparisons of mean performance across countries and subjects (OECD, 2016a: Figures I.2.13, I.4.1, I.5.1):

- First, Portugal scores above the OECD average in science and reading, and close to the OECD average in mathematics and Spain scores close to the OECD average in science and reading, but below the OECD average in mathematics. However all the Latin American countries participating in PISA perform consistently below the OECD average in all three subjects.
- Second, when considering only significant differences – those that are unlikely to occur in the PISA samples unless there was a genuine difference in the populations from which samples are drawn – the relative standing among Ibero-American countries is quite consistent for reading and science. Portugal has the highest mean score in science, while the difference between Portugal's and Spain's mean scores is not significant in reading. Chile scores below Spain and Portugal in reading and science, but above all other countries in Latin America. Uruguay comes next, followed by Colombia, Costa Rica and Mexico, which have similar mean performance in both reading and science. Brazil scores above Peru in reading, but not significantly higher than Peru in science. Finally,

the Dominican Republic scores consistently below the other Latin American countries participating in PISA.

- Third, in mathematics, the rankings are somewhat different. Portugal and Spain share a similar mean performance, followed by Chile and Uruguay, whose mean scores are not statistically different from each other. Mexico scores below Chile and Uruguay, but above Costa Rica, which in turn scores above Colombia, whose mean score is not significantly different from Peru's. In mathematics, Brazil scores below all other Latin American countries, except the Dominican Republic.
- Fourth, mathematics appears to be the weakest of the three PISA subjects for most countries in Ibero-America, in relative terms, while reading is often the strongest subject. This can be seen by comparing both the range of plausible ranks for each country and the gap to the OECD average across the three subjects. For all countries except Portugal and Peru, the ranking in reading is higher than the ranking in mathematics. And the gap separating the mean performance of Spain and especially the Latin American countries from the OECD average is particularly large in mathematics. While all Latin American countries seem to be weaker in mathematics, compared to the other domains, this relative weakness is particularly pronounced in Brazil, Chile, Colombia, Costa Rica and the Dominican Republic.

### *Trends in performance, adjusted for coverage*

PISA 2015 is the sixth round of PISA since the programme was launched in 2000. Every PISA test assesses students' science, reading and mathematics literacy; in each round, one of these subjects is the main domain and the other two are minor domains (see Box 2.1).

The first full assessment of each domain sets the scale and starting point for future comparisons. Science was the major domain for the first time in 2006, and is again the major domain in PISA 2015. This means that it is possible to measure the change in science performance between PISA 2015 and any earlier PISA tests, starting with PISA 2006, but not with respect to PISA 2000 or 2003. The most reliable way to establish a trend for science performance is to compare all available results between 2006 and 2015.

Not all countries participating in PISA 2015 had taken part in earlier rounds of PISA, such as the Dominican Republic, so PISA cannot yet provide performance trends for these countries. Other countries may have joined PISA only recently, or have not participated in all rounds since they first joined PISA.

To better understand a country's trends and maximise the number of countries in the comparisons, this chapter focuses on the average three-year trend in student performance. The three-year trend is the average rate of change observed over three-year intervals during the available period. For countries and economies that have participated in all four PISA assessments since 2006, the average three-year trend takes into account all four points in time; for those countries that have valid data for fewer assessments, the average three-year trend takes into account only the valid and available information (see Box 2.4)

Annex 2.A. provides further information for interpreting trends in performance in PISA 2015.

#### Box 2.4. The average three-year trend

The average three-year trend is used as the main measure of trends in countries' science, reading and mathematics performance. The average three-year trend for the mean is the average rate at which a country or economy's mean score in mathematics, reading and science has changed over consecutive three-year periods throughout its participation in PISA assessments. The interval of three years is chosen to correspond to the usual interval between PISA assessments. Thus, a positive average three-year trend of  $x$  points indicates that the country/economy has improved in performance by  $x$  points on average in each PISA assessment since its earliest comparable PISA results.

The average three-year trend is a more robust measure of a country's/economy's progress in education outcomes than the simple difference between two points in time, as it is based on the information available from all assessments. For countries that participated in more than two PISA assessments, it is thus less sensitive to the statistical fluctuations that might alter a country or economy's trends in PISA performance if the results were compared between only two assessments. This robustness comes at the cost of ignoring accelerations, decelerations or reversals of the rate of change: the average three-year trend assumes that the rate of change is steady over the period considered (linear trend). The average three-year trend also takes into account the fact that, for some countries and economies, the period between PISA assessments is less than three years. This is the case for instance in Costa Rica, which participated in PISA 2009 as part of PISA+ and conducted the assessment in 2010 instead of 2009.

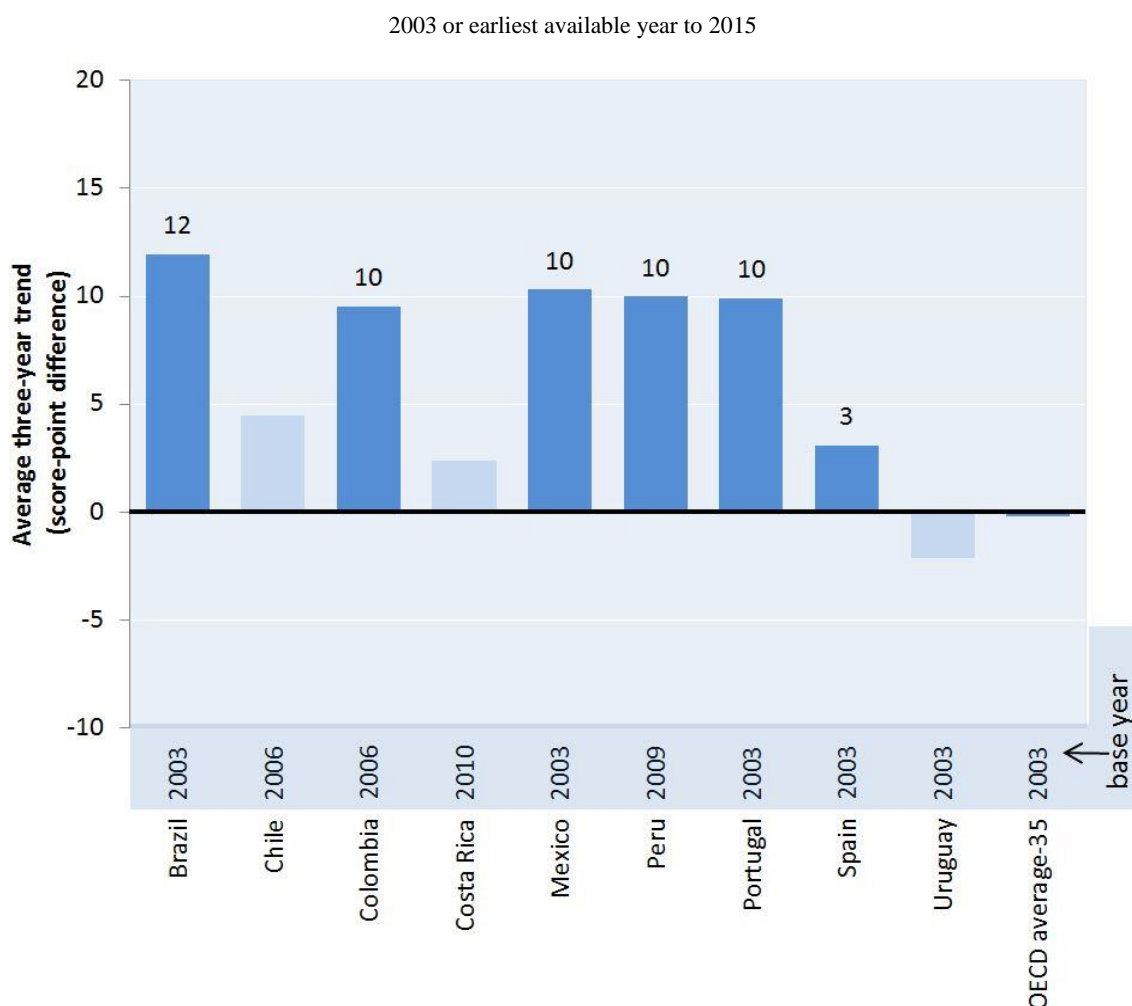
Source: OECD (2016a), *PISA 2015 Results (Volume I): Excellence and Equity in Education*, <http://dx.doi.org/10.1787/9789264266490-en>.

As noted earlier, several countries in Ibero-America have gone through rapid expansions of secondary enrolment during the recent period. This welcome expansion in education opportunities makes it more difficult to interpret how mean scores in PISA have changed over time.

Brazil, Colombia, Costa Rica, Mexico and Uruguay are the countries most affected by this expansion (Figure 2.2). Perhaps surprisingly, their experience shows that increases in access to schooling have not, in general, come at the expense of the average quality of education that 15-year-olds receive.

Even better, among countries in which PISA became, over time, more representative of the entire cohort of 15-year-olds, all but two (Costa Rica and Uruguay) saw significant improvements in the level of mathematics proficiency attained by the top quarter of 15-year-olds during the course of their participation in PISA (Chile also saw no significant improvement, but Chile's coverage rates remained stable over the period; see Figure 2.2). To show this, Figure 2.5 considers the top-performing 25% of the PISA age group. This sample of 15-year-olds is barely affected by changes in coverage rates over the period, and enables the rate of improvement in PISA performance to be monitored, regardless of such changes. This analysis shows that the minimum scores observed among this 25% of top-performing youth increased by about 10 points per three-year period in Brazil, Colombia, Mexico, Peru and Portugal, and by about 3 points per three-year period in Spain. This means that when more disadvantaged children gain access to education for the first time, the remaining students can also benefit.

**Figure 2.5. Linear trend in the minimum mathematics score attained by at least 25% of 15-year-olds**



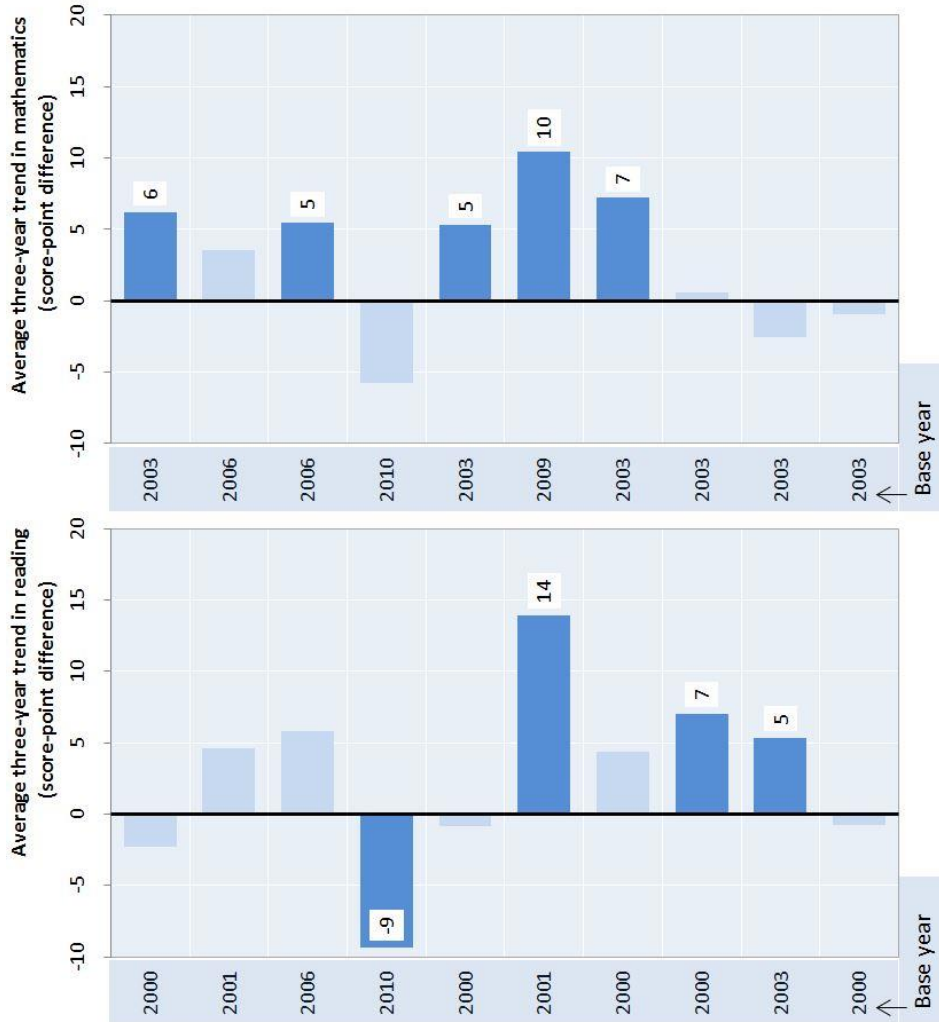
*Note:* Statistically significant trends are shown in a darker tone. Trends in mean performance in science, reading and mathematics. The average three-year trend is the average rate of change, per three-year period, between the earliest available measurement in PISA and PISA 2015.

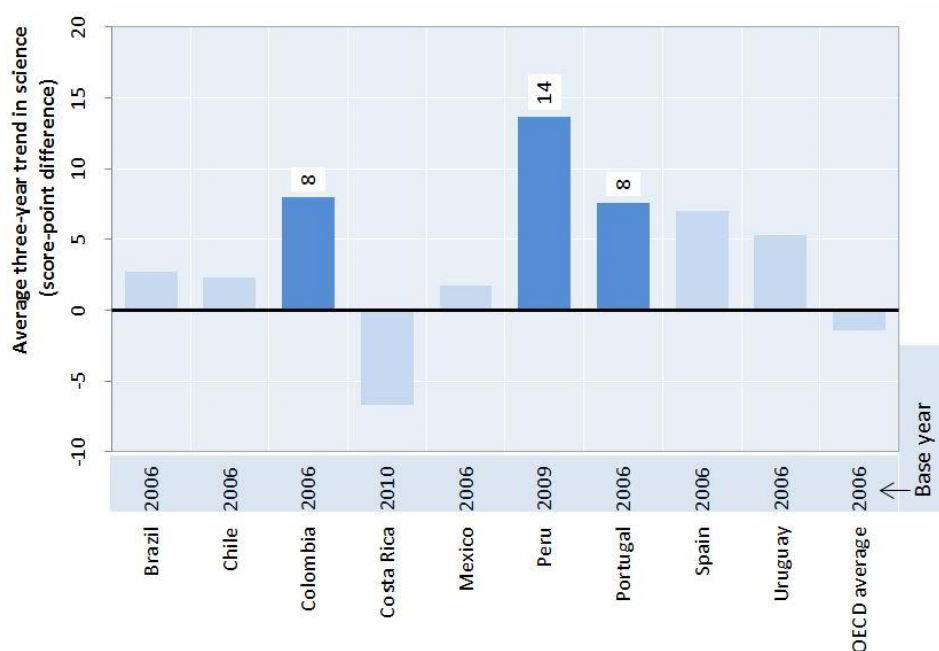
*Source:* OECD, PISA 2015 Database, Table I.5.4d, <http://dx.doi.org/10.1787/888933433203>.

Figure 2.6 shows the average three-year trend in mean science, reading and mathematics performance among students participating in PISA. On average across OECD countries, performance has remained stable in all three domains: a non-significant decline of about one point every three years was observed in science, reading, and mathematics. Among countries in Ibero-America, however, the trends are mostly positive. Colombia, Peru and Portugal have seen significant increases in mean performance across all three domains. In Brazil and Mexico, mathematics results improved, but science and reading results fluctuated around a stable value, while Chile showed significant improvements in reading. However, the improvements in Brazil, Chile and Mexico were mostly concentrated in the early PISA cycles; Brazil's PISA 2015 results in mathematics are in fact significantly below their 2012 values (OECD, 2016a: Table I.4.4a). Spain and Uruguay show non-significant trends in performance across all three domains, and only Costa Rica shows a decline in mean performance, limited to reading scores.

**Figure 2.6. Linear trend in mean science, reading and mathematics performance**

Rate of change per three-year period over a country's participation in PISA





*Note:* Statistically significant trends are shown in a darker tone. The average three-year trend is the average rate of change, per three-year period, between the earliest available measurement in PISA and PISA 2015.

*Source:* OECD, PISA 2015 Database, tables I.2.4a, <http://dx.doi.org/10.1787/888933433171>, I.4.4a, <http://dx.doi.org/10.1787/888933433195>, and I.5.4a <http://dx.doi.org/10.1787/888933433203>.

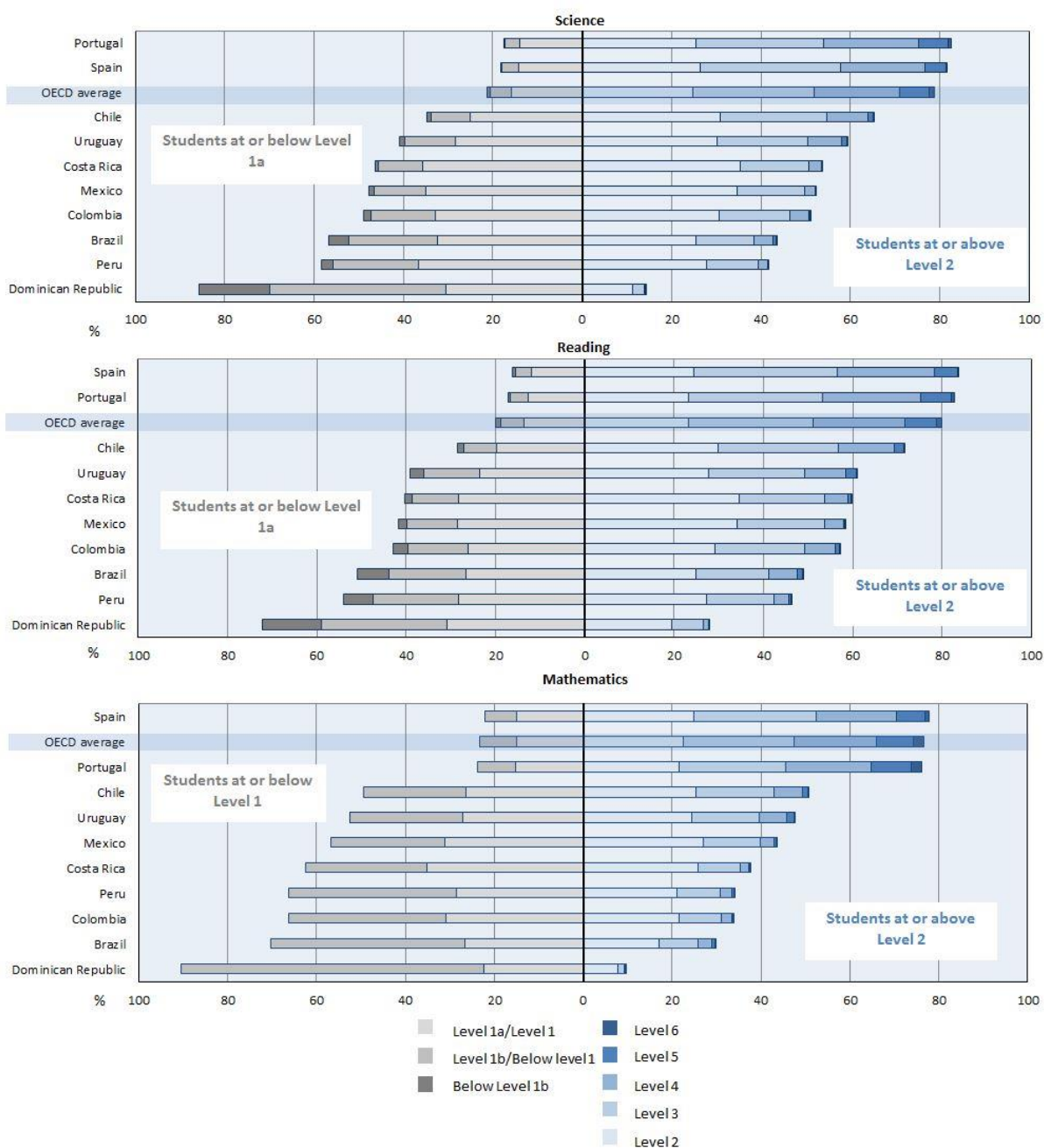
### ***Low performers in science, reading and mathematics***

An important indicator for monitoring countries' progress towards achieving Target 4.1 of SDG Goal 4 is the proportion of 15-year-olds who have achieved at least minimum proficiency level in reading, mathematics and science. The baseline levels of proficiency, defined above, can be used to monitor countries' success.

All Latin American countries have a high share of students performing below the baseline level of proficiency in all three subjects, ranging from 23% in Chile to over 70% in the Dominican Republic, and a low share of high-performing students reaching the highest levels of proficiency in at least one subject. Figure 2.7 ranks countries by the share of students above the baseline in each subject. In particular, it highlights that in several Latin American countries there are a high proportion of students who perform below the baseline in science and mathematics.



**Figure 2.7. Students’ proficiency in science, reading and mathematics**



*Note:* Countries and economies are ranked in descending order of the percentage of students who perform at or above Level 2.

*Source:* OECD, PISA 2015 Database, tables I.2.1a, <http://dx.doi.org/10.1787/888933433171>, I.4.1a <http://dx.doi.org/10.1787/888933433195> and I.5.1a. <http://dx.doi.org/10.1787/888933433203>.

PISA can also help describe the (limited) skills of low-performing students, and thereby highlight how far countries are from ensuring that schools are places of learning for all students. Students who perform at Level 1a in science can use common content and procedural knowledge to recognise or identify explanations of simple scientific

phenomena. With support, they can undertake a scientific enquiry with no more than two variables (e.g. an input and an output variable). They can identify simple causal or correlational relationships and interpret graphical and visual data that require a low level of cognitive ability. Students at Level 1a can select the best scientific explanation for given data in familiar contexts (OECD, 2017a).

Across OECD countries, 15.7% of students perform at Level 1a, and only 5.5% of students perform below it. In the Dominican Republic, in contrast, fewer than half of students (about 45%) attain Level 1a or more. And in Brazil, Colombia, Costa Rica, Mexico, Peru and Uruguay, the largest share of students performs at this level (Figure 2.7).

Students who perform at Level 1b in science can use common content knowledge to recognise aspects of simple scientific phenomena. They can identify simple patterns in data, recognise basic scientific terms and follow explicit instructions to carry out a scientific procedure (OECD, 2017a). While less than 5% of students in Spain and Portugal can be found at or below this level of proficiency, between 10% and 15% of students in Chile, Costa Rica, Uruguay and Mexico can at best engage with and solve science problems at this level of difficulty, as well as 16% of students in Colombia, 22% of students in Peru, 24% of students in Brazil and over 50% of students in the Dominican Republic (Figure 2.7).

Students who perform at Level 1a in reading can retrieve one or more independent pieces of information that are explicitly stated, identify the main theme or the author's intent in a text about a familiar topic, or make a simple connection by reflecting on the relationship between information in the text and common, everyday knowledge. The required information in the text is usually prominent and there is little, if any, competing information. The student is explicitly directed to the relevant factors to consider. This level identifies students who perform below the baseline in reading, but not too far from it (OECD, 2017a).

Across OECD countries, an average of 14% of students can solve Level 1a tasks in reading, but cannot solve tasks located above this level. Some 6.5% of students do not even attain Level 1a. In Brazil, the Dominican Republic and Peru, Level 1a is the modal proficiency level of students, meaning that a greater share of students performs at Level 1a than at any other proficiency level in PISA. Level 1a is the highest level of proficiency for about 12% of students in Spain, 13% in Portugal, 20% in Chile, 24% in Uruguay, and more than one-quarter of students in the remaining Latin American countries (Figure 2.7).

Some students perform even below Level 1a, however. At Level 1b, students can solve only the easiest tasks included in PISA assessments, such as retrieving a single piece of explicitly stated information, e.g. from the title of a simple, familiar text or from a simple list (OECD, 2017a). The share of students who are at best proficient at Level 1b is as high as 41% in the Dominican Republic, 26% in Peru and 25% in Brazil (Figure 2.7).

Students who perform at Level 1 in mathematics can answer mathematics questions involving familiar contexts where all the relevant information is present and the questions are clearly defined. They are able to carry out routine procedures – such as an arithmetic operation – according to direct instructions, in explicit situations (OECD, 2017a).

Students who perform below Level 1 may be able to perform direct and straightforward mathematical tasks such as reading a single value from a simple chart or table, where the labels used in the chart or table match the words in the question; but they are typically

unable to do arithmetic calculations that do not use whole numbers or if they are not given clear and well-defined instructions (OECD, 2017a).

Figure 2.7 highlights the severe difficulty many students in Ibero-America experience in situations that require mathematical problem-solving ability. While between 20% and 25% of students do not reach the baseline level of performance in mathematics in Portugal and Spain (similar to the average across OECD countries) and perform at Level 1 or below, 49% of students in Chile and more than 50% of students in the remaining Latin American countries perform at these levels, and are at best only able to perform routine tasks in well-defined situations, where the required action is almost always obvious.

### *Student performance in the different areas of science*

The PISA 2015 test had a major focus on science, which means that all students were assessed in science, and the test used a greater number of science questions than in the other domains, covering each aspect of the framework in sufficient detail to allow for an analysis of relative strengths and weaknesses within the broad domain of science.

The science framework in particular distinguishes between two types of science knowledge, which are required to engage successfully with scientific issues: content knowledge, and procedural and epistemic knowledge. Content knowledge is knowledge of the natural world and of technological artefacts, including the major facts, concepts and explanatory theories of science, and is typically required in order to explain phenomena scientifically. Procedural and epistemic knowledge is knowledge about how scientists produce new ideas, and about the nature and origin of scientific knowledge. The latter knowledge is important when students have to interpret data and evidence scientifically, evaluate alternative ways of conducting a scientific enquiry, or design such an enquiry themselves.

In general, countries in Ibero-America have relatively balanced profiles of performance across tasks requiring these two types of knowledge. In Costa Rica, however, students appeared to be slightly more successful at tasks requiring mainly content knowledge; whereas in Colombia and Peru, students had greater success at tasks requiring procedural knowledge than at tasks requiring content knowledge (OECD, 2016a: Figure I.2.30).

The science tasks included in PISA 2015 can also be divided into the major field of science to which they belong: physical systems (tasks related to chemistry or physics); living systems (tasks related to the life sciences); and the earth and space domain (tasks related to the earth sciences: geology, astronomy, meteorology and oceanography).

When comparing students' performance across these content domains, a striking commonality emerges between countries in Ibero-America: for all of them, the main strength of their students lies in the living systems domain (OECD, 2016a: Figure I.2.31). In particular, in all ten countries except the Dominican Republic (where performance is in any case the weakest among all the PISA participants), students' performance on physical systems tasks is clearly weaker than on living systems. In Costa Rica, Mexico, Portugal, Spain and Uruguay, performance on earth and space tasks is comparable to that on living systems, but it is weaker in the other countries. This may suggest that students in Ibero-American countries have greater familiarity with topics from the life sciences, perhaps because their curricula place greater emphasis on them in comparison to the emphasis they receive in other countries outside of Ibero-America.

### Box 2.5. Student performance in financial literacy

Four countries in Ibero-America took part in the optional assessment of financial literacy in 2015: Brazil, Chile, Peru and Spain. PISA defines financial literacy as “...knowledge and understanding of financial concepts and risks, and the skills, motivation and confidence to apply such knowledge and understanding in order to make effective decisions across a range of financial contexts, to improve the financial well-being of individuals and society, and to enable participation in economic life”.

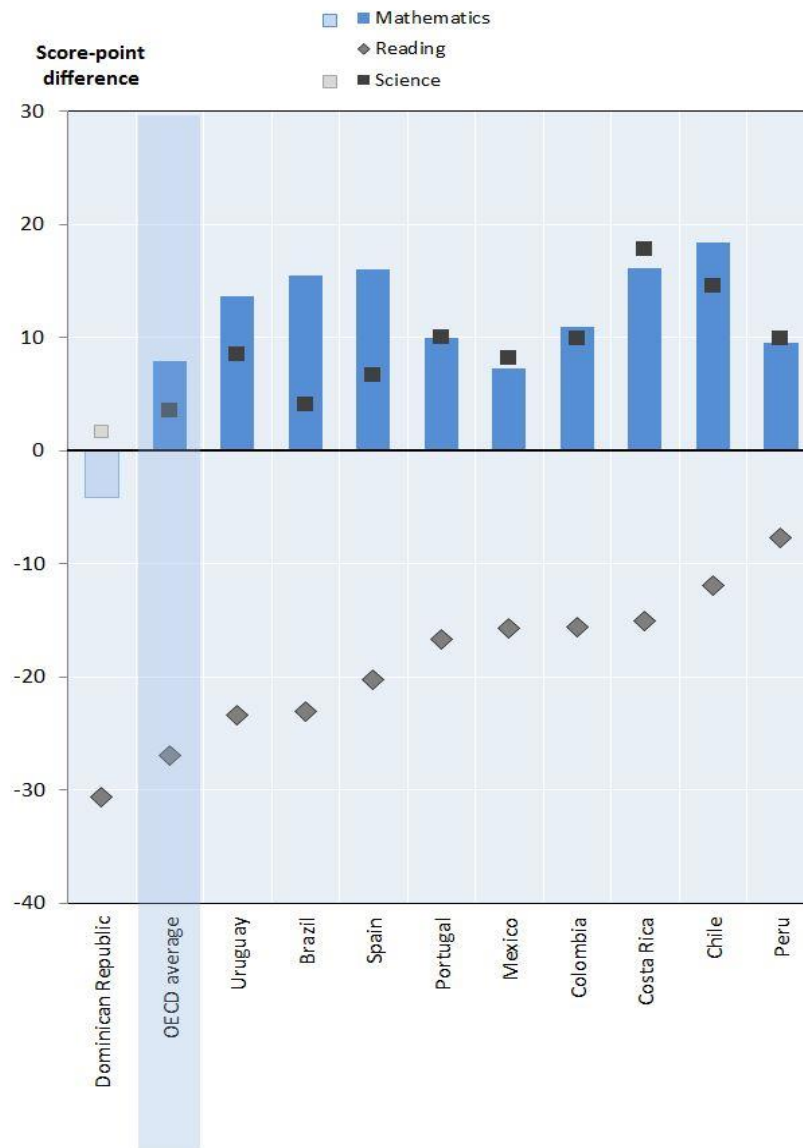
All four countries’ mean performance was below the OECD average: students in Spain scored, on average, 469 points, followed by Chile (432 points), Peru (403 points) and Brazil (393 points). Students in Brazil, Chile and Spain performed worse in financial literacy than students around the world who perform similarly in mathematics and reading; whereas students in Peru perform on par with the expected level of performance, based on their scores in reading and mathematics.

Source: OECD (n.d.), *Country Note: IberoAmérica*, [www.oecd.org/pisa/PISA-2105-Financial-Literacy-Iberoamerica.pdf](http://www.oecd.org/pisa/PISA-2105-Financial-Literacy-Iberoamerica.pdf).

## Gender and socio-economic gaps in reading, mathematics and science

### *Gender gaps in performance and attitudes towards science*

Figure 2.8 presents a summary of the differences between boys’ and girls’ performance in PISA across countries in Ibero-America. In all countries that participated in PISA, boys’ average reading performance is lower than that of girls. However in all ten Ibero-American countries analysed in this report, except the Dominican Republic, the gap is smaller than across OECD countries on average. The reading gap in favour of girls is particularly narrow in Peru. In mathematics, on the other hand, boys outperform girls by 8 score points on average for OECD countries, and four Ibero-American countries – Brazil, Chile, Costa Rica and Spain – have a gap, in favour of boys, of more than 15 score points. The gaps in science performance in favour of boys also tend to be larger in Ibero-America than the OECD average, with the highest gaps found in Chile (15 score points) and Costa Rica (18 score points).

**Figure 2.8. Gender differences in mathematics, reading and science performance**

*Note:* Statistically significant differences are marked in a darker tone. Countries and economies are ranked in ascending order of the mean score-point difference in reading between boys and girls.

*Source:* OECD, PISA 2015 Database, tables I.2.8a, <http://dx.doi.org/10.1787/888933433171>, I.4.8a <http://dx.doi.org/10.1787/888933433195> and I.5.8a. <http://dx.doi.org/10.1787/888933433203>.

Overall, Figure 2.8 shows that the relative performance of boys, compared to girls, tends to be higher in Ibero-America than across the OECD on average, with the exception of the Dominican Republic, where boys do no better than girls in science and mathematics, and score over 30 points below girls, on average, in reading. Peru is the only country, among all countries participating in PISA 2015, where the difference in mean scores between boys and girls is less than 10 points across all 3 subjects.

Girl's relatively poor science and mathematics performance, compared to boys, in Ibero-America, is compounded by gender differences in attitudes towards mathematics that are often to the girls' disadvantage (OECD, 2015). As is the case in most countries participating in PISA, girls in Ibero-American countries report greater levels of anxiety than boys when doing mathematics and lower confidence in their ability to successfully solve mathematics problems. Such negative feelings, which often originate in stereotypes about "masculine" and "feminine" subjects, can discourage young women who are capable and interested in mathematics or science from envisaging a number of careers in science, technology or engineering. Often, the first step in helping girls achieve their full potential in mathematics and science is to change their mindset about these subjects, to break the vicious cycle between negative feelings and underperformance.

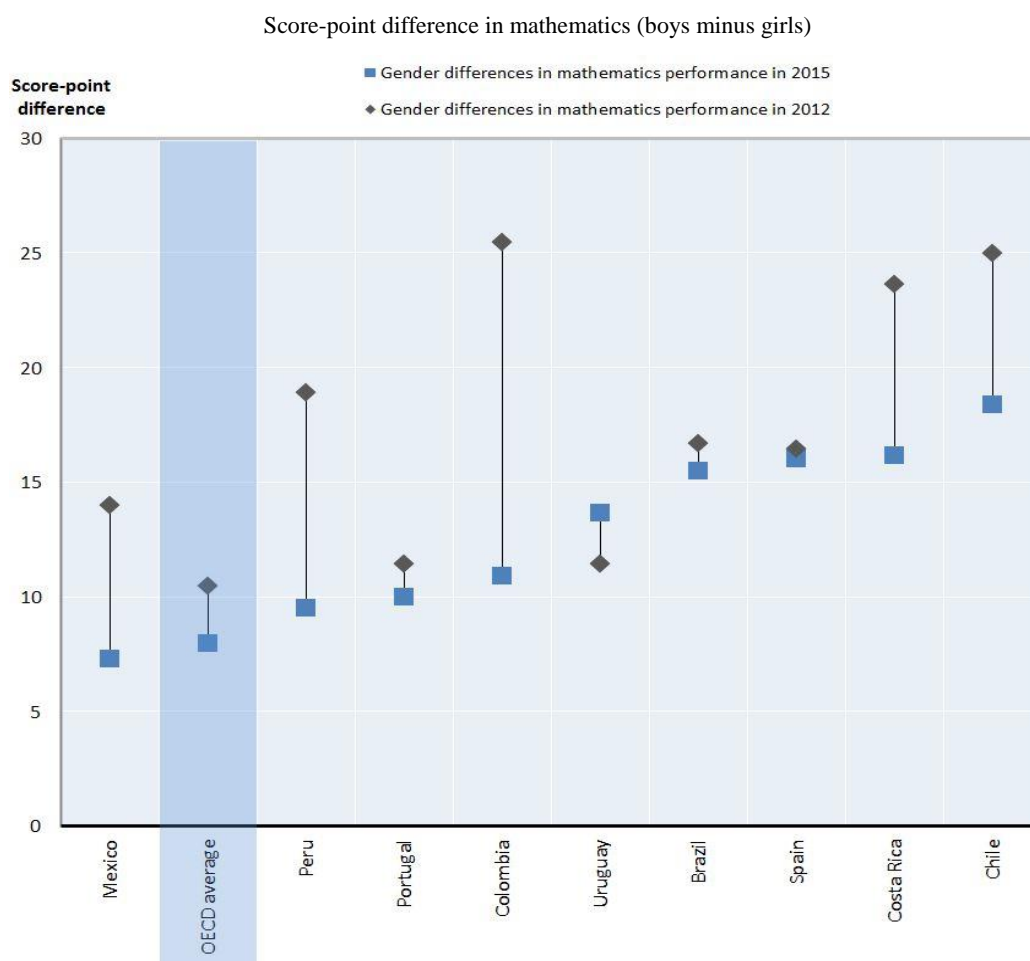
### *Trends in gender gaps*

In mathematics, PISA has consistently found a gap in favour of boys across OECD countries on average; the average gap remained stable between 2012 and 2015. Countries in Ibero-America have often had larger-than-average gaps in this domain but the mathematics gender gap narrowed significantly in Colombia between 2012 and 2015. In 2012, Colombia had the largest gap in favour of boys of all the PISA-participating countries, and was able to reduce this gap considerably, by raising the performance level of girls and bringing it closer to that of boys (OECD, 2016a: Figure I.5.11). By 2015, the gap between boys and girls in Colombia was close to the average gap observed across OECD countries. The gap in favour of boys also narrowed significantly in Mexico, but for a different reason: performance declined among boys, but not among girls (Figure 2.9).

As noted above, in reading, PISA has always found a gap in favour of girls in all countries, although the gaps in Ibero-America tend to be smaller-than-average.

Between PISA 2009 and PISA 2015, the gender gap in reading narrowed by 12 points on average across OECD countries, as a result of a positive trend among boys, and a negative trend among girls. While some countries in Ibero-America also saw girls' advantage in reading shrink between 2009 and 2015 – most notably Portugal (21 score points), Uruguay (18 score points), Peru (14 score points), Spain and Mexico (9 score points) – the gap remained stable in Chile, Colombia, Costa Rica and Brazil (OECD, 2016a: Figure I.4.11).

Of all three domains, gender differences tend to be narrowest in science. But between 2006 and 2015 a significant gap in favour of boys emerged in Uruguay, where there was none before. In all other countries in Ibero-America, the gender gap in science – or its absence – did not change significantly between 2006 and 2015.

**Figure 2.9. Change in gender differences in mathematics, 2012-15**

*Note:* All gender differences are statistically significantly different from zero. Statistically significant changes between PISA 2012 and PISA 2015 are shown next to the country/economy name. Only countries and economies that participated in both PISA 2012 and 2015 are shown. Countries and economies are ranked in ascending order of gender differences in 2015.

*Source:* OECD, PISA 2015 Database, tables I.5.8a, I.5.8c and I.5.8e, <http://dx.doi.org/10.1787/888933433203>

### *Socio-economic inequalities in science performance*

Socio-economic inclusion and fairness requires that all children have access to educational opportunities that lead to effective learning outcomes, irrespective of their parents' wealth, education or occupation. Thanks to detailed information about the background of participating students, PISA can measure socio-economic inclusion and fairness among the student population; however, this represents only a partial description of inclusion and fairness in education – equity within the system. Full analysis would also require information about those 15-year-olds who are not covered by PISA samples – equity in access to the system.

The equity of education systems with respect to students from different socio-economic backgrounds can be examined through different statistical aspects of the relationship between students' performance in PISA and a continuous indicator of students' socio-economic status. To simplify the exposition, and because this relationship is very similar

for all domains assessed in PISA, this chapter only examines the relationship between science performance and the PISA index of economic, social and cultural status (see Box 2.2).

Three aspects of the relationship between socio-economic status and performance deserve particular attention: the *level*, the *slope* and the *strength* of the relationship. The level indicates whether the performance of students in a particular country or education system is higher or lower than that of students in other countries facing similar socio-economic conditions. The slope indicates to what extent students with more advantaged socio-economic backgrounds perform better than disadvantaged students, within each country on average. The strength indicates how small the chances are for disadvantaged students to perform as well as more advantaged students. Higher levels are related to greater inclusiveness, while mild slopes and weak relationships are related to greater fairness. Box 2.6 and Figure 2.11 show the average relationship between socio-economic status and performance across OECD countries, and illustrate the level, the slope and the strength graphically.

**Table 2.2. Main indicators of socio-economic equity in education**

Equity in education						For reference:
Mean performance at different levels of ESCS: <sup>1</sup>			Fairness			Percentage of 15-year-olds covered by PISA in 2015
Students whose ESCS <sup>1</sup> value is at the OECD average	Students whose ESCS <sup>1</sup> value is in the lowest international decile	Students whose ESCS <sup>1</sup> value is in the highest international decile	Percentage of variation in science performance explained by students' socio-economic status	Score-point difference in mean science performance associated with a one-unit increase in the ESCS <sup>1</sup>		
Mean score	Mean score	Mean score	%	Score dif.	%	
OECD average	494	388	546	13	38	
Portugal	514	435	561	15	31	87.6
Spain	507	416	541	13	27	90.9
Chile	463	371	516	17	32	79.8
Uruguay	460	389	515	16	32	71.5
Costa Rica	439	376	482	16	24	63.5
Colombia	442	382	506	14	27	74.6
Mexico	440	382	474	11	19	61.7
Brazil	428	360	491	12	27	70.7
Peru	429	343	473	22	30	74.4
Dominican Republic	354	296	416	13	25	68.5

*Note:* 1. ESCS refers to the PISA index of economic, social and cultural status. Countries and economies are ranked in descending order of the mean score in science for students with a value of 0 on the PISA index of economic, social and cultural status. Cells shaded in dark blue indicate higher quality or equity than the OECD average. Cells shaded in grey indicate lower quality or equity than the OECD average.

*Source:* OECD, PISA 2015 Database, [www.oecd.org/pisa/data/2015database/](http://www.oecd.org/pisa/data/2015database/).

Table 2.2 shows the main indicators of socio-economic equity in science performance for the ten countries examined in this chapter.

The mean performance of students at different levels of the PISA ESCS index shows that students in Portugal and Spain tend to do better than students across OECD countries with similar socio-economic resources, (except for students in the highest deciles of socio-economic status in Spain). In several Latin American countries, the performance of their most disadvantaged students is, in fact, in line with similarly disadvantaged students



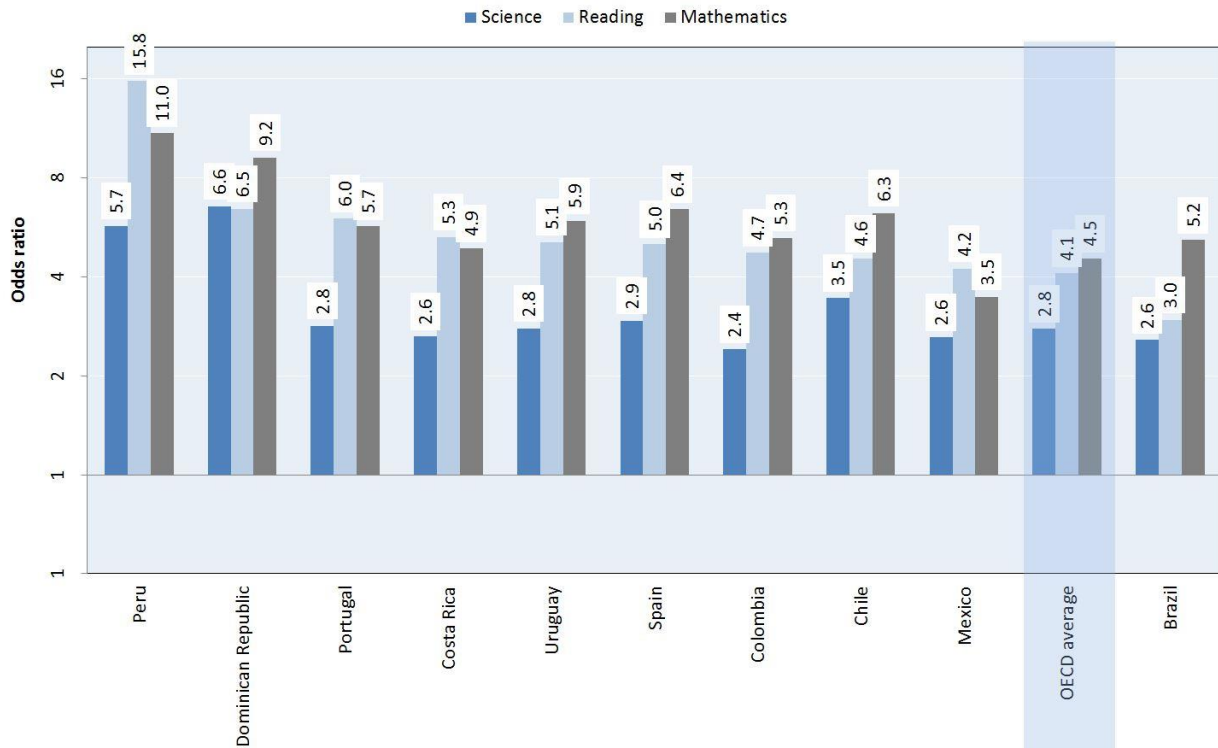
across OECD countries, but their most advantaged students systematically perform below similarly advantaged students across OECD countries. In Brazil, Peru and the Dominican Republic, however, performance lies below the performance achieved by similar students in OECD countries at all levels of socio-economic status.

When examining the inequality in learning outcomes through the two indicators of socio-economic fairness, countries in Ibero-America stand out as having relatively mild slopes, meaning that socio-economic status is associated with smaller differences in mean performance than across OECD countries on average. At the same time, the relationship between socio-economic status and performance is at least as strong as on average across OECD countries, and, in the case of Chile, Peru and Uruguay, significantly stronger. The strong relationship but mild slope, implies that while the outcomes of advantaged and disadvantaged students do not differ as much as in other countries, the chances of achieving good outcomes remain relatively low for disadvantaged students, compared to their more advantaged peers.

Comparing the relationship between socio-economic advantage and high and low performance further shows that in all Latin American countries except Chile, the relationship is steeper for high performance than low performance. This indicates that socio-economic status dampens disadvantaged students' chances of achieving at high levels to a greater extent than it protects advantaged students from relatively low levels of performance (OECD, 2016a: Table I.6.5).

Still, the chances of students achieving a baseline level of performance in science, reading or mathematics is generally much less likely for disadvantaged students than the rest. Figure 2.10 compares the odds of reaching a baseline level of performance for the 25% of students with the lowest socio-economic status in each country to the odds for the remaining 75% of students. In the Dominican Republic (where only a small minority of students reach this baseline level in any domain), the 25% most disadvantaged students are more than six times more likely to perform below the baseline in all domains. In Peru, disadvantaged students are about 15 times more likely than the rest to perform at the lowest levels of proficiency in reading, and also face a disproportionate risk of low performance in the remaining domains.

**Figure 2.10. Likelihood of low performance among disadvantaged students, relative to non-disadvantaged students**



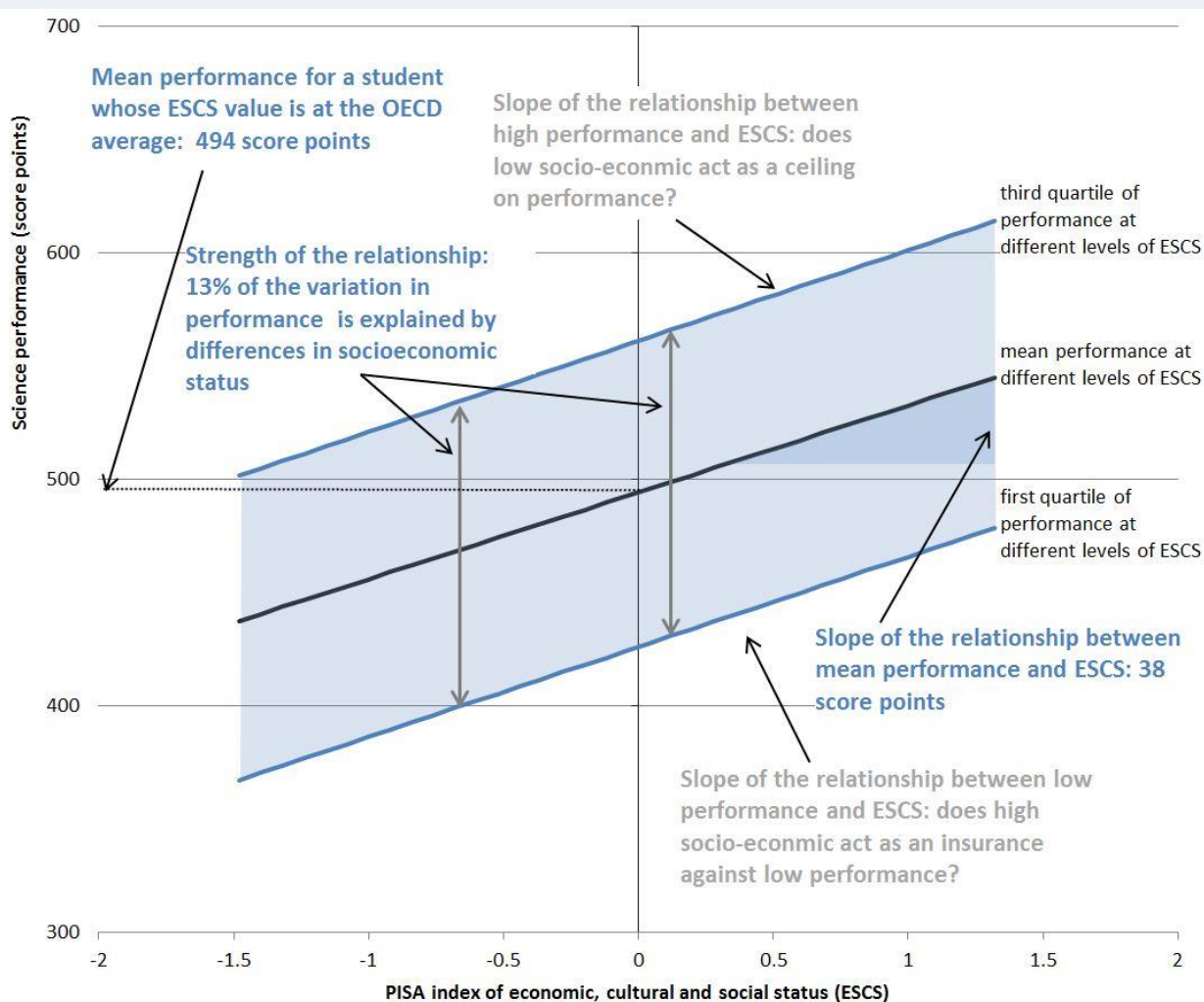
*Note:* All odds ratios are statistically significantly different from 1. The vertical axis is a logarithmic scale. A socio-economically disadvantaged student is a student in the bottom quarter of the distribution of the PISA index of economic, social and cultural status (ESCS) within his or her each country/economy. Countries and economies are ranked in descending order of the likelihood that students in the bottom quarter of ESCS score below Level 2 in reading, relative to non-disadvantaged students.

*Source:* OECD, PISA 2015 Database, Table I.6.6a-c, <http://dx.doi.org/10.1787/888933433214>.

**Box 2.6. A graphical representation of the indicators of socio-economic inclusion and fairness**

Figure 2.11 shows the relationship between the PISA index of economic, social and cultural status for OECD countries on average, and highlights the various indicators of inclusion and fairness that are examined in this chapter.

**Figure 2.11. Students' socio-economic status and science performance across OECD countries**



Source: OECD, PISA 2015 Database, tables I.6.2a, I.6.4a and I.6.5, <http://dx.doi.org/10.1787/888933433214>.

The black curve in the middle represents the average performance observed at different levels of socio-economic status. By comparing the vertical position of the curve across countries, e.g. at a value of zero on the PISA index of economic, social and cultural status (the international average), it is possible to identify differences in performance, after taking account of students' socio-economic status; this constitutes an indicator of inclusion.

The slope of this curve indicates how much, on average, the performance of students with higher socio-economic status lies above that of students with lower socio-economic status. The slope thus indicates the extent of inequality attributable to socio-economic status. Steep slopes indicate greater inequality, while more gradual slopes less inequality. The slope of this curve may also change across the continuum of socio-economic status, indicating that certain levels of socio-economic status are more related to performance differences than others. In this section, however, we focus on the average slope as an indicator of equity.

The blue curves above and below the black curve, on the other hand, represent the area within which the 50% of the students who score closest to the average can be found, for any level of socio-economic status: they correspond to the highest quartile and lowest quartile of performance for different levels of socio-economic status. An important indicator of equity is related to both the slope of the average relationship and the distance between these two lines: for a given slope, the closer the two blue lines are to each other, the stronger the relationship between socio-economic status and performance. Technically, the strength of the relationship is measured by the share of variation in performance that is explained by the PISA index of economic, social and cultural status. If the relationship between social background and performance is weak, then factors other than socio-economic status are likely to have greater bearing on student achievement. In contrast, when the relationship is strong, socio-economic status is highly predictive of the performance that students can achieve in a system.

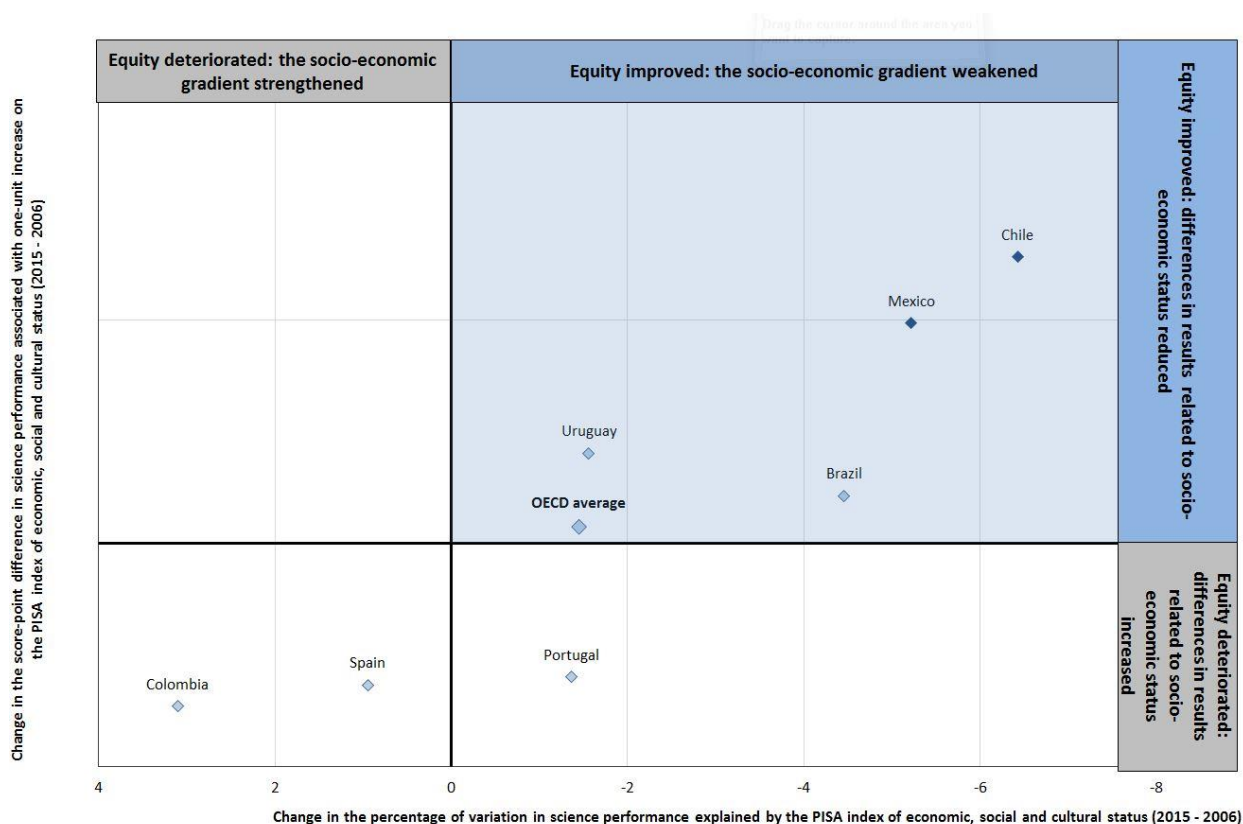
Just as the slope may vary at different levels of socio-economic status, so may the distance between the upper and lower quartile. When the upper curve has a steeper slope than the lower curve, this may indicate that socio-economic disadvantage acts mainly as a ceiling on students' achievement, but that socio-economic advantage is no insurance against low achievement. If, on the contrary, the upper curve is less steep than the lower curve, and the variation in outcomes diminishes with socio-economic status, this may indicate that socio-economic advantage represents mainly an insurance against poor outcomes (relative to the country average), but that a significant fraction of disadvantaged students achieve at high levels despite their disadvantage.

### *Trends in equity in education*

Trends in equity can be analysed by comparing key indicators of fairness between 2006 and 2015, thereby restricting the comparisons to years in which science was the major domain assessed in PISA, and to countries that participated in both assessments. By comparing these trends to the changes observed over the period in science performance, it is possible to identify whether trends in equity are commensurate with trends in performance.

In 2006, on average across OECD countries, 14.4% of the variation in students' science performance could be explained by students' socio-economic status (the strength of the socio-economic gradient). A one-unit change in the PISA index of economic, social and cultural status (ESCS) was associated with a difference in science performance of 39 score points (the slope of the socio-economic gradient). By 2015, the degree to which students' socio-economic status predicted performance in science decreased to 12.9% – a drop of 1.4 percentage points – while the difference in performance between students who were one unit apart on the ESCS index decreased to 38 score points – a non-significant change (Figure 2.12).

Figure 2.12. Change in the strength and slope of the socio-economic gradient, 2006-15



Note: Only countries and economies with available data are shown. Changes in both indicators of equity that are statistically significant are indicated in a darker tone.

Source: OECD, PISA 2015 Database, Table I.6.17, <http://dx.doi.org/10.1787/888933433214>.

Among the Ibero-American countries that have participated in PISA since at least 2006, Portugal and Colombia saw improvements in mean science scores between 2006 and 2015: they raised the average level of proficiency achieved by their students. Neither of these two countries, however, saw any significant reduction in the difference between advantaged and disadvantaged students, or the strength with which socio-economic status determines the outcomes (Figure 2.12). This does not mean that disadvantaged students did not benefit from improvements in education but rather that they benefitted no more, and no less, on average, than their more advantaged peers.

Brazil, Chile and Mexico, on the other hand, saw a non-significant improvement in average science performance between 2006 and 2015 (Figure 2.12). The improvement in Chile and Mexico appears to be concentrated among more disadvantaged students: over the period, the strength with which results are determined by socio-economic status declined significantly, as did the difference in results between advantaged and disadvantaged students. In Brazil, the strength with which socio-economic status determines results also declined, indicating more equally distributed chances of success, but the average difference between more and less advantaged students remained stable.

Spain also saw a non-significant improvement in average science performance; but the score-point difference between more and less advantaged students increased, indicating that improvements were greater for more advantaged students (Figure 2.12). Meanwhile,

the strength of the association between socio-economic background and performance remained stable.

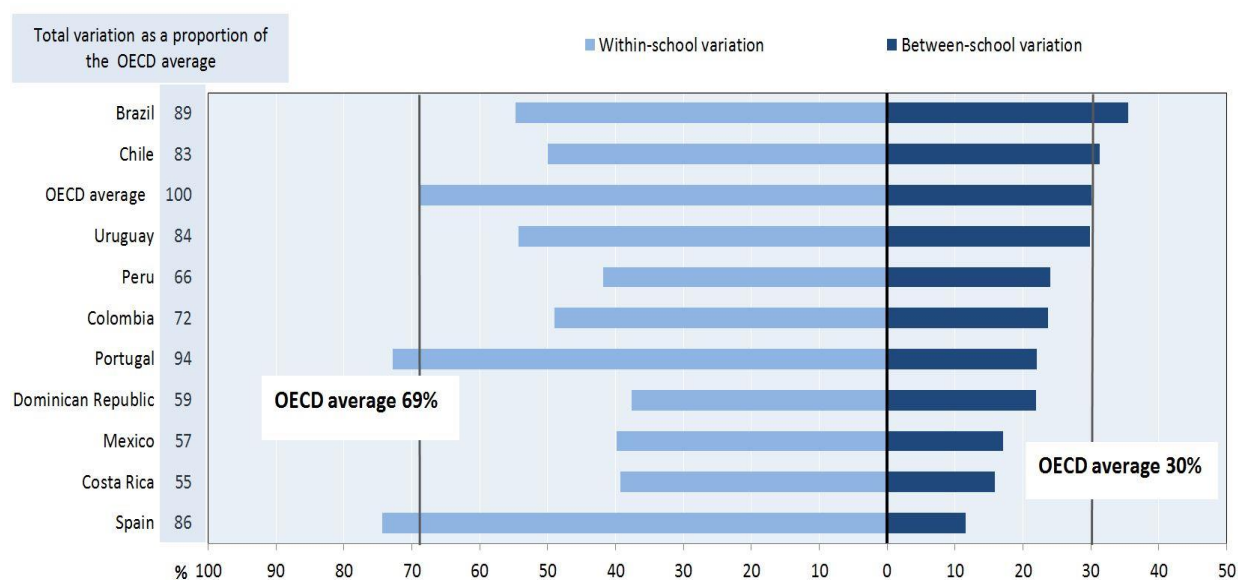
In Uruguay, both performance and equity remained unchanged between 2006 and 2015 (Figure 2.12). Trends in equity are not available for Costa Rica, the Dominican Republic and Peru, as they did not participate in PISA 2006.

### *Variation in performance between schools*

Ensuring consistently high standards across schools is a formidable challenge for any school system. Some performance differences between schools may be related to the socio-economic composition of the school's student population or other characteristics of the student body. When there are strong disparities in the home and community resources available to different schools, they face an unequal task in ensuring that all students have the same opportunities for success. Such disparities may be related to residential segregation, based on income or on cultural or ethnic background; they can also be related to the design of school systems and system-level education policies, such as differences in the degree of autonomy granted to schools, and to policies emphasising greater competition for students among schools and greater school choice (Hsieh and Urquiola, 2006; Söderström and Uusitalo, 2010).

Figure 2.13 represents the variation in student performance in science between and within schools. The overall length of the bar represents the total variation in that country as a proportion of the OECD average level of variation in performance. The dark part of the bar represents the proportion of those differences that is observed between schools, and the light part of the bar represents the proportion observed within schools.

**Figure 2.13. Variation in science performance between and within schools**



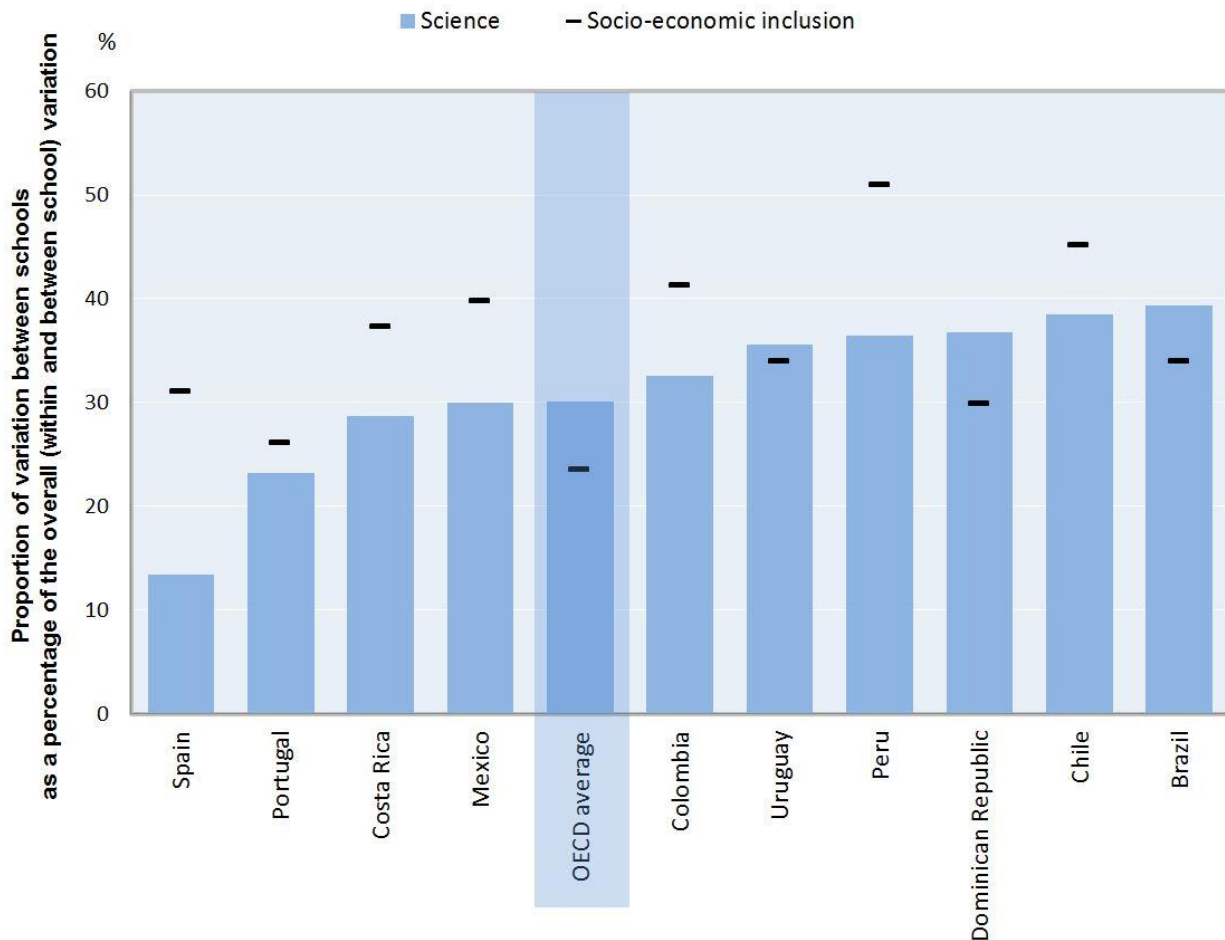
*Note:* Countries and economies are ranked in descending order of the between-school variation in science performance, as a percentage of the total variation across OECD countries.

*Source:* OECD, PISA 2015 Database, Table I.6.9, <http://dx.doi.org/10.1787/888933433214>.

Figure 2.13 shows that all countries in Ibero-America except Portugal are characterised by low overall variation in students' results. It also shows, however, that, in the case of Brazil, Chile and Peru in particular, the variation is largely due to differences in performance between schools. As a consequence, in these three countries, it is often sufficient to know what school students attend to form a relatively accurate prediction of their performance levels. Comprehensive education systems – those which do not sort students by programme or school based on ability – often tend to have small between-school variations in performance. However, in the case of Latin American countries, the between-school variation may not be related to the existence of different tracks or pathways through education for students of different ability, but rather to the socio-economically segregated nature of their societies.

Figure 2.14 shows the between-school variation as a proportion of the overall variation, both for students' achievement in science and for students' socio-economic status. The height of the bars can be interpreted as a measure of how strong the associations are between school and performance, while the symbols indicate how strongly schools are associated with differences in socio-economic status. Schools appear more strongly associated with socio-economic status than on average across OECD countries in all countries in Ibero-America, except Portugal. This means that in Ibero-America, students tend to attend schools in which their fellow students are mostly from a similar socio-economic background: relatively advantaged, for advantaged students, and relatively disadvantaged, for disadvantaged students. What is more, across OECD countries, on average, schools appear more strongly associated with their students' results than with their socio-economic resources. But the opposite is true in many countries in Ibero-America, and most notably in Chile, Colombia, Costa Rica, Mexico, Peru and Spain.

It is no surprise then that the main channel through which socio-economic disadvantage relates to students' results is through school-level associations; within each school, socio-economic advantage or disadvantage only has a minor association with performance. This has important implications for how to target resources in order to improve equity in the system: in particular, by compensating schools, rather than students, for socio-economic disadvantage, countries can still achieve a good match between transfers and needs (good targeting) while avoiding some problems (such as stigma, limited take-up and administrative costs) that are typically associated with more individualised policies.

**Figure 2.14. Between-school differences in science performance and socio-economic status**

*Note:* Countries and economies are ranked in ascending order of the proportion of variation in problem-solving performance that lies between schools.

*Source:* OECD, PISA 2012 Database, Table V.2.4, <http://dx.doi.org/10.1787/888933003668>.

### The school learning environment and how it contributes to (in)equity

Effective schools often differ from ineffective ones by providing an orderly, supportive and positive environment, both inside and outside the classroom that is conducive to learning (Jennings and Greenberg, 2009). In effective schools, both students and teachers value academic activities and student performance, and students rarely miss learning opportunities (Cooper, 1993; Scheerens and Bosker, 1997; Sammons, 1999). While individual teachers can create a classroom environment that is conducive to learning, it is the wider responsibility of school administrators and of the wider community and policy context to ensure that students are protected from threats to their physical and psychological well-being and thrive in an environment in which positive behaviour is valued and encouraged.

However, the PISA data consistently show that the learning environments differ in several respects between the most advantaged and the most disadvantaged schools (OECD, 2016b: Chapter 3, 2017c: Chapter 8).



This section compares the school learning environment of advantaged and disadvantaged schools within each country in Ibero-America using the following dimensions: the prevalence of bullying; the proportion of students who skipped entire days of schools in the two weeks prior to the PISA test; the disciplinary climate in science classes; principal reports on the extent to which instances of negative behaviour by students (such as truancy or bullying) hinder learning; principal reports on the extent to which instances of negative behaviour by teachers (such as absenteeism) hinder learning; the school efforts to involve parents, as reported by principals; and the extent to which parents themselves report being involved in school-related activities (available only in Chile, the Dominican Republic, Mexico, Portugal and Spain).

In all countries in Ibero-America, the school learning environment appears to differ significantly on one or more of these dimensions between schools serving more advantaged children and schools serving mostly disadvantaged children. In particular, in all countries except Peru, the prevalence of student absenteeism is significantly higher in disadvantaged schools than in the most advantaged schools (Table 2.3).

**Table 2.3. The school learning environment, by schools' socio-economic profile**

Difference between advantaged and disadvantaged schools in the following aspects of the learning environment:							
Aspects reported by students:				Aspects reported by principals			Aspects reported by parents:
	Index of exposure to bullying	Share of students who skipped a day of school over a two-week period	Disciplinary climate in science lessons	Index of student behaviours hindering learning	Index of teacher behaviours hindering learning	Index of school efforts to involve parents	Index of parental involvement in school-related activities
Brazil							n.a.
Chile							
Colombia							
Costa Rica							n.a.
Dominican Republic							
Mexico							
Peru							n.a.
Portugal							
Spain							
Uruguay							n.a.

*Note:* Cells shaded in grey indicate that the learning environment in disadvantaged school is worse than in advantaged schools. Cells shaded in blue indicate that the learning environment in disadvantaged school is better compared to advantaged schools. n.a.= not available. Disadvantaged schools are the schools whose socio-economic profile, indicated by the school average index of economic, cultural and social status, is among the lowest 25% of schools in the country. Advantaged schools are among the 25% of schools with the highest socio-economic profile. Countries are ranked in alphabetical order.

*Source:* OECD, PISA 2015 Database, tables III.8.6 <http://dx.doi.org/10.1787/888933471711>, II.3.4, II.3.11, II.3.15, II.3.20, II.3.27 and II.3.31 <http://dx.doi.org/10.1787/888933436489>.

In addition, the following significant differences emerge from Table 2.3:

- In Brazil, Chile and Uruguay, students in disadvantaged schools report a significantly worse disciplinary climate in science lessons than students in advantaged schools; and principals of disadvantaged schools report student and teacher behaviour that hinders learning to a greater extent than in advantaged schools.

- In Colombia and the Dominican Republic, principals of disadvantaged schools report student behaviour that hinders learning to a greater extent than in advantaged schools. In addition, parents in disadvantaged schools in the Dominican Republic report participating less in school-related activities than parents in more advantaged schools.
- In Mexico and Portugal, the prevalence of bullying is higher in disadvantaged schools than in more advantaged schools. Schools whose students are most disadvantaged report fewer efforts to involve parents, and parents themselves report having participated less in school-related activities than parents in more advantaged schools. In Portugal, principals of disadvantaged schools also report student behaviour that hinders learning to a greater extent than in advantaged schools.
- In Peru, the prevalence of bullying is higher in disadvantaged schools than in more advantaged schools. Principals of disadvantaged schools report student and teacher behaviour that hinders learning to a greater extent than in advantaged schools. Principals also report fewer efforts to involve parents than their peers in more advantaged schools.
- In Spain, principals of disadvantaged schools report teacher behaviour that hinders learning to a greater extent than in advantaged schools.

For policy makers and school administrators, raising the level of performance of children who have accumulated several disadvantages before they even enter schools can appear a daunting task. But the differences highlighted here show that the students who lack important family and community resources often also experience a disciplinary climate in their schools that deprives them of crucial opportunities to learn and an environment that supports them less than more advantaged students. It is this double disadvantage that puts their chances of overcoming adversity in jeopardy. By relentlessly fighting problematic behaviour that hinders learning at school, and supporting every student's learning regardless of their background, principals and teachers can help create the conditions for more equitable societies.

## Conclusions

This chapter has highlighted some of the most important challenges that the Ibero-American region faces to improve the skills of its young citizens. The most significant challenge is represented by the large numbers of young people who leave the education system without basic skills in reading, mathematics or science: 2.5 million students in the Ibero-American region taking the 2015 Programme for International Student Assessment (PISA) were not able to complete even the most basic reading, mathematics or science tasks – and this figure does not include the significant share of 15-year-olds no longer in school in these countries.

The early 2000s saw some significant progress towards better learning outcomes for youth: the expansion of enrolment in secondary education over the past decades, for example, has been particularly strong in Brazil and Mexico. And despite this expansion (which other countries in the region have also achieved), the level of mathematics proficiency attained by the more privileged 15-year-olds has not suffered, and in many cases, slowly improved.

But much remains to be done. Without decisive action, underperformance in PISA represents a major threat to social cohesion, as these countries undergo significant

transformations towards economies where knowledge and skills are the most valuable assets on the labour market.

This challenge is compounded by strong socio-economic inequalities, particularly in Chile, Peru and Uruguay. The inequitable outcomes of students, depending on their families' socio-economic status, often appear to be ingrained in the segregated nature of schools and neighbourhoods in Ibero-America. Ensuring consistently high standards across schools is a formidable challenge for any school system; it is even more so in Ibero-America, where students tend to attend schools in which their fellow students are mostly from a similar socio-economic background. Unfortunately, the most recent PISA data consistently show that the learning environments in Ibero-America differ in several respects between the most advantaged and the most disadvantaged schools, to the detriment of socio-economically disadvantaged students. For these students, the lack of family and community resources is therefore compounded by a failure of schools and the system to provide the conditions that would enable better learning. To break the circle of disadvantage and underperformance, countries in the region should do better at aligning resources with needs, and ensure that measures to compensate schools for socio-economic disadvantage effectively create opportunities for all. Chapters 3 and 5 in this report highlight the most significant resources for educational success and provide concrete examples of proven and promising policies across the OECD to tackle the twin challenges of underperformance and inequity.

## Annex 2.A. Interpreting trends in performance in PISA

### Comparing PISA results over time

The methodologies underpinning the analysis of performance trends in international studies of education are explained, in detail, in the report with *PISA 2015 Results* (OECD, 2016a). In order to ensure the comparability of successive PISA results, a number of conditions must be met:

- First, successive assessments must include a sufficient number of common assessment items so that results can be reported on a common scale.
- Second, the sample of students in successive assessments must be equally representative of the target population, and only results from samples that meet the strict standards set by PISA can be compared over time. Even when PISA samples accurately reflect the target population (that of 15-year-olds enrolled in Grade 7 and above), changes in enrolment rates and demographics can affect the interpretation of trends. To distinguish between changes that affect equivalent populations and changes related to the composition of the target population, adjusted trends that account for population changes are presented in addition to the basic measure of performance change across PISA samples.
- Third, the assessment conditions must be sufficiently similar across time so that performance on the test reflects the same underlying proficiency in a domain. Ensuring the equivalence of trend items across time is particularly important in the context of PISA 2015, when most countries and economies that participated in the assessment conducted the test on computers.
- Fourth, the same reporting scale must be used to report student proficiency. In PISA, the reporting scale is re-estimated in each cycle, and then equated to the scale constructed the first time a domain became the major domain. The uncertainty associated with equating scales is included when computing the significance of changes or trend estimates.

### Sources of uncertainty in trend analyses

PISA aims to measure, at each point in time, the knowledge and skills that are required to participate fully in society and the economy. Because these evolve slowly over time, every nine years PISA revisits the framework and the instruments used to measure the domains of reading, mathematics and science. This periodic revision of frameworks and instruments also provides an opportunity to align PISA with new developments in assessment techniques and with the latest understanding of the cognitive processes underlying proficiency in each domain.

The PISA 2015 assessment coincided with the development of an updated framework for science, the major domain, and with the development of new items to capture all aspects of this updated framework. The existing items (trend items) used in PISA 2006, 2009 and 2012 were also reviewed against this updated framework.

A major novelty of the PISA 2015 assessment was also the computerised delivery of the assessment. For the first time in 2015, 57 countries and economies conducted the PISA assessment on computers (including all OECD countries and all Latin American countries participating in PISA except Argentina). An international linking study was conducted as part of the PISA 2015 field trial to identify those items that could support the link between paper and computer tests.

In addition, to reflect the move to computer-based testing, align PISA with progress in scaling methodologies and take advantage of increased computational power, changes were also made to the test design, administration and scaling (how students translate into a comparable score across students taking different tests). The *PISA 2015 Technical Report* (OECD, 2017b) and Annex A5 of *PISA 2015 Results (Volume I)* (OECD, 2016a) explain these changes in detail.

Among the changes in scaling methodology, PISA 2015 introduced a new treatment of missing responses at the end of the test (so-called “non-reached items”; see below). This and other changes in scaling methodologies, test design and test administration introduce an uncertainty about trend comparisons that has to be taken into account when comparing results over time. In particular, the link error quantifies the uncertainty around the comparability of PISA scores across time. All results reported in this chapter and in *PISA 2015 Results* (OECD, 2016a) take the uncertainty of the link between the PISA 2015 scale and prior PISA results into account. Changes in performance that are reported as significant are larger than the difference in scores that could be expected as a result of methodological changes when in fact no true change exists.

### Changes in students’ test-taking behaviour over time

When students take a test in school – including PISA – they can answer each question correctly or incorrectly; they can also leave some answers blank. When assessing students’ proficiency, teachers typically interpret answers that were left blank as another form of incorrect answer: an indication that the student was not able to answer the question correctly. However, non-response at the end of a test session may have other interpretations: for example, students may have run out of time, abandoned the test in advance or encountered a technical problem that prevented them from finishing the test. In all these cases, students’ observed behaviour cannot be directly linked to the content of the question – for instance, whether it was a mathematics or a reading question.

PISA distinguishes two types of non-responses: a consecutive block of non-responses at the end of a test form are interpreted as non-reached items; the first missing answer in that block, and any blank answer prior to the last correct or incorrect answer, are interpreted as skipped items.

When examining the behaviour on the PISA test of students in countries in Ibero-America in close detail, it becomes evident that several countries in the region – and most notably Brazil, Chile, Colombia, Costa Rica, Mexico, Peru and Uruguay – were characterised by high levels of non-reached items in the first rounds of PISA in which they participated (Annex Table 2.A.1). Although most countries saw some reduction in the share of non-reached items over time, in the case of Colombia, Peru and Uruguay, the average share of non-reached items across all students was still above 8% in 2012. Yet in 2015, all these countries had low levels of non-reached items, ranging from 0.4% in Peru to 1.8% in Uruguay, in line with the levels typically observed in other OECD countries on average.

Meanwhile, the percentage of non-reached items in the Dominican Republic was over 12%.

**Annex Table 2.A.1. Percentage of non-reached items across PISA assessments**

	PISA 2000	PISA 2003	PISA 2006	PISA 2009	PISA 2012	PISA 2015
Brazil	14.8	10.5	7.0	4.6	5.9	1.5
Chile	11.6		5.9	3.6	3.0	1.4
Colombia			14.7	10.7	9.9	1.9
Costa Rica				5.2	5.0	0.7
Dominican Republic						12.2
Mexico	4.5	8.4	6.2	6.0	6.6	0.8
Peru	15.8			11.0	10.4	0.4
Portugal	3.2	3.3	1.7	2.4	1.9	0.5
Spain	4.1	3.6	1.9	2.7	2.0	0.7
Uruguay		11.1	9.5	7.8	8.4	1.8
OECD average-29	2.9	2.5	1.5	1.9	1.6	0.8

*Note:* The share of reading, mathematics and science items varies in each assessment. The table reports the average share of non-reached items across all domains and all students participating in PISA. The OECD average-29 includes only the 29 OECD countries that participated in all PISA assessments.

*Source:* OECD, PISA 2000-2015 Database, [www.oecd.org/pisa/data](http://www.oecd.org/pisa/data).

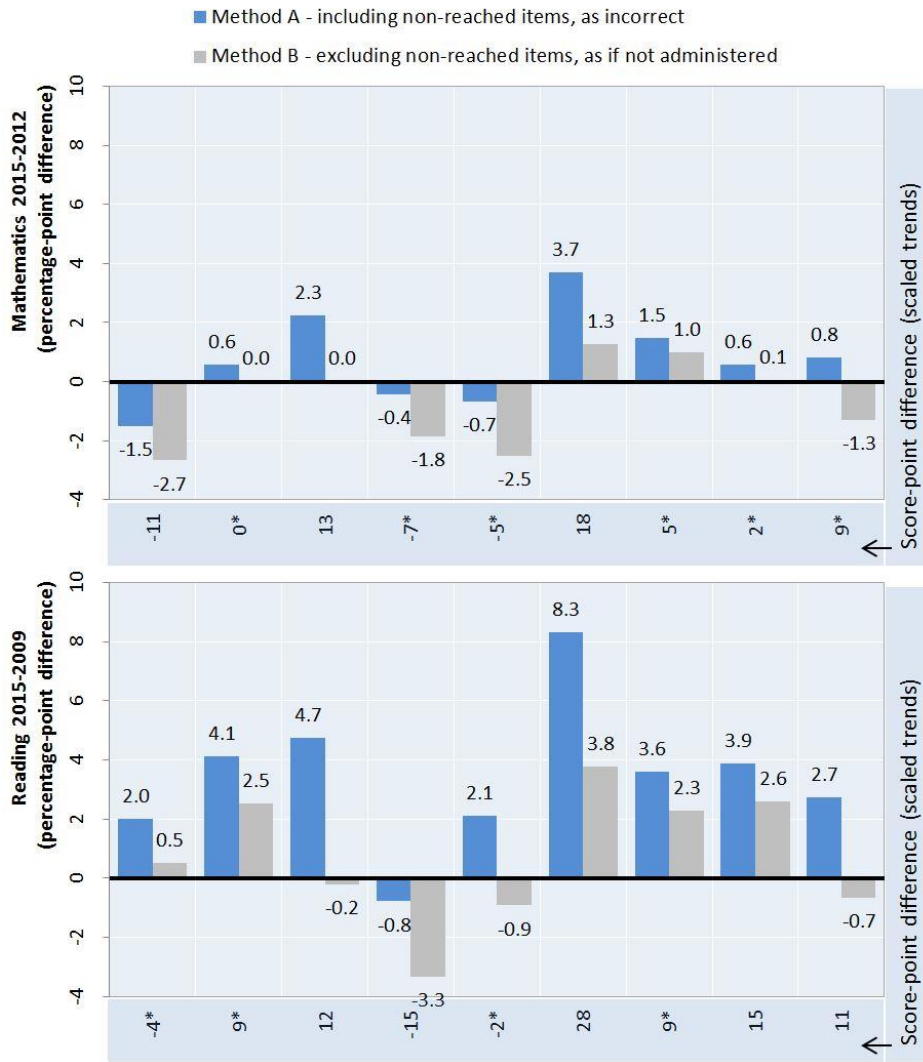
Falling levels of non-reached items are a major source of uncertainty in trend comparisons: if non-reached items are interpreted as reflecting lack of skill, any small increase in the probability of responding correctly to a particular item should be interpreted positively. If on the other hand, the level of non-reached items is attributed to factors that are unrelated to skill (such as increased familiarity with standardised tests, the design or mode in which a test is administered, or pressure from teachers or administrators to complete the test with random guessing strategies), then only increases in the proportion of correct answers, over sections of the test unaffected by non-reached items, should be interpreted as improvements.

PISA changed its interpretation of non-reached items in 2015. In past PISA paper-based assessments, items that were left unanswered at the end of the test were considered as if students had given a wrong answer, when estimating their proficiency. In 2015, they were considered as if they were not part of the test, to reflect the fact in computer-based tests students do not see these questions at all. For countries' PISA 2015 results, this change is of little consequence: all countries, except the Dominican Republic, have very low levels of non-reached items, on average. However, if the same interpretation of non-reached items applied to 2015 results had been applied in the past, some of the improvements – in particular those improvements accompanied by a reduction in non-reached items – may disappear (for a related exercise, see Annex A5 of OECD, 2016a).

In order to document the changes in students' test performance and behaviour transparently, this annex reports comparisons of the percentage of correct answers and the percentage of non-reached items between 2015 and the last year in which each domain was a major focus in PISA. In particular, comparisons of percent-correct scores are presented using two different methods of interpreting non-reached items: *Method A* considers non-reached items as incorrect answers — the approach followed in 2003-12; *Method B* ignores non-reached items — the approach followed in 2015.

**Annex Figure 2.A.1. Change in the percentage of correct answers to trend items**

Difference in percent-correct scores between PISA 2015 and the last year in which each domain was a major domain, by method of considering non-reached items





*Note:* Score-point differences that are not significant are indicated with an asterisk. PISA 2006 data are not available for Costa Rica and Peru (N.A.). The percentage of correct scores is computed over a variable number of items, depending on the country and domain.

*Source:* OECD, PISA 2006-2015 Database (Cognitive compendia), [www.oecd.org/pisa/data](http://www.oecd.org/pisa/data).

Several observations emerge from Annex Figure 2.A.1:

- In Brazil, Costa Rica, Portugal and Spain, the significant changes in mean PISA scores correspond to consistent changes in percent-correct scores, regardless of the treatment of non-reached items.
- In Colombia, the improvement reported in PISA scores across all domains is consistent with the changes in percent-correct scores that interpret non-reached items as incorrect. However, if the reduction in non-reached items is attributed to factors unrelated to skill, then Colombia's results have remained stable.
- Similarly, in Uruguay, the improvement in reading scores between 2009 and 2015 and the stability of science results between 2006 and 2015 is contingent on the interpretation of non-reached items as reflecting lack of skill. If the reduction observed in non-reached items is attributed to other factors, as in Method B, then reading results are broadly stable, and science results in 2015 are below those in 2006.
- Finally, in Peru, the finding of an improvement in reading and mathematics results does not depend on the interpretation of non-reached items, but the size of the improvement is lower if non-reached items are not interpreted as reflecting lack of skill.



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### **Chapter 3. Laying the foundations for quality learning environments: Financial, human and material resources in Ibero-American schools**

*This chapter analyses the financial, material and human resources invested in education in Ibero-American countries. It considers how educational resources have evolved over time, how they compare with the resources invested in other economies of similar economic development, and how they are allocated across different types of schools. It then analyses the relationship between educational resources of all types and student performance in science in the Programme for International Student Assessment (PISA) in 2015 and discusses the implications for education policy.*

## Introduction

In spite of the widespread notion that more resources are strongly correlated with better student performance, previous work has shown that, once a certain level is reached, additional education expenditure does not necessarily translate into better learning outcomes (Hanushek, 1986; OECD, 2016a; Nicoletti and Rabe, 2012). The problem in Ibero-America is that several countries still have relatively low levels of spending on education and have not even reached the threshold beyond which the relationship between resources and performance weakens considerably. Another critical concern is the inequitable distribution of human and material resources across schools in a region where academic performance remains strongly related to the socio-economic status of students. This chapter analyses the role of financial, human and material resources in shaping students' science performance – the main focus of the Programme for International Student Assessment (PISA) round in 2015 – across Ibero-American countries, and how these resources are distributed across different types of schools. It considers a wide range of material resources including buildings, science laboratories and educational materials such as textbooks and information technology (IT) equipment.

## Financial resources

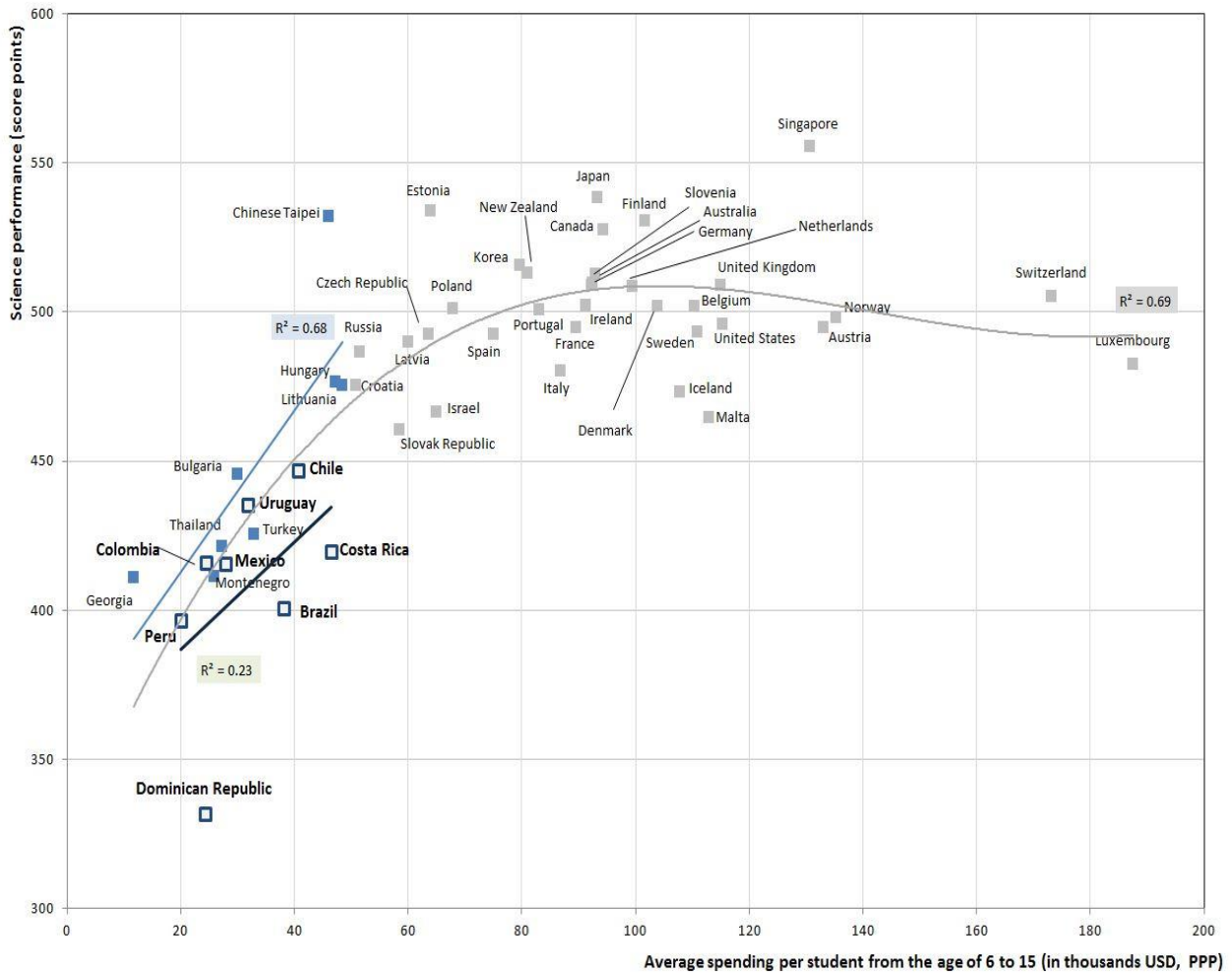
Financial resources in education are needed to pay teachers' salaries, build and maintain infrastructure, buy educational materials, and support other operational costs such as school trips or extracurricular activities. Even in the face of fiscal constraints and competing demands from other types of expenditure, countries need an adequate level of education spending to provide students with quality education. Moreover, governments must not only ensure that they have devoted enough resources to education, but also work towards allocating resources efficiently and equitably to support their desired learning outcomes (OECD, 2017).

The level of education expenditure in a given country is not just determined by its economic development, but also by the economic resources that the country decides to put in. The resources devoted to education by Ibero-American countries are comparable to other countries with a similar degree of economic development, but educational expenditure is still below that of most OECD countries. With the exception of Portugal and Spain, the cumulative expenditure by educational institutions per student between the ages of 6 and 15 is below USD 50 000 in purchasing power parity (PPP) terms in all Ibero-American countries (Figure 3.1). The cumulative expenditure per student as a percentage of gross domestic product (GDP) per capita is also below the OECD average of 233% in all Ibero-American countries, except for Brazil (240%), Portugal (256%) and Costa Rica (322%) (Figure 3.2). In Mexico, Peru and Uruguay, cumulative expenditure per student is below 175% of GDP per capita, among the lowest percentages in PISA-participating countries and economies. One of the reasons behind these low ratios lies in the limited fiscal capacity of Latin American countries, which imposes significant constraints on the budgets allocated to education. In fact, all Ibero-American countries – except for Portugal – have lower tax-to-GDP ratios than the OECD average (OECD / ECLAC / CIAT / IDB, 2017).

Despite this general shortage of funds allocated to education, and the recent economic crisis that has deepened the fiscal constraints facing national governments, expenditure on education increased substantially in all Ibero-American countries except Spain between 2010 and 2013 (OECD, 2016a). In some countries, like Peru or Uruguay, cumulative

expenditure per student has increased by as much as 60% in the last three years. The percentage of GDP invested in education has also increased significantly in all Ibero-American countries between 2010 and 2014, with the exception of Spain and Colombia, indicating countries are according a higher priority to education in the region (Figure 3.2).

**Figure 3.1. Spending per student from the age of 6 to 15 and science performance**



*Note:* Only countries and economies with available data are shown. GDP per capita is based on purchasing power parity.

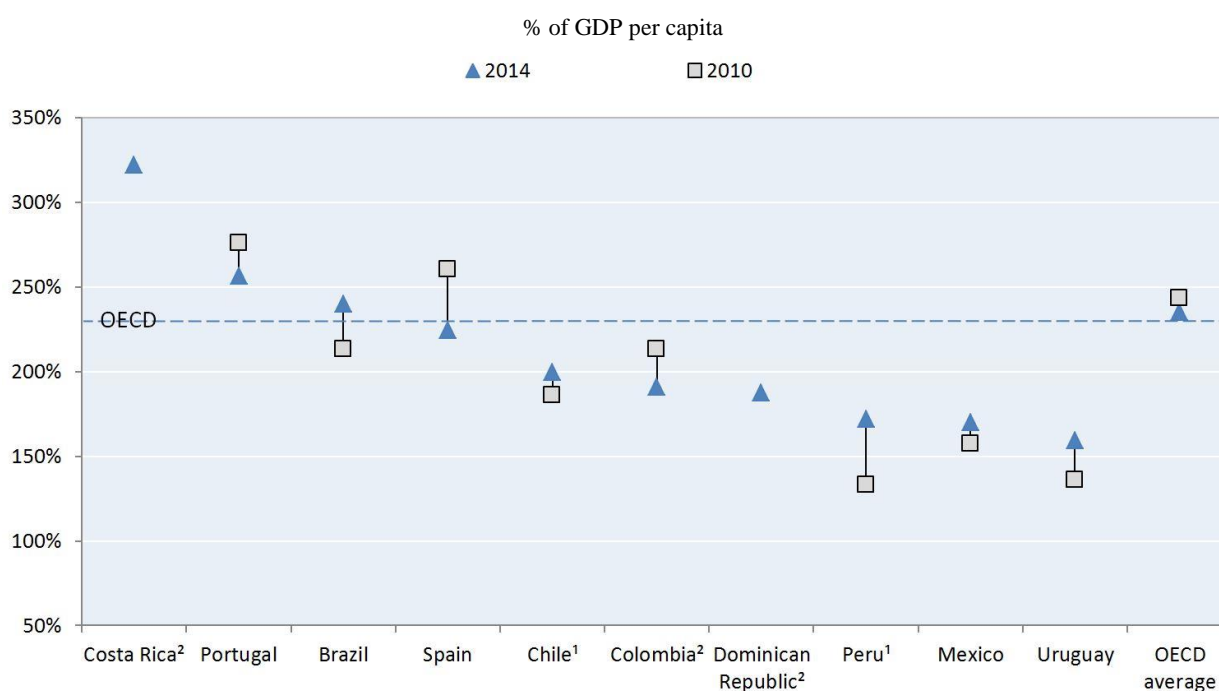
*Source:* OECD, PISA 2015 Results, Volume II Database, Figure II.6.2, <http://dx.doi.org/10.1787/888933436215>.

In countries with higher levels of educational expenditure, students tend to score higher in science, but this relationship is not the same across all levels of investment and it does not explain all the differences in performance between countries (Figure 3.1). Below a cumulative expenditure of approximately USD 80 000 per student – a threshold no Latin American country has reached – more investment in education is positively associated with student performance. Beyond that threshold, the association between education spending and science performance weakens considerably. For example, Portugal has science scores similar to countries that spend twice as much, such as Switzerland and

Luxembourg, and scores lower than Korea and Estonia, even though they spend similar, or even lower amounts per student.

At the same time, the science performance in Latin American countries, particularly in Brazil, Costa Rica and the Dominican Republic, is below that of countries with a similar level of educational spending. For instance, Brazil spends 15% more per student than Turkey and 40% more than Thailand, but Brazilian students scored an average of 401 points in the PISA science assessment (Figure 3.1), significantly below the performance of Turkish (425) and Thai students (421). This performance gap suggests that there may be room to improve the efficiency of educational spending in Latin American countries.

**Figure 3.2. Cumulative expenditure per student aged 6 to 15 in Ibero-America (2010, 2014)**



*Note:* 1. Year of reference is 2011 instead of 2010. 2. Year of reference is 2013 instead of 2014. Countries are ranked in descending order of the cumulative expenditure per student in 2014.

*Source:* OECD (2016d), *Education at a Glance 2016: OECD Indicators*, <http://dx.doi.org/10.1787/eag-2016-en>; OECD (2016a), *PISA 2015 Results (Volume II): Policies and Practices for Successful Schools*, <http://dx.doi.org/10.1787/9789264267510-en>.

## Material resources

The lack of financial resources across Ibero-American countries described above is reflected in the concerns expressed by school principals about the quantity and quality of the physical infrastructure and educational materials in their schools. A lack of or poor-quality material resources in schools can have adverse effects on learning (Jackson, Johnson and Perisco, 2015). Once an adequate level of resources is reached, what matters is how effectively these resources are used and how equitably they are allocated across schools with different socio-economic profiles (Wei, Clifton and Roberts, 2011; Martorell, Stange and McFarlin, 2016). This section examines the situation for a range of

material resources, from buildings and science laboratories, and a range of educational materials, such as textbooks and IT equipment.

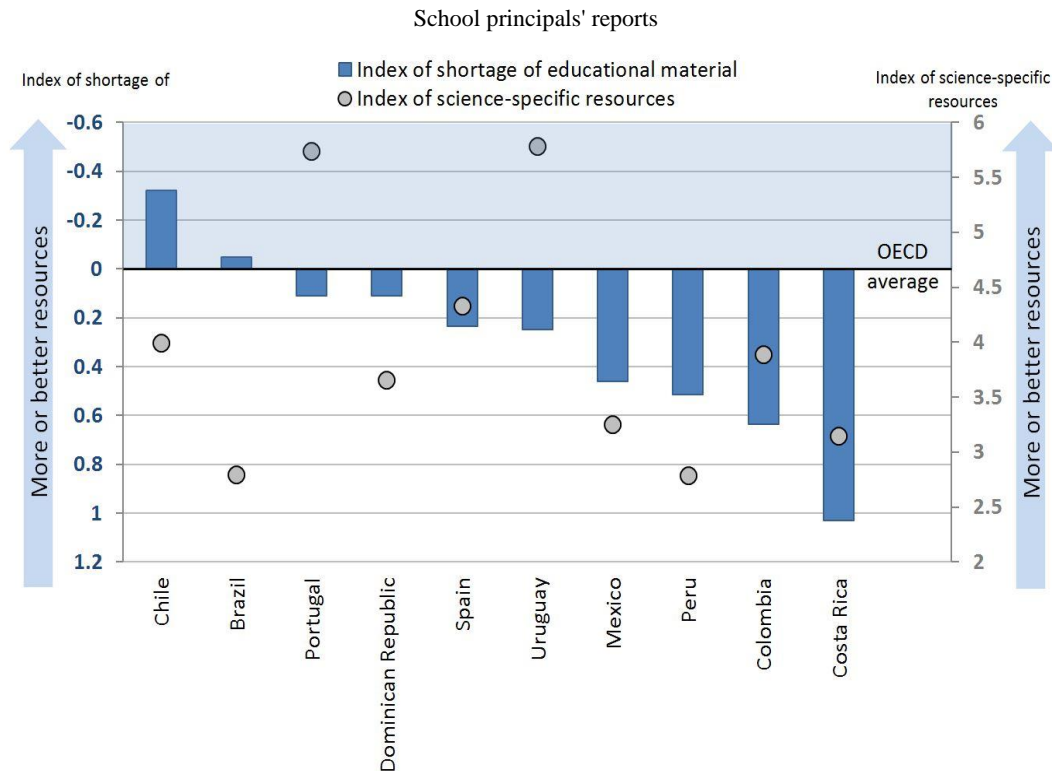
### *Shortages of material resources in Ibero-American schools*

PISA 2015 asked school principals to report the extent to which they believe that inadequate or insufficient material resources – physical infrastructure and educational materials – are hindering the capacity to provide instruction at their schools. Their responses were turned into an index of shortage of educational material (see Box 3.1) where positive values indicate that school principals believe that a shortage of material resources hinders their capacity to provide instruction to a greater extent than on average across OECD countries.

Most Ibero-American countries are placed in the top half of the index of shortage of educational material, with Colombia and Costa Rica displaying the greatest shortages in the region (Figure 3.3). In these two countries, more than 25% of students attend a school where the principal believes that the lack of educational material hinders instruction to a great extent (OECD, 2016). On the other hand, principals in Chile are the least concerned in the region about the lack of and quality of the educational material. For instance, only around 1% of students in Chile attend a school where the principal is greatly concerned about the shortage of education material (OECD, 2016).

Unsurprisingly, science scores tend to be higher among students enrolled in schools where principals are less concerned about the availability and quality of educational material. On average across Ibero-American countries, a one-unit decrease in the index of shortage of educational material is associated with an increase of 12 score points in the science assessment (OECD, 2016). However, the association weakens substantially when differences in the socio-economic profile of students and schools are taken into account, and remains significant only in Brazil, Colombia and Mexico.



**Figure 3.3. Index of shortage of educational material and index of science-specific resources**

*Note:* Higher values in the index of shortage of educational material indicate a greater shortage. Countries are ranked in ascending order of the index of shortage of educational material.

*Source:* OECD, PISA 2015 Results, Volume II database, Table II.2.6 <http://dx.doi.org/10.1787/888933436477> and Table II.6.2 <http://dx.doi.org/10.1787/888933436513>.

### *Science-specific resources in Ibero-American schools*

A similar pattern is observed when principals were asked about the resources in their school science departments, which often require more sophisticated and expensive material than other school departments (see Box 3.1). Principals in most Ibero-American countries are less likely to report that their science department is well equipped and staffed than principals across OECD countries (Figure 3.3). Resources are scarcer in Brazil and Peru where, according to school principals, less than 40% of students attend a school with a well-equipped laboratory, and less than 50% are enrolled in schools where the materials for hand-on activities are in good shape (OECD, 2016a). Only school principals in Portugal and Uruguay are more satisfied with the level and quality of the science-specific resources than principals in OECD countries on average.

Students who are enrolled in schools where the science department is better equipped and staffed tend to score higher in science (OECD, 2016a). However, this relationship weakens once the socio-economic profile of students and schools are accounted for. On average across Ibero-American countries, for every additional positive statement about the science department that principals agree with – that is, a one-unit increase in the index of science-specific resources – the science score increases by about three points, after accounting for the socio-economic status of students and schools.

### Box 3.1. Indices of educational resources

PISA 2015 asked principals several questions about the quantity and quality of the material and human resources available in their schools. The responses were combined to create three specific indexes on educational resources: the index of shortage of educational material, the index of science-specific resources and the index of shortage of education staff.

The **index of shortage of educational material** reflects the extent to which principals in a certain country report that a shortage or inadequacy of material resources (physical infrastructure and educational material) is hindering the capacity to provide instruction in their schools. Physical infrastructure comprises buildings, cooling and heating systems, and instructional space. Educational material includes textbooks, IT equipment, instructional materials or laboratory equipment. The average of this index is zero and the standard deviation is one across OECD countries. Positive values indicate that principals are more likely than the OECD average to report that the shortage of educational material is hindering the capacity to provide instruction; negative values indicate that school principals are less likely to report this.

The **index of science-specific resources** reflects the number of positive responses reported by principals about the availability of certain equipment at the science department. Principals were asked if the following statements were true: “Compared to other departments, our science department is well equipped”; “If we ever have some extra funding, a big share goes into improvement of our science teaching”; “Science teachers are among the best-educated staff members”; “Compared to similar schools, we have a well-equipped laboratory”; “The material for hands-on activities in science is in good shape”; “We have enough laboratory material that all courses can regularly use it”; “We have extra laboratory staff that helps support science teaching”; and “Our school spends extra money on up-to-date school science equipment”.

The **index of shortage of education staff** reflects the extent to which principals in a certain country report that a shortage or inadequacy of teaching or assistance staff is hindering the capacity to provide instruction in their schools. The average on the index is zero and the standard deviation is one across OECD countries. Positive values indicate that principals are more likely than the OECD average to report that a shortage of education staff is hindering the capacity to provide instruction; negative values indicate that school principals are less likely to report this.

Source: OECD (2016a), *PISA 2015 Results (Volume II): Policies and Practices for Successful Schools*, <http://dx.doi.org/10.1787/9789264267510-en>.

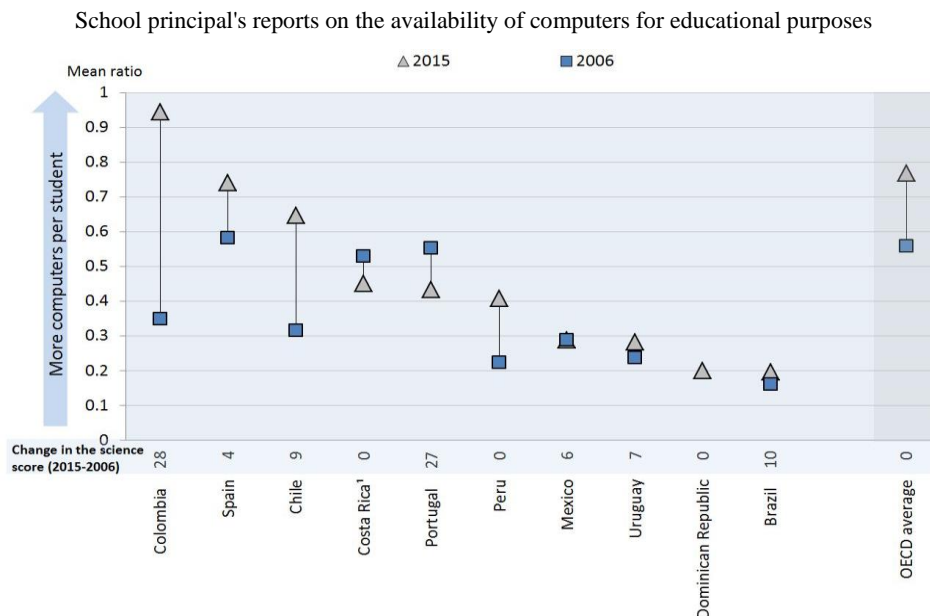
### *Information and communications technology resources in Ibero-American schools*

Accompanying the wave of technological change in recent decades, computer literacy has become one of the skills that students should master for greater participation in the knowledge society. The use of information and communications technology (ICT) for educational purposes at school is supposed to familiarise students with computer use, especially for those who do not have access to this technology at home (OECD, 2016b). Although the advantages of being familiar with new technologies are undeniable, the evidence of its effect on learning outcomes is mixed. Studies in Canada, the

United Kingdom and the United States have concluded that there is a causal and positive relationship between ICT investment and performance in primary education (Machin, McNally and Silva, 2007; Carrillo, Onofa and Ponce, 2010). However, other studies in Israel and the Netherlands have not observed a statistically significant relationship between ICT use and learning outcomes (Angrist and Lavy, 2002; Leuven et al., 2004). One explanation for these divergent findings is that, while computers are an additional input for student learning, their benefits depend on the ability of schools to implement the necessary organisational changes and of teachers to adapt their teaching methods to make the most of these new technologies (Brynjolfsson and Hitt, 2000).

Despite this mixed evidence, schools should still invest in computers and ICT training, if only to ensure that students are prepared to fully participate in societies where ICT is increasingly part of our daily lives. However, until recently the situation has remained bleak in Ibero-America in this regard. Apart from Colombia, where there is almost one computer for every student, the number of computers per student in Ibero-American countries is lower than the OECD average of 0.77 computers per student (Figure 3.4). In Brazil and the Dominican Republic, for instance, there is just one computer for every five students. Despite limited availability of computers, governments in Ibero-American countries have made substantial investments and implemented ambitious programmes (see Box 3.2) in recent years to improve the availability and use of computers and other ICT in the classroom. This is reflected in the positive trend observed in several Ibero-American countries, most notably in Chile, Colombia, Peru and Spain, in the availability of computers for educational purposes (Figure 3.4).

**Figure 3.4. Changes in the number of computers per student (2006, 2015)**



Note: 1. Year of reference is 2009 instead of 2006. Costa Rica, Dominican Republic and Peru did not participate in PISA 2006. Countries are ranked in descending order of the mean number of computers per student in 2015.

Source: OECD (2016), *PISA 2015 Results (Volume II): Policies and Practices for Successful Schools*, <http://dx.doi.org/10.1787/9789264267510-en>, Table II.6.4; OECD (2013), *PISA 2012 Results: What Makes Schools Successful? Resources, Policies and Practices (Volume IV)*, <http://dx.doi.org/10.1787/9789264201156-en>, Table IV.3.18; OECD (2011), *PISA 2009 Results: Students on Line: Digital Technologies and Performance (Volume VI)*, <http://dx.doi.org/10.1787/9789264112995-en>, Table VI.5.8a.

### *Equity in the allocation of material resources*

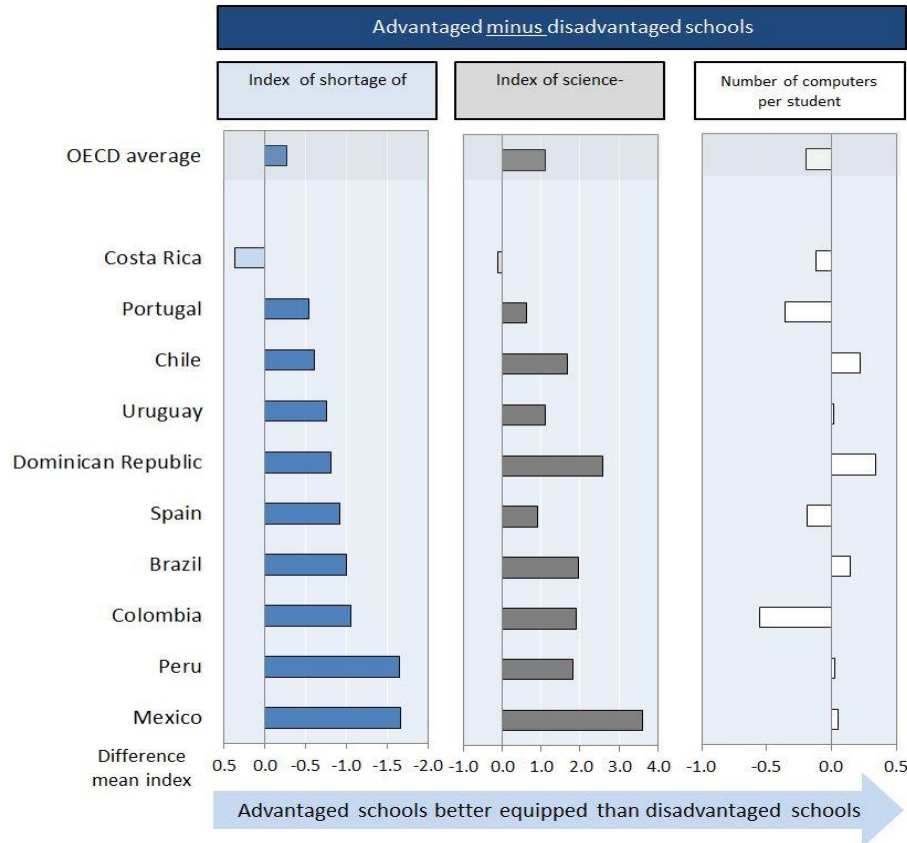
Adequate investment in material resources should be accompanied by efforts to allocate these resources equitably across schools – whether this refers to physical infrastructure, computers or educational material – as a necessary condition to ensure equal opportunities for all students. Although there are disadvantaged students in all Ibero-American countries who are able to perform well academically without external support, governments in the region still need to redouble their efforts to provide the same educational opportunities to all students. An equitable and fair allocation requires that students in socio-economically disadvantaged schools enjoy at least a similar level of educational resources as their peers in more advantaged schools.

The way resources are allocated across schools with different socio-economic profiles is crucial for Ibero-American school systems. In all the countries of the region that participated in PISA 2015, except Costa Rica, socio-economically disadvantaged students are more likely to experience shortages in educational material than their peers in more advantaged settings (Figure 3.5). In Mexico and Peru the socio-economic gap in education materials is the largest of all PISA-participating countries and economies. In these two countries, students who attend advantaged schools are less exposed to shortages in educational material than the average student in OECD countries, whereas those in disadvantaged schools are more exposed to shortages than the average student in all PISA-participating school systems, except Tunisia (OECD, 2016a).

The availability of science-specific resources is also positively associated with the socio-economic profile of schools in all Ibero-American countries except Costa Rica (Figure 3.5). Once more, Mexico is the Ibero-American country where principals in advantaged and disadvantaged schools reported the largest differences with respect to the resources available in their science departments. With regard to the availability of computers for educational purposes, the socio-economic gap in Ibero-American countries is similar to the average across OECD countries, and only in Brazil, Chile and the Dominican Republic do disadvantaged schools have fewer computers per student than advantaged ones. In Colombia and Portugal, by contrast, the computer/student ratio is higher in disadvantaged than in advantaged schools.

**Figure 3.5. Allocation of material resources by school socio-economic profile**

Difference between advantaged and disadvantaged schools in the index of shortage of educational material, the index of science-specific resources and number of computers per student



*Note:* Higher values on the index of shortage of educational material indicate a greater shortage. Significant differences are marked in darker tone. Countries are ranked in ascending order of the difference between advantaged and disadvantaged schools in the index of shortage of educational material.

*Source:* OECD (2016), *PISA 2015 Results (Volume II): Policies and Practices for Successful Schools*, <http://dx.doi.org/10.1787/9789264267510-en>, tables II.2.6, II.6.2 and II.6.5.

The locations of schools also greatly affect access to and distribution of resources. Across most Ibero-American countries, urban schools are better endowed with resources than their counterparts in rural areas, with the exception of computer availability. For instance, principals in urban schools are generally less concerned about the quantity and quality of their educational resources than those in rural schools (Figure 3.6). In Brazil, Colombia, the Dominican Republic, Mexico and Peru, there is a greater shortage of educational material in rural schools than in urban schools. In Peru, for instance, principals in urban schools are as concerned as the typical principal in OECD countries while those in rural schools are more concerned in most PISA-participating countries (OECD, 2016a).

According to Ibero-American principals, the science departments in urban schools tend to have more and better resources at their disposal than science departments in rural schools (Figure 3.6). This is the case in all Ibero-American countries, except for Costa Rica and Uruguay. For instance in PISA 2015, of the eight possible positive statements principals could make regarding science-department resources, Mexican principals in rural schools

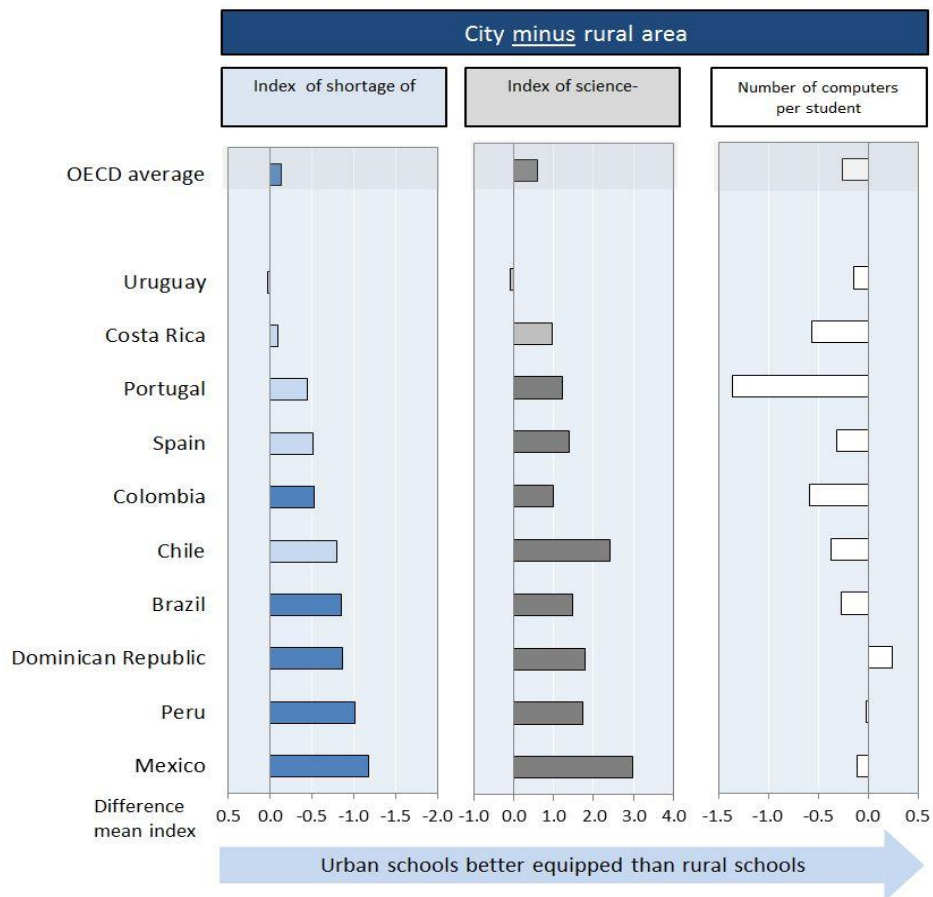
only agreed with one, on average, while principals in urban schools agreed with about half of them (OECD, 2016a).

Interestingly enough, more computers are available for educational purposes in rural schools in a majority of Ibero-American countries, particularly in Portugal; only in the Dominican Republic do rural schools have fewer computers per student than urban ones.

With the exception of computers, however, rural students are provided with fewer resources than their urban counterparts. Countries in the region should keep in mind that allocating more and better resources to rural schools is one effective way to ensure a fairer allocation of material resources across the entire education system, especially in countries with large rural populations like Peru or Costa Rica.

**Figure 3.6. Allocation of material resources by school location**

Difference between urban and rural schools in the index of shortage of educational material, the index of science-specific resources and number of computers per student



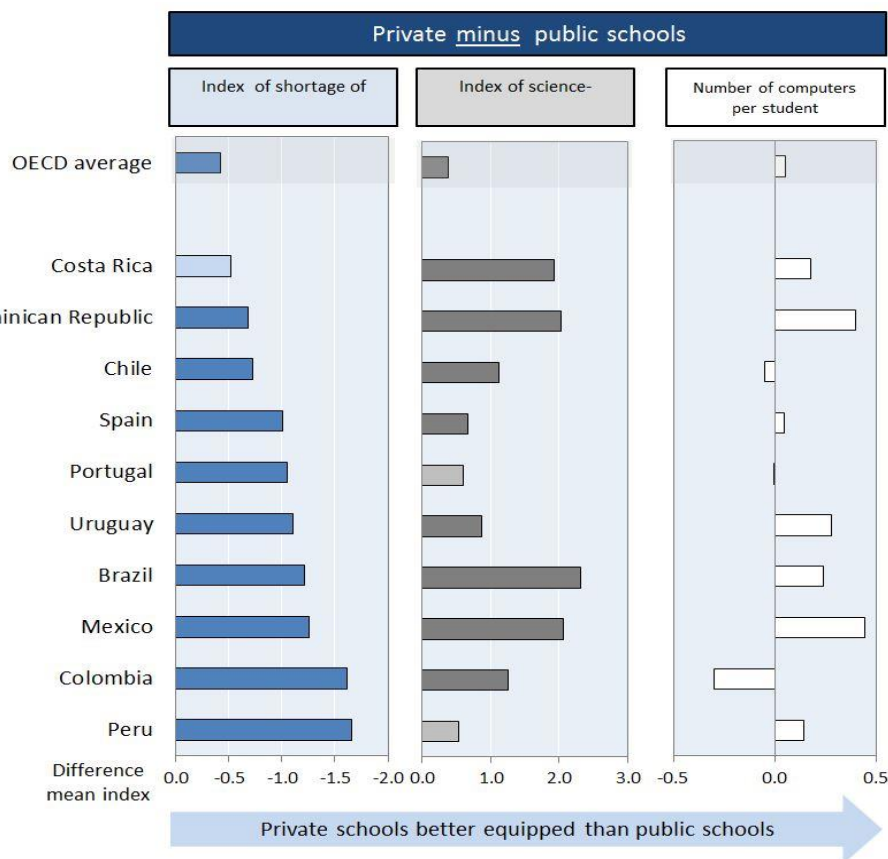
*Note:* Higher values on the index of shortage of educational material indicate a greater shortage. Significant differences are marked in darker tone. Countries are ranked in ascending order of the difference between urban and rural schools in the index of shortage of educational material.

*Source:* OECD (2016), *PISA 2015 Results (Volume II): Policies and Practices for Successful Schools*, <http://dx.doi.org/10.1787/9789264267510-en>, tables II.2.6, II.6.2 and II.6.5.

Similarly, the degree of privatisation also plays an important role in the equitable distribution of material resources among schools. Private schools often enjoy better material resources than public schools (OECD, 2016a). This seems to be the case across most Ibero-American countries (Figure 3.7). For instance, in Peru, principals in private schools are less concerned about the availability and quality of educational material than the average school principal across OECD countries, whereas those in public schools are considerably more concerned (OECD, 2016a). According to school principals, the science departments in private schools are also better equipped and staffed than those in public schools across all Ibero-American countries, except in Peru and Portugal (Figure 3.7). Private schools also have more computers available for educational purposes per student than public schools in a majority of Ibero-American countries. However, in Chile, Portugal and Spain there are no significant differences in the computer-student ratio between private and public schools, and Colombia stands out as the only Ibero-American country where students in public schools have access to more computers than their peers in private schools.

**Figure 3.7. Allocation of material resources by type of school**

Difference between public and private schools in the index of shortage of educational material, the index of science-specific resources and number of computers per student



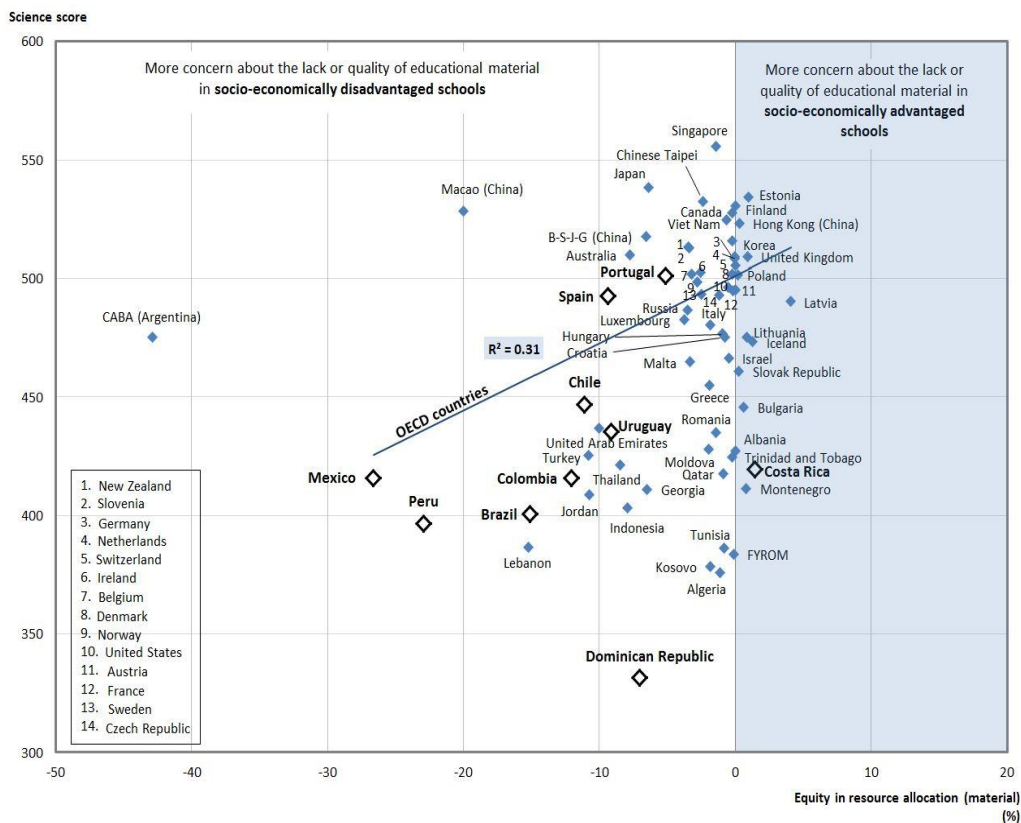
*Note:* Higher values on the index of shortage of educational material indicate a greater shortage. Significant differences are marked in darker tone. Countries are ranked in ascending order of the difference between private and public schools in the index of shortage of educational material.

*Source:* OECD (2016), *PISA 2015 Results (Volume II): Policies and Practices for Successful Schools*, <http://dx.doi.org/10.1787/9789264267510-en>, tables II.2.6, II.6.2 and II.6.5.

*Is there a trade-off between excellence and equity in resource allocation?*

There is no apparent trade-off between the excellence of a school system (measured by the average performance in science) and the equity in resource allocation (measured by the index of equity in resource allocation<sup>2</sup>); school systems that allocate relatively more resources to disadvantaged schools tend to display higher levels of academic performance overall (Figure 3.8). For instance, Estonia and Korea show a strong performance in science, while still ensuring that the educational materials are allocated evenly across schools with different socio-economic profiles. This shows that allocating resources more equitably may benefit everyone, not just struggling students. Ibero-American countries, particularly Brazil, Colombia, Mexico and Peru, could benefit disproportionately from a more equitable distribution of resources since the current resource allocation in these countries is comparatively unfair compared to other school systems participating in PISA (Figure 3.8).

**Figure 3.8. Equity in resource allocation and science performance**



*Note:* Equity in resource allocation is the percentage of variance of the principal's concern about the educational material at the school explained by schools' socio-economic profile. A negative sign indicates that principals of socio-economically disadvantaged schools are more concerned about the educational material at the school than principals of advantaged schools.

*Source:* OECD (2016), *PISA 2015 Results (Volume II): Policies and Practices for Successful Schools*, <http://dx.doi.org/10.1787/9789264267510-en>, Figure II.6.4

<sup>2</sup> The index of equity in resource allocation is based on the degree to which the variance of the principal's concern about the educational material at a school is explained by the school's socio-economic profile.



### Box 3.2. One laptop per child programmes in Ibero-America

In the last 20 years, some Ibero-American countries have invested heavily in programmes to increase the number of computers in schools and their Internet connectivity, establish education portals or improve teachers' ICT skills. Some ICT policies even aspired to distribute one laptop to each student, such as the ones carried out in Peru, Spain and Uruguay:

**Peru:** Peru implemented a one laptop per student programme with the goal of increasing the quality of public primary education, especially in rural schools in extreme poverty. Only 4% of beneficiary students lived in urban areas. The distribution of computers started in 2008 and by October 2009, 170 000 computers had been distributed in 5 100 primary schools. Teacher training was offered, and short guides were created to describe how to use particular software.

**Spain:** The Plan Escuela 2.0 was a programme aimed at integrating ICT tools in Spanish schools. It ran from 2009 to 2012 and cost EUR 100 million. The funds financed 1) the transformation of upper primary and lower secondary classrooms into digital classrooms; 2) the provision of one laptop per student, to all students enrolled in these levels in schools supported by public funds; 3) the implementation of teacher training to ensure the programmes' resources were used effectively; and 4) the development of digital content for teachers to use. However, a recent impact evaluation has shown that this programme did not translate into better learning outcomes, as measured by PISA (Prieto, 2014).

**Uruguay:** The Conectividad Educativa de Informática Básica para el Aprendizaje en Línea (CEIBAL) project is a one laptop per student project launched in 2007 with the aim of supporting Uruguayan educational policies with technology. Its goal was to provide all students and their families continuous access to a computer, online resources through wireless connectivity and free software. By the end of 2009 it covered all students in public primary schools. In 2010, the programme was rolled out to secondary schools. The laptops were designed specifically for students, being lightweight and protected against water and dust. To allow teachers to become familiar with the hardware and software and develop the teaching materials, they were offered teacher training two months before the laptops were officially released to the students. Approximately 56% of teachers were trained to teach subjects using ICT. Later, support groups visited teachers to help them integrate curricular training in specific content areas and to increase the use of technology. De Melo et al. (2014) did not find any effect of the programme on students' maths and reading scores during the first two years of its implementation. They argued that the absence of effect could be explained by the fact that the programme did not involve compulsory teacher training and that the laptops were not used exclusively for educational purposes in the classrooms.

*Source:* Chong (2011), "Computers in schools: Why governments should do their homework"; Prieto (2014), "Evaluación del programa Escuela 2.0 para la asignatura de matemáticas a partir de PISA 2012"; De Melo, Machado and Miranda (2014), "The impact of a one laptop per child program on learning: Evidence from Uruguay".

## Human resources

Many conclusions emerge from the research on student learning, one of the most important being that teachers and teaching are among the most important influences on students (Hattie, 2009). The quality of teaching and teachers' subject knowledge explain a greater share of the variation in students' performance than teachers' qualifications or work status (Rockoff, 2004; Rivkin, Hanushek and Kain, 2005; Hanushek, Piopiunik and Wiederhold, 2014). In fact, the impact of higher-quality teachers goes far beyond their students getting good scores; students of such teachers are also higher achievers in life as they are more likely to attend college (especially the higher-ranked ones), earn higher salaries, live in neighbourhoods with a higher socio-economic profile, and save more for retirement (Chetty, Friedman and Rockoff, 2014). For that reason, attracting the best teachers should be a priority for all Ibero-American countries. High-performing school systems not only make teaching an attractive career choice – drawing in the best possible candidates as a result – but also establish appropriate pathways for career progression and provide opportunities for professional development.

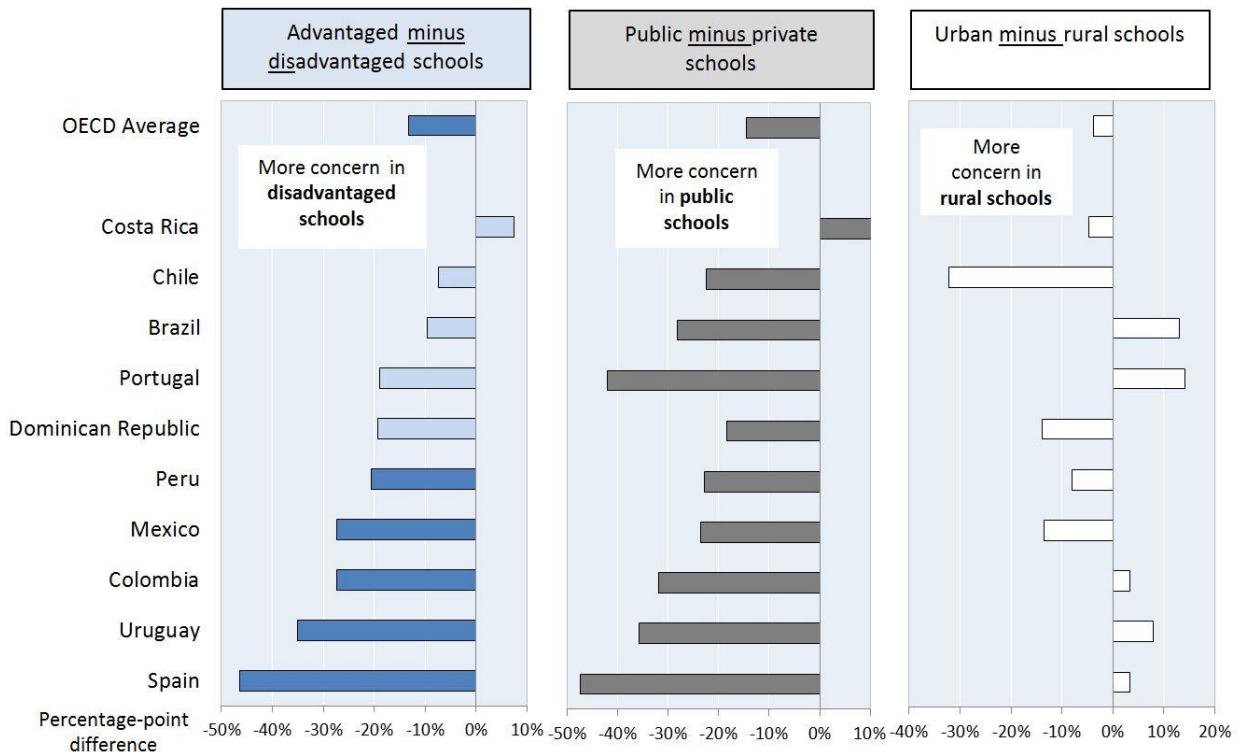
### *Shortages of teaching staff in Ibero-American countries*

PISA 2015 asked school principals to report the extent to which a shortage or inadequacy of teaching or assistance staff is hindering their capacity to provide instruction in their schools. Based on their responses, principals in a majority of Ibero-American countries are more concerned about the quantity and quality human resources in their schools than the average principal across OECD countries (OECD, 2016a). A case in point would be Costa Rica where as many as 23% of students are enrolled in schools where the principal reported that a lack of teaching staff hinders instruction to a great extent.

Advantaged schools are better staffed than disadvantaged schools in Ibero-American countries, according to principals' reports about the lack of teaching staff (Figure 3.9). The difference between advantaged and disadvantaged schools is particularly large in Colombia, Mexico, Spain and Uruguay. Shortages in teaching staff are also more common in public than in private schools in all Ibero-American countries except Costa Rica. The difference in the exposure to shortages of teaching staff between students from public and private schools is particularly large in Spain and Portugal, which are among the countries that display the most acute gaps across PISA-participating countries and economies. However, there is no significant rural-urban gap in any of the Ibero-American countries with respect to the shortage of teaching staff.

**Figure 3.9. Perceived shortage of education staff by school socio-economic profile, type of school and school location**

Differences in the proportion of principals perceiving shortage of main education staff between advantaged and disadvantaged schools, urban and rural and public and private schools, Ibero-American countries and OECD average



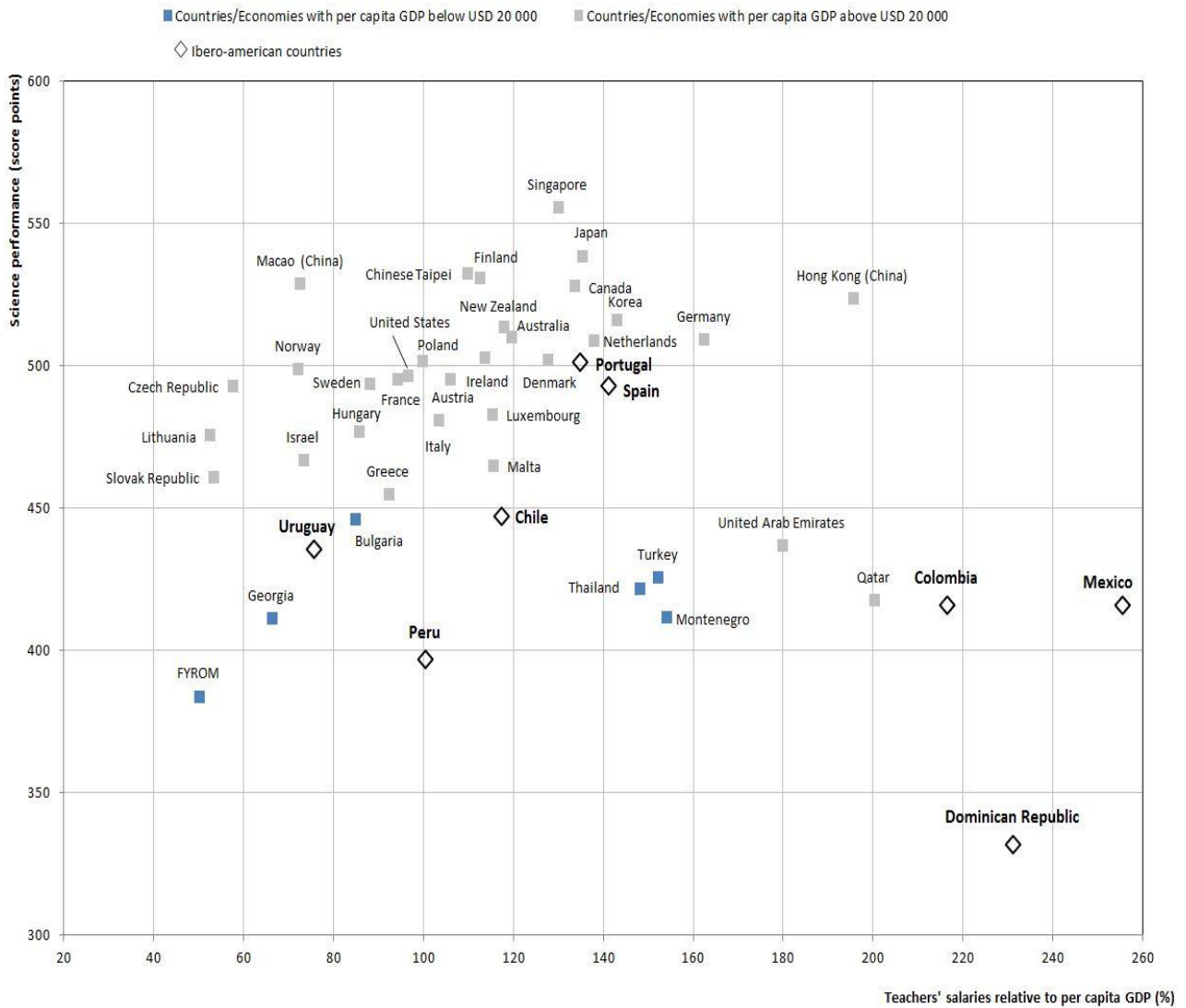
*Note:* Significant differences are marked in darker tone. Countries are ranked in ascending order of the difference in perception of principals of shortage of main education staff between disadvantaged and advantaged schools.

*Source:* OECD, PISA 2015 Database, [www.oecd.org/pisa/data/2015database/](http://www.oecd.org/pisa/data/2015database/).

### *The need to improve teaching quality across Ibero-America*

Ibero-American countries need to improve the quality of teaching by attracting the best candidates to the teaching profession and by providing professional development activities for the existing teaching force. To attract the best candidates to become teachers, Ibero-American countries need to increase the attractiveness of the profession in the region. Raising teacher salaries may help in those countries where teachers’ salaries are comparatively low. Indeed, there are wide differences across Ibero-American countries in the level of teacher salaries. At the lower end, teachers in Uruguay earn around 80% of their country’s GDP per capita, while those in Colombia, the Dominican Republic and Mexico earn more than twice than their countries’ GDP per capita. However, even if higher salaries make the teaching profession more attractive, they may not be enough to improve student performance (Figure 3.10).

**Figure 3.10. Teachers' salaries and science performance**



*Note:* Teachers' salaries refer to the salaries of upper secondary teachers with typical qualifications in the respective countries and economies after 15 years of experience. Only countries and economies with available data are shown. The reference year for per capita GDP is 2013, except for the following countries: Bulgaria (2012), Canada (2012), Croatia (2015), Macao (China) (2014), Peru (2014) and Uruguay (2014).

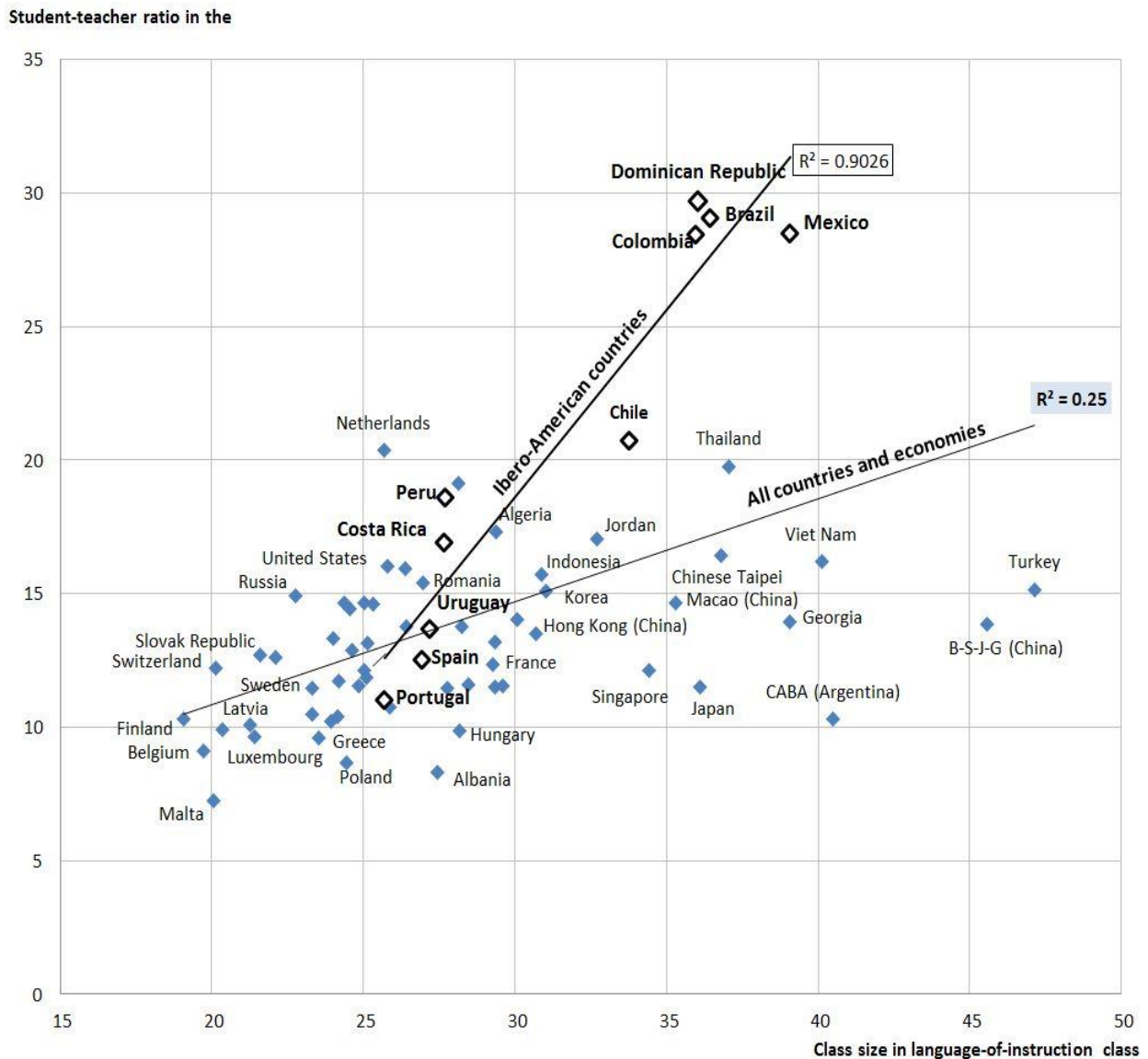
*Source:* OECD (2016), *PISA 2015 Results (Volume II): Policies and Practices for Successful Schools*, <http://dx.doi.org/10.1787/9789264267510-en>, Figure II.6.7.

Another element that could contribute towards improving the quality of the teaching workforce is the type and quality of the training teachers receive before entering the profession. PISA results illustrate, for instance, that students score somewhat higher in science the greater the proportion of qualified science teachers in their school (OECD, 2016a). In Ibero-American countries a large share of students are taught by qualified and certified teachers, but there are large disparities across school systems (OECD, 2016). The share of science teachers with a university degree and a major in science is particularly low in Brazil (33%), Peru (21%) and Uruguay (6%), compared to the OECD average (74%). In contrast, at least 4 out of 5 science teachers have a university degree and a major in science in Colombia, Costa Rica, Spain and Portugal.

The demands on teachers are becoming increasingly complex. If teachers are now expected to transform students into lifelong learners, it is imperative that they themselves learn and develop throughout their careers. Teachers not only need to be able to use the latest tools and technologies but they need to be able to take advantage of the latest research on learning, pedagogy and practices. Part of making this happen requires access to high-quality professional development. Participation in professional development has been found to be an effective way to improve the way teachers learn, work and feel about their job, including their self-efficacy and job satisfaction (Desimone et al., 2002; OECD, 2016c). Some studies suggest that these activities are more effective when the training is practical, promoted by school principals, funded by education authorities and involves external experts (Wade, 1985; Timperley, 2008). According to school principals in all Ibero-American countries, the percentage of teachers – and of science teachers – who attended a programme of professional development in the three months prior to the PISA assessment is below the OECD average (OECD, 2016a). While about half of science teachers had participated in professional development activities across OECD countries, only 30% of teachers had done so in Mexico, and less than 22% in Uruguay.

Working conditions can also make a big difference when attracting and retaining highly skilled teachers. The extraordinarily high student-teacher ratios in several Ibero-American countries, such as Brazil, Colombia, the Dominican Republic and Mexico, reveals the challenging working conditions that many teachers in the region face (Figure 3.11). With such a large number of students per teacher, and relatively large class sizes, the time that teachers can devote to preparing lessons and supporting individual students is severely limited. By contrast, in several East Asian school systems, such as Japan, Macao (China), Singapore, Chinese Taipei and Viet Nam, class sizes are also relatively large, but student-teacher ratios are low, freeing up time for class preparation and other school-related tasks.

**Figure 3.11. Relationship between class size and student-teacher ratio**



Source: OECD (2016), *PISA 2015 Results (Volume II): Policies and Practices for Successful Schools*, <http://dx.doi.org/10.1787/9789264267510-en>, Table II.6.26.

## Conclusions

There is scope to improve student outcomes in Ibero-America through a more generous and equitable allocation of educational resources. Too many principals across Ibero-American countries are still concerned about the physical infrastructure, educational materials and science-specific resources in their schools, and these concerns are generally more acute where resources are needed most: in socio-economically disadvantaged, public and rural schools. At the same time, governments in Ibero-American countries have made large investments to improve the availability of computers for educational purposes, and yet the positive impact on student outcomes remains to be seen.

Good teachers can have positive long-term effects on student outcomes (Chetty, Friedman and Rockoff, 2011). It is therefore discouraging that too many principals in Ibero-America are still concerned about the lack of quality teachers in their schools, and that the shortage of quality teachers is more frequently reported in socio-economically disadvantaged and public schools than in advantaged and private schools. Making the teaching profession more attractive is necessary to attract the most qualified candidates to the profession, and address the observed shortages in teaching staff. This requires not only setting adequate salaries for teachers, but also establishing appropriate pathways for career progression, opening up more opportunities for professional development and improving working conditions.

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## Chapter 4. Well-being and inequality in Ibero-American countries: Evidence from PISA 2015

*The Programme for International Student Assessment (PISA) defines students' well-being as the psychological, cognitive, social and physical functioning and capabilities that students need to live a happy and fulfilling life. Evidence has shown that students' material, social and cultural conditions are deeply intertwined with this subjective well-being. This chapter explores the different dimensions of students' well-being as measured in PISA and its relationship with their cultural and socio-economic status across Ibero-American countries. It presents and then analyses the PISA data on measures such as life satisfaction, anxiety, expectations about future career paths, sense of belonging at school and bullying through the lens of students' background characteristics. It then considers inequality and the impact of socio-economic status at society level and its inter-relation with the life of students at the age of 15. It also includes examples of how policy makers can effectively intervene, presenting positive experiences across Ibero-American countries such as the Spanish School Learning Environment Plan (Plan de Convivencia Escolar) to outline future possible directions of policy intervention.*

## Introduction

Jay Gatsby, the fictitious character from F. Scott Fitzgerald's novel *The Great Gatsby* recalls that his father once told him not to criticise people before considering that not everyone has had the same advantages he has had. More recently, economists have dubbed the relationship seen in many countries between socio-economic inequality and intergenerational social mobility the "Great Gatsby curve" (Corak, 2013). The consequences of this relationship are straightforward: more unequal societies tend to reproduce the same income differences from one generation to the next. Moreover, this vicious circle is likely to herald lower perceived levels of well-being among younger generations, even beyond their likely reduced material conditions. What does the evidence suggest about the status of students' well-being in Ibero-America? How does social and economic inequality correlate with the well-being of young Ibero-Americans?

The Programme for International Student Assessment (PISA), the international students' survey conducted by the OECD since 2000, could help answer these questions. PISA not only provides a unique source of internationally comparable evidence of students' competency and cognitive skills in mathematics, reading and science towards the end of compulsory schooling, but it also provides a wide array of information regarding their subjective well-being, social attitudes and socio-economic background. The Ibero-American countries that participated<sup>3</sup> in the last cycle of PISA in 2015 were Brazil, Chile, Colombia, Costa Rica, the Dominican Republic, Mexico, Peru, Portugal, Spain and Uruguay.

PISA defines students' well-being as the psychological, cognitive, social and physical functioning and capabilities that students need to live a happy and fulfilling life (OECD, 2017). More generally, well-being primarily refers to the quality of life of 15-year-old students and since they spend a considerable amount of their time in the classroom, surveys like PISA provide a unique opportunity to understand whether students enjoy good physical and mental health, how happy and satisfied they are with different aspects of their life, how connected they feel to others, and the aspirations they have for their future.

The aim of this chapter is thus twofold: first, to inform education policy discussions in Ibero-American countries by presenting the latest evidence from PISA about students' well-being, and second, to provide evidence on the relationship between students' well-being and their socio-economic status.

## Students' subjective well-being in PISA 2015

### *Life satisfaction at age 15*

PISA 2015 measures some aspects of psychological well-being – comprising students' sense of purpose in life, self-awareness, positive emotions and expectations – through students' reports of their life satisfaction, motivation to do well in school and schoolwork-related anxiety.

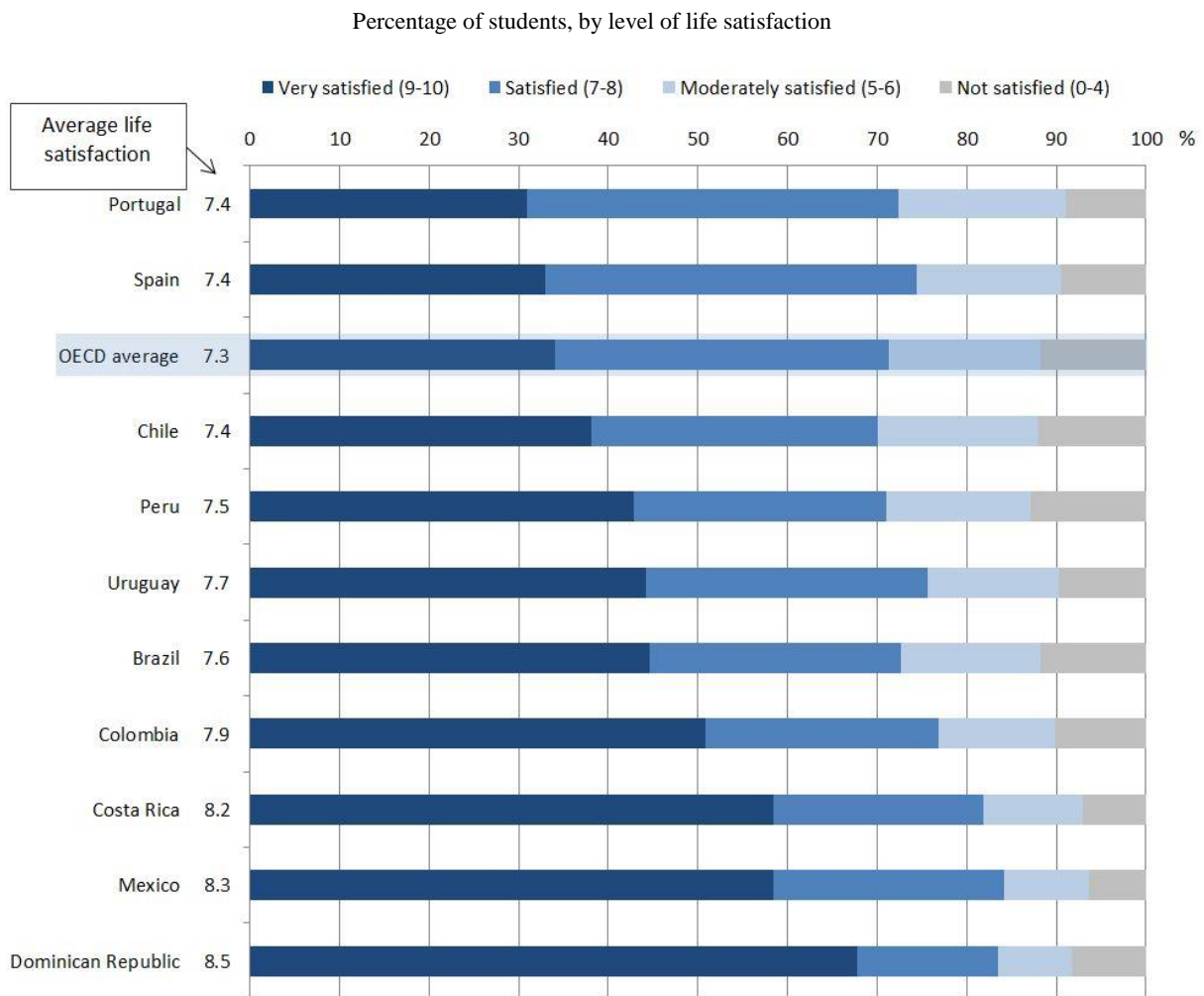
Life satisfaction is measured in PISA by students' self-reported overall satisfaction with life on a scale from 0 to 10, where 0 means the worst possible life, and 10 means the best

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<sup>3</sup> Argentina participated but was not adjudicated (only the Ciudad Autónoma de Buenos Aires was). See Annex 4 of OECD (2016) for further details.

possible life. Across OECD countries students have reported to “value” their life satisfaction at 7.3, while for Ibero-American countries the average is slightly higher at 7.8.<sup>4</sup> Intuitively, this suggests that the average adolescent in an Ibero-American country is more satisfied with life. More interestingly, the Dominican Republic is the country with the highest level of life satisfaction reported in PISA 2015, at 8.5 (Figure 4.1).

**Figure 4.1. Life satisfaction among 15-year-old students**



*Note:* Countries and economies are ranked in descending order of the percentage of students who reported being very satisfied with their life.

*Source:* OECD, PISA 2015 Database, tables III.3.2 and III.3.8, [www.oecd.org/pisa/data/2015database/](http://www.oecd.org/pisa/data/2015database/).

Despite the relatively high life satisfaction levels reported in Ibero-American countries, there are non-negligible differences between the many sub-populations in these countries. In all Ibero-American countries except the Dominican Republic, boys tend to report higher life satisfaction than girls. Moreover, Spain is one of the few countries where there is a (positive) significant difference in self-reported life satisfaction for native students compared to immigrant ones. This could be linked to the fact that young immigrants

<sup>4</sup> These data and all the other reported PISA results in this chapter are from OECD (2017).

might be suffering from the culture shock and stress of adjusting to their new life in the host country.

When looking at science performance and life satisfaction, the picture for Ibero-American countries becomes even more blurred: in Brazil, Colombia and Costa Rica, top-performing students reported lower satisfaction than their lower-performing peers, while the opposite holds in Spain and across OECD countries on average. These results should be taken with a pinch of salt: the cross-sectional nature of PISA data does not allow causal inferences to be made and thus potentially conflicting explanations could be driving these diverging results. Moreover, there is limited empirical evidence of a “virtuous circle” – high achievement increases students’ life satisfaction, which, in turn, motivates students to work harder to get better marks (Chang et al., 2003).

### *Life satisfaction and socio-economic status*

How does the economic development of a country square with the perceived life satisfaction of its students? Across PISA-participating countries (including Ibero-American countries) there is no evident relationship between adolescents’ life satisfaction and a country’s or/economy’s per capita gross domestic product (GDP). This finding is unexpected, as on average people in higher-income countries report greater satisfaction with life (Helliwell, Layard and Sachs, 2016). A potential partial explanation (OECD, 2017) is that PISA includes only those 15-year-olds who are enrolled in school, thereby excluding large numbers of adolescents in low-income countries who are not enrolled and tend to live in poverty. The OECD PISA for Development initiative is now piloting a programme that specifically targets the out-of-school population of adolescents, which will fulfil the goal of including these currently excluded children (see Chapter 2, Box 2.3).

However, self-reported life satisfaction differs in Ibero-America between students from different socio-economic backgrounds. On average, advantaged students<sup>5</sup> reported greater life satisfaction than disadvantaged students. In particular, in Chile, Portugal, Spain and Uruguay, advantaged students reported life satisfaction levels more than 0.2 points higher than disadvantaged students. Conversely, in Brazil disadvantaged students reported a higher life satisfaction than their most advantaged peers.

The weak (and possibly negative) relationship between performance in PISA and students’ satisfaction with their life is anything but linear: some aspects of high academic performance, such as a sense of achievement, can boost students’ satisfaction with life; other aspects, such as intense competition, psychological pressure and results-driven anxiety, might diminish adolescents’ energy and positive attitude towards flourishing in life.

### *Schoolwork-related anxiety at age 15*

Schoolwork-related anxiety is another facet of the assessment of well-being in PISA 2015. Test anxiety negatively influences students’ performance, increases their likelihood of skipping school and negatively affects their socio-emotional development (Ramirez and Beilock, 2011; Salend, 2012). Many students who have the ability to perform well in exams can end up achieving poor results because of debilitating levels of anxiety. Thus,

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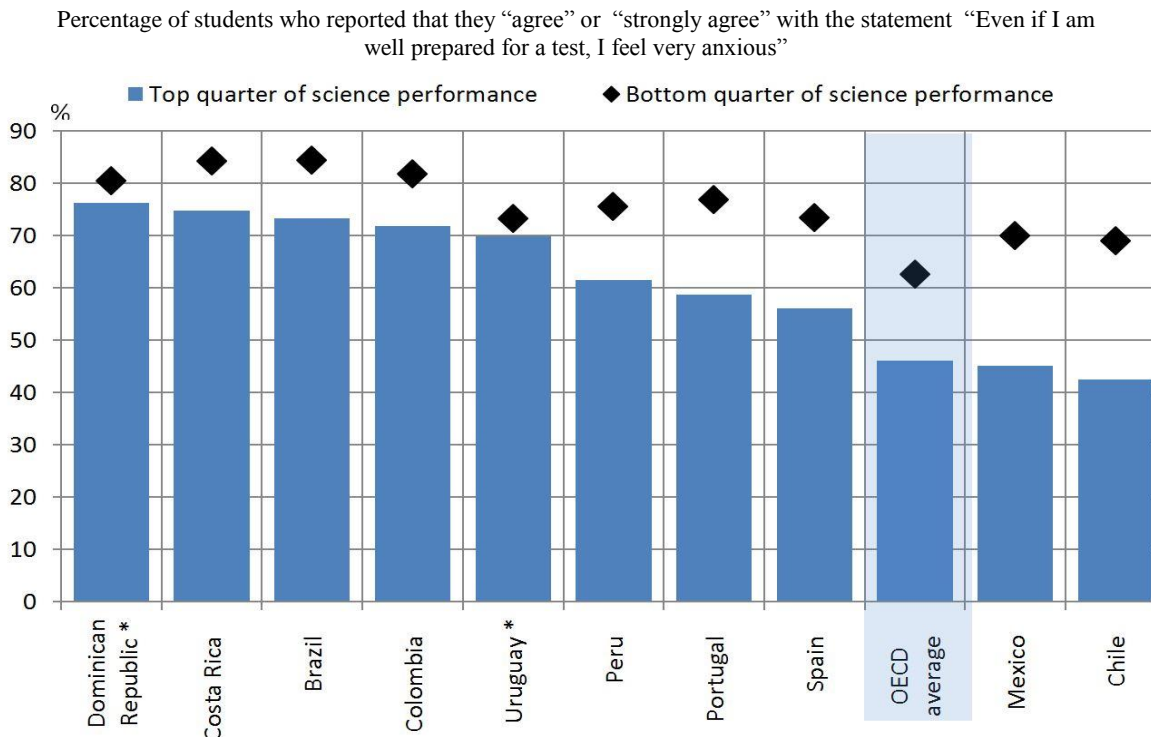
<sup>5</sup> Advantaged (disadvantaged) students are defined as those students in the top (bottom) quarter of the PISA index of economic, social and cultural status.

test results may only partly reflect the real academic capacity of students who can be affected by their psychological distress.

Across Ibero-American countries, performance and text anxiety are negatively correlated. In fact, the share of low performing students reporting schoolwork-related anxiety is significantly higher than the share of top-performing students, especially when expressing their tension before tests (Figure 4.2). One potential explanation could be that in this case anxiety might arise from the fact that students associate top grades with better career prospects. Students in Ibero-America who report that they want to get top grades and want to select from the best opportunities upon graduation are significantly more likely to feel very anxious about a test than their less ambitious peers, with the largest difference of at least 30 percentage points in Colombia. Moreover, parents might play a role in setting unrealistically high expectations, which ultimately undermine students' confidence (Gherasim and Butnaru, 2012).

Except for Colombia and the Dominican Republic, the difference between low- and top-performing students who reported getting very tense when studying is at least 21 percentage points, slightly above the average observed across OECD countries (18 percentage points). Gender differences are also in line with the average in OECD countries: girls reported significantly higher levels of anxiety than boys.

**Figure 4.2. Schoolwork-related anxiety among students in the top and bottom quarters of science performance**



*Note:* Differences in the percentage of students who feel anxious that are not statistically significant are marked with an asterisk next to the country/economy name. Countries and economies are ranked in descending order of the percentage of high-performing students in science who reported that they feel very anxious even if they are well prepared for a test.

*Source:* OECD, PISA 2015 Database, Table III.4.3a, <http://dx.doi.org/10.1787/888933470681>.

These patterns should again be interpreted with caution: the very same students who are reporting higher anxiety and scoring lower than their peers could be doing so precisely due to the anxiety they suffer from when taking tests at school. Teachers could intervene in this context to help students feel less anxious and calmer, with positive potential spillovers on their performance. For instance, students reported lower odds of feeling very tense when their teachers adapted lessons to the class needs and knowledge in all Ibero-American countries, except the Dominican Republic, Portugal and Uruguay.

#### *Anxiety and socio-economic status*

The evidence from PISA 2015 also suggests that across Ibero-American countries, disadvantaged students feel more tense or anxious than their advantaged peers. With the exception of Costa Rica, the Dominican Republic and Uruguay, a significantly higher share of disadvantaged students reported feeling very anxious even when they are prepared for a test. The difference is similar to that observed in OECD countries on average, if not larger. This result suggests an association between anxiety and performance that is disproportionately stronger among disadvantaged students, who could be feeling more pressure when doing tests at school.

As anxiety can be highly detrimental to students' cognitive achievement and subjective well-being, support for these struggling students could come from their parents and teachers, who can encourage them to trust in their ability to accomplish various academic tasks.

#### *Expectations of future career achievements*

How do students form their expectations about future educational and career pathways? What are the factors that contribute to them? How do expectations relate to socio-economic status and other dimensions of well-being? PISA 2015 asked students about the level of education they expect to complete. These expectations are thought to be different from the fantasies and dreams that students may have developed during childhood as they also incorporate students' self-assessment of their own capacities to realise their aspirations (Jerrim, 2011).

In Ibero-America, at least 40% of students expect to complete university education; the highest expectations were in Colombia, where the share was 76% of students. Moreover, a greater share of students expects to get a university degree in Ibero-America than the OECD average of 44% in all countries except Portugal and Uruguay. These expectations can be self-fulfilling prophecies, as the effort students invest to meet their expectations often pays off (OECD, 2012).

#### *Expectations and socio-economic status*

Students who have positive expectations for the future are likely to display higher self-esteem and more effective coping mechanisms. In Ibero-America, among students with similar socio-economic backgrounds, those who expect to complete university education were 27% more likely to report high levels of satisfaction with their life (9 or 10 on a scale from 0 to 10) than those without such expectations. This relationship seems to suggest that supporting students' psychological and social well-being at school might affect how adolescents see their future as students, and consequently the level of effort they invest in school activities.

Expectations are also influenced by the students' socio-economic background, and thus by the social and cultural environment they grew up in and their parents' social position and educational attainments. Parents and family background may – directly or indirectly – play an important role in shaping the expectations of young students. The PISA 2015 data seem to support this claim as advantaged students in Ibero-America are more likely to expect to enter university. The difference between advantaged and disadvantaged students varies across countries with the largest gap found in Portugal and Spain (52 and 51 percentage points respectively) and the smallest in Costa Rica and the Dominican Republic (6 and 8 percentage points respectively).

Ibero-American students whose mother attained a university education are significantly more likely to expect to complete a university degree than those whose mother only attained lower secondary education, with the exception of those in the Dominican Republic and Peru. This would confirm previous hypotheses about the possible indirect association between parents' educational achievements and students' expectations (OECD, 2016).

Students' personal characteristics also correlate with their educational expectations. In all Ibero-American countries, girls are more likely to expect to attain a university degree than boys. Moreover this gap is, on average, larger than the one observed across OECD countries. In OECD countries, girls' higher expectations of attaining a university degree than boys are reflected in their higher enrolment rates in universities, although they remain under-represented in certain fields, such as hard sciences.

### *The social dimension of well-being at school*

Students spend a large part of their time at school, where consequently most of their social life takes place. The quality of their social lives can be interpreted as the social dimension of their well-being and it includes students' relationships with their family, peers and teachers, and students' feelings about their social life in and outside school. PISA 2015 measured students' social well-being through their sense of belonging at school, exposure to bullying and relationships with teachers.

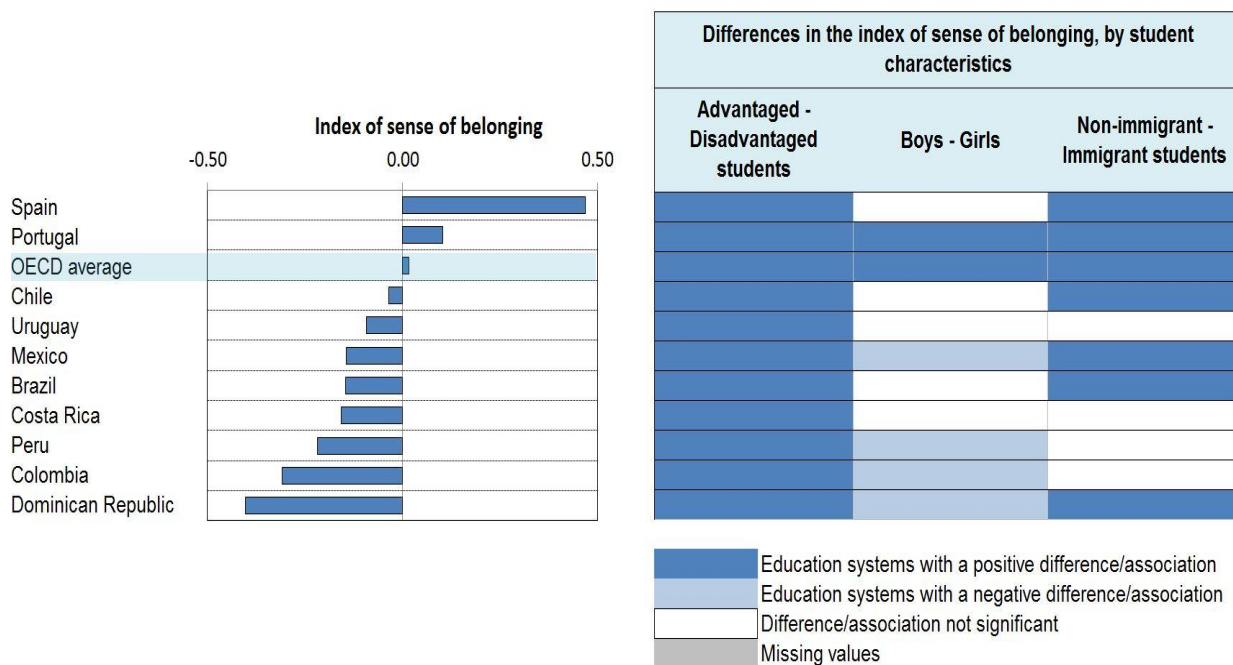
This social dimension of well-being is linked to other dimensions and to their cognitive achievements: there is a vast literature showing that adolescents who feel they are part of a school community are more likely to perform well academically and be more motivated in school (Borgonovi and Pál, 2016). Furthermore, researchers have found that an absence of a feeling of connectedness at school is an antecedent of depression among adolescents (Shochet et al., 2006).

Compared to previous cycles, Ibero-America saw an increasing trend of students reporting feeling estranged from school in the 2015 PISA cycle. This negative finding is in line with other countries participating in PISA. Nevertheless, Spain recorded the highest average value of the index of sense of belonging across all PISA-participating countries (Figure 4.3). Girls are more likely than boys to feel that they belong in school in all Ibero-American countries with the exception of Brazil, Chile and Portugal. A sense of belonging is also correlated with other dimensions of well-being: students with a high sense of belonging at school are, on average, more satisfied with their life than students with a low sense of belonging, with the exception of the Dominican Republic.



**Figure 4.3. Index of sense of belonging, by student characteristics**

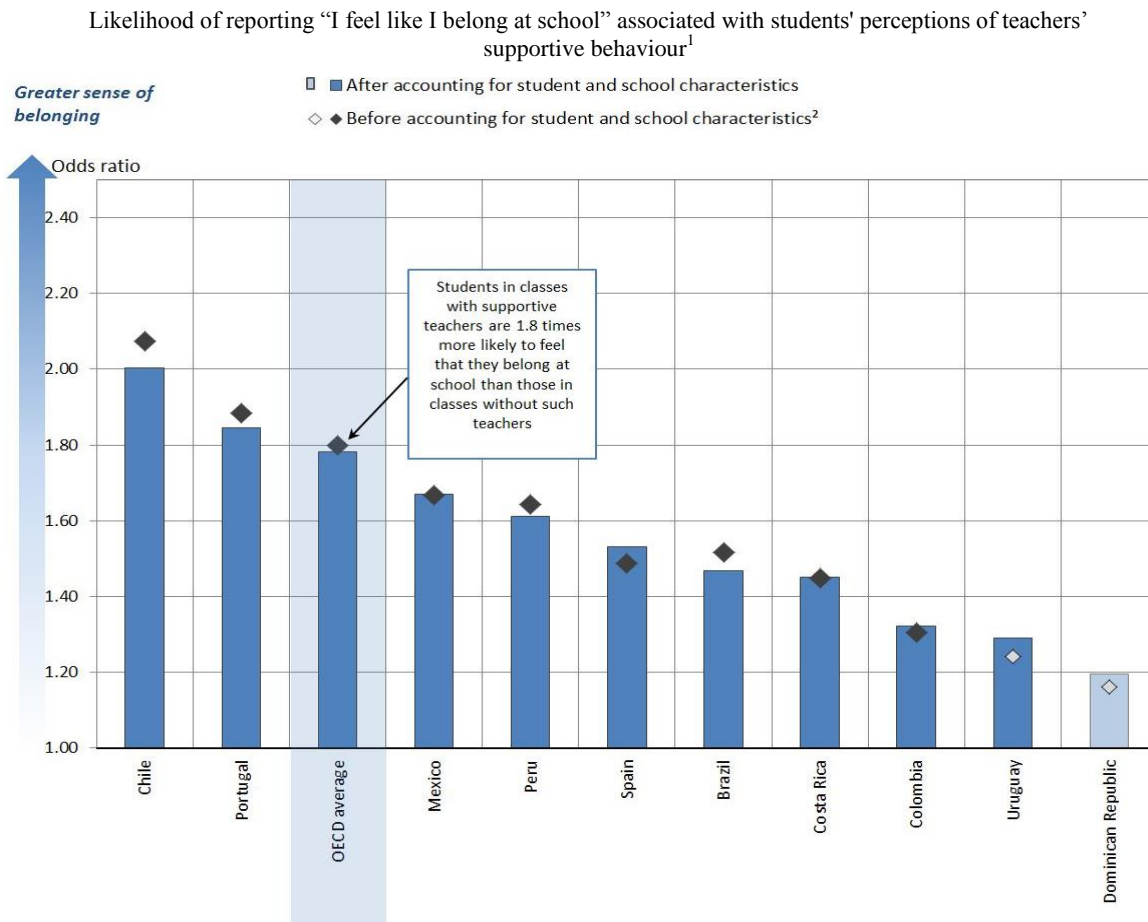
Results based on students' self-reports



*Note:* Countries and economies are ranked in descending order of the index of sense of belonging.

*Source:* OECD, PISA 2015 Database, Table III.7.6, <http://dx.doi.org/10.1787/888933471305>.

Across Ibero-American countries, students are more likely to report that teachers graded them more harshly than other students and called on them less than on the others. More than 20% of students in Spain and Uruguay and about 30% of students in the Dominican Republic reported harsher grading by teachers at least a few times a month (OECD average: 18%). Finally, 20% or more of students in Peru and Spain perceived that their teachers disciplined them more harshly than others at least a few times a month. Students' perception of support from teachers in learning science is also positively correlated with their self-reported sense of belonging at school in all Ibero-American countries (Figure 4.4). In Chile, students who felt that teachers supported their learning were twice as likely to report that they feel as if they belong at school as students who did not. This evidence might suggest that promoting communication and respectful interactions between teachers and students could help to enhance students' well-being (O'Brien and Bowles, 2013). In turn, improving students' sense of acceptance and belonging at school could also help students develop stronger interpersonal skills, openness and healthy attitudes towards other groups in society – competencies that are crucial for students' lives beyond school (OECD, 2017).

**Figure 4.4. Students' sense of belonging at school, by perception of teacher support**

Note: 1. Perceived teacher support refers to students responding "every lesson" or "most lessons" to the statements "The teacher shows an interest in every student's learning", "The teacher gives extra help when students need it" and "The teacher helps students with their learning". 2. Student and school characteristics include gender, performance in reading and science, and the PISA index of economic, social and cultural status (ESCS) at the student and school levels. Statistically significant values are marked in darker tone. Countries and economies are ranked in descending order of the odds ratio of reporting "I feel like I belong at school", after accounting for student and school characteristics.

Source: OECD, PISA 2015 Database, Table III.7.19, <http://dx.doi.org/10.1787/888933471440>.

In the education policy arena, awareness is growing about bullying and its negative consequences. In Spain, the School Learning Environment Plan (*Plan de Convivencia Escolar*) has been implemented to monitor students' well-being with a specific focus on anti-bullying practices. The plan's central goal is to create a positive learning environment where students can safely develop their cognitive, emotional, social and physical skills. The plan includes an information system that monitors schools' learning environments and identifies student behaviour problems, including anti-bullying procedures and an online survey that any student can take to assess their own well-being.

Data from Spain (Díaz-Aguado Jalón et al., 2010) show that in the period 2007-08 bullying rates were lower in Castile and Leon (where the plan was implemented), with 1 in 40 students affected, than in Spain as whole, where 1 in 26 students reported being bullied. PISA 2015 data confirm that students in Castile and Leon reported one of the lowest bullying rates among the Spanish Autonomous Communities. For instance, only

1.7% of students in Castile and Leon agreed or strongly agreed that they were threatened by other students, compared to 2.6% of students in Spain and 3.7% in OECD countries.

Across Ibero-America, roughly one in five students reported being victims of any type of bullying at least a few times per month, in line with the average of the OECD countries. Boys in Ibero-America (except in Costa Rica, Portugal and Uruguay) are more likely than girls to report that they have been victims of any type of bullying act and this gender difference is greater than the OECD average.

Academic performance is also negatively correlated with the incidence of bullying. In Ibero-America, the percentage of low-performing students (those in the bottom decile for science performance) who reported that they get hit or pushed is at least twice as those in the top decile for science. Except in Costa Rica and the Dominican Republic, Ibero-American schools with a high incidence of bullying (where more than 10% of the students are frequently bullied) score lower in science on average than schools with a low incidence of bullying (where less than 5% of students are frequently bullied). In Chile this difference is 24 score points after accounting for differences in the socio-economic composition of schools (the OECD average is 25 score points).

The social dimension of students' well-being is a dynamic and inter-related construct. At least 35% of students in Ibero-America who reported being frequently bullied also reported that they feel like an outsider at school. As in many countries, students in Ibero-America who reported being frequently bullied are more likely to report that they are not satisfied with their life than students who are not frequently bullied. In Spain this difference in the percentage of frequently and infrequently bullied students who are not satisfied with life is 20 percentage points (the OECD average is 16 percentage points).

#### *Social well-being and socio-economic status*

Students' sense of belonging at school is likely to be influenced by their socio-economic status. As previously discussed, socio-economic status captures many different dimensions of students' backgrounds, which have possible direct and indirect effects on them. Across 69 PISA-participating countries with comparable data (including all Ibero-American countries), socio-economically advantaged students reported a significantly higher sense of belonging than disadvantaged students. Moreover, students across Ibero-America who reported feeling like outsiders at school performed significantly worse in science: on average by 20 points, and more than 30 points in Brazil and Peru (the equivalent to one full year of schooling). However these differences narrowed once socio-economic background had been accounted for, thus suggesting it has a potential mediating effect on the relationship between belonging and performance. Bullying is also associated with students' family background except in the Dominican Republic: students in Ibero-America who do not feel that their parents help them when they have difficulties in school were significantly more likely to report that they experience frequent exposure to any type of bullying than those who feel that their parents help them.

### **Students' well-being and societal inequalities**

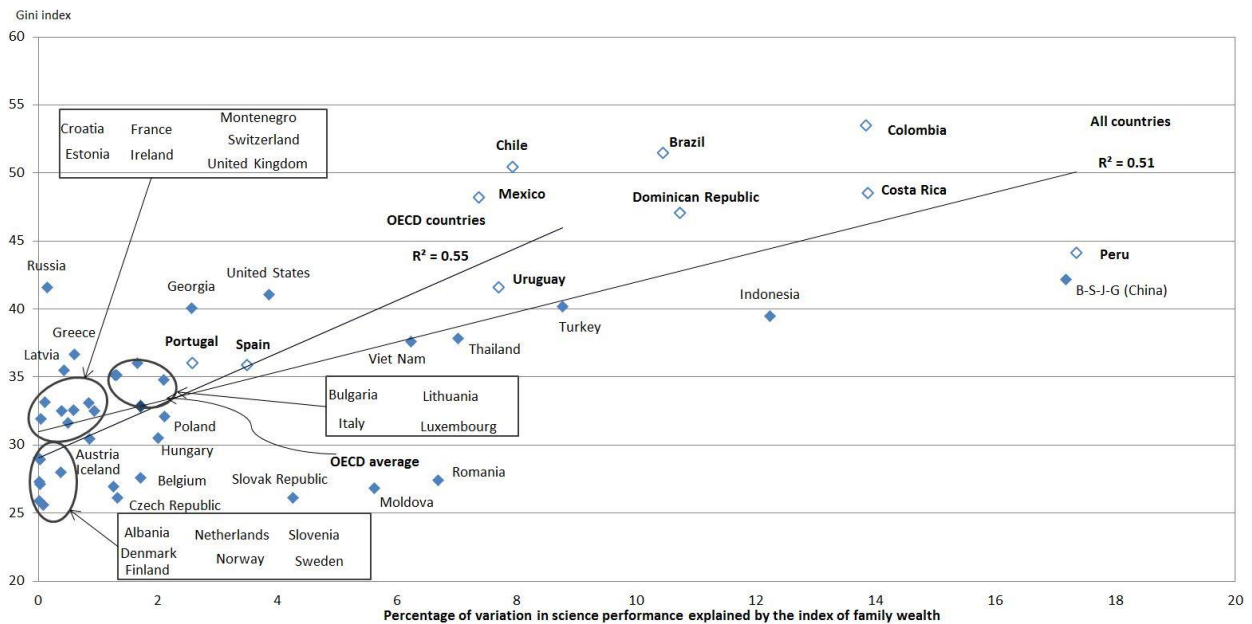
Most students' social networks are centred upon families, where children learn and develop. Parental support can positively influence students' cognitive achievements, their well-being and socio-emotional development (OECD, 2017). However, as cognitive achievements and well-being are strongly related to students' socio-economic status and this is in turn defined in terms of parental occupation, parental educational attainment and

family material possessions, it is important to disentangle the different sources of the strong relationship between socio-economic status and students’ well-being to guide the design of appropriate educational policies (OECD, 2016).

How does intergenerational social mobility relate to well-being in Ibero-America? The first finding is that, among Ibero-American countries, and especially so in Argentina, Brazil, Colombia, the Dominican Republic and Uruguay, there is a (worryingly) strong relationship between the PISA index of wealth and students’ science performance. This relationship can be interpreted a measure of the intergenerational transmission of social advantage (Sandefur, 2015). The second finding is that this measure strongly correlates with the overall level of income inequality (as measured by the Gini index) in the respective countries (Figure 4.5). For example, in Colombia income inequalities are high (the Gini index is 54 out of 100) and household possessions account for around 14% of the variation in student performance. This association suggests that the inequalities observed more broadly in a country are reflected in the determinants of student performance. In other words, in all systems rich parents may use their wealth to provide better education for their children, but in more unequal societies, wealthy parents pass on more of that advantage to their children: the “Great Gatsby curve” described at the start of this chapter.

**Figure 4.5. Family wealth, performance and income inequality**

Association between the Gini Index and the percentage of variation in science performance explained by family wealth



*Note:* The index of family wealth is based on the number and type of home possessions, such as cell phones, computers, cars and rooms with a bath or shower reported by the student. The percentage of variation in performance in PISA that is explained by the index of family wealth is a measure of the relevance of material resources of one generation for the education success of the next generation. The Gini Index measures the extent to which the distribution of income among households within an economy deviates from a perfectly equal distribution. A Gini Index of 0 represents perfect equality and one of 100 represents perfect inequality.

*Source:* OECD, PISA 2015 Database, Table III.10.7, <http://dx.doi.org/10.1787/888933472348>.

Do students whose parents have different occupations attend the same schools? In Brazil, Colombia, the Dominican Republic, Peru, Spain and Uruguay (all economies with relatively high income inequality), more than 20% of the segregation in the school system related to parents' occupation is between private and public schools. In other words, one-fifth of the uneven distribution of children across schools reflects the fact that children of white-collar workers are more likely to study in private schools than the children of blue-collar workers. Highly selective private education is thus a potential source of socio-economic segregation within an education system, and private schools are more exclusive in some countries than in others (Jenkins et al., 2008).

How do these inequalities influence students' well-being? In fact, family affluence and social status can also affect adolescents' satisfaction with life, perceptions about themselves and their aspirations for the future. Economic conditions can affect adolescents' well-being by limiting their consumption and leisure opportunities (Becchetti and Pisani, 2014). In Costa Rica, the Dominican Republic, Mexico, Portugal, Spain and Uruguay, 5-7% of students from among the wealthiest families (those in the top quartile of a wealth index based on household possessions) reported that they were not satisfied with their life, below the OECD average of 9%. Family wealth, social status and neighbourhood characteristics can also shape students' aspirations (Stewart et al., 2007). In all Ibero-American countries except the Dominican Republic, the children of blue-collar workers are less likely than those of white-collar workers to expect to have a managerial occupation or a university degree. Part of this gap in expectations might be related to school segregation: in Brazil, Peru and Spain, the children of blue-collar workers who attend a school where their schoolmates are prevalently from white-collar backgrounds are more likely to expect a managerial occupation than their counterparts in public schools, after accounting for students' performance in science. They are also more likely to expect to complete university than children who attend public schools in Brazil, Chile, Colombia, Mexico, Spain and Uruguay, after accounting for performance in PISA.

## Conclusions

PISA provides a very rich set of indicators to measure the well-being of 15-year-old students in Ibero-America and its relationship with their socio-economic status. Well-being is a multi-faceted and dynamic concept, resulting from the complex interplay of many conflicting forces, both internal and external to the students. Consequently, numerous between- and within- country differences can be observed across Ibero-American countries (and more in general across PISA-participating countries). This chapter has provided a considerable range of evidence on this heterogeneity and its inter-relationship with educational systems' and societies' characteristics and students' socio-economic background.

While students in Ibero-America tend to report on average a relatively high life satisfaction the relationship with performance is unclear. The positive association between performance and the ability of students to flourish in life and display positive energy can be offset by intense competition, psychological pressure and results-driven anxiety.

Across Ibero-American countries, performance and test anxiety are negatively correlated, possibly because students associate top grades with better career prospects. In fact, students in Ibero-America who report that they want to get top grades and want to select from the best opportunities upon graduation are significantly more likely to feel very

anxious for a test with respect to their less ambitious peers, with the largest difference of roughly 30 percentage points in Colombia.

What could be done to reduce the negative impact of anxiety on students' performance? Teachers and parents could act to help students feel less anxious, such as adapting lessons to the class needs and knowledge, which could have positive spill-overs into improved performance.

Expectations are another fundamental dimension of students' well-being and can act as self-fulfilling prophecies as students invest efforts to meet their expectations. Parents and family background may play an important role in shaping expectations, directly or indirectly, with advantaged students in Ibero-America more likely to expect to attain a university education.

Do students in Ibero-America feel more or less estranged from school compared to previous PISA cycles? PISA 2015 found an increasingly large share of students across the region reported feeling like outsiders at school although Spanish students still recorded the highest average levels of belonging of all the PISA-participating countries. The sense of belonging at school is likely to be influenced by the components of students' socio-economic status, with socio-economically advantaged students reporting a significantly greater sense of belonging than disadvantaged ones. Fostering a greater sense of acceptance and belonging at school could help students develop stronger interpersonal skills and healthy attitudes towards other groups in society that in turn will be crucial for their lives beyond school.

How does intergenerational social mobility relate to well-being in Ibero-America? Drawing from the evidence on the "Great Gatsby curve", this association between income inequality and intergenerational social advantage seems strong across Ibero-America, suggesting that a more unequal society makes it possible for wealthy parents to pass on more of that advantage to their children. In many countries a large part of the segregation in the school system related to parents' occupation is between private and public schools.

These inequalities influence students' aspirations. Across Ibero-America, children of blue-collar workers are less likely than children of white-collar workers to expect a managerial occupation or a university degree. The father of Jay Gatsby had wisely anticipated the potential perils of social and economic inequality not only in affecting the material outcomes of less advantaged people but also in affecting their psychological, cognitive and social well-being and their expectations and aspirations for the future.

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## Chapter 5. Policies to improve access to quality education in Ibero-America: How do they compare to policies across OECD countries?

*The key challenge facing Ibero-American countries is effectively reaching out to students across their territories and those now outside of the education system, providing quality and equitable education and opportunities to help them stay in education and progress successfully into the labour market. While a certain level of resources is important, how efficiently and equitably these resources are used also matters significantly. This chapter looks into the education improvement efforts that Ibero-American countries have been undertaking, in order to identify promising policy responses that could be relevant to the rest of the region. It will also compare the region's efforts against an array of proven and promising policies across OECD countries, particularly high-performing and fast-improving systems that could serve as inspiration for some Ibero-American countries. Finally, as efforts to improve education systems require a "whole of system approach", this chapter reviews policy efforts aimed at different levels of the system: policies targeted at students, schools and the education system overall.*



## Introduction

Education and skills can provide benefits to both individuals and societies. Better-quality education can improve individuals' cognitive and non-cognitive skills, enhancing their employment opportunities, and is also associated with greater entrepreneurship, less reliance on welfare or health systems, and even more engaged citizens (OECD, 2012). As discussed in Chapter 1, by strengthening individuals' resilience, high-performing education systems also strengthen their national economies' capacity to overcome increasing challenges and to adapt to today's fast-changing, knowledge-based and globalised economy in the long term. In sum, improving education systems is an economic and social imperative; they are the key investment for a country's future prosperity.

As shown in previous chapters, the key challenge facing Ibero-American countries is effectively reaching out to students across their territories and those now outside of the education system, providing quality and equitable education and opportunities to help them stay in education and progress successfully into the labour market. Although there has been improvement, most Ibero-American countries except for Spain and Portugal still perform well below the OECD average in the Programme for International Student Assessment (PISA) and most are also improving at a slower pace than emerging economies in other regions, particularly in Southeast Asia. Moreover, many students in these countries are leaving the education system too early. Sustained efforts will therefore be needed to improve quality, which of course also implies strengthening universal access and equity for all.

Evidence collected by PISA over the years shows that policies matter and that an adequate level of education spending is a necessary condition to provide students with quality education (see Chapter 3). The level of education expenditure in Ibero-American countries is still below that of most OECD countries (see Figure 3.1 in Chapter 3). With the exception of Portugal and Spain, in all Ibero-American countries the cumulative expenditure by educational institutions per student between the ages of 6 and 15 is below USD 50 000 (in purchasing power parity adjusted terms). To effectively expand access to quality education, governments across the region need to provide sufficient resources, while prioritising funding allocations where they can make the most impact.

While a certain level of resources is important, how efficiently and equitably these resources are used matters significantly. Among the top seven performing countries in PISA, only Singapore had one of the highest levels of cumulative expenditure per student up to the age of 15. The remaining six, including Estonia and Korea, achieved high performance in their education systems despite having public spending per student below the OECD average (OECD, 2016a; see Figure 3.1 in Chapter 3).

Sustained improvement, while more difficult to achieve, does not depend solely on high levels of resources. This is shown by Portugal and Colombia, for example, which are among the few education systems of all those participating to achieve sustained education improvements across PISA cycles (OECD, 2016a). In PISA 2015, Portugal performed at similar levels to Belgium, Denmark, France, Ireland, Norway, Poland, Sweden, Switzerland and the United States in science, despite having lower levels of expenditure than all of these countries except Poland. Similarly, Colombia spends about one-quarter of the OECD average expenditure per student between the ages of 6 and 15 but its mean performance has improved by 28 score points since 2006, the second largest improvement among the 52 education systems with comparable data in science. Colombia achieved this

while increasing student enrolments at Grade 7 or above (when students are eligible for the PISA test).

This chapter aims to look further into the education improvement efforts that Ibero-American countries have been undertaking, in order to identify promising policy responses that could be relevant to the rest of the region. It will pay particular attention to policies adopted by Brazil, Colombia, Chile, Mexico and Portugal, Ibero-American countries that have managed to increase access, improve student achievement or reduce social inequalities. It will also compare the region's efforts to general policy trends among OECD countries, particularly high-performing and fast-improving systems.

Furthermore, as efforts to improve education systems require a “whole of system approach”, this chapter reviews policy efforts aimed at different levels of the system. Some of these efforts have already provided some evidence of impact, while others have been included as promising efforts. This chapter first looks at policies that target students directly, to ensure that a larger population can access school and stay longer in education, while also addressing performance gaps. Second, it looks at teaching and school leadership policies, to improve the quality of teaching and learning. Finally it considers the overall/broad education system, to help steer countries towards better education quality. Nevertheless, it is important to highlight that the impact of policies need to be continuously monitored to prove their relevance and efficacy.

### Promoting successful educational pathways for Ibero-American youth

Ensuring equity in education means building a system that gives all students opportunities to succeed in their education or professional pathways. This section presents some key policy responses targeted directly at students that Ibero-American countries have been putting in place to achieve this objective. These policies relate to increasing the number of years that children and young people spend in education, but also addressing gaps in performance that may emerge among students from different socio-economic or cultural backgrounds, and also gender gaps.

#### *Improving access to and completion of school education in Ibero-America and OECD countries*

Ibero-American countries have made great progress in expanding access to education. In 2014, virtually all 5-14 year-olds in Ibero-America were enrolled in school (World Bank, 2017; OECD, 2016b). Most countries in Ibero-America have also increased secondary enrolment rates (World Bank, 2017) and this phenomenon has been reflected in the PISA data (see Chapter 2). In Portugal, for example, secondary school coverage increased by 14 percentage points, and in Brazil and Colombia, it increased by nearly 10 percentage points between 2003 and 2012 (OECD, 2016b).

Indeed, increasing educational attainment has been an important effort in OECD countries and the Ibero-American region. Nowadays, upper secondary is considered to be the minimum desired qualification level for successful integration in society and the labour market (OECD, 2017a). Across OECD countries, upper secondary education was compulsory in 20 countries in 2017 (OECD, 2017g). In the Ibero-American region, upper secondary education has been compulsory for some time in Spain (since 1990) and Portugal (since 1986), and it has recently become compulsory in Argentina (2006), Brazil (2009) and Mexico (2012).

But despite this progress, as discussed in Chapter 2, Ibero-American countries still face significant challenges if they are to expand access and improve completion at higher levels of education. While only 16% of adults have not completed upper secondary school across OECD countries, this percentage increases to around 35% in Brazil, Portugal and Spain, and 50% in Costa Rica and Mexico. The region also lags behind in tertiary attainment, with Spain the only Ibero-American country with a similar share of tertiary-educated 25-34 year-olds (41%) as the OECD average (42%) in 2015. In Portugal, only one in three young adults had a tertiary education, and in other Ibero-American countries with available data, this share is below 30%; only 21% of young adults in Mexico and 16% in Brazil have a tertiary education (OECD, 2016b). As discussed in Chapter 1, educational attainment is not only associated with a higher probability of being employed, but also with higher wages.

Improving access to and completion of high quality education need to remain priorities for the region. Countries are doing this through different policy instruments. These include helping students to start strong by increasing education coverage and quality for the early years and later on at school, particularly for children from disadvantaged backgrounds; introducing programmes to prevent students from repeating grades and dropping out; providing support to help students from disadvantaged backgrounds stay in education; bridging performance gaps of different types; and raising expectations about what students can achieve.

### *Early childhood education can help improve lifelong learning outcomes*

Early childhood education and care (ECEC) is increasingly viewed as the first step in lifelong learning. The evidence shows that students who participated in early childhood education and care tend to perform better academically much later on in their education, but Ibero-America still has much to do in this area (OECD, 2017b).

#### Improving coverage

Coverage in ECEC remains a challenge in Ibero-America, especially for the most disadvantaged. ECEC attendance has remained below the OECD average for most Ibero-American countries and the gaps between different social groups remain large. Disadvantaged children, who are more likely to face poor learning environments at home, can gain the most from access to quality ECEC services, as it can enable them to start school on an equal footing to their wealthier peers (Schleicher, 2014). Some countries (such as Argentina, Mexico and Uruguay) have achieved higher enrolment levels in pre-primary education than the OECD average among advantaged children, but their enrolment rates for disadvantaged students remain well below the OECD average (OECD, 2016e).

OECD countries also face the challenge of improving ECEC coverage. To address the need to increase coverage, several OECD countries, including Australia, Austria, Germany, Japan, Norway and Poland, but also Ibero-American countries such as Argentina, Chile, Mexico and Spain, have made ECEC compulsory, provided legal entitlements to ECEC, addressed cost issues for parents or increased the number of places available in ECEC centres to expand coverage.

### Addressing quality issues

While there is broad evidence on the importance of early childhood education for early childhood development and later educational outcomes, the extent of its benefits heavily depends on the quality of ECEC services (OECD, 2017c).

Ibero-American countries face a great challenge in improving the quality of their pre-primary education. On average across the OECD, students who had attended at least two years of pre-primary school scored 10 points higher in PISA than students who did not attend (after accounting for socio-economic background). In several countries in the region – Brazil, Chile, the Dominican Republic, Peru, Portugal and Spain – students with at least two years of pre-primary education also appeared to score higher in PISA than their peers who did not receive pre-primary education. However, these differences disappear once the students' and schools' socio-economic background is taken into account, except among students in Spain who had received three years or more of pre-primary education (OECD, 2016a).

It is critical to ensure that all children in their early years receive adequate care and education to support the development of their cognitive and non-cognitive skills. This has been a priority among OECD countries, with at least 19 of them implementing a variety of policies to improve quality and access in ECEC during 2008-14 (OECD, 2015a).

Among Ibero-American countries, Argentina and Colombia are examples of countries implementing broad strategies targeting both coverage for the most disadvantaged and quality concerns.

- In Argentina, a bill has been introduced to make education compulsory from the age of 3 across the country. At the same time, it is making progress building new pre-school centres to increase the coverage among 3-4 year-olds. The new policy is being accompanied by a plan for teacher training and innovation in the pedagogical models for the early years. It expects to achieve universal coverage by 2021.
- In Colombia, the Early Childhood Comprehensive Care Strategy – From Zero to Forever (*Estrategia para la Atención Integral de la Primera Infancia – De Cero a Siempre, 2011*) focused on children aged 0-5. The strategy has aimed to achieve universal coverage of ECEC with a particular focus on the country's poorest and most vulnerable children. The strategy also aims to: 1) improve the quality and coverage of ECEC provision; 2) ensure the implementation of ECEC in departments and municipalities across Colombia; 3) implement an evaluation and monitoring system for ECEC; 4) develop a knowledge management system for ECEC; and 5) mobilise Colombian society to support the development of ECEC. This strategy has spurred increasing participation in ECEC. In 2010 only about 566 000 children under the age of five were enrolled in comprehensive ECEC; by 2014 the number reached by the strategy had risen to 1 million. The goal is to increase enrolment in ECEC to 2.4 million under-fives (subsequently revised to 2 million children aged up to five years) and to ensure that 100% of children in extreme poverty are participating in ECEC by 2018 (OECD, 2016c).

### *Preventing student disengagement and improving retention in education also matter*

Ibero-American countries need to ensure that students have the necessary support and motivation to allow them to stay in school at least until the end of their compulsory

education. This involves introducing policies that can help address issues such as grade repetition and student truancy, which are consistently high in the region compared to the OECD average (see Chapter 2).

Grade repetition is a system-level policy that can hinder the effectiveness of efforts to increase the number of years in compulsory education. In PISA 2015, students in the Ibero-American region generally reported higher levels of grade repetition than the OECD average of 11%. As discussed in Chapter 2, grade repetition as reported by 15-year-olds in PISA 2015 appears to remain prominent in Ibero-America, being highest in Colombia (43%) and lowest in Mexico (16%). Evidence shows that grade repetition can widen achievement gaps between students, and also encourages student disengagement, which may lead to dropping out or other high-risk behaviour. It also imposes additional financial costs to the system and to students, who postpone their entry into the labour market by at least one year (OECD, 2012). This practice also amplifies socio-economic disparities, as disadvantaged students are 80% more likely to repeat a grade than their advantaged peers, even after accounting for their performance (OECD, 2016a). Many OECD countries have introduced reforms to limit the use of grade repetition, such as Austria and France (OECD, 2012) and there has been a reduction in the incidence of grade repetition between 2009 and 2015.

Student truancy – skipping school or arriving late – can also have adverse consequences for students, as truants are more likely to drop out of school, wind up in poorly paid jobs, have unwanted pregnancies, abuse drugs and alcohol, and even become delinquent. On average across OECD countries, 26% of students said they had skipped classes at least once and 20% reported that they had skipped a whole day of school at least once in the two weeks prior to the PISA 2015 test. In PISA-participating countries and economies, skipping a whole day of school is more common in disadvantaged schools than in advantaged schools (see Chapter 2). In all Ibero-American countries except Chile, a larger share of 15-year-olds reported skipping a whole day of school than the OECD average. Around half of students reported skipping a whole day in the Uruguay (51.5%), the Dominican Republic (51.4%) and Brazil (48%). Moreover, between 2012 and 2015, Brazil, Colombia, Peru and Uruguay were among the PISA-participating countries with some of the largest increases in the share of students who reported that they had skipped a day of school, with an increase of about 25 percentage points over that period, while Spain was one of the countries where the share had decreased the most, by 3.4 percentage points.

#### *Programmes of targeted support can help students at risk of repetition or dropping out*

Some OECD countries, such as Ontario (Canada) and the Slovak Republic, have implemented early screening programmes to identify students who are at risk of dropping out. In Ontario (Canada), the Student Success / Learning to 18 Strategy is a well-known example of a policy that managed to increase the chances of student success while in school (Box 5.1).

### Box 5.1. Policies in Ontario (Canada) to reduce dropout rates

In 2003, the Ontario Ministry of Education implemented the Student Success / Learning to 18 Strategy to increase graduation rates and provide all Ontario students with the tools to successfully complete their secondary schooling and reach their post-secondary goals. The strategy was introduced in phases, beginning with increasing leadership capacity to promote strong leadership in schools and school boards and to change school cultures to achieve long-term systemic improvement. At the school-board level, it created a new senior leadership role, the Student Success Leader, and at the school level it created the Student Success Teacher to provide support to students at risk of dropping out. In addition, secondary schools established Student Success Teams, consisting of school leaders, Student Success Teachers and staff. The teams tracked and addressed the needs of disengaged students, and also worked to establish quality learning experiences for all students. According to the final evaluation report of the strategy, developing good leadership at all levels – ministry, school board and school level – coupled with extensive capacity building were key to the success of the reform.

In 2011/12, Ontario had a high-school graduation rate of 83%, a 15 percentage point improvement since 2003/04. Over these 8 years of the Student Success Strategy, approximately 115 500 more students graduated than would have if the rate had remained at its 2003/04 level.

Source: OECD (2015d), *Education Policy Outlook: Canada*, [www.oecd.org/edu/EDUCATION%20POLICY%20OUTLOOK%20CANADA.pdf](http://www.oecd.org/edu/EDUCATION%20POLICY%20OUTLOOK%20CANADA.pdf).

Ibero-American countries have also made efforts to prevent students from disengaging from the system through different targeted approaches. For example, in Uruguay, the Tutorials Project (*Liceos con Tutorías y Profesor Coordinador Pedagógico*) (2008) aims to prevent grade repetition and dropping out among disadvantaged students. It provides additional and targeted support for schools with the greatest socio-economic challenges to improve the learning outcomes of students in these schools. Participation in this programme is compulsory for schools with more than 400 students and a yearly repetition rate higher than 25% for the entire general lower secondary cycle. The programme consists of tutorials for students that schools identify as being at the greatest risk of repetition or dropping out. Additional resources are also provided for school meals, uniforms and supplies for all students in the school (schools receive a fixed amount of money depending on their enrolment numbers which they distribute across all types of materials). In 2013, 20% of the student population enrolled in public general lower secondary education (25 150 students) took part in the programme.

There are also some programmes that target students outside the education system, in order to understand the factors that led to their disengagement and provide them with holistic support to re-enter and remain in education. In Colombia, the city of Armenia (capital city of the Quindío Department) introduced an initiative in 1998 called School Reaches Out to the Children, to identify students who are outside the education system and the factors that led to their exclusion in order to provide them with comprehensive support to re-enter. The success of the initiative has led to its extension to 20 other municipalities and 5 departments. By 2013, the programme had identified over 4 000 children and helped them to attend education (OECD, 2016c).

*But vocational education can also help to make education more attractive and relevant for students*

Countries must also simultaneously make education – and, in particular, upper secondary education – more attractive and relevant to students’ and the labour market’s needs to ensure successful completion and reduce disengagement, which is very high in the region. Education systems should reform themselves to cater for varying students’ needs and fast-changing labour market requirements, by, for example, offering training options for those who wish to enter the workplace.

Making upper secondary more responsive to the needs of students and the labour market can be done through a flexible combination of vocational and academic choices. It is important that these diverse pathways are both equivalent and consistent in quality matters: all programmes should deliver benefits from both a learning and outcomes perspective and be valued in the same way. The aim should be that all students complete the equivalent of upper secondary school and have the opportunity to pursue tertiary education if they so desire. For this, vocational education and training (VET) students need to develop similar generic skills to those usually delivered in more academic upper secondary programmes. Literacy, numeracy and scientific knowledge and skills are as important as the professional ones that VET graduates acquire for their lifelong employment, learning and socialisation (OECD, 2012).

Currently, a very small share of 15-19 year-old Ibero-American students are enrolled in vocational programmes. Although enrolment rates vary considerably across the region – from 3% in Brazil to 23% in Portugal – all countries are below the OECD average of 26%. In addition, even more mature students (20-24 year-olds) in Ibero-America are less likely to participate in vocational tracks than in general programmes, with the exception of Portugal and Spain (OECD, 2017f). Interestingly, unlike most PISA-participating countries, in many Ibero-American school systems, such as Brazil, Colombia, Costa Rica, the Dominican Republic and Mexico, students in pre-vocational or vocational programmes scored higher in science than students in general or modular programmes (OECD, 2016e). This may suggest that many vocational education and training systems in the region are in fact highly demanding and prestigious tracks with a greater academic focus. Such a model may discourage students who are less academically-oriented and who might be engaged by, and indeed excel in, more practical forms of learning (OECD, 2017a).

To increase the attractiveness and relevance of education for youth:

- In 2013, Portugal implemented a network of Centres for Qualification and Vocational Education (*Centros para a Qualificação e o Ensino Profissional*) to provide quality guidance and counselling about schools, VET and dual certification opportunities. These centres help young people and adults find education and training; develop school and professional processes for recognition, validation and certification of competencies; collaborate in the definition of criteria for establishing a network of educational and training provision; monitor how student training adheres to previously defined paths; and collect information on learning outcomes and the labour market. This network replaced the 2005 New Opportunities Programme (*Programa Novas Oportunidades*), which had been adjusted in 2013 (based on an impact evaluation study) to focus more on job market requirements and professional retraining and to align it further with guidelines of the European Alliance for Apprenticeships. The programme reduced

dropout rates and promoted vocational training, which now accounts for around 50% of students (OECD, 2014).

- In Brazil, the 2011 National Programme for Access to Technical Education and Employment (*Programa Nacional de Acesso ao Ensino Técnico e Emprego*) increased the provision of free training places for young people from poor backgrounds to avoid them dropping out. In 2011, around 625 000 courses were provided free of charge, 580 000 of which were professional qualification courses (initial and continuing training), and nearly 45 000 upper secondary courses (leading to a technical education qualification). According to national statistics, more than 8 million Brazilians took technical courses and initial and continuing education in the period 2011-14 (OECD, 2015e).
- In Argentina, the 2015 National Scope Training Capacity Building (*Capacitación Laboral de Alcance Nacional*) is a secondary-level training programme for students to develop the knowledge and skills that will improve their career opportunities. The programme is intended for students on their fourth year of non-technical secondary schools. Monitoring will be required to prove the programme's relevance and efficacy (INET, n.d.).

### *Students from disadvantaged backgrounds also need additional support to stay in education*

Students with disadvantaged backgrounds often face greater difficulties in accessing education and are more likely to be low performers, repeat a grade, disengage or drop out from education completely (see Chapter 2). Among countries participating in PISA 2015, Ibero-American students who come from poor families, have less educated parents and limited access to books, have lower performance than students with similar backgrounds in other regions of the world.

In Chile, Peru and Uruguay, for example, more than 15% of the variation in science performance can be explained by students' socio-economic status, while the OECD average is 13%. Furthermore, the probability of repeating a course in Spain is almost six times greater for disadvantaged students – the highest figure among all PISA-participating countries. Equity challenges related to access and completion are especially relevant among ethnic minority students in Latin America.

Moreover, as pointed out in Chapter 2, except for Portugal, schools in Ibero-America appear more strongly segregated by socio-economic status than on average across OECD countries. In Ibero-America, students tend to attend schools in which they interact disproportionately with other students with similar socio-economic background.

Evidence shows that school segregation can magnify students' socio-economic inequalities. Schools with higher proportions of disadvantaged students are more likely to suffer from a variety of social and economic problems in their environments that can hinder the quality of their learning, such as higher unemployment and lower income levels in their neighbourhoods and among students' families, higher proportions of single-parent families or higher crime. Sometimes, such schools' lower performance can be due less to their students' socio-economic backgrounds, and more due to the schools' inadequate response to student needs, insufficient support for staff (or the inability of the school to attract quality staff), or poor management and professional practice. As discussed in Chapter 3, evidence from PISA 2015 shows that disadvantaged students in Ibero-America are also more likely to attend schools where there is a lack of educational material and teaching staff.



Since 2006, several countries in the region – including Brazil, Chile, Mexico, Portugal and Uruguay – have managed to improve equity while simultaneously improving or maintaining their performance in PISA. Much of this progress can be explained by improvements in the performance of disadvantaged students, especially in Mexico where students from the lowest level of PISA’s economic, social and cultural scale (ESCS) saw a 19-point improvement in their performance between 2006 and 2015 in PISA’s science assessment. Some of this success might be attributed to policies targeting students from low socio-economic backgrounds (OECD, 2016d). Among the more advantaged students in the region, performance has generally been stagnant or deteriorated.

Ensuring an equitable allocation of resources and improving the quality of instruction are, of course, key. However, it is also important for education systems to recognise that disadvantaged students often have *additional* needs that schools need to cater for (OECD, 2010). Policy measures to support disadvantaged schools and students among OECD countries include, for instance, offering additional and/or targeted resources to schools with a large share of disadvantaged students or directly to students to help them stay in education.

- Estonia has provided school lunches, textbooks and learning materials for free to students in basic education since 2006 in an effort to promote equal access to education (OECD, 2016g).
- In the Netherlands, extended schools, which mostly serve disadvantaged students, include other services for children, such as childcare, health and welfare services, and sports and cultural institutions. The purpose of this co-operation is to promote children’s development by offering them help where necessary at school or in their home setting, as well as by offering additional activities (such as culture and sport) with which they normally have little contact; and in some cases, additional academic instruction. The concept of the community school comes from an initiative by local stakeholders such as municipalities, school boards and welfare services (OECD, 2012, 2015a).
- Ireland has had positive outcomes from its relatively long-standing Delivering Equality of Opportunity in Schools (DEIS) programme which provides support to students from disadvantaged families (see Box 5.2).

#### **Box 5.2. Ireland’s policy for educational inclusion**

Ireland adopted the Delivering Equality of Opportunity in Schools (DEIS) programme in 2005 as a national comprehensive policy for educational inclusion. It included a system to identify disadvantaged schools and an integrated School Support Programme to provide schools and school clusters or communities with additional support and resources. DEIS measures include: 1) access to Home, School, Community Liaison services and to the School Completion Programme; 2) measures such as guidance and counselling to increase attendance, retention and attainment; and 3) more curriculum choice.

Impact analysis of the programme points to positive outcomes for DEIS post-primary schools, with an increase in completion rates from 68.2% for cohorts starting in 2001 and completing in 2006-07 to 80.1% for those starting in 2006 and completing in 2011-12. The analysis also indicated positive results in reading and mathematics performance.

Source: OECD (2013c), *Education Policy Outlook: Ireland*, [www.oecd.org/edu/EDUCATION%20POLICY%20OUTLOOK%20IRELAND\\_EN.pdf](http://www.oecd.org/edu/EDUCATION%20POLICY%20OUTLOOK%20IRELAND_EN.pdf).

Ibero-American countries have also developed programmes that offer disadvantaged students additional targeted support to promote their attendance at school. It would be useful to follow up on these policies in order to better understand their impact on student attendance.

- In Portugal, the 2012 School Food Support Programme (*Programa Escolar de Reforço Alimentar*) provides a morning meal to students identified by their schools as facing food shortages, and to increase awareness among students and their families of the importance of a healthy diet and eating breakfast. The programme covered about 14 000 students in 2012/13, and about 12 000 students in 2013/14 (OECD, 2014).
- In the Dominican Republic the similar School Meal Programme provides meals to children at the primary level in urban and rural areas (INABIE, n.d.).
- In Mexico, the Education Ministry operates an extensive and diversified scholarship programme to help address inequality-related challenges. This scheme currently benefits around 7.8 million Mexican students across primary, secondary and tertiary education (OECD, forthcoming).

Additionally, conditional cash transfer programmes have been an important policy choice for countries to increase educational attainment of the most disadvantaged students. These programmes provide social assistance benefits to families subject to their children's enrolment in education and school attendance. Conditional cash transfer programmes are an increasingly common policy instrument in the Ibero-American region, particularly among Latin American countries, although they are also prevalent in other parts of the world; Indonesia, South Africa, Turkey and the United States (New York) have also implemented them (Fiszbein and Schady, 2009).

In countries like Brazil and Mexico, they have become the main source of social assistance (Fiszbein and Schady, 2009).

- Conditional cash transfer programmes have already been in place for some years in Mexico. The most recent version is Prosper (*Prospera*), also known by its previous name, Opportunities (*Oportunidades*). This incentive programme offers financial support to families under the condition that children remain enrolled in ECEC, school or a bachelor's degree and has benefitted over 6.8 million families – the equivalent of one-fourth of the total Mexican population since 2002 (OECD, 2017d).
- Brazil implemented the 1995 School Allowance (*Bolsa Escola*) programme and later the 2003 Family Allowance (*Bolsa Família*), originally targeting families with 7-14 year-old children. It has helped lift many families out of subsistence-level poverty while also increasing their motivation to send their children to school. In 2006, the programme's coverage was extended to cover students aged 15-17, thereby encouraging enrolment in upper secondary education. According to national statistics, more than one-third of students enrolled in primary and secondary education received the *Bolsa Família* stipend in 2012, a total of 17.9 million students out of the 50.5 million enrolled in basic education (OECD, 2015e).
- In Colombia, the More Families in Action (*Más Familias en Acción*) programme started in 2001 as a temporary measure to address the negative social effects of the economic crisis in the late 1990s, and in 2012 it became a national policy following positive evaluations. The programme includes two types of cash transfers: 1) a lump sum for each family with children under 7 years old

(regardless of the number of children) subject to the children's health controls; and 2) for every 5-18 year-old (up to a maximum of three children per family), enrolled and regularly attending school (up to Grade 11) without failing a grade more than twice. The programme has had very promising results and high participation levels: 2.7 million families (4.7 million people) participated in 2013. Different evaluations estimated that the Gini coefficient of inequality would have been half a point higher in the absence of the programme. Children in participating families have on average higher school attendance (by 4 percentage points), a higher probability of completing secondary school (6.4 percentage points), and a lower probability of 7-11 year-olds working (1.3 percentage points). On average, participation in the programme increased the education of 18-26 year-olds by 0.6 years (OECD, 2016c).

There are also policies that have targeted improving the quality of instruction in disadvantaged schools at least in Mexico and Colombia. Students in these initiatives improved achievement at a faster pace than students from more privileged backgrounds.

- In Colombia, the New School (*Escuela Nueva*) programme developed a student-centred participatory pedagogy between the late 1980s and early 1990s in over 20 000 rural schools. Students in rural schools participating in *Escuela Nueva* outperformed their peers in urban schools, except in larger cities (OECD, 2017g).
- In Mexico, the Integral Strategy for the Improvement of Educational Achievement in Mexico (EIMLE, also known as Learning Community Project or *Redes de Tutoría*), was put in place in 9 000 schools to develop learning communities. When EIMLE was in operation, the achievement of public middle school students in the most marginalised communities reached and surpassed the achievement of their most privileged counterparts. In the case of mathematics, EIMLE students practically reached the performance of students in private schools (OECD, 2017g).

Along with this support, however, it is also important to pay attention to other types of gaps in opportunities that may occur because of students' backgrounds.

### ***Ibero-America also needs to continuously work to bridge performance gaps among students***

Performance gaps exist because of a difference in opportunities due to socio-economic or cultural background, or even gender. Providing support to help students stay in education is not only a moral imperative, but also brings economic and social benefits for societies, as discussed above in this chapter.

### ***The region could do more to bridge performance gaps between boys and girls***

As noted in Chapter 2, Ibero-America has a greater challenge than on average among OECD countries when it comes to bridging gaps in student performance for boys and girls. While PISA has consistently found a gap in favour of girls in reading, countries in Ibero-America tend to have a smaller gap than the OECD average (see Chapter 2). Across OECD countries, boys tend to continue to perform better in mathematics and science; the average difference in science performance between boys and girls is 4 score points, but these differences are more significant in Portugal (10 points), Chile (15 points) and Costa Rica (18 points). The percentage of girls achieving high levels of science (above

Level 5) is lower than that of boys in all Ibero-American countries, but particularly so in Brazil, Chile, Portugal, Spain and Uruguay (OECD, 2016a).

Disparities in performance related to gender do not start at birth, but rather at home from a very early age. Across OECD countries and partner economies, entrenched social norms, family expectations and prevalence of stereotypes – rather than innate differences in aptitude – often lead to disparities in performance and behaviour between boys and girls (OECD, 2016a). This has an impact that goes well beyond classrooms and affects children’s academic, personal and professional careers, by implicitly biasing their perception, reducing girls’ confidence and narrowing the opportunities that are effectively available to women.

Nevertheless, in some of the top-performing countries and economies in PISA such as Hong Kong-China, Chinese Taipei and Vietnam, girls perform on a par with their male classmates in sciences and attain higher scores than boys in most other countries and economies around the world. Similarly, while in all countries and economies boys underperform in reading compared to girls – and by a wide margin – boys’ scores in reading in the top-performing education systems are still much higher than girls’ scores in less well-performing education systems. These results show that gender gaps in school performance are not determined by innate differences in ability and, most importantly, that the gender gap can be bridged (OECD, 2015b).

A concerted effort by parents, teachers and policy makers is needed if both boys and girls are to be able to realise their full potential and contribute to the economic growth and well-being of their societies. Bridging performance gaps between boys and girls is not only a moral imperative, but it is also crucial for countries to successfully compete in today’s global economy. Low levels of female participation in the labour market are costly. This is particularly important in the Latin American region, given that only one in two women are in the labour market, whereas in Spain and Portugal 70% of 15-64 year-old women are in the labour force (OECD.Stat, 2017).

Countries are pursuing different strategies to bridge the gender gap in education. Some policies have focused on limiting/breaking gender stereotypes and entrenched social norms that may exist in textbooks or pedagogical methods.

Germany, for example, introduced a training tool to eradicate gender stereotypes from textbooks and in the French Community of Belgium a small manual helps teaching staff to review educational resources and ensure that they foster diversity, including gender diversity. Additionally, a website is provided for education staff to address gender stereotypes. Similarly, in Finland, a new guidebook advises upper secondary teachers on teaching strategies that will benefit both genders.

In Ibero-America, there are currently promising efforts underway in Chile to address gender inequities in opportunity, most recently represented by the creation of the Ministry for Women and Gender Equity, a presidential office charged with advancing a gender equity agenda. Since the early 1990s the government has introduced policies to address gender inequities such as in the curricular reform of 1997, the Curricular Framework of Basic Education (Marco Curricular de la Educación Básica). In early childhood education and care, the government has aimed to change the language of textbooks by referring to girls and boys, and the examples discussed in the classroom, e.g. showing girls performing scientific activities and boys performing humanistic tasks. In basic education, the government has aimed to promote girls’ participation in mathematics and science classes, while encouraging boys’ participation in language and history classes, changing

the language of textbooks, and changing the examples discussed in the classroom. Chile has made progress addressing performance challenges specific to boys in reading. According to the PISA 2015 reading results, Chile had one of the smallest gaps in performance between girls and boys (OECD, 2017g).

*Indigenous, afro-descendant and migrant students could benefit from more support*

In Ibero-America, inequities also stem from students' ethnic and migrant status. Students from indigenous groups, afro-descendant communities and migrants tend to be disadvantaged and report lower educational attainment levels as well as performance (OECD, 2016a), contributing to widening income disparities and labour market duality (OECD, 2017a). For example, there are major disparities in terms of educational attainment between indigenous and non-indigenous Chileans. On average, indigenous Chileans attend 9.7 years of schooling compared to 10.9 years among their non-indigenous peers (OECD, 2017g).

There is also a significant gap regarding learning outcomes. PISA 2015 results show that, on average, across the OECD, non-immigrant students outperform their immigrant peers by 31 score points. The trend is similar across all participating Ibero-American countries, although less significant in Chile, Costa Rica and Portugal. In fact, performance differences between immigrant and non-immigrant students in Mexico are among the highest in the OECD, at 63 score points (OECD, 2016a).

Although the challenges faced by indigenous, afro-descendant and migrant students go far beyond education, education can be a powerful instrument to address disparities, not only in educational opportunities but also a much wider set of inequities. Education systems should be therefore designed to recognise and respond to the specific needs and contexts of these groups. School leaders and teachers also need to be effectively prepared to teach indigenous and afro-descendant students, and be provided with the resources to help them develop their capabilities and their confidence (OECD, 2017e).

For example, Show Me Your Math is an initiative developed in Atlantic Canada to promote engagement with mathematics within the context of the community and cultural practices (Box 5.3).

**Box 5.3. Show Me Your Math, Canada**

In Atlantic Canada, Show Me Your Math is a programme that invites aboriginal students to explore the mathematics that is evident in their own community and cultural practices. By exploring aspects of counting, measuring, locating, designing, playing and explaining, students discover that mathematics is all around them and is connected to many of the cultural practices in their own communities. Each year students gather for the annual mathematics fair and celebrate the work they have done. The programme began in 2007 and has continued to grow over the years with moves to more classroom-based inquiry projects that are known as Mawkina'masultinej (let's learn together) projects. The programme has now spread from Nova Scotia to other provinces and territories, as an effective and engaging way for indigenous and non-indigenous students to understand and apply mathematical concepts and principles.

Source: OECD (2017e), *Promising Practices in Supporting Success for Indigenous Students*, <http://dx.doi.org/10.1787/9789264279421-en>.

### *Increasing students' well-being and expectations about what they can achieve*


Besides addressing performance gaps, Ibero-American systems need to raise students' well-being and overall expectations about what they can achieve. The challenge of improving performance in Ibero-America extends across the socio-economic spectrum, and goes beyond gender differences, as discussed above.

Motivation is an important factor in improving student outcomes. Students' expectations can be "self-fulfilling prophecies", as the effort that students invest to meet their expectations often pay off. For example, when comparing students of similar socio-economic backgrounds and academic achievement, students who expect to graduate from university are more likely to complete tertiary education than their peers who do not have such high expectations. Conversely, students who expect to drop out of school without qualifications are more likely to do so. As discussed in Chapter 4, PISA 2015 data show that advantaged students in Ibero-America are more likely to expect to enter university education. While students' expectations should take into account their performance and how they could improve it, schools should provide academic and career counselling to *all* students to help them reach their potential in terms of their future education and career prospects (OECD, 2016a). High-performing systems, such as Singapore, have developed this type of policy (see Box 5.4).

#### **Box 5.4. Education and career guidance in Singapore**

Singapore has done well in PISA 2015, but is continuing to make important changes in its education system to prepare students even better for the future. Taking a lifelong perspective, it is creating multiple education-career pathways that will enable students to discover and pursue their interests, and continuously develop social, emotional and cognitive skills. Education and career guidance is one important element to help students make informed decisions along their education and career journey (Ministry of Education, Singapore, 2017). The Education and Career Guidance programme allows Singaporean students to receive support in different aspects of education and career planning through counselling, mentoring and online courses (Cheng and Tan, 2016). The programme's counsellors provide individualised support to students all the way from secondary to tertiary education, and work with various stakeholders to implement an education and career guidance plan customised for the individual student. Activities such as talks, fairs and learning journeys are also organised in collaboration with community and industry partners to help students explore their strengths and interests, in relation to their aspirations. These activities foster students' social and emotional competencies (including self-identity, awareness, motivation and self-directedness), and improve workplace readiness.

**Figure 5.1. The Singapore Education and Career Guidance framework from primary school to working life**



	Awareness	Exploring and planning	Crystallisation and planning	Developing and transitting
Building self-awareness and personal management	Explore personal strengths, hobbies, interests	Develop self-awareness in areas of interest, abilities, values and career aspiration	Develop career self-concept	Take ownership of own career development
Exploring education, training and careers	Build awareness about the wide array of occupations in the world of work	Explore relevant courses of study and pathways linking to the world of work	Develop skills in acquiring and using sectorial career information	Develop skills and networks to facilitate entry into the chosen career
Develop plans and decision-making	Explore secondary schools and set goals in learning	Develop skills to plan, discuss with relevant others and make decisions on post-secondary education choices and careers	Develop school-to-work transition skills. Develop skills in planning and making informed decisions for further education and jobs	Navigate the world of work confidently and manage career transitions

As part of the strategy to encourage young people to take greater ownership of their own learning throughout life, Singapore is also launching an online education, training and career guidance portal for students and people in the workforce (SkillsFuture Singapore, 2017). Navigating a user-friendly platform, students can discover their interests and strengths, and explore various education and career pathways to realise their aspirations. This will be extended beyond schools so that when they join the workforce, they can use the portal to search for suitable jobs, manage their careers and learn about new skills.

Source: OECD (2017b), *PISA 2015 Results (Volume III): Students' Well Being*, <http://dx.doi.org/10.1787/9789264273856-en>.

Socio-emotional well-being also plays an important role in students' achievements. Research shows that adolescents who feel part of the school community are more likely to perform better academically and be more motivated. And while the average 15-year-old in Ibero-America reports higher levels of life satisfaction than their peers across OECD countries, a larger share of students in the region report feeling like an outsider in school compared to previous PISA cycles. Additionally, disadvantaged students are more likely to feel estranged from school (OECD, 2017b).

Although the link between academic performance and life satisfaction is not clear or straightforward, as Chapter 4 points out, teachers, schools and parents can make a real difference by attending to students' psychological and social needs and helping them develop a sense of control over their future and the resilience they need to be successful in life. Many promising programmes have been developed across OECD and Ibero-American countries.

- In Japan, the fundamental standards for school curricula from primary to upper secondary levels (Courses of Study) were revised in 2008/09 with the goal of fostering a zest for life in students. The current Courses of Study aim to develop students' solid fundamental knowledge and skills; the ability to think, make decisions and express themselves in order to solve problems using these knowledge and skills; and the attitude to learn proactively. Their objectives

include strengthening the curriculum in such subjects as languages, mathematics and science, and increasing study hours in class.

- In 2013, as part of a move towards a greater focus in promoting student happiness in the education system, Korea introduced a pilot Free Semester System of test-free semesters for lower secondary students. These are designed to reduce students' stress related to tests and help them to acquire life values and engage in various activities, including career searches. During these free semesters, students attend “departmentalised classes”, where they participate in debates, experiments and practices and learn how to manage projects. Students also participate in various free semester activities, including career development, selection of subjects, art education, physical education and student clubs. Following a positive response to the initial rollout of the Free Semester System in lower secondary education, the programme was expanded in 2015 to cover 80% of lower secondary schools (2 551 schools, far more than the initial goal of 1 500 schools). Satisfaction surveys indicate that students, teachers and parents all view the Free Semester System as a positive change.
- In Mexico, to encourage students to stay in upper secondary and reduce the risk of social exclusion, the 2008 programme *Constructing Yourself (Construye T)* includes teacher training, support with preparing a diagnosis of strengths and weaknesses, a school project to respond to their challenges, and guidance for students. It has been implemented in almost 33% of schools by the Ministry of Education, assisted by the United Nations Children's Fund (UNICEF), the United Nations Development Programme (UNDP), United Nations Educational, Scientific and Cultural Organization (UNESCO) and another 39 non-governmental organisations (NGOs). In 2014, after an evaluation of the programme, its design was reformulated to promote the holistic education of students, contribute to their social-emotional development, improve the school environment, and prevent risky behaviour. Over 20 000 teachers and principals have received capacity-building training since 2013. Monitoring will be required to assess the relevance and success of the programme.

### Teaching and school leadership quality for better student outcomes

Sound education policies and practices can only be as good as the capacity of schools to implement them. There is broad evidence showing that teachers are the single most important factor influencing student achievement (Hattie, 2009; Hanushek and Rivkin, 2012; OECD, 2005, 2015a). They have more direct impact on student learning than, for example, structures, budgets, curricula, inspection and accountability systems, or governance. PISA results illustrate, for instance, that students score somewhat higher in science the greater the proportion of qualified science teachers in their school (see Chapter 3). Therefore, attracting, developing and retaining a high-quality teaching workforce is critical for the future of schooling in the region.

Moreover, in the current international context of increased accountability, where more is demanded from education systems, school leadership is receiving growing attention as a key lever of education quality. Good school leadership requires creating the right environment to help teachers to teach well and students to learn well. Therefore, school leaders are not only responsible for managing school operations and administration, but they also shape the attitudes, motivation and behaviour of the community within the school to keep improving. At the system level, leadership is key to helping adequately implement education policies, as schools are the frontline of delivery.



Improving teaching and school leadership quality requires comprehensive and continuous policies that allow for the evolving nature of learning and of the teaching profession. Hence, the recruitment, development and retention of high-quality teachers and school leaders is critical for the future success of school systems in the region.

During 2008-14, at least 24 countries (including Denmark, Estonia, Finland, France, Ireland, Italy, Korea, Portugal and Turkey) promoted policies aiming to improve the quality of teaching and school leadership, either through comprehensive policies or more targeted ones, for example focused on improving the quality of teachers' initial education, career progression, career paths and remuneration, teacher appraisal and professional development (OECD, 2015a).

### *Raising the bar for entry into the profession*

Despite the overwhelming evidence of the critical role of teachers to raise learning outcomes, Ibero-American countries and, in particular, those in Latin America still face significant challenges in attracting, developing and retaining a high-quality teaching workforce.

Although teachers' educational attainment levels have risen across the Latin American region, studies show that the individuals who enter the teaching profession are academically weaker than the average tertiary graduate (World Bank, 2015). Additionally, PISA 2015 found that the share of science teachers with a university degree and a major in science is particularly low in Brazil (33%), Peru (21%) and Uruguay (6%), compared to the OECD average of 74% (see Chapter 3). Raising the bar for entry into the profession has been a challenge for countries. OECD findings show that recruiting highly qualified graduates into the teaching profession can be a good way to improve student learning (OECD, 2005). Factors such as the quality of prospective applicants into initial teacher education programmes and minimum entry requirements are strongly related to occupational prestige, but in many countries the teaching profession has been generally viewed as easily accessible. When compared to other professional occupations such as medicine or law, entry into initial teacher education has not been competitive and it has been argued that those who enter teaching generally have lower academic achievement (Guerriero, 2017).

Several countries have raised the standards for teacher recruitment. High PISA performers, like Estonia, Israel, Japan and Poland, have set policies to improve the quality of their teaching staff by raising the licensing requirements (OECD, 2013a). Sweden has also recently set up more stringent requirements for admission to teacher education, including aptitude tests, and introduced a teacher registration system in 2013 (OECD, 2015a).

- In Ibero-America, Portugal has also implemented several promising initiatives aimed at strengthening the teaching profession, including 1) implementing more stringent admission conditions for teachers' education programmes in 2014; 2) reinforcing scientific curricula in teachers' education programmes in 2014; 3) introducing an evaluation exam for teachers with a professional qualification and/or fixed-term contracts for teachers with less than five years of practice (Knowledge and competence evaluation assessment, *Prova de avaliação de conhecimentos e capacidades*); and 4) introducing a lifelong training framework for teachers that links continuing professional development to career progression and aims to improve the quality of teaching (OECD, 2014).

- In Brazil, the 1996 Law of Directive and Bases of National Education mandated that, by 2006, all new teachers must have a university qualification, and that initial and in-service teacher training programmes be free of charge. These regulations came at a time when coverage was expanding significantly, leading to an increase in the number of teachers in the system. In 2000, for example, there were 430 000 secondary school teachers, 88% of whom had a tertiary degree; in 2012 there were 497 797, 95% of whom had tertiary qualifications. Subsequent reforms in the late 2000s sought to create standards for teachers' career paths based on qualifications, not solely on tenure. However the planned implementation of a new examination system for teacher certification, covering both content and pedagogy, has been delayed. Although universities are free to determine their curriculum for teacher-training programmes, the establishment of an examination system to certify teachers would send a strong signal of what content and pedagogical orientation should be developed (OECD, Hanushek and Woessmann, 2015).

### *Setting career and improvement pathways for the profession*

Making the profession attractive to high-quality candidates will depend on the overall incentives and professional growth that teaching and school leadership offer compared to other professions. This includes providing salaries that reflect the level of skills needed to carry out the responsibilities of the profession. As discussed in Chapter 3, raising teachers' salaries may help attract the best candidates to the teaching profession in countries where salaries are comparatively low, such as Uruguay. Unlike in most OECD countries, in Ibero-American countries, teachers' salaries do not increase with the level of education they teach, except in Mexico and Spain. The starting salaries of teachers with minimum qualifications increase from primary to lower secondary education by 28% in Mexico and 12% in Spain (OECD, 2017f). On the other hand, teachers in most Ibero-American countries benefit from greater job stability than other professions (World Bank, 2015).

Ibero-American countries still face challenges in attracting a highly qualified workforce to a teaching career. Indeed, an OECD report (OECD, 2010) noted that in Mexico teaching is not always recognised as a profession, but more as an occupation or a technical/ vocational job. The OECD argued that this may be due to the lack of a formal framework of professional standards to guide teaching practices, among other factors.

It will be essential for Ibero-American countries to provide teachers and society with a clear, coherent and engaging perspective of what is expected from teachers throughout their careers, and how they will be supported to achieve these goals. This will help to both attract quality candidates into the profession and bring the best out of existing teachers. It will require establishing clear career pathways, along with conditions that support and motivate teachers and school leaders to improve (Toledo Figueroa and Wittemberg, 2015). This is key in the Ibero-American region where teachers face challenging working conditions – high student-teacher ratios and large class sizes – and are less likely to attend a programme of professional development than their peers in OECD countries (see Chapter 3).

Between 2008 and 2014, at least 22 OECD countries implemented policies on teacher professional standards, selection and quality incentives, career paths and remuneration, teacher appraisal, initial education, or professional development for teachers or school principals. Initial education for teachers was the area where most countries introduced

reforms, with 15 countries introducing policy changes during that time (OECD, 2015a). However, most of these countries also implemented policies in other areas of teaching and school leadership, for example Australia (see Box 5.5) and Estonia.

#### Box 5.5. Australia's professional teaching standards

Australia implemented its professional teaching standards supported by the Self-Appraisal Tool and the Australian Charter for the Professional Learning of Teachers and School Leaders (for continuing professional development). The standards are accompanied by videos that illustrate the practice in real life and other supporting material that provides information on the accountability requirements for teachers at different career stages (initial teacher education, registration, teacher performance and development, and certification).

Source: AITSL (2011), *Australian Professional Standards for Teachers*, [www.aitsl.edu.au/teach/standards](http://www.aitsl.edu.au/teach/standards).

Ibero-American countries have also been very active in promoting policies which target the creation of career structures that help signal teaching as a profession, for example Chile, Colombia, Mexico and Portugal. As these efforts are very recent, careful monitoring will be required over time to increase their potential impact:

- Chile has recently developed the New System of Teacher Education Professional Development (*Sistema de Desarrollo Profesional Docente*). This overarching framework has a plan for the next 10 years (2016-26), which seeks to raise the quality of initial teacher preparation, coursework and practice teaching. It commits to developing and supporting teachers from entry into the profession and throughout their careers. It also develops a new career and pay structure for teachers, and aims to enhance the role of teachers and the teaching profession in the community. The New System also applies to early childhood education teachers who have not previously been part of the broader teaching system and therefore not had the opportunity for professional development or support (OECD, 2017g). The Teacher's Code already in place had required that school principals in municipal schools be hired through a public competition, and have teaching qualifications and at least five years of teaching experience, as well as some training in school administration (Santiago et al., 2013).
- Mexico implemented legislation in 2013 to create a Professional Teacher Service (*Servicio Profesional Docente*), aimed at professionalising teachers, school leaders and supervisors during their careers in terms of selection, recruitment, evaluation, training, career progression and incentives (OECD, 2015a).
- Portugal also introduced a lifelong training framework for teachers in 2014 that links continuing professional development to career progression to improve the quality of teaching (OECD, 2014).
- In Colombia, the Let's All Learn programme (*Programa de Transformación Educativa "Todos a Aprender"*), is the leading initiative to improve pre-school and primary school teachers' skills in Colombia's most disadvantaged schools. It builds upon the experience of the Programme of Rural Education which aimed to raise teaching skills through school-based coaching methods, strong pedagogical content strategies and well-sequenced instruction. Through a cascading teacher training model (where a group of teachers receive training or education in a

particular topic and, once they are proficient, become the educators of a second group of teachers), 100 trainers have provided pedagogical and didactic strategies to 3 000 mentor teachers who in turn provide on-site support for language and mathematics teachers to transform their classroom practices to improve student performance in Colombia's national test SABER 5. Between 2010 and 2014, the programme has benefitted over 2 million primary education students, over 90 000 teachers and has supported 4 303 schools located in 833 municipalities (OECD, 2016c).

### *Developing stronger school leadership*

Developing stronger leadership is also important to support better learning and teaching outcomes in schools. PISA 2015 results show that students score higher in schools where principals hold more responsibility for governance and report above average levels of leadership (relative to curriculum, instruction, professional development and teachers' participation) (OECD, 2016e). Leadership acts at all levels of the education system, from the classroom to the individual school and the education system as a whole, to shape the conditions of teaching and learning.

School leaders are not only responsible for the school's administration and management, but also for implementing system-level policies and ensuring an adequate environment for successful learning and teaching. In the current context where more is demanded from education systems, leadership is receiving growing attention as a key lever of education quality (Pont, Nusche and Moorman, 2008; OECD, 2015a).

Among OECD countries, the Israeli Institute for School Leadership (in Hebrew, Avney Rosh, אבני ראשה) was established in 2007 by the Ministry of Education to improve the professionalism of school leaders. The institute identifies potential candidates to become school principals, develops and runs their preliminary training, and follows up with continued development and career-long training. It also researches and develops new tools and knowledge to assist school leaders and maintains an active national school leadership network (OECD, 2016f).

Similar strategies are being implemented across Ibero-American countries:

- Portugal implemented a reform of its school leadership in 2008 which modified selection processes and responsibilities for principals, from "first among equals" (teachers elected to the position by their peers, functioning mainly as administrators) towards professionally selected and accountable school leaders, with clearly identified authority and responsibilities. In 2012, specialised mandatory training for school leaders was also reinforced (OECD, 2014).
- In Spain, a course requirement was included in the school leader selection process and the process has been changed to guarantee that candidates from different schools are given the same opportunities (OECD, 2013b). The leadership course lasts at least 120 hours and helps develop managerial and leadership skills.
- In Colombia, the business sector partnered with the Colombian Ministry of Education and academics in 2012 to create an innovative programme, Transformative School Leaders (*Rectores Líderes Transformadores*), to foster the development of leadership skills in public schools. The programme clarifies the competences that school principals need to successfully perform their pedagogical, management, administrative and community responsibilities. It targets school principals and the whole leadership team. As part of the programme, school principals participate in 4 intensive courses over a period of

10 months for a total of 40 hours of training per week and 160 over the whole process. After the training, the leadership team prepares a report on the lessons learnt and their school transformation plans. During the following two years the team receives technical guidance and support as they implement their school transformation plan. In 2015, the initiative was being used in five municipalities (Bogotá, Itagüí, Manizales, Medellín and Cali) and three departments (Cundinamarca, Antioquia and Atlántico) (OECD, 2016c).

- In Chile, the selection system for principals was modified in 2011 under the Quality and Equality of Education law and now requires that principals be hired through a competitive examination similar to that used for the High Public Service (OECD 2013a). A new policy for good management and school leadership is being developed based on five key points: 1) definition of responsibilities and faculties of the leadership role; 2) modifying selection processes of school leaders; 3) development of school leadership capacities (e.g. through training and induction, also developing tools and support); 4) creation of school leadership centres (e.g. to do research, innovate, provide training, disseminate information and support policy implementation); and 5) improvement of initiatives targeting school leaders (e.g. through regional consultation bodies or research).

### *Fostering adequate learning environments*

Improving the quality of schools also means fostering adequate learning outcomes through creating safe and welcoming environments and providing the basic material conditions, which can also help students to become more resilient in the face of adversity, feel more connected with the people around them and aim higher in their aspirations for their future (OECD, 2017b). Policy makers and educators must also pay attention to students' well-being, which refers to the psychological, cognitive, social and physical functioning and capabilities that students need to live a happy and fulfilling life. Most students in Ibero-American countries report high average levels of life satisfaction, except in Spain and Portugal. On average, 15-year-old students in Ibero-America reported relatively high satisfaction with their life. For example, on a life satisfaction scale ranging from 0 to 10, students in the Dominican Republic reported a level of 8.5 and students in Portugal a level of 7.4, compared to the OECD average of 7.3. At least 38% of students in Latin American countries reported a life satisfaction level of 9 or above, well above the OECD average of 34%.

At the same time, some countries in the region face similar challenges to OECD countries in fostering well-being in schools, for example in tackling bullying. Students who are frequently bullied may feel insecure and on guard, and will clearly have difficulty finding their place at school. They tend to feel unaccepted, depressed and isolated and, as a result, are at greater risk of dropping out and often perform worse academically (OECD, 2017b). A larger or similar share of students in Ibero-America report being frequently bullied than the OECD average of 8.9%: 9.0% in Brazil, 9.5% in Uruguay, 10.1% in Mexico, 10.9% in Costa Rica and 12.2% in the Dominican Republic.

Many OECD countries have established anti-bullying programmes involving a whole-of-school approach, with co-ordinated engagement among teachers, students and parents. Several of these holistic programmes include training for teachers on bullying behaviour and how to handle it, anonymous surveys of students to monitor the prevalence of bullying, and a strategy to provide information to and engage with parents. The Olweus Bullying Prevention Programme, first developed and implemented in Norway, has greatly

influenced the design of anti-bullying strategies around the world. This programme includes meetings among teachers, improved supervision, surveys of students, parent-teacher meetings, role-playing among students to learn how to handle bullies, gathering and disseminating information about bullying for students and parents, developing class rules against bullying, and talking with bullies and their parents without imposing punitive measures (OECD, 2017b).

Other prevention programmes include KiVa, which was developed in Finland and is now implemented in Belgium, Estonia, Hungary, Italy, the Netherlands and Sweden; the Kia Kaha programme, developed in New Zealand; and the Respect programme in Norway. In Ibero-America:

- Castile and Leon (Spain) also adopted a more systemic, participative and comprehensive approach for improving well-being at school. An example of this new strategy is the new anti-bullying plan (*Plan antiacoso y por el buen trato*), that incorporates new measures to reduce the prevalence of bullying even further. These measures include: 1) a stronger focus on supporting victims and re-educating offenders, in addition to the traditional goal of eradicating bullying; 2) updating the intervention protocol for bullying incidents, particularly those related to cyberbullying, following the goals and principles of awareness, prevention, protection, confidentiality, co-ordinated action, collective solutions, systematisation, efficacy and urgency; and 3) co-ordinating the plans and actions of all public and private institutions involved in the fight against bullying (OECD, 2017b).
- Colombia, in partnership with the United Nations Children's Fund (UNICEF), developed platforms, methodologies and content of conflict processes for young people to encourage the development of local peace initiatives. The programme Peace in Time (*Paz a Tiempo*), has awarded 3 145 virtual diplomas to adolescents who have been trained and certified as peace builders (UNICEF, 2014).

### Achieving a clear vision, balancing change and continuity of education policies

Steering education systems towards better performance requires a system-level and long-term approach aligning different stakeholders' actions, governance strategies and funding. There is no single model for success, and high-performing countries have different approaches to ensure quality in their education systems.

Certain elements are key to achieving high-quality education for all, however. High-performing countries build on their institutions and take into account the different governance levels, their dynamics and resources to drive improvement across the system and schools. They set clear objectives for their education system, ensure that the right institutions are in place to deliver on the objectives, engage stakeholders in the process, and find the right balance between central and local direction, while at the same time ensuring that financial, material and human resources are aligned with the national objectives (OECD, 2015a).

During 2008-14, at least 23 OECD countries adopted policies to frame their education improvement efforts. Some countries developed education strategies for general education improvement (e.g. Chile, the Czech Republic, Estonia, Poland and Spain). Others defined priorities or goals to guide their education systems towards concrete objectives (e.g. Finland and Japan), while others introduced targeted policies to reorganise the distribution of roles and responsibilities for more effective delivery of

education, either by creating new institutions or developing local level capacity (e.g. the Czech Republic, Finland, Germany, Mexico and Portugal) (OECD, 2015a; see also Box 5.6).

#### Box 5.6. System-level policies in Estonia and Japan

**Estonia's** Lifelong Learning Strategy for 2014-20 is a national strategy that proposes strategic measures in five areas: 1) changing the approach to learning and teaching; 2) raising the status of the teaching profession and developing school leadership; 3) improving the concordance of lifelong learning opportunities with the needs of the labour market; 4) applying modern digital technology to learning processes; and 5) creating equal opportunities for lifelong learning for everyone (OECD, 2016h).

**Japan's** Basic Plan for the Promotion of Education is an example of a plan setting priorities over time. This plan includes direction for education investments, targets and reforms. Local governments formulate their own basic plan based on their own needs, using the national plan as a framework. In 2008, based on the 2006 revised provisions in the Basic Act on Education, the government formulated the Second Basic Plan for the Promotion of Education. This new five-year plan came into force in 2013 and a third plan is now being prepared to enter into force in 2018 (OECD, 2015c).

Source: OECD (2015c), *Education Policy Outlook: Japan*, [www.oecd.org/edu/Japan-country-profile.pdf](http://www.oecd.org/edu/Japan-country-profile.pdf); OECD (2016h), *Education Policy Outlook: Estonia*, [www.oecd.org/edu/Education-Policy-Outlook-Country-Profile-Estonia.pdf](http://www.oecd.org/edu/Education-Policy-Outlook-Country-Profile-Estonia.pdf).

Among Ibero-American countries:

- Mexico has implemented a national strategy. In 2012, its Pact for Mexico was signed between the most important political parties and the Federal Government, with clear commitments on education: to increase education coverage in upper secondary (80%) and tertiary education (40%); improve teaching and learning conditions by providing more autonomy to schools and establishing full-time schools; create a professional teaching service and promote system improvement with more transparency; and consolidating the evaluation authority. This pact was followed by a reform to the constitution enshrining these commitments, which has also evolved into an education reform that is now being implemented.
- Portugal adopted a more targeted approach in the transfer of responsibilities to local or school level in some countries. Through Portugal's Agreement on the Reorganisation of the School Network (2010), schools have been reorganised into school clusters for efficiency and effectiveness, with the possibility of closing underperforming or small schools. In 2008, schools were given the opportunity to sign autonomy agreements; 26% of school clusters have taken this opportunity up since this measure was implemented (OECD, 2014).

In sum, reforms need time. Achieving the right balance between central and local direction needs to take into account the mechanisms needed to provide transparency to the system, as well as the current and future capacities needed by those involved to achieve mid and longer-term goals. Countries need to ensure continuity in reforms beyond political and electoral cycles, providing time for reforms to mature and adapting them as needed later on, based on evidence.

## Conclusions

Education systems are complex entities to manage and reform and there is no single combination of policies and practices that will work for everyone, everywhere. Still, education policies matter and good policies can make a difference in providing students with better life opportunities. While most countries in Ibero-America face greater challenges in terms of access, completion and performance than the average OECD country, there is an array of proven and promising policies across the OECD, but also in the region, that could serve as inspiration for some Ibero-American countries:

- **Policies putting student learning at the centre.** Countries across the OECD and the Ibero-American region are implementing policies to improve learning outcomes for all by supporting students to stay in the system. In this process, it is important to help students, schools and the community to challenge preconceived notions of what students can achieve, and encourage them to go further, but through well-grounded guidance to help them progress successfully through the system and effectively reach their full potential. To support student learning, for example, several countries have expanded coverage of ECEC to ensure that all children have access to a strong start to their education and life, but have also worked to improve the quality of ECEC services. Countries have also implemented policies to prevent students' disengagement from the system, or implemented policies to address performance gaps among students.
- **Strengthening teaching, school leadership and learning environments.** Policies centred on schools have mostly focused on fostering high-quality teaching and school leadership to raise students' performance. Raising the bar to entry into the teaching profession is important to ensure high-quality teachers and leaders, but attracting the best candidates will only be possible if they have clear perspectives of how they can evolve and improve as professionals throughout their careers.
- **Steering the system towards shared education goals.** Several countries across the OECD and beyond are also undertaking reforms to ensure adequate conditions at the system level, such as developing and implementing long-term strategies to frame their education improvement efforts. Developing a state vision, which builds upon an agreed evidence base to define policy change and policy continuity are critical to steer education systems and students towards higher performance.

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## **SKILLS IN IBERO-AMERICA** INSIGHTS FROM PISA 2015

In a knowledge-based global economy, investment in human capital is an essential component of any inclusive growth strategy. When workers lack the necessary skills, new technologies and production processes are adopted more slowly and do not translate into new growth models with higher value-added activities. However, skills affect individual's lives and well-being far beyond what can be measured by labour-market earnings and economic growth. This is particularly relevant for Ibero-American countries as they embark on a path of structural reforms to unleash new and sustainable sources of growth.

What specific skills challenges are Ibero-American countries facing today?

What are the similarities and differences in educational performance and skills amongst the countries? What accounts for differences in performance between Latin American countries compared to Spain and Portugal and how can this gap be closed? What are the main drivers of student performance?

How do these skills challenges impact labour market outcomes?

*Skills in Ibero-America: Insights from PISA 2015* provides an overview of the main skills challenges facing Ibero-American countries.