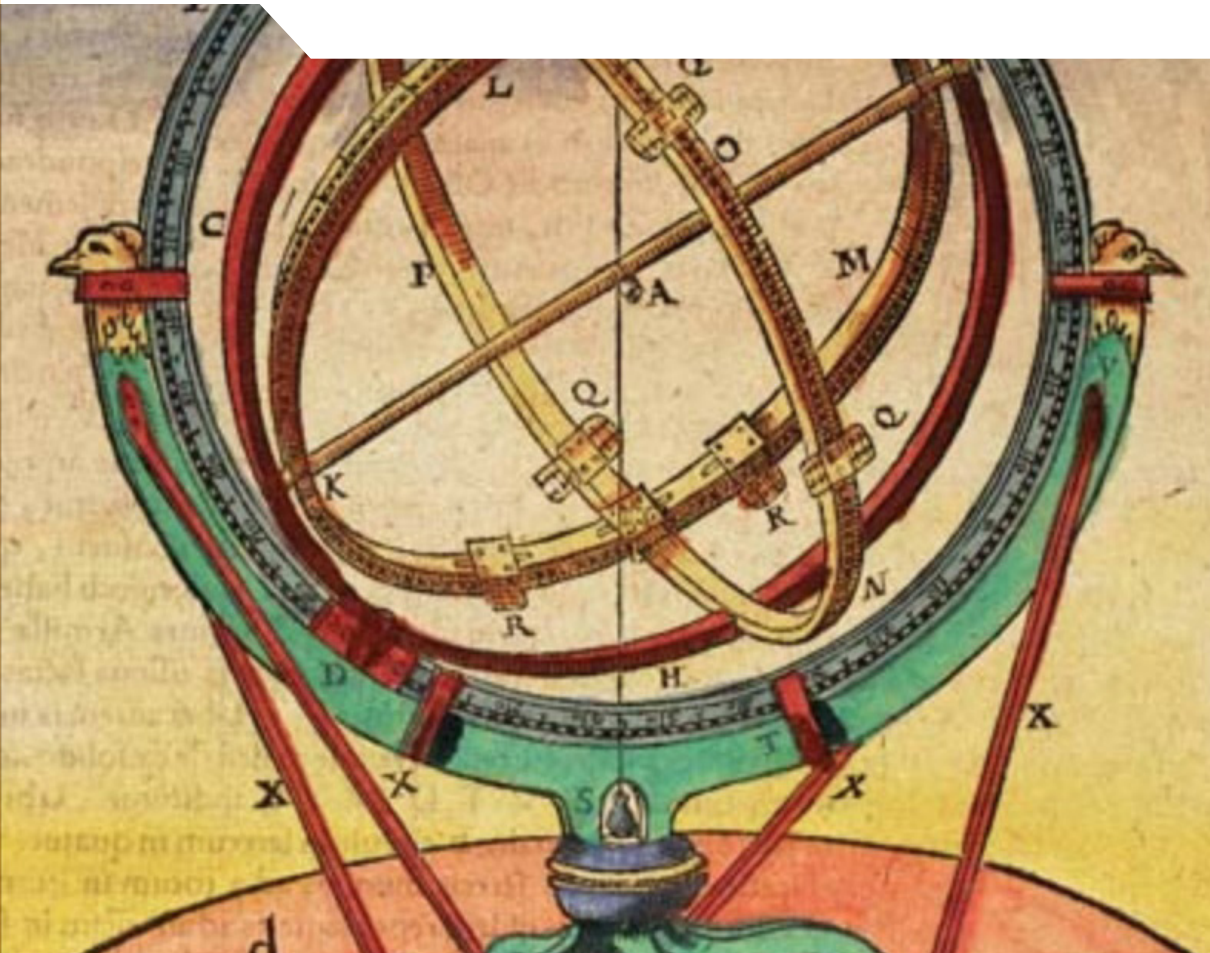




Measuring Innovation in Education

A JOURNEY TO THE FUTURE



Centre for Educational Research and Innovation



Measuring Innovation in Education

A JOURNEY TO THE FUTURE

Stéphan Vincent-Lancrin, Gwénaél Jacotin, Joaquin Urgel,
Soumyajit Kar and Carlos González-Sancho

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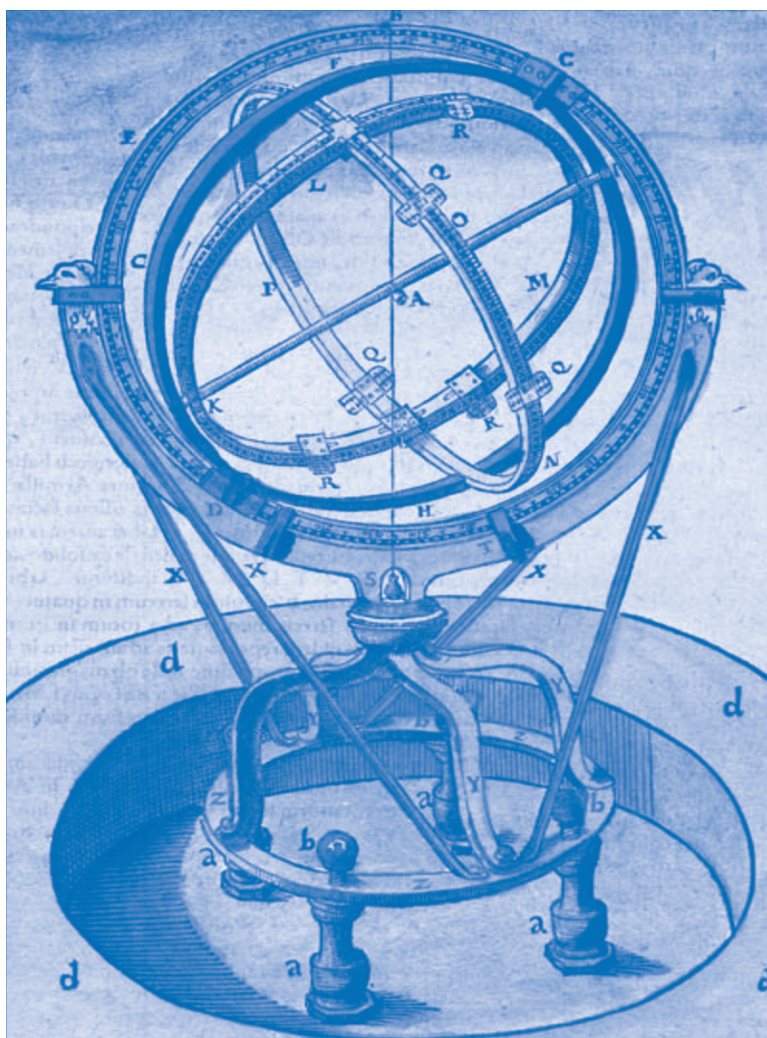
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Measuring Innovation in Education: the Origins



Why Measure Innovation in Education

In accordance with international practice, we define innovation as “the implementation of a new or significantly improved product (good or service) or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations.”

Educational organisations (e.g. schools, universities, training centres, education publishers) can introduce (1) new products and services, such as new syllabi, textbooks or educational resources (2) new processes for delivering their services, such as e-learning services, (3) new ways of organising their activities, for example communicating with students and parents through digital technologies, and (4) new marketing techniques, such as differential pricing of postgraduate courses. Such new practices aim at improving the provision of education in one way or another, and should therefore be regarded as intended “improvements”.

The ability to measure innovation is essential to the improvement of education.

Monitoring systematically whether, and how, practices are changing within classrooms and educational organisations, how teachers develop and use their pedagogical resources, and to what extent change and innovation are linked to better educational outcomes would provide a substantial increase in the international education knowledge base. Policy makers would be able to better target interventions and resources, get quick feedback on whether reforms changed educational practices as expected, and we would better understand the conditions for and impact of innovation in education.

The OECD project *Measuring Innovation in Education* uses three perspectives for addressing these issues: 1) comparing innovation in education to innovation in other sectors; 2) identifying meaningful innovations across educational systems; and 3) constructing metrics in order to examine the relationship between educational innovation and changes in educational outcomes.

With support from the European Commission, the OECD Centre for Educational Research and Innovation seeks to address this important measurement gap for policy making.

How we measure Innovation in Education

We used two approaches to measuring innovation in education, aligned with existing approaches to measuring innovation in the public sector.

The first approach to measuring innovation in the public sector is the adaptation to education of existing national innovation surveys, such as the EU Community Innovation Survey. Such surveys offer well-established tools for measuring innovation, and have been used for several decades for parts of the private sector. Part I of *Measuring Innovation in Education: A New Perspective* (OECD, 2014) explored this approach to measuring innovation in education and presented indicators in line with the methodology of the Community Innovation Survey.

The second approach sector is based on surveys of organisational change. These surveys typically measure the dissemination of specific innovations in the economy, for example computers or organisational practices. *Measuring Innovation in Education: A New Perspective* (OECD, 2014) adopted as working definition of innovation the implementation of a new or significantly changed process, practice, organisational or marketing method observed at the education system level through micro-data collected within schools. The emphasis is particularly placed on change in practices. The next edition of *Measuring Innovation in Education* will present a range of indicators based on the same approach.

Innovation is defined as a significant change in selected key practices in education we focus on questions that were asked in at least two waves of three international surveys (PISA, TIMSS and PIRLS) and build a few indicators that allow identifying changes in professional practices at the classroom or school levels.

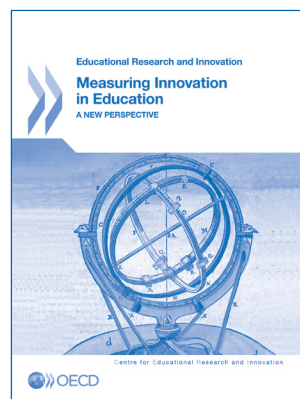
How much change counts as a significant change? There is no definitive answer to this question. For example, the degree to which the adoption of a teaching practice by 10% more teachers can be considered innovative depends on the context: it may be considered a more significant change in a country in which 10% of teachers used the practice than in a country in which 70% of teachers already used it. *Effect sizes* assist the reader in making this judgment. Effect sizes give a standardised measure of these changes and help interpret the relative magnitude of the change: the greater the effect size, the higher the magnitude (and likelier the “significance”) of change over time.

The 2014 edition of *Measuring Innovation in Education*

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Part I. COMPARING INNOVATION IN EDUCATION WITH OTHER SECTORS

- Chapter 1: Highly innovative workplaces in education and other sectors
- Chapter 2: Employee participation in innovation in education and other sectors
- Chapter 3: Speed of adoption of innovation in education and other sectors
- Chapter 4: Highly innovative jobs



Part II. INNOVATION AS CHANGE IN CLASSROOMS AND SCHOOLS

- Chapter 5: Innovation in teaching style
- Chapter 6: Innovation in instructional practices
- Chapter 7: Innovation in class organisation
- Chapter 8: Innovation in the use of textbooks in classrooms
- Chapter 9: Innovation in the methods of assessment used in classrooms
- Chapter 10: Innovation in the availability of computers and the internet in the classroom
- Chapter 11: Innovation in the use of computers in the classroom
- Chapter 12: Innovation in the provision of special education in schools
- Chapter 13: Innovation in the extent of teacher collaboration in schools
- Chapter 14: Innovation in feedback mechanisms in schools
- Chapter 15: Innovation in evaluation and hiring in schools
- Chapter 16: Innovation in schools' external relations
- Chapter 17: Composite indices of innovation in classrooms and schools

Part III. CHANGE IN EDUCATIONAL OUTCOMES

- Chapter 18: Innovation and educational outcomes

OECD (2014), *Measuring Innovation in Education: A New Perspective*, Educational Research and Innovation, OECD Publishing, <http://dx.doi.org/10.1787/9789264215696-en>.

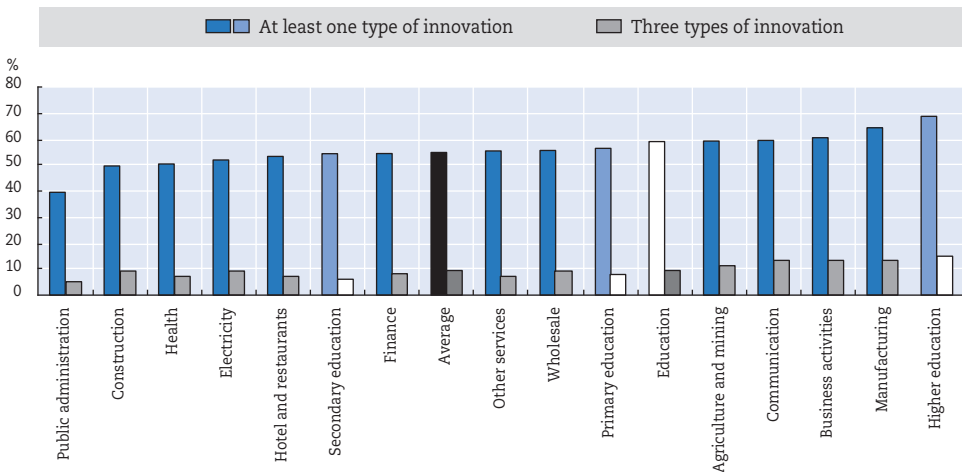
Key findings on innovation in the education sector from the 2014 edition


Some of the innovation indicators were derived from a survey covering tertiary graduates in 19 European countries. They cast light on several dimensions of innovation in education and other sectors of the economy (or society):

- Contrary to common belief, there is a fair level of innovation in the education sector, both relative to other sectors of society and in absolute terms. 70% of graduates employed in the education sector consider their establishments as highly innovative, on par with the economy average (69%).
- Within the education sector, higher education shows the greatest innovation intensity, while secondary and primary education have approximately similar levels.
- Compared to other sectors, knowledge and method innovation is above average in education, product and service innovation is below average, and technology and process innovation is at the average sectorial level.
- Education is at or below the average in terms of the speed of adoption of innovation: 38% of graduates reported that their educational establishment was mostly at the forefront in adopting innovations, new knowledge or methods (against 41% on average in the economy).
- Higher education stands out in terms of speed of adopting innovation, above the economy average, and well above primary and secondary education.
- The education sector has significantly higher levels of innovation than the public administration on all our indicators and is at least as innovative as the health sector on each measure.

Figure 1. **Professionals in highly innovative jobs across three types of innovation, by sector and education level**

Percentage of graduates working in highly innovative organisations and playing a role in introducing innovations, 2005 or 2008



StatLink  <http://dx.doi.org/10.1787/888933082879>

Note: Covers Austria, Belgium, Czech Republic, Estonia, Finland, France, Germany, Hungary, Italy, Lithuania, the Netherlands, Norway, Poland, Slovenia, Switzerland, Turkey and the United Kingdom. Excludes Spain. Year 2008 for Hungary, Lithuania, Poland, Slovenia and Turkey; year 2005 for other countries. The three types of innovation are: product or service innovation; innovation in technology, tools or instrument; innovation in knowledge or methods.

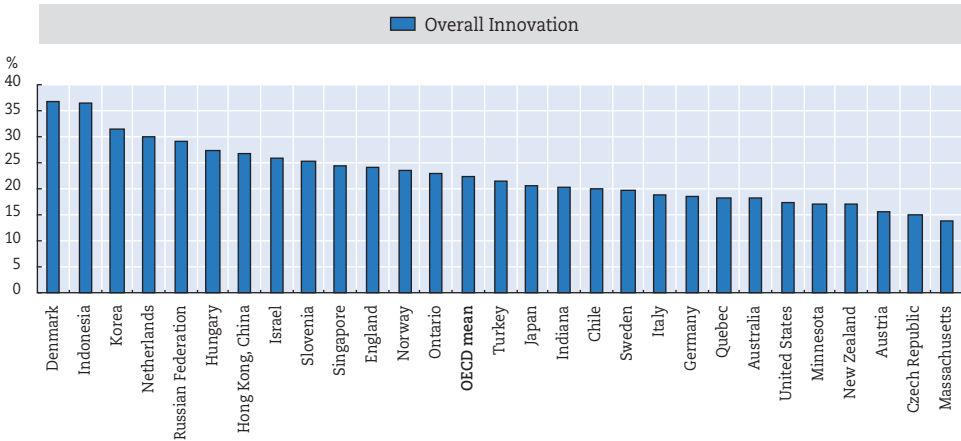
Source: OECD (2014), *Measuring Innovation in Education: A New Perspective*, <http://dx.doi.org/10.1787/9789264215696-en>.

Key findings on innovation in primary and secondary education from the 2014 edition

Another approach to measuring innovation in education is based on assessing significant changes in key practices in educational establishments, be they pedagogical or organisational. This approach was implemented using international surveys such as PISA, TIMSS and PIRLS. Some of the key findings are as follows:

- In all participating countries there have been large increases in innovative pedagogical practices in areas such as relating lessons to real life, higher order skills, data and text interpretation, and personalisation of teaching.
- In their pedagogical practice, teachers have innovated in their use of assessments and in the accessibility and use of support resources for instruction.
- Educational organisations have innovated in the areas of special education, creation of professional learning communities for teachers, evaluation and analytics, and relationship building with external stakeholders (such as parents).
- In general, countries with greater levels of innovation have seen increases in certain educational outcomes, including higher (and improving) 8th grade mathematics performance, more equitable learning outcomes and more satisfied teachers.
- Innovative educational systems generally had higher expenditures than non-innovative systems; however, their students were no more satisfied than those in less innovative systems.
- Overall, there has been more innovation at the classroom than at the school level.
- Innovation is not a positive performance in itself. Systems with poor educational performance may innovate more than systems with better results as they are trying to improve their results: while the effort is laudable, there is no guarantee that improvement will be achieved. Conversely, good systems may feel less pressure to innovate; they may also consider that their good performance allows them to take the risk of bold innovations.

Figure 2. Overall composite innovation index, 2000-2011



StatLink  <http://dx.doi.org/10.1787/888933086546>

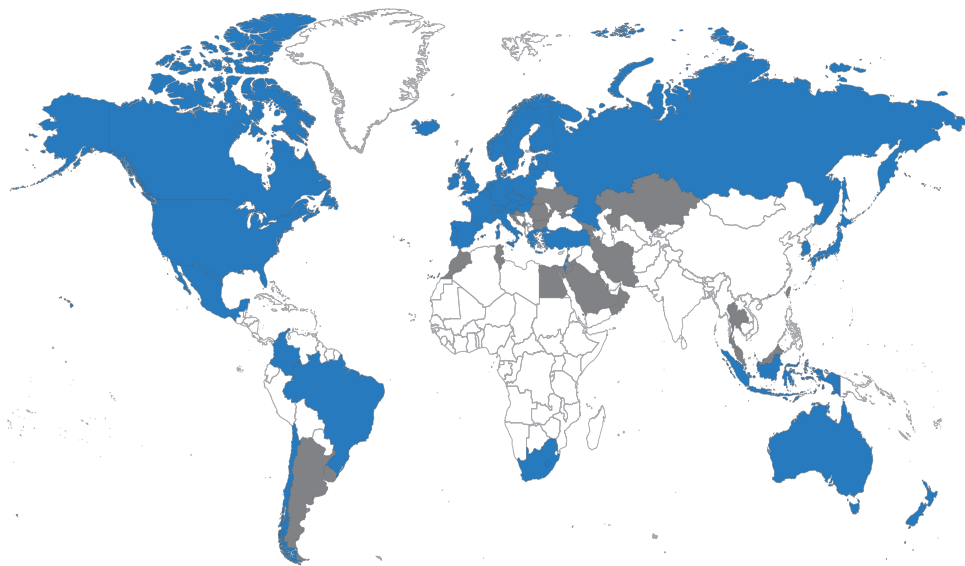
Source: OECD (2014), *Measuring Innovation in Education: A New Perspective*, <http://dx.doi.org/10.1787/9789264215696-en>.

The composite innovation index is based on average absolute effect sizes of changes in the practices covered in Part II of *Measuring Innovation in Education: A New Perspective*. A large value on the index shows that changes have occurred across different aspects of that education system, whether reductions or increases in particular practices.

Preview of the next edition of Measuring Innovation in Education

Country coverage of the next edition

Figure 3. Countries to be covered in the next edition



Education systems to be covered in the next edition (blue)

Australia, Austria, Belgium, Brazil, Canada, Colombia, Chile, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hong Kong-China, Hungary, Iceland, Indonesia, Ireland, Israel, Italy, Japan, Korea, Latvia, Lithuania, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Russian Federation, Singapore, Slovak Republic, Slovenia, South Africa, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States.

Education systems to be covered in the online supplement (grey)

Argentina, Armenia, Bahrain, Bulgaria, Croatia, Egypt, Georgia, Jordan, Kazakhstan, Kuwait, Islamic Republic of Iran, Lebanon, Malaysia, Malta, Morocco, Oman, Qatar, Montenegro, Romania, Saudi Arabia, Chinese Taipei, Thailand, Tunisia, Ukraine, Uruguay.

12 examples of innovation to be covered in the next edition

INNOVATION IN THE CLASSROOM: PEDAGOGICAL PRACTICES

1. Possibility for students to design their own experiments
2. Scope for students to explain their ideas
3. Explaining the relevance of science in everyday life
4. Use of memorisation of facts and procedures as a pedagogical technique
5. Using computer simulations for learning
6. Using computers to practice skills and procedures

INNOVATION IN SCHOOLS: WORK PRACTICES AND RESOURCES

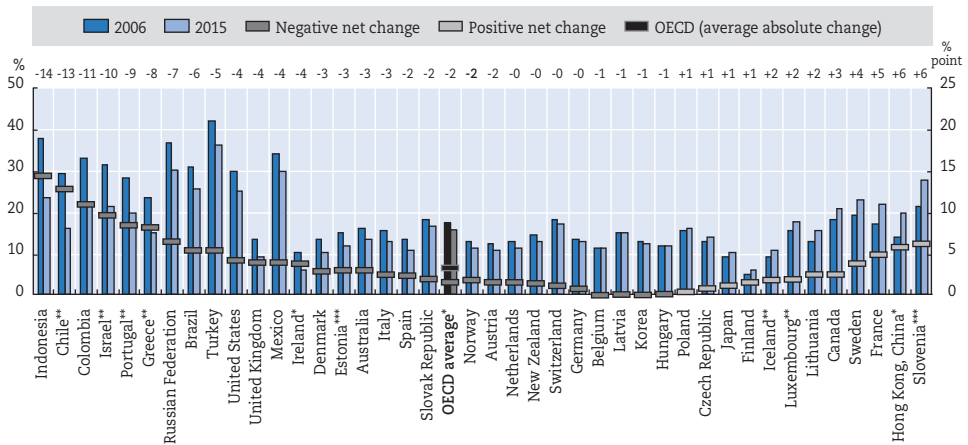
7. Teacher collaboration in form of peer observation
8. Teacher collaboration through teaching discussion with peers
9. Professional development for fostering students' critical thinking and problem solving
10. Availability of laptops or notebooks in schools

INNOVATION IN EXTERNAL RELATIONS

11. Parental involvement in school activities
12. Public posting of school achievement data

1. Possibility for students to design their own experiments

Figure 4. **Percentage of 15-year-old students who are allowed to design their own experiments in all or most of the lessons, as reported by the students**



Notes: *** change statistically significant at the 0.01 level; ** change statistically significant at the 0.05 level; * change statistically significant at the 0.1 level. The percentage of students who implement the practice should be read on the left axis; the change in percentage point in the implementation of the practice should be read on the right axis (and the value is indicated above the graph for the reader's convenience).

Source: Authors' calculations based on PISA (2006 and 2015).

Why it matters

Designing their own science experiments is one of the learning strategies for students to think as scientists and to get a deeper understanding of scientific phenomena. This pedagogical practice should be part of a mix of pedagogical practices in science and requires subtle guidance and feedback from teachers and peers.

Change at the OECD level: small

A majority of countries saw moderate changes in this practice. Overall, the OECD recorded a slight decline of 2 percentage points. On average, the countries witnessed a change of around 3 percentage points, an absolute effect size of 0.08 points. There has thus been little change in this practice in the past decade. An average of 16% of students could design their science experiment in all or most science lessons in 2015, ranging from 36% in Turkey to 6% in Ireland and Finland.

Countries where there has been the most change

Negative changes trump positive ones in this practice. Slovenia and Hong Kong, China recorded a 6 percentage point increase between 2006 and 2015, while Colombia, Chile and Indonesia saw a decline of more than 10 percentage points.

2. Scope for students to explain their ideas

Why it matters

Most education systems aim to develop children’s critical thinking, creativity and communication skills. This requires that teachers give children enough room to express and explain their ideas and that they are able to confront them with those of their peers. This “active” pedagogical practice should be part of the mix of learning activities, with teachers defining the right dosage for their teaching and learning context.

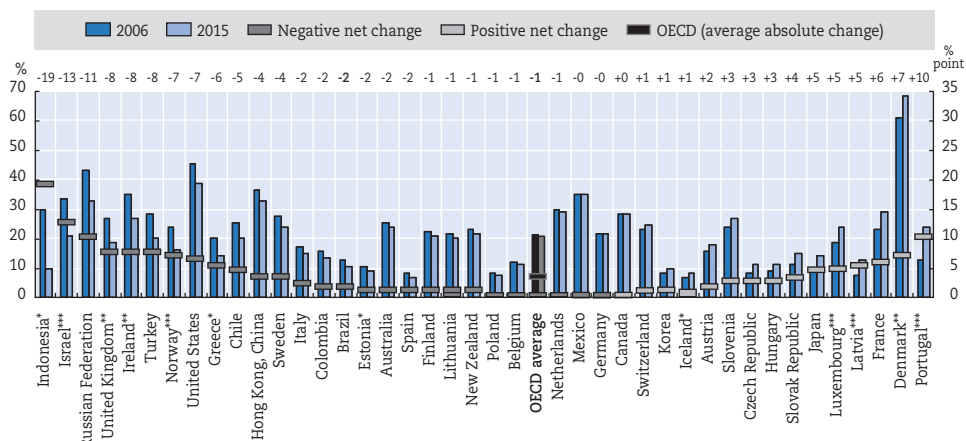
Change at the OECD level: small

Most countries have seen a negative change in this practice, albeit small. At the OECD level, negative and positive changes have almost nullified each other to reach an average decline of less than 1 percentage point. The covered OECD countries have registered a change in this practice of about 4 percentage points on average, representing an effect size of 0.09, which is small. The share of students with the frequent opportunity to explain their ideas varies quite a lot across countries. In 2015, 68% of the students were frequently given opportunities to explain their ideas in Denmark as opposed to 7% in Spain.

Countries where there has been the most change

Indonesia and Israel experienced declines of 19 and 13 percentage points respectively. Few countries registered a significant positive change: Portugal had an increase of 10 percentage points, and Denmark, of 7 percentage points.

Figure 5. **Percentage of 15 year old students who are given opportunities to explain their ideas in all or most of the lessons, as reported by the students**

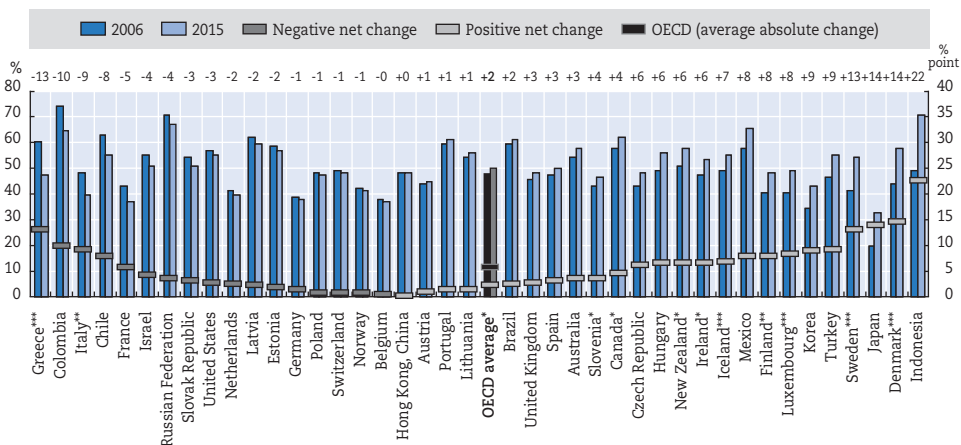


Notes: *** change statistically significant at the 0.01 level; ** change statistically significant at the 0.05 level; * change statistically significant at the 0.1 level. The percentage of students who implement the practice should be read on the left axis; the change in percentage point in the implementation of the practice should be read on the right axis (and the value is indicated above the graph for the reader's convenience).

Source: Authors' calculations based on PISA (2006 and 2015).

3. Explaining the relevance of science in everyday life

Figure 6. Percentage of 15 year old students whose teachers explain the relevance of broad science topics in everyday life, in all or most of the lessons, as reported by the students



Notes: *** change statistically significant at the 0.01 level; ** change statistically significant at the 0.05 level; * change statistically significant at the 0.1 level. The percentage of students who implement the practice should be read on the left axis; the change in percentage point in the implementation of the practice should be read on the right axis (and the value is indicated above the graph for the reader's convenience).

Source: Authors' calculations based on PISA (2006 and 2015).

Why it matters

Students learn better science if they see the point of learning it. Relating the scientific concepts taught in class to the everyday life of children or, more generally, showing the relevance of what is taught to everyday life problems makes science more attractive to them – and teaching and learning more effective. This good pedagogical practice should be as widespread as possible.

Change at the OECD level: small

At the OECD level, there has been a slight increase in this practice, of about 2 percentage points. Among the countries covered, positive changes occur in slightly more often than negative changes. The mean change, be it positive or negative, is around 5 percentage points, corresponding to a modest effect size of 0.108. On average, this practice has not changed significantly in OECD countries. As for its prevalence, 50% of students on average had a teacher systematically relating science concepts to students' everyday life.

Countries where there has been the most change

Between 2006 and 2015, Indonesia saw the greatest increase in this practice (22 percentage points), followed by Japan and Denmark (14 percentage points each). At the other end of the spectrum, students in Greece and Colombia experienced a considerable decline in this teaching practice (13 and 10 percentage points respectively).

4. Use of memorisation of facts and procedures as a pedagogical technique

Why it matters

Memorising facts, rules and procedures is part of all learning strategies. Often associated to “traditional” and relatively “teacher-centred” approaches to teaching and learning, memorisation should be seen as part of the mix of pedagogical practices that teachers should use. Good teachers will find the right dosage with other, more active learning practices. An increase of these practices is often related to the existence of high-stakes exams or assessments in education systems.

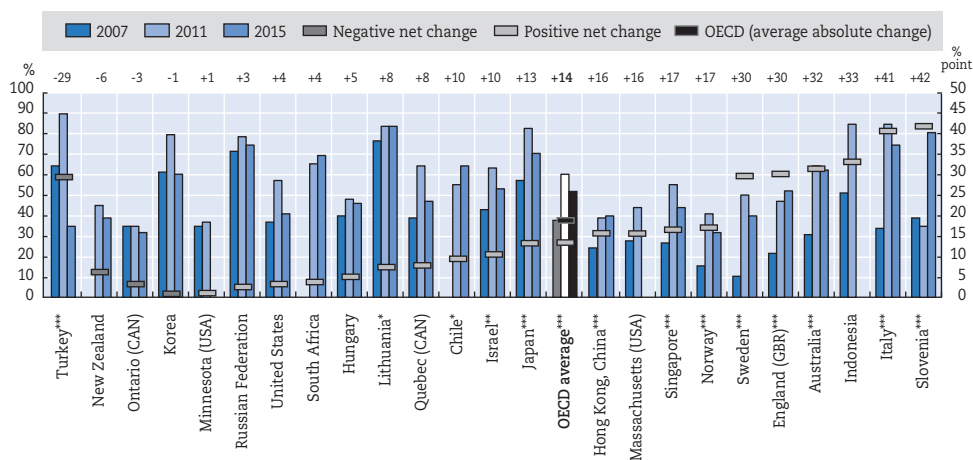
Change at the OECD level: big

In secondary education, most OECD countries have experienced a positive change in this practice. The OECD average has increased by 14 percentage points, with 50% of mathematics students being asked to memorise facts and procedures in at least half of their lessons. The change, be it positive or negative, has amounted to 19 percentage points on average, corresponding to a relatively large effect size of 0.40. This practice is common across countries, but with big variations: 32% of 8th grade mathematics students are asked to memorise rules, procedures and facts in at least half of their maths lessons in Ontario (Canada), against 80% in Slovenia.

Countries where there has been the most change

Turkey is by far the country that has experienced the largest decrease in this pedagogical practice, with a negative change of over 29 percentage points between 2007 and 2015, whereas it has increased in Italy and Slovenia by more than 40 percentage points. There has also been a big change in Sweden, England, Australia and Indonesia.

Figure 7. **Percentage of 8th grade mathematics students whose teachers ask them to memorise rules, procedures and facts in at least half of the lessons, as reported by the teachers**

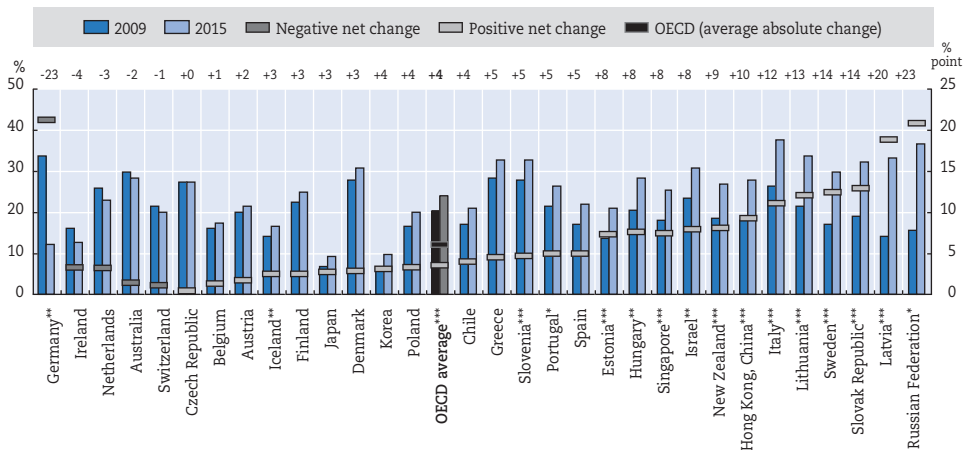


Notes: *** change statistically significant at the 0.01 level; ** change statistically significant at the 0.05 level; * change statistically significant at the 0.1 level. The percentage of students who implement the practice should be read on the left axis; the change in percentage point in the implementation of the practice should be read on the right axis (and the value is indicated above the graph for the reader's convenience).

Source: Authors' calculations based on TIMSS (2007, 2011 and 2015).

5. Using computer simulations for learning

Figure 8. Percentage of 15 year old students who played simulations at school, on computers at least once or twice a month, as reported by the students



Notes: *** change statistically significant at the 0.01 level; ** change statistically significant at the 0.05 level; * change statistically significant at the 0.1 level. The percentage of students who implement the practice should be read on the left axis; the change in percentage point in the implementation of the practice should be read on the right axis (and the value is indicated above the graph for the reader's convenience).

Source: Authors' calculations based on PISA (2009 and 2015).

Why it matters

One of the virtues of computers for learning lies in their power for simulations: they allow students to practice and to become experts in specific tasks without the real-life consequences of failures. Playing simulations (or learning in simulated environments) are thus one of the good uses of computers for learning, and an interesting pedagogical practice to follow, both in mathematics and other domains – although it will typically have to be supplemented by with other practices.

Change at the OECD level: moderate

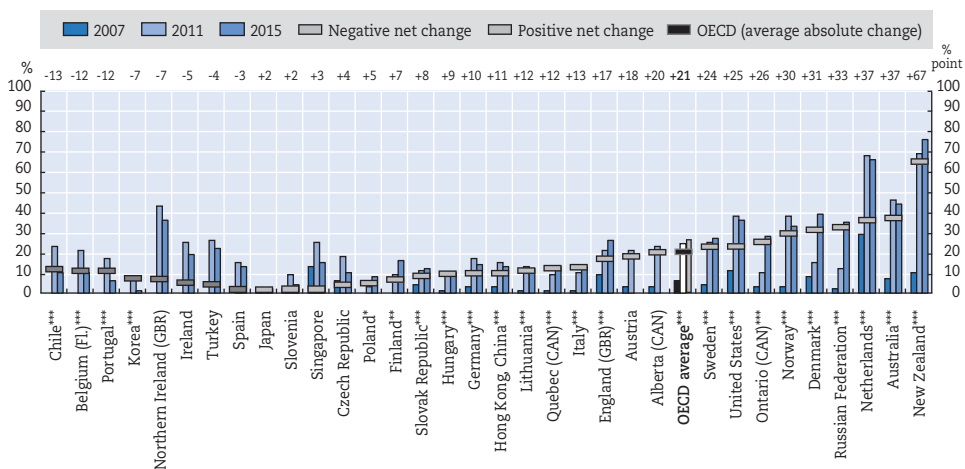
Most countries have seen an increase in this practice. There has been a net increase of 4 percentage points on average in OECD countries. Positive and negative changes across all OECD countries amount to 6 percentage points, corresponding to a modest effect size of 0.15. In all countries, less than 50% of students are asked to use this practice regularly. In 2015, the Russian Federation and Italy had about 40% of their students using computer simulations at school for learning, against only 10% in Japan and Korea.

Countries where there has been the most change

Germany registered a substantial decline in the prevalence of this practice (23 percentage points). The Russian Federation on the other hand saw an increase of the same amount (23 points), followed closely by Latvia which recorded an increase of 20 percentage points.

6. Using computers to practice skills and procedures

Figure 9. **Percentage of 4th grade mathematics students who use computers during lessons to practice skills and procedures at least once or twice a week, as reported by the teachers**



Notes: *** change statistically significant at the 0.01 level; ** change statistically significant at the 0.05 level; * change statistically significant at the 0.1 level. The percentage of students who implement the practice should be read on the left axis; the change in percentage point in the implementation of the practice should be read on the right axis (and the value is indicated above the graph for the reader's convenience).

Source: Authors' calculations based on TIMSS (2007, 2011 and 2015).

Why it matters

Practice makes perfect. Part of the mastery of mathematics relies on implementing and practicing the procedural knowledge one has acquired. While computers can now make complex calculations with perfect accuracy, part of this procedural knowledge allows students to understand how mathematicians think and assess how to deal with mathematical problems. This pedagogical practice needs to be supplemented by other pedagogical practices requiring more thinking from the student, but computers are a good medium for this kind of learning.

Change at the OECD level: big

Across the OECD area, the use of computers for practising skills and procedures during 4th grade mathematics lessons at least once or twice a week increased by 21 percentage points on average. The absolute change for these countries was of similar magnitude, with a large effect size of almost 0.60. The extent to which students are exposed to this practice varies significantly across countries, from 2% in Japan to over 77% in New Zealand in 2015.

Countries where there has been the most change

New Zealand has shown the largest increase in the use of computers by 4th grade students for practising skills and procedures in mathematics lessons between 2007 and 2015 (67 percentage points), followed by Australia, the Netherlands, the Russian Federation, Denmark and Norway, all of them registering increases by over 30 percentage points. In all these countries, this has represented a significant pedagogical innovation. Chile, Belgium (Fl.) and Portugal have experienced the largest decline in this practice (around 12 percentage points), although these negative changes were only measured between 2011 and 2015.

7. Teacher collaboration in form of peer observation

Why it matters

An important dimension of teacher professional development depends on their participation in “professional learning communities” or “learning organisations”. Teachers improve their professional practice by reflecting on good and bad practices and learning from each other. One professional practice that often contributes to this form of learning is the observation of other teachers in the teaching process. This practice is increasingly encouraged across countries.

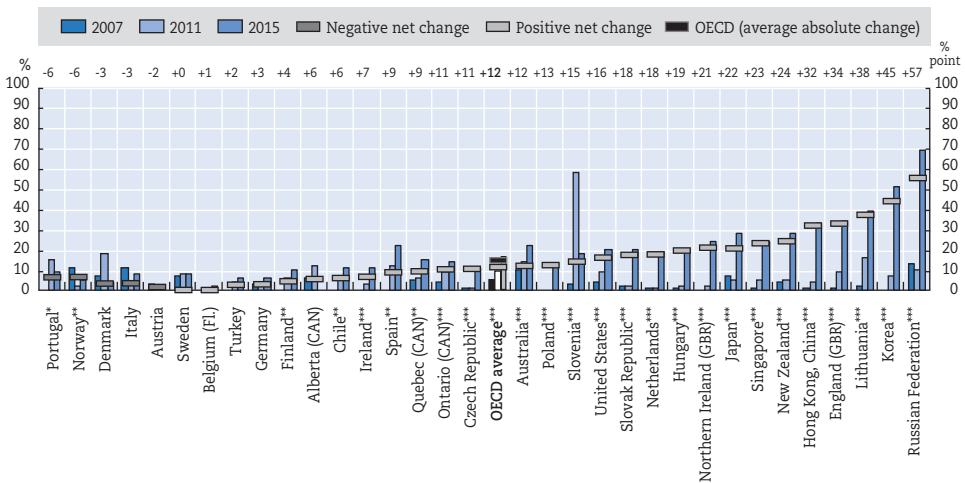
Change at the OECD level: big

The practice has more often spread than retracted across OECD countries, with an average increase in students having teachers’ taking part in peer observation of 13 percentage points. The overall absolute change corresponded to a large effect size of 0.44. This was a significant innovation in teachers’ practice across the OECD. The share of students with teachers often taking part in peer observation varies significantly within OECD countries, from only 2% of teachers in Belgium (Fl.) to 52% in Korea.

Countries where there has been the most change

The Russian Federation and Korea showed the largest increase in this practice with positive net changes of 57 and 45 percentage points respectively. This has been a major innovation as significantly more students had teachers engaging in this form of professional development. In Norway and Portugal, the practice faced the largest decrease (6 percentage points each), a change that remains relatively small.

Figure 10. **Percentage of 4th grade students whose teachers visit another classroom often or very often to learn more about teaching, as reported by the teachers**

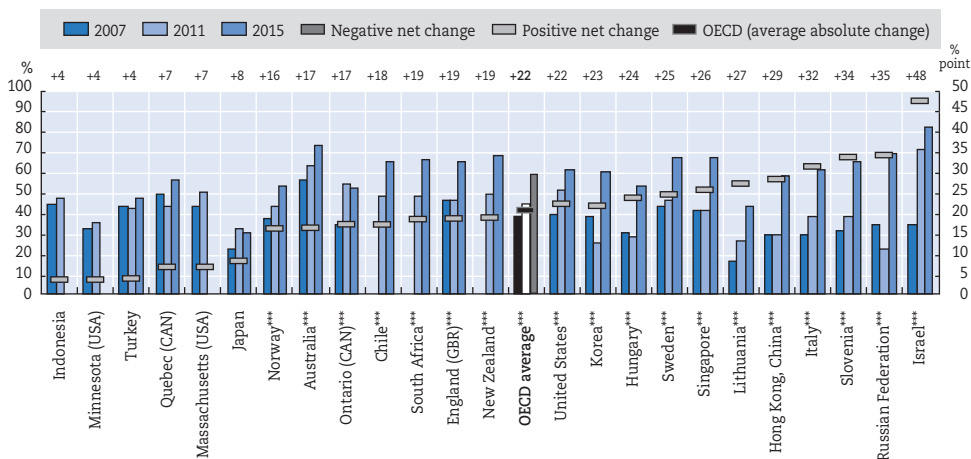


Notes: *** change statistically significant at the 0.01 level; ** change statistically significant at the 0.05 level; * change statistically significant at the 0.1 level. The percentage of students who implement the practice should be read on the left axis; the change in percentage point in the implementation of the practice should be read on the right axis (and the value is indicated above the graph for the reader's convenience).

Source: Authors' calculations based on TIMSS (2007, 2011 and 2015).

8. Teacher collaboration through teaching discussion with peers

Figure 11. **Percentage of 8th grade science students whose teachers discuss often or very often with other teachers how to teach a particular topic, as reported by the teachers**



Notes: *** change statistically significant at the 0.01 level; ** change statistically significant at the 0.05 level; * change statistically significant at the 0.1 level. The percentage of students who implement the practice should be read on the left axis; the change in percentage point in the implementation of the practice should be read on the right axis (and the value is indicated above the graph for the reader's convenience).

Source: Authors' calculations based on TIMSS (2007, 2011 and 2015)

Why it matters

An important dimension of teacher professional development depends on their participation in “professional learning communities” or “learning organisations”. Teachers improve their professional practice by reflecting on good and bad practices and learning from each other. A key dimension of this collaboration is an exchange of ideas about their teaching practice with teachers teaching the same subject – a practice that is more common than peer observation.

Change at the OECD level: big

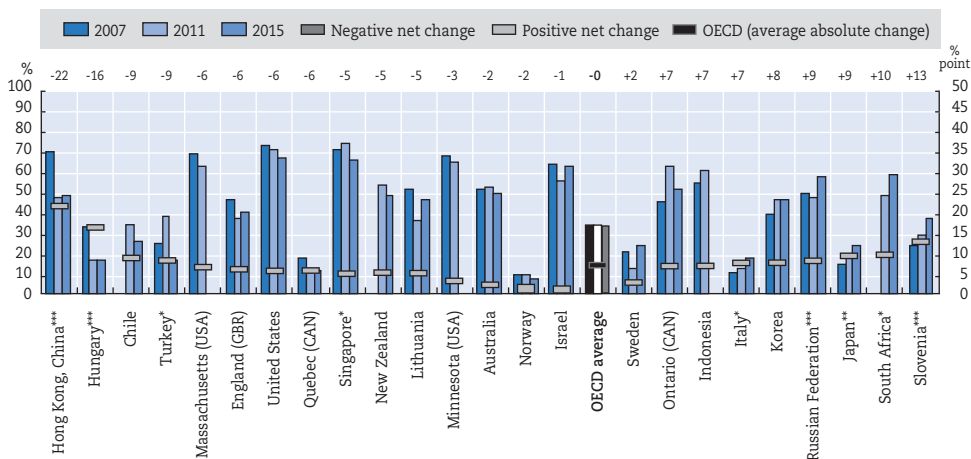
The change was positive across all countries for which information is available, with an average net increase of almost 15 percentage points for an OECD country. When both increases and decreases are accounted for, the absolute change across the OECD was over 21 percentage points, corresponding to a large effect size of 0.44. This has thus been an innovation in most countries. The share of 8th grade science students whose teachers discussed often or very often how to teach a particular topic with a colleague varied from 31% in Japan to 83% in Israel in 2015.

Countries where there has been the most change

Students in Israel (48 percentage points), the Russian Federation (35 percentage points), Slovenia (34 percentage points) and Italy (32 percentage points) experienced the largest increases in this teacher practice between 2007 and 2015. This was thus an important innovation in their education system. Increases in this practice were particularly small in Indonesia, Minnesota (United States) and Turkey (around 4 percentage points). No country in the sample experienced a negative change.

9. Professional development for students' critical thinking and problem solving

Figure 12. Percentage of 8th grade science students whose teachers participated in professional development aimed at improving students' critical thinking and problem-solving capacity, as reported by the teachers



Notes: *** change statistically significant at the 0.01 level, ** change statistically significant at the 0.05 level; * change statistically significant at the 0.1 level. The percentage of students who implement the practice should be read on the left axis; the change in percentage point in the implementation of the practice should be read on the right axis (and the value is indicated above the graph for the reader's convenience).

Source: Authors' calculations based on TIMSS (2007, 2011 and 2015).

Why it matters

Fostering students' critical thinking and problem-solving skills is one of the key education objectives of curricula in most OECD countries, and a key competency for students both for economic and social reasons. One condition for these innovation skills or 21st Century competencies to be taught and learnt is that teachers understand how they could adjust their practice to this effect. Professional development is one of the ways for them to learn this.

Change at the OECD level: small

While positive and negative changes have cancelled each other across the covered countries, there has been an average increase or decrease of 7 percentage points in the share of students with teachers participating in this kind of professional development. This corresponds to a moderate effect size of 0.16. The share of students with teachers participating in such professional development varies significantly across countries, from less than 10% in Norway to over 65% in the United States.

Countries where there has been the most change

Students in Hong Kong, China and Hungary have experienced a decrease of over 10 percentage points in this teacher practice, whereas the share of students whose teachers participate in this form of professional development has increased by over 9 percentage points in Japan, the Russian Federation, South Africa and Slovenia. All these changes have remained modest overall and there has not been much innovation in this area in any covered country.

10. Availability of laptops or notebooks in schools

Why it matters

Digital technologies have mainly reached schools through the availability of computers, and technology is now increasingly seen as “mobile” thanks to the availability of portable devices. While the availability of desktops has decreased over the past years, digitalisation is reflected by the availability of other forms of computers: laptops (or notebooks) are some of them. To produce good results, these devices need to support good pedagogical practices.

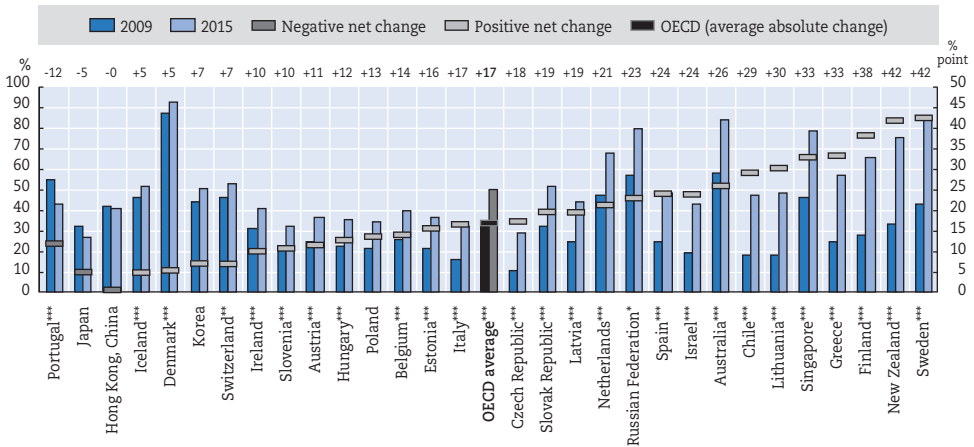
Change at the OECD level: big

The overall picture is that most countries have experienced a rise in the percentage of students with access to laptops or notebooks at school. In an OECD country, the share of students having access to laptops in schools has increased by 18 points on average. The overall magnitude of change in the availability of this resource, be it positive or negative, was of 18 percentage points, corresponding to a large effect size of about 0.40. This was thus a domain in which there has been noticeable innovation. The share of students having access to laptops ranged from 92% in Denmark to 27% in Japan in 2015.

Countries where there has been the most change

Out of the countries covered, only Portugal and Japan saw a fall of 12 and 5 percentage points respectively in the availability of laptops or notebooks in schools. This is contrasted sharply by New Zealand and Sweden, which recorded an increase of 42 percentage points, and Finland, of 38 percentage points. The increase in the share of students having access to laptops also exceeded 20 percentage points in the Netherlands, the Russian Federation, Spain, Israel, Australia, Chile, Lithuania, Singapore and Greece. This increased student access to laptops has been an innovation in many countries.

Figure 13. **Percentage of students with access to laptops or notebooks for use at school, as reported by the students**



Notes: *** change statistically significant at the 0.01 level; ** change statistically significant at the 0.05 level; * change statistically significant at the 0.1 level. The percentage of students who implement the practice should be read on the left axis; the change in percentage point in the implementation of the practice should be read on the right axis (and the value is indicated above the graph for the reader's convenience).

Source: Authors' calculations based on PISA (2009 and 2015).

11. Parental involvement in school activities

Why it matters

Parents play a key role in the successful school education of their children. Their involvement in school activities eases a constructive dialogue with school teachers and administrators, and a more personalised education and learning path for their children. It also facilitates their continuous interest in their children's school life and learning that contributes to their better results.

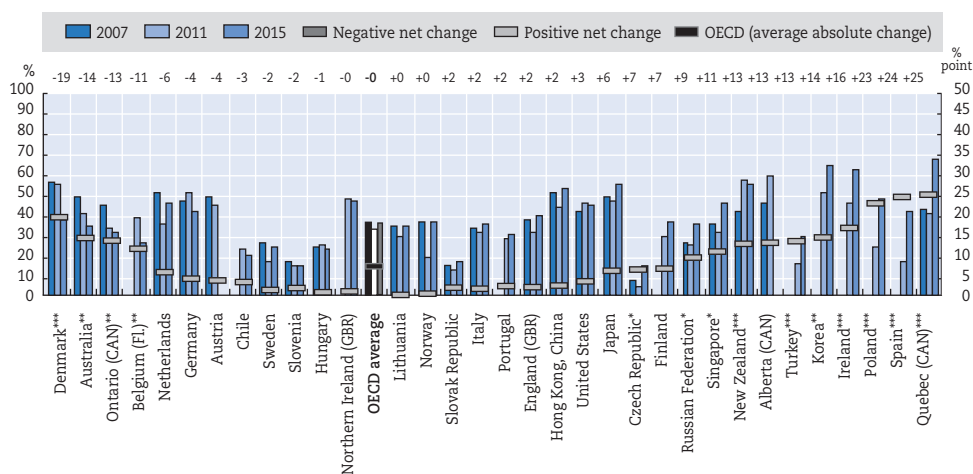
Change at the OECD level: small

Decreases in the practice fully compensate increases, and on average the absolute change in the OECD area was of 7 percentage points, corresponding to a small effect size of 0.14. The share of students in schools where parents had medium or high involvement in schools' activities remained relatively low in most countries, but with relatively large differences between them: in 2015 it ranged from 5% of students in such schools in the Netherlands to over 45% in the United States.

Countries where there has been the most change

The largest changes in this practice have been observed in Québec (Canada), Spain and Poland with increases in the share of concerned students of 22 percentage points between 2007 and 2015. In these countries, greater parental involvement has been an educational innovation. Over the same time period, the largest declines in this practice have been experienced in Hungary, the Netherlands and Northern Ireland (a decrease of roughly 10 percentage points in each case).

Figure 14. **Percentage of 4th grade students enrolled in a school with medium, high or very high parental involvement in school activities, as reported by the school principal**

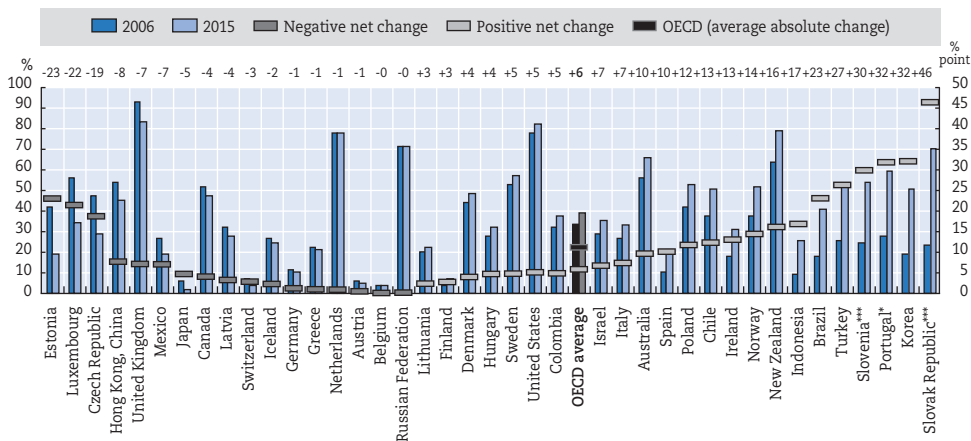


Notes: *** change statistically significant at the 0.01 level; ** change statistically significant at the 0.05 level; * change statistically significant at the 0.1 level. The percentage of students who implement the practice should be read on the left axis; the change in percentage point in the implementation of the practice should be read on the right axis (and the value is indicated above the graph for the reader's convenience).

Source: Authors' calculations based on TIMSS (2007, 2011 and 2015).

12. Public posting of school achievement data

Figure 15. **Percentage of students studying in schools which post achievement data publicly, e.g. in the media, as reported by the school principal**



Notes: *** change statistically significant at the 0.01 level; ** change statistically significant at the 0.05 level; * change statistically significant at the 0.1 level. The percentage of students who implement the practice should be read on the left axis; the change in percentage point in the implementation of the practice should be read on the right axis (and the value is indicated above the graph for the reader's convenience).

Source: Authors' calculations based on PISA (2006 and 2015).

Why it matters

With the increasing availability of learning outcome data at school level, it becomes increasingly common to provide information to the public about how schools are performing, at least in some specific areas. This allows for comparison and may provide incentives to schools to improve – but also allows families to know how their neighbourhood schools are doing (or provide them with information about where to enrol their children, provided such choice is possible in their context). The jury is still out about whether this reinforces inequalities or allows students from disadvantaged backgrounds to access better schools.

Change at the OECD level: moderate

Covered countries present both negative and positive changes, but at the OECD level the average net change is positive (about 6 percentage points). Change in this practice, be it positive or negative, has affected 11% of students in an average OECD country, which corresponds to a moderate effect size of 0.25. The prevalence of this practice varies considerably: in 2015, less than 2% of students in Japan were enrolled in schools publicly posting achievement data, compared to more than 83% in the United Kingdom.

Countries where there has been the most change

In terms of change, this practice presented substantially different scenarios: while Estonia and Luxembourg saw a decline of more than 20 percentage points in this practice, in the Slovak Republic it increased by 46 percentage points. Korea and Portugal also recorded substantial increases of over 30 percentage points in the period from 2006 to 2015. In all these countries, the public posting of school achievement data (or its interruption) has been a noticeable innovation.

Measuring Innovation in Education: Journey to the Future

Towards an innovation and improvement capacity index in education

The OECD Centre for Educational Research and Innovation has identified some key drivers of innovation and improvement in education as part of its Innovation Strategy for Education and Training:

- **Educational research:** the investment in and use of research and evaluation are key elements in an educational innovation ecosystem.
- **Educational Development:** as in other sectors, an education industry should develop innovative tools, organisations and processes to improve and change the practices in the education sector.
- **Regulation and system organisation:** innovation and improvement only thrives where good ideas can be implemented and are not hidden by too risk-averse regulations on curriculum, assessment, etc. It also depends on the entrepreneurialism of the actors, on incentives, and on the availability of funds for educational innovation.
- **Learning organisations:** innovation and improvement are strongly related to how work is organised and whether education establishments and professionals are able to both absorb and generate improved knowledge and practice.
- **Human resources:** the skills for and openness to innovation of actors within the education sector, notably teachers and faculty, are key aspects of a good innovation ecosystem.
- **Technology:** the application of general purpose technologies to the education sector, and notably of digital technologies, is a key promise for innovation and improvement. In particular, the development and use of longitudinal information systems (and their “big data”) holds key promises for innovating the education sector.

The new edition will explore to what extent these different pillars of innovation can be measured and monitored over time at the country level and thus pave the way towards an “innovation capacity index” in education.

Towards international surveys on innovation in education

While past and ongoing work use existing international datasets, improved measures of innovation in education would entail more specific studies. Our preferred approach to measuring innovation in education would be to develop a dedicated international survey – or at least a survey instrument. This survey would ideally:

- Adopt and adapt the “organisational change” approach using matched employer-employee-user surveys.
- Be administered to the central educational administration (ministries or relevant local authorities) and to educational establishments in primary, secondary and tertiary education.
- Question three levels of stakeholders (principal/president, teachers/faculty and students) about the state and changes in their work practices and work environment.
- Infer innovation by comparing whether the investigated practice was used (or used to the same extent) at the time of the survey and, say, three years before.
- Ask respondents their opinion about the impact of these practices (or change in these practices) on different educational goals (e.g. learning outcomes, equity, access, cost-efficiency).
- Capture the sources and objectives of planned innovations, to what extent these planned improvements are implemented and perceived on the ground, and the extent of unplanned innovations.
- Cover the broad innovation areas: products and services offered by educational organisations to their users/clients (e.g. textbooks, study programmes); pedagogical practice (e.g. pedagogies, introduction of new teaching or administrative equipment); organisational practice (e.g. organisational routines, human resource practices, knowledge management practices; support for the introduction of new ideas and practices, participation in training and retraining courses); external relations (e.g. relationships with parents, employers, research organisations, other academic institutions, advertisement practices).
- Collect information about the broader environment in which these practices take place, such as information about the size of establishment and classrooms, number of classes, competition with other schools in the neighbourhood, regulation and regulatory changes.

Measuring Innovation in Education

A JOURNEY TO THE FUTURE

The ability to measure innovation is essential to the improvement of education.

Monitoring systematically whether, and how, practices are changing within classrooms and educational organisations, how teachers develop and use their pedagogical resources, and to what extent change and innovation are linked to better educational outcomes would provide a substantial increase in the international education knowledge base. Policy makers would be able to better target interventions and resources, get quick feedback on whether reforms changed educational practices as expected, and we would better understand the conditions for and impact of innovation in education.

As part of the OECD *Innovation Strategy for Education and Training*, the project on *Measuring Innovation in Education* uses three perspectives for addressing these issues: 1) comparing innovation in education to innovation in other sectors; 2) identifying meaningful innovations across educational systems; and 3) constructing metrics in order to examine the relationship between educational innovation and changes in educational outcomes.

With support from the European Commission, the OECD Centre for Educational Research and Innovation seeks to address this important measurement gap for policy making.

This publication provides a brief overview of past and forthcoming work.

For more information: www.oecd.org/edu/innovation.