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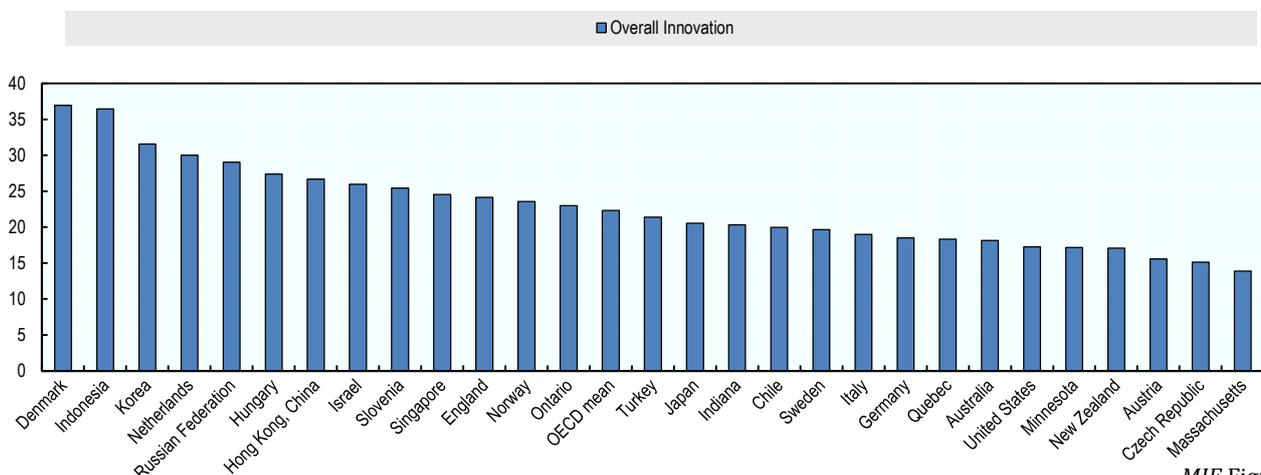
The purpose of the *Measuring Innovation in Education* report

The ability to measure innovation is essential to an improvement strategy in education. Knowing whether, and how much, practices are changing within classrooms and educational organisations, how teachers develop and use their pedagogical resources, and to what extent change can be linked to improvements would provide a substantial increase in the international education knowledge base.

The OECD *Measuring Innovation in Education* report offers new perspectives to address this need for measurement in educational innovation through a comparison of innovation in education to innovation in other sectors, identification of specific innovations across educational systems, and construction of metrics to examine the relationship between educational innovation and changes in educational outcomes. This country brief provides a short overview of the key findings of the report, as well as the top five Singaporean pedagogic and organisational innovations identified in this report.

Key findings on innovation in education – did you know?

Overall composite innovation index, 2000-2011



MIE Figure 17.1

- In education, innovation can take place through either significant changes in the use of a particular educational practice or the emergence of new practices in an educational system.
- Contrary to common belief, there is a fair level of innovation in the education sector, both relative to other sectors and in absolute terms.
- Within education, innovation intensity is greatest in higher education, with secondary and primary education approximately equal.
- Compared to other sectors, knowledge and method innovation is above average in education, product and service innovation is below average, and technology innovation is at the average sectorial level.
- In Europe, higher education stands out in terms of speed of adopting innovation compared to the economy average as well as the rates in primary and secondary education.

- There have been large increases in innovative pedagogic practices across all countries studied for this report in areas such as relating lessons to real life, higher order skills, data and text interpretation and personalisation of teaching.
- In their pedagogic practice, educators 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 see increases in certain educational outcomes, including higher (and improving) 8th grade mathematics performance, more equitable learning outcomes across ability and more satisfied teachers.
- Innovative educational systems generally have higher expenditures than non-innovative systems; however, their students are no more satisfied than those in less innovative systems.

Approach to measuring system innovations

While *Measuring Innovation in Education* identifies and analyses hundreds of innovations at the classroom and organisational levels, this brief identifies the top five Singaporean innovations in pedagogic and organisational practices between 2003 and 2011. To determine each educational system's top five innovations in pedagogic and organisational practices, data from three international education datasets – Trends in International Mathematics and Science Study (TIMSS), Progress in International Reading Literacy Study (PIRLS), and the Programme on International Student Assessment (PISA) – were analysed to identify the areas in which each education system has demonstrated emerging or changing organisational and pedagogic practices over a specific period. For a full description of the data and methods used for analysis in this report, see report Annex A: Data Sources and Methods.

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Note regarding data from Israel

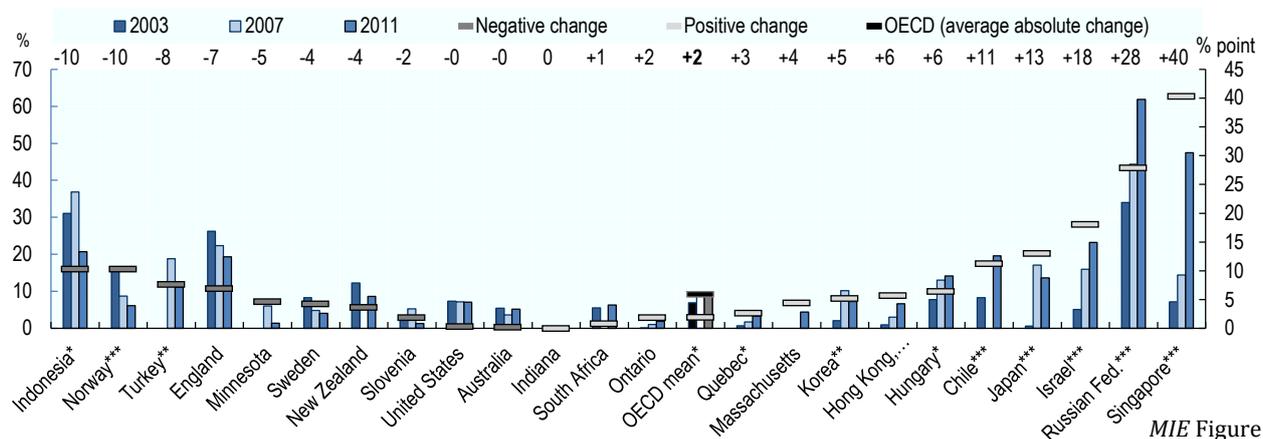
The statistical data for Israel are supplied by and are under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

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Singapore's top five innovations in organisational policy and practice:

(1) More use of incentives for secondary teachers...

Percentage of 8th grade mathematics students in schools which currently use any incentives to recruit or retain teachers and change over time



MIE Figure 15.10

In secondary education, Singapore's largest organisational innovation was an increase in the use of incentives to promote teacher retention in schools. Between 2003 and 2011, the percentage of 8th grade mathematics and science students in schools using incentives to recruit or retain teachers rose from 7.2% to 47.5%. For this metric, these gains were the largest of any educational system included in this report.

(2) More external evaluation of primary and secondary school classrooms...

Teachers in Singapore also underwent more frequent observations of their practices by inspectors or other persons external to the school. Between 2003 and 2011, Singapore saw a 24% point increase in the percentage of 4th grade students in schools in which observations by external evaluators were used to evaluate the practices of their teachers, the fourth-largest change of any system analysed in this report. 8th grade science and mathematics students saw respective 14% point and 12% point increases in this metric.

(3) More parental involvement in school projects, programs and trips...

In secondary education, another major innovation was increased parental volunteering in projects, programmes or trips in their child's school. Between 2003 and 2007, parents of 8th grade students in Singapore saw an increase of 15% points in the frequency of invitations to volunteer for projects, programmes and trips, the largest change in this metric of any educational system included in this report.

(4) More peer evaluation of teachers in secondary education...

Another top innovation in Singaporean secondary schools was the increased use of teacher peer review. The country saw significant changes in peer review evaluation of teacher practices for both 8th grade mathematics and science classrooms (increases by 21% points and 19% points, respectively, between 2003 and 2011).

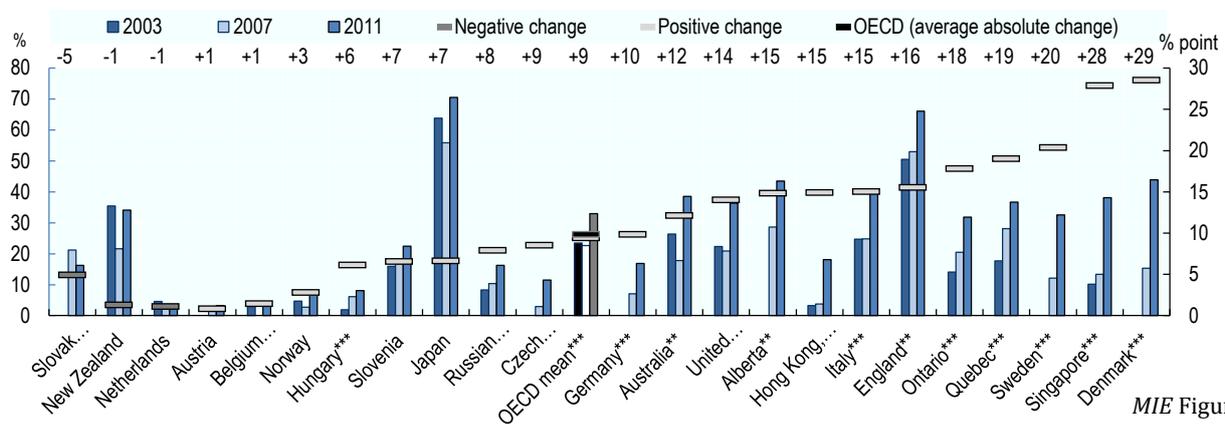
(5) More enrichment education for secondary science students...

Another top organisational innovation in secondary schools in Singapore was the availability of enrichment education for 8th grade mathematics students. Between 1999 and 2007, the percentage of 8th grade students in Singapore enrolled in schools offering enrichment activities in mathematics increased by 13% points, a difference greater than the OECD average change of 4% points in this metric. As of 2007, approximately 94% of 8th grade students in Singapore were enrolled in schools offering enrichment science education, compared to an OECD average of 53.5%.

Singapore's top five innovations in pedagogic practice:

(1) More self-directed experiments in primary and secondary science lessons...

Percentage of 4th grade science students whose teachers ask them to design or plan experiments or investigations at least once per month and change over time



MIE Figure 7.12

Between 2001 and 2011, Singapore saw a 28% point increase in the percentage of 4th grade students whose teachers ask them to design or plan experiments or investigations at least once a month and an increase of 10% points in this metric for 8th grade students according to teacher reports. Student reports of this metric for secondary classrooms from 2003 to 2007 also reflected an increase in this practice (+6% points), while 4th grade students reported a 2% point decrease in this metric over the same period.

(2) More observation and description in secondary school science lessons...

Another Singaporean pedagogic innovation is the requirement that students explain and elaborate on their answers during secondary school science lessons, which enhances students' curiosity and scientific communication skills. Between 2007 and 2011, Singapore saw a 28% point increase in students asked to observe and describe natural phenomena during their 8th grade science lessons, compared to a mean difference of 20% points for OECD countries over the same period.

(3) More relating of science lessons to everyday life...

Between 2003 and 2011, according to teachers, Singapore saw a 22% point increase in the percentage of students whose teachers ask them to relate what they learn in class to their daily life in their 8th grade science classes. Students reported only a 1% point increase in this metric from 2003 to 2007. 4th grade science teachers reported similar gains in this metric to their secondary school colleagues, with a reported 19% point increase between 2003 and 2011.

(4) More use of answer explanation in secondary mathematics...

Between 2003 and 2007 the proportion of 8th grade students whose teachers ask them to explain their answers in their mathematics lessons increased by 22% points according to teachers, representing the second-largest increase in this metric of any educational system analysed in this report. Over the same period, Singaporean students self-reported no difference in this metric.

(5) More active learning in secondary science lessons...

Between 2007 and 2011, Singapore saw an 8% point difference the percentage of students who are asked to explain what they are studying in at least half of their science lessons, according to teacher reports. Of the educational systems examined in this report, Singapore saw the fourth-largest increase in this metric.