Education for the future

An international perspective

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Trends in science performance (PISA)

Student performance vs. OECD average across years:
- 2006: 450
- 2009: 470
- 2012: 490
- 2015: 510

The graph shows a steady increase in student performance over the years, as indicated by the red line.
Trends in science performance (PISA)

OECD average
Poverty is not destiny - Science performance
by international deciles of the PISA index of economic, social and cultural status (ESCS)
Students expecting a career in science

Percentage of students who expect to work in science-related professional and technical occupations when they are 30

- Science-related technicians and associate professionals
- Information and communication technology professionals
- Health professionals
- Science and engineering professionals
Expectations of a science career by gender

Figure I.3.5

Science and engineering professionals

Girls
Boys

Health professionals

Girls
Boys

Information and communication technology (ICT) professionals

Girls
Boys

Science-related technicians or associate professionals2

Girls
Boys
Singapore, Canada, Slovenia, Australia, United Kingdom, Ireland, Portugal

Singapore, Chinese Taipei, Hong Kong (China), New Zealand, Denmark

Above-average science performance

Japan, Estonia, Finland, Macao (China), Viet Nam, B-S-J-G (China), Korea, Germany, Netherlands, Switzerland, Belgium, Poland

Norway

Stronger than average beliefs in science

Sweden, Lithuania, Croatia, Iceland, Georgia, Malta

United States, Spain, Israel, United Arab Emirates

Above-average percentage of students expecting to work in a science-related occupation

Brazil, Bulgaria, Chile, Colombia, Costa Rica, Dominican Republic, Jordan, Kosovo, Lebanon, Mexico, Peru, Qatar, Trinidad and Tobago, Tunisia, Turkey, Uruguay
Students expecting a career in science
by performance and enjoyment of learning

Figure I.3.17

- Low enjoyment of science
- High enjoyment of science

Percentage of students expecting a career in science

Score points in science

- 300
- 400
- 500
- 600
- 700

Low enjoyment of science
High enjoyment of science
Change between 2006 and 2015 in students’ enjoyment of learning science

![Graph showing the change in enjoyment of science between 2006 and 2015 for various countries. The graph indicates that enjoyment of science decreased in some countries and increased in others.](image-url)
Challenges for tomorrow
Digitalisation

- Systems thinking
- Design thinking
- Global competence
- Digital literacy
- Information literacy
Digitalisation

- Democratizing
- Concentrating
- Particularizing
- Homogenizing
- Empowering
- Disempowering

Scale without mass

1m $ / employee

120 k$ / employee
The kind of things that are easy to teach are now easy to automate, digitize or outsource.
Robotics

The Auto-auto
>1m km,
one minor accident,
occasional human intervention
Augmented Reality
A lot more to come

• 3D printing
• Synthetic biology
• Brain enhancements
• Nanomaterials
• Etc.
The multi-faceted world of knowledge
The human world of knowledge
The small world of the curriculum
The small world of the curriculum
The small world of the curriculum
The small world of the curriculum
The small world of the curriculum
The small world of the curriculum
The big world of learning – Global citizenship

- **The True**
  The realm of human knowledge

- **The Good**
  The realm of ethics and judgement

- **The Just and Well-Ordered**
  The realm of political and civic life, binding social capital

- **The Beautiful**
  The realm of creativity, esthetics and design

- **The Sustainable**
  The realm of natural and physical health

- **The Prosperous**
  The realm of economic life
Good science teaching

A well-structured, clear and informative lesson on a topic including teachers’ explanations, classroom debates and students’ questions pays off, as does adaptive instruction. Inquiry-based science instruction (e.g. experimentation and hands-on activities) tends to relate negatively to performance but positively to student engagement and career expectations.
Comparing countries and economies on the different science knowledge subscales
Comparing countries and economies on the different science knowledge subscales

Figure I.2.30
Comparing countries and economies on the different science knowledge subscales

Figure I.2.30
Memorisation is less useful as problems become more difficult (OECD average)

Greater success

Odds ratio

Easy problem

Difficult problem

$R^2 = 0.81$

Source: Figure 4.3
Control strategies are always helpful but less so as problems become more difficult (OECD average)

Source: Figure 5.2
Elaboration strategies are more useful as problems become more difficult (OECD average)

Source: Figure 6.2
Students’ use of elaboration strategies

Source: Figure 6.1
Some students learn at high levels
All students learn at high levels
Delivered wisdom
User-generated wisdom

Recognising both students and adults as resources for the co-creation of communities, for the design of learning and for the success of students
The past was divided

Teachers and content divided by subjects and student destinations

Schools designed to keep students inside, and the rest of the world outside
The future is integrated

Integrated: Emphasising integration of subjects, integration of students and integration of learning contexts
Connected: with real-world contexts, and permeable to the rich resources in the community
Less subject-based, more project-based
Uniformity
Diversity

Embracing diversity with differentiated pedagogical practices
Standardisation and Conformity

Standardisation and compliance lead students to be educated in batches of age, following the same standard curriculum, all assessed at the same time.
Ingenious

Building instruction from student passions and capacities, helping students personalise their learning and assessment in ways that foster engagement and talents.
Learning a place

Schools as technological islands, that is technology was deployed mostly to support existing practices for efficiency gains
Learning an activity

Technologies liberating learning from past conventions and connect learners in new and powerful ways. The past was interactive, the future is participative.
Administrative control and accountability
Professional forms of work organisation
Public with private
Idiosyncratic policies
Alignment of policies
Find out more about our work at www.oecd.org
  – All publications
  – The complete micro-level database

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and remember:
Without data, you are just another person with an opinion