Innovation strategy for education and training

Innovation is a new imperative for education policy

Innovation is a driver of growth and well-being in the economy and society. In education, innovation has also become an imperative to bring about qualitative changes alongside the expansion of education systems. Innovation should lead to more efficiency and improved outcomes in quality and equity of learning opportunities

To reap the gains of innovation, education and training policies have to empower people to both innovate and adapt to innovations. In this endeavour, OECD countries need to share knowledge and experiences on the design and implementation of effective and evidence-based policies to encourage, facilitate and measure innovation in education.

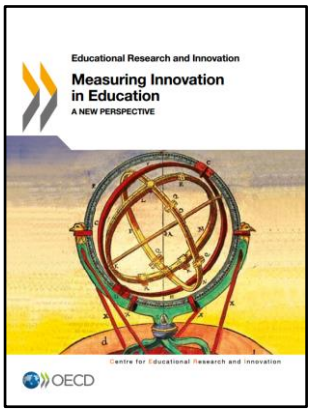
CERI Innovation Strategy for Education and Training: two complementary strands of work

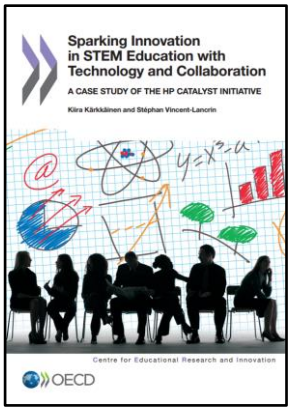
The CERI Innovation Strategy for Education and Training explores new approaches to support radical and incremental innovation and continuous improvement in education systems, and to equip people with the skills required for innovation. The project has developed two main and complementary strands of work:

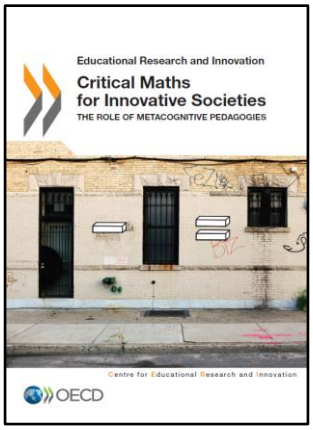
1. **Innovation in education.** This explores how different forms of innovation can be fostered and measured in the education sector, and how they can bring improved outcomes.

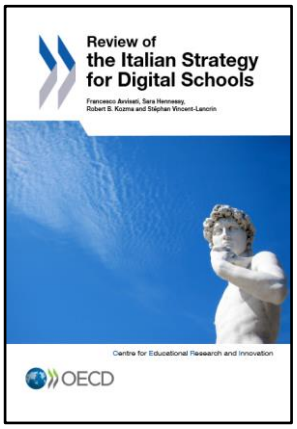
2. **Skills and education for innovation.** This explores the set of skills that are needed in innovative societies, and how they can be developed in education. It notably focuses on how to teach, learn and assess students' creativity and critical thinking.

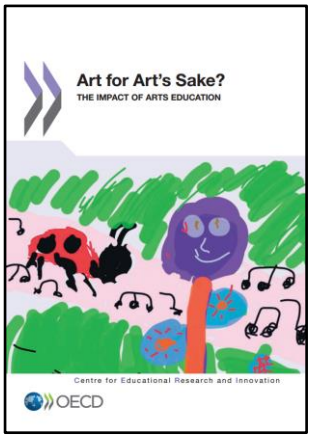
The project has produced a number of reports, articles and conferences to inform policy makers on these topics. In addition, the project has contributed to the OECD Innovation Strategy, the OECD Skills Strategy, the OECD Development Strategy, and contributes to the OECD "Going Digital" horizontal project.

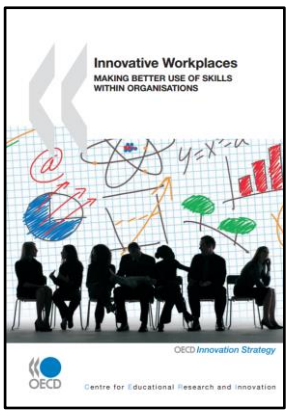












Find all our publications and additional information at
www.oecd.org/edu/innovation

Strand 1: Innovation in education

Pillars of innovation in education

This strand of the project explores the role and interaction of multiple **levers of innovation policy** in the education sector and how they can be governed to become more effective. It examines a range of innovation **policy instruments** to identify how countries do or could promote an innovation ecosystem that accommodates incremental and radical experimentation and facilitates self-sustained improvement.

System organisation

Regulatory frameworks provide **incentives** and **opportunities** for innovation in the education system.

- Does the rate of innovation increase when educators are spurred on by competitive incentives? How much room for innovation leave central and school-based approaches to curriculum decision making?

Technology

A systemic and evidence-informed approach is needed for **technology-based innovations in education**.

- How to best enhance teaching and learning with technology?
- How could **longitudinal information systems** lead to a more efficient use of the "big data" collected by education systems in support of innovation and improvement?

School organisation

Forms of **work organisation in schools** can spur organisational learning and educational outcomes.

- How do professional interactions within schools – as well as individual and organisational learning and training – effectively promote innovation?

Educational R&D

Public and private investments are required to promote R&D on existing and new **educational products and services**.

- Can the education industry developing innovative tools grow to match the rate of innovation seen in other sectors?
- How is educational R&D structured and supported within countries?

Measuring innovation in education

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, and to what extent change is linked to improvements, strengthens the **education knowledge base** which informs policy making.

- New information about innovation in education compared to other sectors.
- Over 200 measures of innovation in education using international data.

Main publications on innovation in education

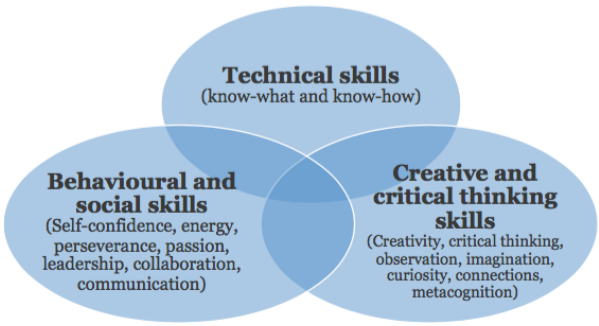
- OECD (2014), ***Measuring Innovation in Education: A New Perspective***, OECD Publishing.
- OECD (2013), ***Sparking Innovation in STEM Education with Technology and Collaboration***, OECD Publishing.
- OECD (2013), ***Review of the Italian Strategy for Digital Schools***, OECD Publishing.
- Hennessy, S. and L. London (2013), "**Learning from International Experiences with Interactive Whiteboards:** The Role of Professional Development in Integrating the Technology", OECD Education Working Papers, No. 89, OECD Publishing.
- Foray, D. and J. Raffo (2012), "**Business-Driven Innovation: Is it Making a Difference in Education?** An Analysis of Educational Patents", OECD Education Working Papers, No. 84, OECD Publishing.
- OECD (2010), ***Innovative Workplaces: Making Better Use of Skills within Organisations***, OECD Publishing.

Strand 2: Skills and education for innovation

Developing skills for innovation

This strand of the project explores the role of the education and training system in fostering **the dispositions and skills that are conducive to innovation**. In innovation-driven societies, education and training systems must empower people to innovate and to quickly respond to new skills needs generated by technological and organisational change. This work identifies the skills required for innovative societies and analyses how different teaching and organisational practices help foster them.

Three main sets of skills for innovation



Innovation goes beyond content and procedural knowledge in a particular domain. People need to **think critically**, to **challenge assumptions** and conventions, and to be able to **come up with new ideas** and **make connections**. Innovation is also aided by behavioural and social skills that help people acquire technical skills, apply their creativity and critical thinking, and put their ideas into action. While innovation skills empower people for innovation and give access to better jobs, they are also a driver of personal satisfaction and wellbeing.

Policy strategies

The Innovation Strategy for Education and Training explores a number of policy issues to help OECD countries to scale up and mainstream effective approaches for the promotion of skills for innovation:

- How education and training systems must **adjust to the evolving skill needs** of highly innovative societies.
- How different school and university subjects – **science, mathematics, arts, entrepreneurship** – help develop skills for innovation.
- The **pedagogies and teaching models**, such as problem-based learning or metacognitive strategies, that may be more conducive to develop skills for innovation.
- The **models of workplace organisation**, including professional development, that are most effective in encouraging and further developing skills for innovation.

Main publications on skills and education for innovation

- Mevarech, Z. and B. Kramarski (2014), ***Critical Maths for Innovative Societies: The Role of Metacognitive Pedagogies***, OECD Publishing.
- Avvisati, F., G. Jacotin, G. and S. Vincent-Lancrin, "**Educating Higher Education Students for Innovative Economies**", *Tuning Journal for Higher Education*, 1, 223-240.
- Hoidn, S. and K. Kärkkäinen (2014), "**Promoting Skills for Innovation in Higher Education**: A Literature Review on the Effectiveness of Problem-based Learning and of Teaching Behaviours", *OECD Education Working Papers*, No. 100, OECD Publishing.
- Lucas, B., G. Claxton and E. Spencer (2013), "**Progression in student creativity in school**: First steps towards new forms of formative assessments", *OECD Education Working Papers*, No. 86.
- Winner, E., T. Goldstein and S. Vincent-Lancrin (2013), ***Art for Art's Sake? The Impact of Arts Education***, OECD Publishing.

Fostering creativity and critical thinking skills

Teaching, learning and assessing creative and critical thinking skills

How to foster and assess creative and critical skills in formal education? Working with schools, higher education institutions and experts within countries, the project develops **a vision and language on what it means and takes to develop creativity and critical thinking**. This vision is embodied in a **rubric**, a **bank of pedagogical resources,** in **professional development plans**, and in **examples of student work** that give concrete examples and scaffolding to teach and learn these skills.

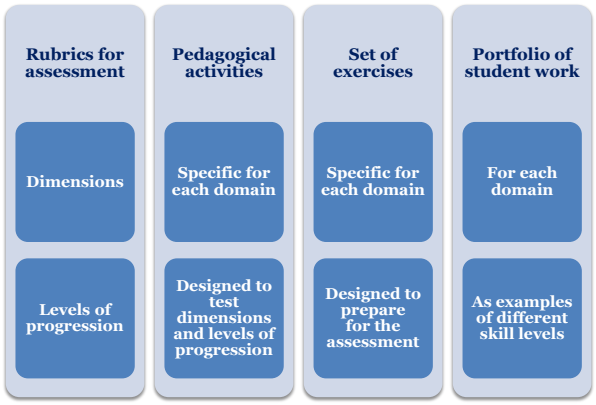
The pilot phase of the project (2015-18) has engaged **school and teacher networks in 11 countries**, reaching over 17 000 students, 650 teachers and 325 schools. Teachers have adapted their teaching practice and implemented **pedagogical interventions** aimed at fostering creative and critical thinking skills **in their curricular domain.** This has provided a **proof of concept** for a teacher-friendly language that is understandable and usable internationally.

Using a **quasi-experimental research design**, the project aims to evaluate whether the pedagogical interventions have the expected effects on a variety of factors, from test scores through to attitudes, understanding of creativity and critical thinking, and pedagogical practices. The monitoring also helps identify the **conditions for the successful development of these skills** in formal education. The rigorous monitoring and evaluation of innovative practices is key to the design of validation and scale up strategies and to their adjustments to different contexts.

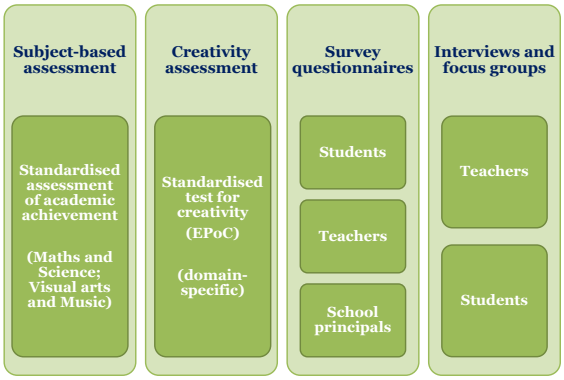
Looking forward

The project has paved the way for ***creative thinking*** to be the **innovative domain for PISA 2021** and is informing the design of the standardised assessment. In 2018, the project will start similar work in **higher education** and **teacher training**. A **validation phase of the project at the school level** is envisaged from 2019 onwards: it will implement the pedagogical intervention at a larger scale and evaluate its effects in a rigorous way. Working at primary, secondary and tertiary education levels, the projects aims to trigger systemic change.

Pedagogical toolkit



Quasi-experimental monitoring framework



OECD rubric on creativity and critical thinking

	CREATIVITY Coming up with new ideas and solutions	CRITICAL THINKING Questioning and evaluating ideas and solutions
INQUIRING	• Make connections	• Challenge assumptions
IMAGINING	• Generate ideas and play with unusual and radical ideas	• Find several perspectives on the problem
DOING	• Produce, perform or envision something personally novel	• Evaluate solution justified on logical, ethical or aesthetic criteria
REFLECTING	• Assess the novelty of a solution and of possible consequences	• Reflect on uncertainty/limits of chosen solution/position

The team

Stéphan Vincent-Lancrin	Senior Analyst and Project Leader	stephan.vincent-lancrin@oecd.org
Carlos González-Sancho	Analyst	carlos.gonzalez-sancho@oecd.org
Mathias Bouckaert	Analyst	mathias.bouckaert@oecd.org
Meritxell Fernández-Barrera	Analyst	meritxell.fernandezbarrera@oecd.org
Federico de Luca	Analyst	federico.deluca@oecd.org
Madeleine Gereke	Assistant	madeleine.gereke@oecd.org
Gwénaël Jacotin	Statistician	gwenael.jacotin@oecd.org
Joaquin Urgel	Consultant	joaquin.urgel@oecd.org