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## INNOVATION AND KNOWLEDGE MANAGEMENT



*Recognition of the key role of research and knowledge management in educational practice and policy making is in general recent. The volume of relevant educational research and development (R&D) tends to be low, despite education being so explicitly about knowledge, and there has been only weak capacity to develop and exploit the knowledge base on which to build improved practice and effective policies. A great deal of educational change is still shaped by short-term considerations despite education's fundamental long-term mission and nature. Improving the knowledge base and fostering innovation have been the aims of policy in a number of countries. Within the OECD, analyses of educational R&D systems, knowledge management, innovative practice and systemic innovation, futures thinking, and evidence-informed policy and practice, have all been prominent, some of it carried out in contribution to the OECD's horizontal Innovation Strategy. Analysis has also focused around the so-called 21st century skills, seen as fundamental to innovative and creative societies.*



## INTRODUCTION


Innovation is a longstanding focus of educational work at the OECD: the Centre for Educational Research and Innovation (CERI) was founded over 40 years ago in 1968. Most recently, this Centre has provided the educational contribution to the OECD-wide “Innovation Strategy”, which is also looking at other sectors such as entrepreneurship, science, technology, research, immigration, tax and trade in order to help countries capture the economic benefits of innovation. Work on “New Millennium Learners” has focused especially on how education systems can best use and develop the skills for technology, including through technology-rich innovation. The “Innovative Learning Environments” project is compiling examples of innovations that reconfigure the way that learning takes place.

Recognition of the key role of research and knowledge management in educational practice and policy making has been growing but still tends to be weakly developed. In many countries, there has been only limited capacity to develop and exploit the knowledge base on which improved practice and effective policies can be based. The volume of relevant educational R&D tends generally to be low, despite education being so explicitly about knowledge. Similarly, a great deal of educational change is still shaped by short-term considerations despite education’s fundamental long-term mission and nature. Educational R&D systems, knowledge management, futures thinking, and evidence-informed policy and practice, have all been prominent aspects of the research and innovation work of the OECD in education.

## KEY FINDINGS

**For a person, organisation, economy or society to be innovative requires wide-ranging skills, including “soft skills”, making it a priority to ask how effectively education systems foster them:** Innovation covers a wide range of activities, from invention and breakthroughs, to implementation and minor improvements. It therefore necessitates a wide variety of skills:

- **Basic skills and digital age literacy:** These include reading, writing and numeracy, and the skills to use digital technology, and to access and interpret information.
- **Academic skills:** Associated with disciplines such as languages, mathematics, history, law and science, these skills are generally obtained through the education system and are transferable across different situations.
- **Technical skills:** The specific skills needed in an occupation, which may include both academic and vocational skills, as well as knowledge of certain tools or processes.
- **Generic skills:** Skills of this sort commonly are seen to include problem-solving, critical and creative thinking, ability to learn, and ability to manage complexity. A skill such as problem solving may be considered as transferable, but some argue that it is also firm-specific.
- **“Soft” skills:** These include working in teams and heterogeneous groups, communication, motivation, volition and initiative, the ability to read and manage one’s own and others’ emotions and behaviours, multicultural openness, and receptiveness to innovation.
- **Leadership:** Related to “soft” skills, these include team building and steering, coaching and mentoring, lobbying and negotiating, co-ordination, ethics and charisma.

 *The OECD Innovation Strategy: Getting a Head Start on Tomorrow*, 2010, Chapter 3


**Schools are conventionally poor at using the key motors of innovation – research knowledge, networking, modular restructuring, technological advance:** OECD work on knowledge management has identified four key “pumps of innovation”:




- **The “science-based” innovation pump:** Education has not traditionally made enough direct use of research knowledge, and there is often cultural resistance to doing so. This is increasingly being targeted in reform.
- **The “horizontally-organised” innovation pump:** There are obvious benefits in terms of teachers pooling their knowledge through networks, but incentives to do so remain underdeveloped. There is need to tighten the “loose coupling” between the single teachers, individual classrooms and individual schools that so characterise school systems.
- **The “modular structures” pump:** This is about building complex processes from smaller sub-systems that are designed independently, but function together. Education is accustomed to working in modules, but much of it involves schools or teachers operating separately from each other.
- **The “information and communication technologies” (ICT) pump:** There is a powerful potential for ICT to transform education, but its use in schools remains underdeveloped, partly because the main *modus operandi* of school administration and instruction are resistant to change.

 *Innovation in the Knowledge Economy: Implications for Education and Learning*, 2004, Chapter 2

**The growing focus on educational outcomes has resulted in both an explosion of evidence of different kinds and a policy thirst for the results of educational research:** There is a mounting preoccupation with what happens as a result of educational investments and participation, rather than the primary focus being on these inputs. Outcomes cover not only course completion and qualifications, but also skills and competences (as with the PISA surveys), access to and success in the labour market, and wider social outcomes, such as health and citizenship, attributable to education. There has been a huge expansion of evidence resulting from the growing volume of testing and assessment activities. As policy increasingly focuses on what education actually delivers, so is there interest in the information coming from research, but we know too little about how this evidence is used and whether it is used effectively.

 *Evidence in Education: Linking Research and Policy*, 2007, Chapter 1

**Too much educational decision making is preoccupied by the short term:** Today's world is increasingly complex and uncertain, with a growing number of stakeholders making new demands on education. Yet, so much of education is still determined by short-term thinking – preoccupation with pressing immediate problems or simply seeking more efficient ways of maintaining established practice. Neglect of the long term is increasingly problematic in meeting the challenges of complexity and change. Futures thinking can stimulate reflection on the major changes taking place in education and its wider environment. It helps to clarify visions of what schooling should be and how to get there, and the undesirable futures to avoid. As well as clarifying values and options, it provides tools to engage in strategic dialogue.

 *Think Scenarios, Rethink Education*, 2006, Foreword and Part 2

#### Box 8.1. Innovation in Education

Innovation in education has attracted increasing attention. The US stimulus package has for example allocated USD 650 million of its USD 5 billion investment in school reform to a new Investing in Innovation Fund (i3). The fund supports local efforts to start or expand research-based innovative programmes to help close the achievement gap and improve outcomes for students. In 2009, the Netherlands also published an explicit Social Innovation Agenda for Education, and Hungary is reviewing its educational innovation system. However, most countries still need to turn their implicit educational innovation strategies into explicit ones.

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In recent years, greater emphasis has been placed on the development and use of evidence in teaching. Educational research based on methodologies for measuring causal impacts has grown and increased the body of available knowledge. New links with neuroscience are also promising as they allow better understanding and diagnosis of certain learning difficulties. The enhancement of educational research will remain a serious challenge in the years to come, and developing the necessary evidence will require further work.

New educational products, resources and teaching methods are another source of innovation in education. ICT has led to the development of resources, such as learning management systems and other information systems and diagnostic tools. While the impact of these resources on the quality or cost-efficiency of education is still to be assessed, the increasing involvement of businesses in the production of new educational resources or models opens new avenues. In many cases, however, this market is limited by insufficient demand from schools.

Some education systems are establishing a new generation of sophisticated information infrastructures, such as longitudinal information systems which give rapid feedback to teachers, parents and other stakeholders. In addition to potentially changing the culture of the teaching profession, these systems may remove a key barrier to educational innovation: the difficulty of demonstrating the positive value of educational innovations. As long as innovation cannot be clearly linked to better achievement of educational objectives (learning outcomes, equity, access, cost-efficiency), the innovation process will be slowed by a lack of demand or avoidance of what may simply appear to be another educational fad.

To develop new models of educational delivery, most governments encourage experimentation by the public school systems or fund access to private schools offering alternative schooling models. Innovation and experimentation funds, as well as innovation prizes and rewards, give stakeholders incentives to develop innovative methods. Some countries have used market mechanisms within their public education systems in order to facilitate innovation (e.g. charter schools). These mechanisms have generated organisational and marketing innovation. While it is less clear that they have led to innovation in the core business of education, they have contributed to the dissemination of alternative learning environments (collaborative learning, bilingual schools, computer schools, etc). New models of higher education institutions are also appearing in OECD countries, based on storytelling curricula, engineering projects or purely online learning.

User-driven innovation has also become more prominent in the past decade in education owing to the Internet. A number of higher education institutions now offer open educational resources. In addition, wikis and repositories of different types of educational resources are available to students and teachers worldwide.

Insufficient evidence that an educational innovation represents a significant improvement over traditional or mainstream practices hinders the demand for innovation: students, parents or teachers tend to prefer well-known methods rather than experiment with new ones. Potential innovators also lack incentives to innovate in view of the lack of a clear market for their new products or models. As a result, the use and development of innovations remains fragmented. This is why measurement and evaluation of educational change and innovation will be essential to unleash innovation in education.

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Source: OECD (2010), *The OECD Innovation Strategy: Getting a Head Start on Tomorrow*, OECD Publishing.



## POLICY DIRECTIONS

The OECD's horizontal "Innovation Strategy", in considering how people can be empowered to innovate, concluded with a set of "policy principles" about education and training systems, and innovative workplaces. These tend to parallel closely more general conclusions about education and training policy:

- **Equip people with skills for innovation:** Ensure that education and training systems are adaptable, and can accommodate the changing nature of innovation and the demands of the future. Curricula and pedagogies should develop the capacity to learn new skills and take full advantage of information and communications technologies.
- **Improve educational outcomes:** A considerable share of children still do not complete upper secondary education or leave schools with poor literacy and numeracy skills. While virtually all young people in OECD countries have access to at least 12 years of formal education, mechanisms are needed to ensure that solid educational foundations are universal.
- **Continue to reform tertiary education systems:** Public authorities should enable tertiary education institutions to become catalysts for innovation, notably in their local and regional settings. While the steering role should be reserved for government, institutions should have considerable room for manoeuvre. The tertiary sector also needs to retain sufficient diversity to respond to future needs in the innovation system.
- **Connect vocational education and training to the world of work:** This requires a good balance between occupationally-specific skills that meet employers' needs and generic transferable skills that equip graduates for lifelong learning and mobility.
- **Enable women to play a larger role in the innovation process:** Although female educational attainment tends now to outstrip that of men, the tax and benefit systems, and workplace practices and childcare are key to fuller engagement by women in the labour force and innovation.
- **Support international mobility:** Policies should support knowledge flows and the creation of enduring linkages across countries. Migration regimes for the highly skilled should: be efficient, transparent and simple; enable short-term/circular movements; and support connections to nationals abroad.
- **Foster innovative workplaces:** Employee involvement and effective labour management help to foster creativity and innovation, and employment policies should encourage efficient organisational change. Learning and interaction within firms are key to their innovation performance; governments may also shape national institutions to support higher levels of employee learning and training.

 *The OECD Innovation Strategy: Getting a Head Start on Tomorrow*, 2010, Chapter 3

**Effective decision making means to be informed as far as possible by evidence, with educational professionals working in a "knowledge-rich" environment:** There is need for better links between educational research, policy and practice, and for further progress towards making education a knowledge-rich profession. Greater access to web-based information goes hand-in-hand with less quality control, alongside a shift in most OECD countries towards more decentralised decision making in education. Given greater information, less quality control, a more informed public and a greater diversity of policy makers, the need for clear, reliable and easily available evidence on which to base decisions has become more important than ever before, as has the need to find mechanisms to obtain reliable answers to pressing policy questions.

 *Evidence in Education: Linking Research and Policy*, 2007, Chapter 1




**Create and encourage knowledge brokerage in education systems:** Brokerage agencies are increasingly important to encourage dialogue between policy makers, researchers and educators, and to build capacity to evaluate what does and does not work. An important first step is to create a database of quality research on key topics of interest to policy makers, and to provide clear goals for conducting and evaluating educational research. A key component of these brokerage agencies is the transparent exchange of findings with their methodologies clearly defined, with commitment to update and maintain state-of-the-art syntheses on core topics. And, all centres should seek to disseminate to as wide an audience as possible in order to effect both top-down and bottom-up change.

 *Evidence in Education: Linking Research and Policy, 2007, Chapter 1*


Governments can foster investments and stimulate the production of digital learning resources (DLRs) both by commercial companies/publishers and users by:

- **Offering seed money, supplemented with development and transition funds:** The production of DLRs can be stimulated by offering public tender seed money to publishers, supplemented by development project funding and support to help keep innovations afloat once the initial project funding has ended.
- **Promoting co-operation between public and private players for DLR development:** Governments can encourage companies to develop corporate social responsibility programmes and to increase co-operation with public authorities in education. Schools and local educational authorities will need guidelines on how best to approach such co-operation.

 *Beyond Textbooks: Digital Learning Resources as Systemic Innovation in the Nordic Countries, 2009, Chapter 7*

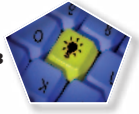
**A systemic approach to innovation in VET is urgent:** Precisely in times of economic crisis, innovation is increasingly a key factor, not only to economic growth, but also to social welfare. A recent study of systemic innovation in the VET sector suggested the following guiding policy principles:

- Develop a systemic approach to innovation in VET as a guiding principle for innovation-related policies.
- Promote a continuous and evidence-informed dialogue about innovation with the VET stakeholders.
- Build a well-organised, formalised, easy to access, and updated knowledge base about VET as a prerequisite for successfully internalising the benefits of innovation.
- Supplement investments in VET innovations with the necessary efforts in monitoring and evaluation.
- Support relevant research on VET according to national priorities and link these efforts to innovation.

 *Working Out Change: Systemic Innovation in Vocational Education and Training, 2009, Chapter 10*

**Create an effective interface between innovation and higher education systems:** Such an interface is essential in order to reap the benefits from public and private investments in research, and to ensure the vitality and quality of higher education systems. Directions for creating such an interface include:

- **Improve knowledge diffusion rather than commercialisation via stronger intellectual property rights (IPRs):** Innovation is not only a discovery process to then be commercialised but R&D is often problem solving along a pathway of innovation. The diffusion capabilities and support activities of tertiary education institutions may thus be as important as discovery processes, and policy should consider methods and instruments to promote them.
- **Improve and widen channels of interaction, and encourage inter-institutional collaboration:** Linkages between the tertiary education sector and other actors in the research and innovation system, such as firms and public research organisations, need to be actively developed to ensure



effective knowledge diffusion. When programmes are designed, they need to consider in particular the engagement of small- and medium-sized enterprises from all technological sectors as they tend to be under-represented in such collaborations.

- **Foster mobility across the research and innovation system:** Inter-sectoral mobility is one of the main vehicles for knowledge diffusion; mobility between firms, tertiary education institutions and public research organisation should be actively promoted.



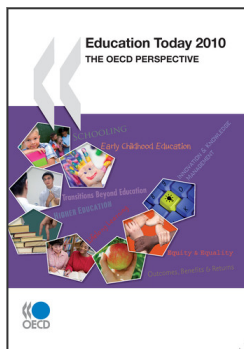
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