

Executive Summary

OECD economies have experienced the transformation from their traditional industrial base to the knowledge era in which learning and innovation are central. Yet, many of today's schools have not caught up as they continue to operate as they did in the earlier decades of the 20th Century. How can learning within and outside schools be reconfigured in environments that foster the deeper knowledge and skills so crucial in our new century? To succeed in this is not only important for a successful economy, but also for effective cultural and social participation and for citizens to live fulfilling lives.

This book summaries and discusses key findings from the learning sciences, shedding light on the cognitive and social processes that can be used to redesign classrooms to make them really effective learning environments. It explores concrete examples in OECD countries, from alternative schools to specific case studies in Mexico, that are seeking to break the mould and realise the principles emerging from learning science research. It asks how these insights can inspire educational reform for the knowledge era, in which optimising learning is the driving aim and in which innovation is both the widespread catalyst of change and the defining result.

Innovating to Learn, Learning to Innovate will be of particular interest to policy makers, researchers, teachers, students and families. It is published by the OECD Centre for Educational Research and Innovation (CERI).

The search for innovative learning environments

The opening chapter by the OECD Secretariat (Francisco Benavides, Hanna Dumont and David Istance) starts with the core competences and knowledge that OECD education systems aim to develop in their students for the 21st Century to argue that the current organisation of OECD education systems may well not provide the optimal environments to facilitate the acquisition of these skills. The chapter analyses four sources to enrich the reform agenda: a) findings and principles derived from the

learning sciences; b) research-based innovations; c) the experience and lessons of alternative schooling; and d) innovative cases in the field. It concludes that these offer the basis of a new paradigm at the centre of the educational reform agenda.

Optimising learning: implications of learning sciences research

Keith Sawyer's starting point in Chapter 2 is the transformation in recent decades of many OECD member countries from industrial to knowledge economies, which emphasises the importance of creativity, innovation, and ingenuity. Learning scientists have shown that far too many schools are not teaching the deep knowledge that underlies knowledge work. Cognitive scientists have studied how children retain material better and are able to generalise it to a broader range of contexts, when they learn deep rather than surface knowledge and when they learn how to use that knowledge in real-world settings. Thus, learning science is seen as providing the basis to argue that standard model schools are not well aligned with the knowledge economy.

Educated workers now need a conceptual understanding of complex concepts, and the ability to work with them. They need to be able critically to evaluate what they read, be able to express themselves clearly both verbally and in writing, and understand scientific and mathematical thinking. They need to learn integrated and usable knowledge, rather than the sets of compartmentalised and de-contextualised facts. They need to be able to take responsibility for their own continuing, lifelong learning.

The most effective learning environments will have the following characteristics:

- *Customised learning:* Each child receives a customised learning experience.
- *Availability of diverse knowledge sources:* Learners can acquire knowledge whenever they need it from a variety of sources: books, web sites, and experts around the globe.
- *Collaborative group learning:* Students learn together as they work collaboratively on authentic, inquiry-oriented projects.
- *Assessment for deeper understanding:* Tests should evaluate the students' deeper conceptual understanding, the extent to which their knowledge is integrated, coherent, and contextualised.

The “standard model” of schooling is seen to align poorly with these. While some of these characteristics can be implemented within the standard model (e.g. collaborative learning tasks as many schools are doing today), others are much more difficult to implement (for example, customised learning is inconsistent with a high degree of standardisation).

Research-based innovation and alternative approaches to constructivism

Research-based innovation is the particular interest of Carl Bereiter and Marlene Scardamalia (Chapter 3). It allows future-oriented educators to identify approaches that offer the promise of making qualitative leaps beyond current outcomes, helping education systems to identify approaches that are worth working to develop as new directions. Its focus on *fruitfulness* is seen as different from all the approaches in education based on “effect size”. It also contrasts with *basic* research, aimed at understanding the phenomenon or problem of interest, and with *decision-oriented* research, aimed at identifying “best practice” and guiding policy decisions. “Design research” has been applied as a term to research aiming to create and improve innovations; each major advance opens up novel possibilities for future advances. While standard in the applied sciences and engineering, it is still a novelty in education and marks a significant departure from “evidence-based” or “best” practice.

Research-based innovation in the learning sciences has given rise to a number of promising pedagogical avenues, which belong to the broad family of social-constructivist approaches. They propose five dimensions of different educational practice to distinguish among recent research-based innovations:

- *Degree of directedness*: This dimension ranges from extreme directedness, at one end, to collaborative inquiry at the other in which students work together to understand something. “Self-directed learning”, “co-operative learning”, “self-regulated learning” and “guided discovery” apply in the intermediate range.
- *Emphasis on ideas versus activities*: The sustained and well-directed effort at idea improvement is often lacking in many areas of human activity. Initiating students into this process is among the single most important contributions of schools in the Knowledge Age.
- *Emphasis on the individual versus community*: Many progressive forms of education emphasise the individual. There is, however, a growing

recognition of the importance of dialogue in the education process which, if sustained and meaningful, translates into a community.

- *Design versus beliefs*: Design is about the usefulness, adequacy, improvability, and developmental potential of ideas and may be contrasted with normative beliefs. Different approaches to learning mix the normative and design modes in different combinations – both are important.
- *Accommodation to external constraints*: When innovations are put into practice, compromises have to be made, which almost always involve some sacrifice of effectiveness, clarity, and integrity.

Lessons from alternative schooling

Anne Sliwka (Chapter 4) surveys alternative education giving an overview of some of the main currents and examples. While it is a “fragmented landscape” in some respects, it also has some core common features and alternative schooling often confirms the directions suggested by the learning sciences. Many teaching practices developed in alternative schools, such as student-centred and independent learning, project-based and cooperative learning and authentic assessment have become increasingly mainstream through their influence on public education.

The learner: most of the alternative models of education perceive and organise learning as an active process based on the needs and interests of individual students. *The learning environment*: the traditional classroom set-up has been deliberately discontinued by most alternative schools; instead their learning environments tend to put the learner centre stage, to provide a wide array of learning resources and to facilitate individual as well as collaborative learning. They often use the “community” as a deliberate extension of the classroom. *Teachers*: the teacher role ranges from being a coach that students may draw on if they so choose through to a provider, organiser and manager of customised learning in experiential learning environments.

Curricula and content of learning: most alternative schools enjoy considerable freedom in the design of their curricula. A notable feature of most alternative schools is their aim to teach an integrated curriculum that does not strictly separate traditional subject areas but rather emphasises the interconnections between the disciplines. *Assessment*: alternative schools share the conviction that children and adolescents learn most effectively when they are interested and motivated which shapes the form, function and culture of assessment. They tend to focus on individual and criterion-

referenced forms of assessment, such as learning reports, learning logs and portfolios, in which students document and reflect on their own learning.

Democratic pedagogies, curricula and teaching

Mar Rodríguez-Romero (Chapter 5) argues that we cannot afford to waste the wealth of knowledge which is hidden in a myriad of anonymous initiatives. For her, these “local innovations” are essential in order to discover new forms and dynamics of teaching and learning to guide the difficult renovation of pedagogical practices that have characterised schools up to now. Rodríguez suggests this should lead to radical not incremental change around three main orientations: situated pedagogies, curricular justice, and democratic teaching and learning.

Situated pedagogies are strategic, diversified and emancipatory, taking advantage of grassroots educational experiences and local commitment. Situated teaching seeks to promote authentic – *i.e.* significant – educational practices in relation to a particular culture and community. *Curricular justice* is about mitigating the effects and reproduction of both socio-economic and cultural inequalities. A common learning programme is necessary, which should extend access to both the advantaged and the disadvantaged the experiences and knowledge that are habitually ignored but which are essential for widening social participation. *Democratic teaching and learning* is about the creation of democratic structures and processes within the school, along with a democratic curriculum. Democracy in school has a clear link with community action in that the school should form part of the cultural practices in which students and their families are involved.

In the process of community construction, an essential role is played by those intermediary social structures such as neighbours, family, voluntary associations, non-governmental organisations, by teachers’ associations and by the school itself, situated between people’s private lives and depersonalised public institutions. The state, through different administrations including educational structures, should encourage the appearance of these intermediary channels of participation.

*The construction of learning environments:
lessons from the Mexico study¹*

The authors of Chapter 6 were all in the network of experts in the Mexico study, 2005-2006. Juana Sancho-Gil sets the current push to innovate and reform against the historical backcloth of progressive movements during the 20th Century. She argues for more radical approaches given the disappointing results of reforms – learning outcomes are still limited and schools and teachers continue to work in highly traditional ways – and she stresses the need to search for new models or structures of learning with learners and their needs at their centre.

Juan Cassasus adopts an *interactionist* perspective and proposes that the driving forces of most innovations are needs and emotions. In what he calls the *needs-emotions-actions* dynamic, the extent of satisfaction of certain needs sets off emotional responses which in turn drive individuals or groups to react or innovate to respond to their needs.

Marcela Tovar-Gómez and Lilia Pérez-Franco use the four Mexico study cases extensively for their analyses. Tovar-Gómez argues for the creation of new learning structures that recognise the heterogeneous nature of education and its contexts, which call for more flexible instruments and for more participative and structured methods. She suggests *inter alia* revising the certification processes and explicitly encouraging counselling and research activities among teachers. Pérez-Franco notes that the innovations examined have survived while following different “building routes”. Some started as on-the-ground responses to local needs; others were created in the system’s middle tiers in response to top-down reforms, articulated by public servants who were sensitive to the needs, abilities and requests of local actors. She outlines different profiles for the actors of innovation which survive.

Margarita Zorrilla highlights and discusses urgent outstanding questions: how can recent learning science outcomes be translated into practice? How can teachers’ understanding of these findings be facilitated

¹ As explained in the foreword to this publication, the OECD Centre for Educational Research and Innovation (CERI) started in 2005 the analytical work on models of learning. The core of this analysis was co-ordinated with Mexico and was based on intensive consultations and discussions with different groups of experts, as well as on fieldwork. This period, from July 2005 to June 2006, was known as the *exploratory phase* and concluded with the OECD-Mexico International Conference: “Emerging Models of Learning and Innovation” held between 14-16 June 2006 in Mérida, Yucatán.

and how can they be helped to apply them? How could teachers and other actors become real mediators between learners and the knowledge they need and want to acquire? How can a broader and more equitable concept of quality education be fostered?

For María de Ibarrola, innovations need to be understood historically in context. She observes that recent reforms and education initiatives in Mexico have sought to improve the education system but have fallen short. Thus she exhorts national and international analysis to “make visible” ground-level experiences that have obtained successful learning outcomes as one means to facilitate the transition towards more flexible education policies and systems.

An executive summary of the four Mexico study cases is included as Annex A of this publication.

What makes educational innovations work on the ground?

For María Cecilia Fierro-Evans (Chapter 7), innovation is a managerial process with the purpose of responding to practical needs or problems. It involves a critical review of practices influencing performance which can then build legitimacy and support. It can be understood in terms of: i) a model of intervention; ii) agents of change and political processes; and iii) the cultural, institutional and educational context.

The *intervention model* refers to the content and scope of the proposed changes, the structure and context of the intervention, its expected evolution, the size of the target population; and whether is local or wider in origin. While micro-level innovations might seem to have “limited relevance”, paradoxically, they are usually the most permanent and make the deepest impact on practice.

The *role of agents and the change process*: an innovation’s development is determined by the social interaction of group members through the successive stages of: awareness, expression, interest, trial and evaluation, trial period, and adoption. The problem-resolution model of innovation insists that target populations must themselves generate the innovation and its implementation will depend on the ability to solve problems and establish spaces for participation.

As regards *context*, changing practices embedded in strong historical and cultural roots is always problematic – the clearer the philosophical and psycho-pedagogical underpinnings, the greater are their possibilities in inspiring change. Insufficient training is a frequently-reported weakness in

innovation projects, sometimes only amounting to the provision of information about expected changes. Open and constant dialogue among teachers, students and experts may foster the energy and creativity to stimulate innovation, reinforcing innovative attitudes, creative participation and a willingness to expose established practices to critical analysis.

The phases and functioning of educational innovation

For Inés Aguerrondo in Chapter 8 a new paradigm of learning and teaching will require both re-thinking the micro-level configurations of learning and education (“the didactic triangle”) and the larger processes and dynamics of education. She analyses the dynamics of innovation in terms of four phases.

The first phase may be described as *Genesis or Gestation*, after the innovation has been triggered by a perceived problem or gap that needs to be addressed. There must be the political and administrative space for the innovation to happen, agents and actors to launch it, and sufficient buy-in from others. The second phase is about *setting the innovation in motion*. It is at this stage that difficulties and any resistance will become apparent which will demand strategies to address them. These strategies may be termed “feasibilities” and divided into: i) to want to do (politico-cultural feasibility); ii) to know what to do (feasibility of knowledge); and iii) to be able to do (concrete feasibility and resources available).

The third phase is about *implementation* and the dynamics of the process. Innovation takes place inside a complex system, both within the educational context and in interaction with external factors. After being set in motion, the three main processes are: (1) *consolidation*, when the innovation strengthens and enriches itself, (2) *bureaucratisation*, when the innovation transforms itself internally, keeping its shape but not its innovating content; (3) *interruption* happens when a formal decision is taken to end the experience. The fourth phase is about the *sustainability and functionality*. Functionality depends on the enhancement of “performance” as regards the problem the innovation has addressed. Sustainability is both about ensuring, while avoiding the problems of, routine and institutionalisation and meeting the challenge of expansion.

Open learning: a systems-driven model of innovation

Tom Bentley (Chapter 9) argues that the basic approach to educational reform across OECD countries revolves around the same governance

paradigm and the on-going dominance of public bureaucracies. For him this focus has not resulted in the replacement of the traditional bureaucratic model of schooling. Bureaucracy is usually characterised as rigid, rule-based, and internally focused. Instead, education resilience lies in its flexibility in permitting an ordered, incremental process of adjustment within its own organisational parameters.

These organisational structures may thus be functional but they limit the possibilities of learning. They limit the scope of inquiry, interaction and information flow in teaching and learning activities and they limit the transfer of innovation by maintaining fragmented organisational units, largely insulated from the pressures of competition and market incentive. Schooling also tends to be insulated from innovation because of the perceived risks of responding to the younger generations without losing the socialising role that society expects of education.

Given the sway of bureaucratic systems, new reform strategies for improvement need to harness them in the relentless, open-ended pursuit of better learning outcomes. For Bentley, open systems offer greatest potential for education system reform. Open source educational repositories, seeking to share learning resource and design learning environments through open collaboration, are now rapidly growing. Organising these at scale requires open systems of co-ordination and development, with clear design rules and hierarchies of decision-making and their rigorously tested by users.