Directions for Schooling and Educational Innovation from Recent OECD Analyses

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This paper aims to provide insights into the search for new models and approaches to schooling and educational innovation by drawing on a range of OECD analysis much of it within OECD's Centre for Educational Research and Innovation (CERI). First, the paper examines reasons why greater emphasis needs to be placed on innovation in moving on from traditional models of schooling. Second, it presents conclusions from two OECD policy reviews – one on teachers and one on school leadership – which are relevant to the capacity of systems to professionalise and change. Third, it reviews findings related to the nature and organisation of learning, from a variety of research, practice and policy perspectives. Fourth, we return to the issue of innovation – not as an argument from outside education for doing schooling differently but as an essential aspect within education that needs to be promoted but is often problematic. This discussion includes consideration of the power of the bureaucratic paradigm which is so prevalent in school systems.

Rationales in Research for Change in Schooling

The 'PISA Argument' for Change

The "PISA argument" for attending to modernisation, innovation and promoting creativity is that even in their own terms, school systems are not outstandingly successful. PISA attainments provide a starting point for considering alternatives as they is based on a dynamic model "in which new knowledge and skills necessary for successful adaptation to a changing world are continuously acquired throughout life" (PISA, 2003b), rather than measuring achievement in terms of specific curricula. With its focus on reading, mathematical and scientific *"literacy"*, PISA emphasises the mastery of processes, the understanding of concepts, and the ability to function in different situations in each domain, rather than the possession of specific knowledge. Beyond these domains, the assessment of *cross-curricular competencies* such as ICT and problem-solving skills is an integral part of PISA[2].

Why should education systems be considered not outstandingly successful even in their own terms? The answer lies in findings such that in only 5 OECD countries do more than two-thirds of young people reach or surpass PISA level 3 in reading literacy - the level which

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[2] PISA (Programme for International Student Assessment), has measured the outcomes of education systems at the end of compulsory schooling and related factors every three years since 2000, involving well over 1 million 15-year-olds surveyed and over 60 countries.

involves comprehension and interpretation of moderately complex text. (The 5 countries are: Canada, Finland, Ireland, Korea, and New Zealand.) The average across OECD countries is 57.1% attaining level 3 or above. In 17 OECD countries, 40% or more do not achieve at the level 3 threshold in reading literacy, and these low-performing students are in the majority in four of these countries. The countries which have 40% or more achieving at best at levels 2 are Austria, the Czech Republic, Denmark, France, Germany, Greece, Hungary, Iceland, Italy, Luxembourg, Mexico, Norway, Portugal, the Slovak Republic, Spain, Turkey, and the United Kingdom. They are the majority of students in Greece, Italy, Mexico, Portugal, the Slovak Republic, Spain, and Turkey. *[PISA2006, Chapter 6]*

Regarding problem-solving and taking all OECD countries together, around a fifth of the students in 2003 could be considered "reflective, communicative problem-solvers", who are able to analyse a situation, make decisions and manage multiple conditions simultaneously, with just under a third being "reasoning, decision-making problem-solvers" and a third counted as "basic problem solvers". This leaves around 16 % considered as "weak or emergent problem-solvers", who are generally unable to analyse situations or solve problems that call for more than the direct collection of information. There are large differences between countries on problem solving but still larger variation within countries. This again raises the question of the effectiveness of education systems in core respects.

The positive approaches to learning deliberately fostered in many of the alternatives to traditional schooling thus receive support in PISA results, which also highlight that too many students are not well prepared for the knowledge society in terms of the different literacies and problem-solving abilities. These arguments are supported by many analysts working in the learning sciences.

The Learning Sciences Argument

Keith Sawyer, editor of the Cambridge Handbook of the Learning Sciences (2006) recently prepared a review of the field for OECD/CERI in its new project on Emerging Models of Learning and Innovation. This section is based on his critique of traditional models of schooling. While the "standard model of schooling" described by Sawyer may be something of a caricatured heuristic device, it helps make clear the scale of the educational enterprise ahead.

His starting point is the transformation in recent decades of many OECD member countries from an industrial to a knowledge economy, with dominant activities based on the production and distribution of knowledge and information, rather than the production and distribution of things, (Drucker, 1993). Many analysts have come to emphasise the importance of creativity, innovation, and ingenuity in the knowledge economy; indeed, some scholars now characterise today's economy as the *creative economy* (Florida, 2002), powered by human creativity. It might be tempting for educationists to marginalize such an economic focus for defining key features and competences, (short-sighted though this would be as the economic sphere fundamental to education and certainly the driving rationale of so much education reform politically). But the social, cultural and personal goals in today's knowledge society are very much in line with the economic arguments. To succeed in community and family projects calls for very similar capacities for cooperation, analysis, creativity, entrepreneurialism and innovation.

When learning scientists first went into classrooms, according to Sawyer, they discovered that most schools were not teaching the deep knowledge that underlies knowledge work. By the 1980s, cognitive scientists had discovered that children retain material better, and are able to generalise it to a broader range of contexts, when they learn deep knowledge rather than surface knowledge, and when they learn how to use that knowledge in real-world social and practical settings. Thus, learning scientists began to argue that standard model schools were not aligned with the knowledge economy.

Many of today's schools are not teaching the deep knowledge that underlies innovative activity, argues Sawyer, and the structural configurations of the standard model make it very hard to create learning environments that result in deeper understanding. An underlying theme of the learning sciences is that students learn deeper knowledge when they engage in activities that are similar to the everyday activities of professionals who work in a discipline. Knowledge workers tend to apply their expertise in complex social settings, with a wide array of technologically advanced tools. These observations have led to a *situated* view of knowledge (Greeno, 2006). This means that knowledge is not just a static mental structure inside the learner's head but instead knowing is a process that involves the person, the tools and other people in the environment, and the activities in which that knowledge is being applied. This active, embedded conception moves beyond the transmission and acquisition conception of learning implicit in the traditional model.

In the knowledge economy, memorization of facts and procedures is not enough for success. Educated workers need a conceptual understanding of complex concepts, and the ability to work with them creatively to generate new ideas, new theories, new products, and new knowledge. 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, life-long learning. These abilities are important to the economy, to the continued success of participatory democracy, and to living a fulfilling, meaningful life. Traditional models of schooling which are not aimed at deep understanding and the development of critical, problem-solving capacities for most students, Sawyer convincingly argues, are not well suited to today's knowledge economies and societies.

Another route to similar conclusions argues directly from school practices to the nature of contemporary economies and societies. Jay Ogilvy's keynote address at the OECD Toronto 2004 Schooling for Tomorrow Forum poses the challenge for public education as the shift from industrial-era standardisation to information-era customisation (OECD 2006a). For him, information-age educators can afford to treat each student differently, including differences in learning style. All this he maintained runs counter to the "one size fits all" thinking which is behind much of the rhetoric of the standards movement which pushes toward industrial era standardisation. At the same time, Ogilvy recognises that equity issues become critical if there is a move away from 'one size fits all' and indeed these pose powerful challenges for schools endeavouring to encourage diversity (see discussion below concerning 'personalised learning').

One framework for the key competencies needed to function in today's complex demanding society, which aligns closely with the above arguments and goes well beyond any

particular level or educational setting, was elaborated through the OECD DeSeCo Project. This came up with three broad clusters, each further divided into three components [*The Definition and Selection of Key Competences 2004]*:

- 1. *Using tools interactively*: A) the ability to use language, symbols and text interactively; B) The ability to use knowledge and information interactively; C) The ability to use technology interactively.

- 2. *Interacting in heterogeneous groups*: A) the ability to relate well to others; B) The ability to co-operate; C) The ability to manage and resolve conflicts.

- 3. *Acting autonomously*: A) The ability to act within the big picture; B) The ability to form and conduct life plans and personal projects; C) The ability to assert rights, interests, limits and needs.

At the same time, these more fundamental competences are shaped by much more than schools and education systems. They are about the nature of culture and society, and socialisation in the broadest terms. Why they are useful in providing yardsticks for school systems to compare themselves against is in case raising the question of what can be can inform assessment:

Policy Orientations suggested by OECD on Teachers and Leadership

Recent large 'thematic' review programmes in OECD already give important orientations towards building the capacity for change implied by the above critiques. One, completed and published in 2005, concerns teachers – their recruitment, professional development, and deployment. The other still on-going is about school leadership.

"Teachers Matter", 2005

Teacher employment and deployment are organised along markedly different lines in different systems: in some this follows a 'career-based' model[3]; in others, a "position-based" model[4]. OECD analysis proposes the following directions to inform policy development whichever of the two applies:

- *Emphasise teacher quality over teacher quantity:* There is substantial research indicating that the quality of teachers and their teaching is the most important factor shaping student outcomes that is open to significant policy influence. Key

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[3] In "career-based" systems, teachers expect to stay long in the public service after early entry and once recruited are allocated to posts according to internal rules (*e.g.* France, Japan, Korea and Spain). These systems tend to avoid problems of teacher shortages but there are real concerns about how far teacher education is connected to school and student needs, with lack of incentives for continued professional development and of responsiveness to local needs.

[4] These systems tend to select the 'best' candidate for each position, whether by external recruitment or internal promotion, with wider access to the profession in terms of age or previous career experience, (*e.g.* Canada, Sweden, Switzerland, and the United Kingdom). The problems typically encountered in these systems are shortages, especially in mathematics, sciences etc., difficulties in ensuring a core of good teachers beyond age 40, and greater disparities in teacher quality between attractive and unattractive districts/schools.

ingredients in the teacher quality agenda include more attention to the criteria for selection into initial teacher education and employment; on-going evaluation throughout the career to identify areas for improvement; recognising and rewarding

- *Develop teacher profiles to align teacher development and performance with school needs:* Countries need to have clear, concise statements of what teachers are expected to know and be able to do; these need to be embedded throughout the school and teacher education systems. The teacher profiles should encompass strong subject matter knowledge, pedagogical skills, the capacity to work effectively with a wide range of students and colleagues, to contribute to the school and the profession, and the capacity to continue developing.

- *View teacher development as a continuum:* The stages of initial teacher education, induction and professional development need to be well connected to create a coherent learning and development system for teachers – which they tend not to be in most countries. Lifelong learning for teachers implies supporting them more effectively in the early career stages and then in providing incentives and resources for ongoing professional development.

- *Make teacher education and entry more flexible:* Provide more routes into the profession including: post-graduate study following an initial qualification in a subject matter field; para-professionals and teacher's aides given opportunities to gain full qualifications; and mid-career changers able to combine reduced teaching loads and concurrent participation in teacher preparation.

- *Transform teaching into a knowledge-rich profession:* Teachers need to be active agents in analysing their own practice in the light of professional standards and their and their own students' learning. Teachers need to engage more actively with new knowledge, and with professional development focused on the evidence base of improved practice.

- *Provide schools with genuine responsibility for teacher personnel management:* The evidence suggests that too often the selection process is dominated by rules about qualifications and seniority that bear little relationship to the qualifications needed to be an effective teacher. The school is the key agency for student learning – and hence for teacher selection, development etc. – but will need highly-skilled leadership teams and support to carry this out.

School leadership

Four core functions have been identified through the on-going OECD work for leadership:

i) *Supporting, evaluating and developing teacher quality*: this covers such aspects as managing the curriculum and teaching programme; teacher monitoring and evaluation; supporting teacher professional development; and supporting collaborative work cultures.

ii) *Goal-setting, assessment and accountability*: this is seen to call for giving school leaders discretion over school strategic direction-setting; providing proper support and training opportunities; and encouraging leaders to distribute responsibilities regarding evaluation and accountability.

iii) *Strategic resource management*: involving school leaders in teacher recruitment and enhancing their financial management skills.

iv) *Leadership beyond school borders*: whether with the surrounding community or with other schools via networking.

These orientations regarding teachers and leadership are intended to guide contemporary reform endeavours across OECD countries. Whether such directions in themselves will be sufficient is an open question. As expressed by one of the rapporteurs to the OECD Schooling for Tomorrow Forum in June 2004:

"..reforms have ultimately come up against a wall, or rather a ceiling, beyond which further progress seems impossible, leading increasing numbers of school administrators and educators to wonder whether schools do not need to be reformed but to be reinvented." (OECD 2006a: 187-188)

If there is to be "reinvention" and not just "reform" it is likely that more profound change will still be needed which goes to the nature of teaching and learning in more ambitious ways. These will need to become more central if the agenda of promoting creativity and innovation in school systems is to have a reasonable chance of success.

OECD Projects on Teaching and Learning

Personalised learning

The aim of "personalising learning" is of growing prominence in thinking and policy discussion in some countries. It springs from awareness that "one-size-fits-all" approaches to school knowledge and organisation are ill-adapted to individuals' needs and to the knowledge society at large. This emerging idea is that systems capable of achieving universally high standards are those that can personalise the programme of learning and progression offered to the needs and motivations of each learner. Personalisation can mean adopting a more holistic, person-centred approach to learner development, as well as more demand-driven, market-friendly approaches to system change. In part, it reflects a change in social climate, driven by the affluence and value change that arise from sustained economic growth.

The degree of interest is reflected in the recent OECD/CERI publication, "Personalising Education", [OECD, 2006(b)]. Sanna Jarvela's contribution to that volume summarises some of the findings of research into the nature of learning and aims for education, which the personalisation agenda addresses:

- Collaborative efforts and networked forms of expertise are increasingly needed in the future knowledge society.

- Students need to be able to develop their personal learning needs and individual expertise in the areas which they either feel incompetent or they want to increase their existing expertise.

- Curiosity and creativity are increasingly essential.

- Learning is developed through explicit learning strategies, learning to learn skills, technological capacities for individual and social learning activities, and through learning communities with collaborative learning models.

- Learning needs to be sensitive to contextual conditions, different values and cultural features.

- When technology is seen as an intelligent tool for supporting individual learning, as well as collaborative learning among different individuals, there are multiple ways to expand potential in every student.

Leadbeater in the same volume distinguishes between "shallow" and "deep" interpretations of personalisation by incorporating – ambitiously – the aim of scaling-up from the micro (shallow or isolated initiatives) to the macro level (deep or widespread practice). This serves to bring equity issues to the fore, for he also warns: "The biggest challenge to the personalised learning agenda is what it means for inequality… the more that personalised learning promotes self-provisioning, the more it could widen inequalities" (p.113) Unless opportunities are actively skewed towards the disadvantaged, he argues, any radical personalisation agenda will fail.

It invites the question of whether there is available any serious solution to this potentially fatal flaw in personalisation as a political as opposed to an educational approach – the risk of widening inequalities. If access to and take-up of educational opportunities in part reflects the unequal endowments of human and social capital that different individuals, and societies, bring to the process, then is it not inevitable that the higher value, higher status, higher quality learning services will end up being systematically dominated by those who are already more advantaged? Or might it be possible to pass through a phase of burgeoning micro personalisation initiatives, with all the risks of initially widening inequalities, as the pathway to a genuine shift in practice in education systems for the benefit of all?

Answers to these questions are essential to providing convincing responses to the aims of extending innovation and creativity in our education systems. Greater personalisation goes hand in hand with such aims – moving away from highly specified, controlled and standardised approaches in favour of greater creativity and diversity. Bureaucratic systems are in any event highly resilient to change as discussed below. And one powerful underpinning of bureaucracy and standardisation is the argument that it is the only route to equality of opportunity. Hence, the personalisation agenda needs to provide convincing arguments that greater differentiation can avoid fuelling systemic inequality.

Assessment for learning (formative assessment)

Assessment for learning may be viewed as an essential element of more personalised approaches to education. It refers to assessment of student progress that is an ongoing part of

everyday teaching, rather than a special event. Like other approaches which place learning at the centre – such as mastery learning or intensive tutoring – they have been associated with significant gains in achievement. As well as promising to raise standards, such approaches address equity head on. They do so through the individualisation of teaching and learning strategies and through the continual identification of and responses to students who are experiencing difficulties. Moreover, these approaches are explicitly about developing cultures of learning in schools and classrooms. Yet, they receive far less prominence than conventional forms of assessment such as achievement tests and examinations which are much more in the one-size-fits-all" mode. All this helps to explain the interest of formative assessment to CERI (OECD 2005a).

Formative assessment is designed to provide teachers and students with critical information about learning needs, help students to assess their progress towards learning goals, and guide teachers to vary their teaching according to needs and goals. It can include data from a number of sources such as classroom interactions, as well as more conventional forms of assessment such as tests and examinations. It provides ways of responding to the aims of enhancing learning and augmenting teacher professionalism rather than assuming that the act of assessment itself, providing summary measures of achievement levels, is tantamount to improvement. Some of the core methods and practices of formative assessment are useful to note as potentially framing elements in alternative models of learning. These are described in detail in the full OECD report (Chapter 4):

> Element 1: establishment of a learning culture that encourages interaction and the use of assessment tools: helping students feel safe and confident; recognising individual and cultural differences; planning for student learning, rather than merely planning activities.

> Element 2: establishment of learning goals, tracking individual student progress toward themes, and adjusting learning goals as needed.

> Element 3: use of varied instruction methods to meet diverse student needs.

> Element 4: use of varied approaches for assessing student understanding: using diagnostic assessment; different forms of questioning.

> Element 5: feedback on student performance and adaptation of instruction to meet identified needs.

> Element 6: active involvement of students in the learning process: scaffolding learning; helping students to develop a repertoire of learning strategies; building skills for peer- and self-assessment; enhancing students' roles in peer- and self-assessment.

Reactions received in implementing the OECD/CERI formative assessment study provide interesting insights for the challenge ahead. One common reaction was to say "but that is just 'good teaching', we're doing it already". The study experts noted that this response of "we're already doing it" was sounded most vocally in places where no systematic application of formative assessment was going on. The difficulty encountered in finding cases that met these criteria even in systems which were sufficiently interested to take part in

the study[5] having appointed a national expert with insider knowledge to accompany the external expertise, suggests that assessment for learning is far from common, let alone universal, practice at the lower-secondary level at least.

Neuro-science and emotions

The project on "Learning Sciences and Brain Research" was launched by CERI in 1999. The purpose was to encourage collaboration between learning sciences and brain research, on the one hand, and researchers and policy makers, on the other (OECD 2002, 2007). On many questions, neuroscience builds on the conclusions of existing knowledge from other sources, such as psychological study, classroom observation or achievement surveys, providing neuro-scientific explanations to already-charted phenomena. On other questions, neuroscience is exploring new domains: such the different patterns of brain activities associated with expert performers compared with novices (as a means to understanding comprehension and mastery), or how learning can be an effective response to the decline of ageing, or why certain learning difficulties are apparent in particular students even when they seem to be coping well with other educational demands.

We might expect that a closer focus on the workings of the brain would lead to ever greater focus on cognitive processes and how these might be improved. Paradoxically perhaps, the closer study of the brain highlights the importance of emotions. Emotional states induced by fear or stress directly affect learning and memory. Brain studies have illuminated how negative emotions block learning and have identified the amygdala, the hippocampus and stress hormones (glucocorticoids, epinephrine and norepinephrine), as playing a crucial role in mediating the effects of negative emotions on learning and memory. Some level of stress is essential for optimal adaptation to environmental challenges and can lead to better cognition and learning, but beyond this modicum it activates responses in the brain associated with flight and survival and inhibits those responsible for analytical capacity. Hence if the student is faced with sources of stress in an educational context which go beyond the positive challenge threshold – for instance, aggressive teachers, bullying students, or incomprehensible learning materials whether books or computers – it triggers fear and cognitive function is negatively affected.

Brain research, drawing on cognitive psychology and child development research, has been able to identify a critical brain region whose activity and development relate to the performance and development of self-control. Self-regulation is also one of the most important behavioural and emotional skills that children need in their social environments. A growing research base lends support to the possibility of emotional regulation as a – perhaps the – critical component of emotional competence necessary for effective interactions with others in stressful situations. Understanding brain maturation and emotions will contribute to defining age-appropriate strategies for emotional regulation. It might also end up showing that concepts which place emotional development to the fore in various forms of "alternative schooling", which had previously been grasped intuitively or philosophically, may in fact have very sound neuro-scientific underpinnings.

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[5]   Canada, Denmark, England, Finland, Italy, New Zealand, Queensland (Australia), and Scotland.

"New Millennium Learners"

The new OECD/CERI work on "New Millennium Learners" is looking at the characteristics of learners and the impact of their sustained use of digital devices and services. Surprisingly little is known about the effects of technologies on cognitive skills. Studies carried out with pre-adolescent children so far seem to indicate the importance of two factors: first, the impulse to experiment and discover, and the consequent lack of fear, that characterises the exploratory behaviour of children at a young age; and second, the predisposition to emulate adults' behaviour. The latter relates in turn to the issue of gender differences of technology use and the consequent impact this might have in education, both at home and in schools. Hence the relevance of this work for enhancing creativity – the natural dispositions of young people to experiment with ICT – alongside constraining factors (in this case the role models provided by too many adults and the discouraging cultures of too many schools).

But although concepts like multitasking or non-linear approach to information are taken for granted by digital natives, there is little known about their practical implications. The same applies to the spread of videogames and the nature of implicit learning that players can eventually acquire. Research carried so far supports the idea that there is a growing gap between school culture, and the values and lifestyles traditionally associated to it, and young people's cultures.

A number of factors can explain this gap, ranging from the evolution of family patterns to the emergence of specific cultural products for young people, increasingly associated with digital media. Social applications of digital technologies consistent with the concept of the network society become increasingly important and gain ground among young people. For education, most young people possess the competence to deal with sophisticated learning environments where digital resources are an important asset. It is important for education, therefore, to figure out ways in which they can promote the convergence of all educational resources, traditional and digital.

A problem of competing policy discourses has been identified in this work. On the one hand, there is the discourse which claims that the real educational benefits of using ICTs are to be seen in domains such as team-working, creativity, problem-solving and the like, in ways very close to the subject of this paper. Yet so long as these are not central to (or even recognised in!) assessment systems such as national examinations, the potential for realising such benefits will always be severely constrained. The second discourse focuses on the factors with a demonstrated impact on boosting educational performance as measured in existing national and international surveys. And, as yet, there is insufficient evidence that ICT use does have an incontrovertible impact on standards so undermining, for those wedded to this discourse, the educational arguments for imaginative ICT use in schools.

But, no-one should expect each and every use of ICT to have a positive learning impact – focusing the question back onto ICT used in what ways, in which circumstances, for which students etc – and asking for incontrovertible evidence of the benefits of ICT in a learning society may be no more sensible than to ask for the evidence about the value of books before buying any for schools.

Knowledge Management, Networking and Innovation

Many studies have argued for more flexible, open forms of learning and of school organisation but while it is not difficult to identify numerous promising examples, it is not so easy to find evidence of more sustained and widespread change. A variety of the factors inhibiting fundamental change to traditional practices has been analysed in OECD/CERI work on knowledge management (OECD 2000a; OECD, 2004a). This suggests that, in general, schools have weak networking and knowledge-sharing among teachers. Spending on educational research and development is very low in contrast to other sectors of activity characterised by the intensive creation and use of knowledge and the application of the R&D is quite limited. Most of the professional knowledge that teachers use in their daily work is tacit: it is rarely made explicit or shared with colleagues. Schools and classrooms are normally isolated one from another rather than interlinked. In short, the message is that too many schools still tend to have only rudimentary knowledge management practices, despite knowledge being education's explicit business.

Four "pumps of innovation"

OECD/CERI analysis of knowledge management in education (2004a) identifies four key "pumps of innovation" that may be found in different sectors of economic and social activity. The problem identified in this report regarding the effective operation of all four sources or "pumps" of innovation is that traditional arrangements and organisation of education have tended to inhibit their application compared with many other sectors.

- *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 individual units – single teachers, individual classrooms, individual schools as units - that characterises so many school systems.

- *The "modular structures" pump:* This is about building a complex process or system from smaller subsystems that can be designed independently but function together. Education is accustomed to working in modules, but much that takes place has schools or teachers operating separately from each other.

- *The "information and communication technologies" 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.

Earlier Schooling for Tomorrow analysis focused particularly on the second "pump of innovation": the concept and practice of networks (OECD 2003a). Their participatory, horizontal nature opens up the potential to displace the excessively bureaucratic decision-making structures of many school systems. Equally, they are important constituents of the "meso" level - lying between the macro level of government policy-making, on the one hand,

and the micro level of individual schools, on the other. David Hopkins's contribution to the 2003 report, for instance, maintains that most school systems have operated almost exclusively through individual units - teachers, departments, schools or local agencies - and such isolation may have been appropriate during times of stability. But, in a context of change there is need to "tighten the loose coupling", in order to increase collaboration and establish more fluid and responsive structures.

Networks are an important means of doing this. They do not just facilitate innovation: they can also be an innovation in themselves by offering the possibility of new ways of working. The "meso" level has become increasingly important in times of innovation and change, in the form of creative and responsive structures for working within and between schools and other learning organisations.

The "fourth pump of innovation" – ICT - has the power to facilitate important changes in instruction, in home, community, and school relations, and in school management. But, no miracles derive from the mere presence of ICT in a school – technology *by itself* guarantees nothing. This conclusion is repeated in the 2005 edition of the OECD *Educational Policy Analysis*. There have been massive investments in ICT in schools in OECD countries. But we should not be beguiled by encouraging statistics on connecting schools to the Net or low student-computer ratios into supposing that this is in itself any automatic solution to educational improvement, still less radical new ways of organising learning.

For one thing, high *thresholds* of equipment and investment need to be reached in order to reap significant educational benefits. Investments in educational ICT must be large enough to allow most students to gain access to the technology fairly frequently, so that it does not sit unused or infrequently used. So equipment and its use are important, not as a sufficient condition of change but as a necessary one for certain forms of teaching and learning. To put this in perspective, the CERI 'New Millennium Learners' and PISA work has shown that while more than 90% of all 15-year-olds in most OECD countries can access a computer connected to the Internet and half connect daily at home, they connect less than once a week in schools.

Second, to make a real difference the ICT should enable activities that could not have been done otherwise or to facilitate tasks that would have been difficult or impossible without it. These may be to permit certain forms of ambitious cooperative learning, untrammelled by constraints of time and space. This fourth technological "pump of innovation" may fruitfully be understood in its role in facilitating the other three: ICT as a means of bringing research knowledge to bear on the teaching and learning process; ICT as a means of permitting networks and horizontal knowledge-sharing to flourish; and ICT as a means of permitting complex modular organisational forms to be adopted as opposed to highly standardised schooling units.

Reform and innovation – confronting the resilience of bureaucratic systems

Tom Bentley, in an analysis recently prepared for OECD/CERI, argues that the challenges being placed before schooling requires identifying and harnessing a particular approach to innovation and system change to recreate the parameters of teaching, learning, participation and organisation. And it requires that we understand properly the sources of

bureaucratic and systemic resilience. His analysis is reproduced here as providing insight into the broader governance and contextual challenges confronting the promotion of innovation in learning systems.

For Bentley, what is striking is the formal universal priority now enjoyed politically by education yet with very similar reform goals adopted from country to country, with a strong focus on pushing up quality through standards-based reform. Yet with few exceptions, he maintains, the basic approach across OECD nations revolves around the same governance paradigm, and the ongoing dominance of public bureaucracies in managing schooling and school reform. The aim of the reform strategy is to ensure that each school has an appropriately focused strategy for improving its own performance, on the basis of its participation in a single system of governance and accountability. The underlying idea is that resourcing, management and pedagogical decisions at every level are driven by transparent, consistent educational standards. But for him this focus has not resulted in the replacement of the traditional bureaucratic model of schooling.

One explanation is that the familiar model of schooling has become so entrenched that it is simply impossible to overturn it, because of the vested interests and centuries-old habits that hold it in place. But even where these interests are weak, or have been swept away, for example through industrial relations reform or the introduction of market competition, the model has not changed radically. Successful private schools rarely stray from the organisational form or the regulatory methods found in state sectors. Across countries and cultures, the received definition of a 'successful school' has become remarkably similar, increasingly influenced by both the international research movement on school improvement, and the internationalisation of performance indicators and measurement through the OECD and other international organisations.

Traditional models of bureaucracy are usually characterised as rigid, rule-based, and internally focused. But perhaps the explanation for their *resilience* in fact lies in their peculiar flexibility. Rather than the formal, rational objectives and accountabilities of the institutional system, which is the focus of so much school reform, much recent thinking about the nature of social and economic behaviour has focused on the evolution of complex adaptive systems. That is, human behaviour is adaptive in that it continuously adjusts to changing environments and new experience, even without conscious decision-making.

So, for Bentley the bureaucratic model is adaptive in the sense that it allows its members – schools, administrators, teachers and so on – to coordinate the process of continuous adaptation to changing student identities, changing socio-economic conditions, and changing policy requirements, through an ordered, incremental process of adjustment, refinement, and organisational learning. The bureaucratic model is not impervious to change because it is inflexible, but because it offers a particular kind of flexibility: it makes continuous adaptation manageable, as long as the changes can be accommodated within its own organisational parameters. The system is implicitly geared towards maintaining the integrity of *its own* design.

But, he argues, it is not necessarily designed to optimise learning outcomes for all of its participants. These organisational structures are functional in the sense of simultaneously make ordered learning possible by creating the predictability and responsibilities needed in

order to organise at large scale. But they produce boundaries which limit the possibilities of learning, because they limit the scope of inquiry, interaction and information flow, in teaching and learning activities. It results in a combination of stability and incremental change which allows the traditional model of schooling, and of bureaucratic school systems, to adapt continuously to all kinds of external change. It is thus well able to deflect the disruptive potential of almost any innovation, no matter where it is coming from.

In the face of the resilience of the bureaucratic system underpinning schooling, the lesson he draws is that, rather than seeking to subvert or bypass the adaptive capacity of existing systems, new reform strategies for improvement need to harness them. They must connect them with the relentless, open-ended pursuit of better learning outcomes, rather than to the implicit preservation of their own core values and underlying structure. For that, we need a new view of innovation and its relationship to system design, and a refreshed sense of the global context into which we should put education.

Concluding Remarks

Powerful arguments can be made for fundamental changes to schooling that move away from familiar traditional models and arrangements, as indeed can already be found in different places around the world. Educational systems with advanced learning, innovation and creativity at the core, would arguably be much nearer to contemporary economies and societies and the competences they need.

However, the scale of the challenge should not to be under-estimated: it certainly will not be achieved by the optimistic hope that repetition of the need for change will somehow magically bring it about. Education is not a technocratic process which, with a little tweaking here and there, can be shifted to a new paradigm – school systems are both resistant to change and highly adaptable.

At the very least, major reform will need to arrive at basic consistency and resolution of the contradiction whereby assessment and accountability regimes may stifle the very approaches to learning and innovation that the reform seeks in principle to encourage. In the language of Ogilvy referred to above, the standardising tendency of some of the policies enacted with the aim of raising standards which may be inimical to learning and education fitted for the Information Age.

At the same time, reforms which seek to personalise learning and generate the conditions for innovation to flourish will need to confront the equity arguments concerned that this is the route for those already ahead in human and cultural capital to invest still more at the expense of those without.

Paper from the conference „Promoting Innovation and Creativity: Schools' Response to the Challenges of Future Societies" held on 8-10, April, Brdo, Slovenia.
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http://www.mss.gov.si/en/zakonodaja_in_dokumenti/events/conference_promoting_innovation_and_creativity/

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