

DIRECTORATE FOR EDUCATION  
CENTRE FOR EDUCATIONAL RESEARCH AND INNOVATION (CERI) GOVERNING BOARD

**CERI'S 40TH ANNIVERSARY CONFERENCE ON "LEARNING IN THE 21ST CENTURY:  
RESEARCH, INNOVATION AND POLICY"**

24-25 November 2008

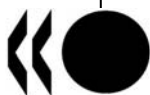
*The CERI Governing Board is invited to:*

- *DISCUSS* the corpus of work covered by the conference; how further synergies might be made across the different strands related to learning, in CERI and related programmes; and the orientations for change as presented in Section 4 (paragraphs 43-62).
- *COMMENT* on the conference's horizontal approach and how this might be developed in the "Education Horizons" work in the next biennium, including potential topics for a 2010 conference.
- *NOTE* the strong endorsement of the value of CERI work made by the Secretary-General (paragraphs 75-79) and *DISCUSS* what more might be done to sharpen CERI's distinctive contribution within overall OECD work on education.
- *AGREE* to the declassification of this document so that it can be distributed more widely as the report of the Conference.

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JT03254694



This paper presents the main aims, issues and outcomes from the 40<sup>th</sup> anniversary CERI conference – “Learning in the 21<sup>st</sup> Century: Research, Innovation, and Policy” – held on 15-16 May 2008. It discusses the value and future of its horizontal approach; it brings together key findings and issues around the conference themes; it outlines the directions identified for shaping policy and practice; and it presents the conference keynote address made by the OECD Secretary-General.

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## **CERI'S 40<sup>TH</sup> ANNIVERSARY CONFERENCE ON "LEARNING IN THE 21<sup>ST</sup> CENTURY: RESEARCH, INNOVATION AND POLICY"**

### **1. Introduction**

1. As a focal event to celebrate its 40<sup>th</sup> anniversary, the Centre for Educational Research and Innovation hosted a conference on 15-16 May 2008 – Learning in the 21<sup>st</sup> Century: Research, Innovation, and Policy. It was attended by approximately 110 delegates and experts, from 25 countries, the European Commission and UNESCO, as well as the social partners BIAC and TUAC. The CERI Governing Board Chair, Frances Kelly, presided over the conference and many other Governing Board members participated and took active roles.

2. This event was prominent in the 2008 celebratory calendar but not the only international event marking the anniversary. The May conference had been preceded by the "What Works" seminar on teaching and assessment for adults with low basic skills in February 2008; it has been followed by the final Schooling for Tomorrow conference in Helsinki (September/October) and the Tokyo OECD/Japan Seminar (October), with the final University Futures "Higher Education 2030" conference still to come in Paris on December 8-9, 2008. These all together have made up the calendar of CERI 40<sup>th</sup> Anniversary events.

3. This paper first outlines the aims of May 2008 conference and discusses the horizontal approach, which has now been incorporated as a regular feature of the programme under the "Education Horizons" activity. Second, it brings together key findings and issues around the conference themes. Third, it outlines some of the directions identified for shaping policy and practice, informed by closer attention to promoting learning. Finally, it presents the keynote address made by the OECD Secretary-General during the Conference, which addresses "Drivers for Reform Strategies – Learning and Innovation" and the role of CERI.

4. The list of participants is circulated separately as an annex to this document, [EDU/CERI/CD(2008)18/ANN]. The documents and presentations made available to the conference are available on <http://www.oecd.org/edu/learninginthe21stcentury>.

### **2. The May 2008 Conference – Learning in the 21<sup>st</sup> Century and the Horizontal Approach**

5. Why learning? Part of the reason lies in its central importance in knowledge-based societies and economies. In many countries there is a push to reflect this by ensuring that reforms of the education system focus more strongly on learning itself rather than simply changing structures and educational organisation. But what does a 'focus on learning' mean in concrete terms? Specifically, the Conference addressed such questions as:

- Who are 21<sup>st</sup> century learners – are their demands and capacities the same as earlier generations?
- What do we know about how people learn, including the functioning of the brain, and how well is this reflected in educational practice?
- What do we know about learning environments and different approaches to learning?

- Are there significant gaps between educational arrangements and what is known about successful learning? How might these be closed?
- What more do we need to understand about the different processes of learning to make it effective in shaping educational reform?

6. But there is also a CERI-specific answer to the question “why learning?”. This conference provided a forum for bringing together several recent major CERI analyses which share this common theme - on Learning Sciences and Brain Research, Innovative Learning Environments, New Millennium Learners, assessment for learning, innovative approaches from higher education (E-learning, Open Educational Resources) - while at the same time linking up to related OECD analyses from PISA and the Programme on Educational Building (PEB). That is, this conference was able to draw together several strands of OECD analysis where CERI in particular has made a key contribution, as well as bringing in both wider EDU perspectives and the OECD agenda more broadly (see the Secretary-General’s keynote address in the final section).

“We have at the OECD developed a very strong capacity for producing comparative educational statistics and indicators. We have strengthened our capacity for policy analysis and advice. The third main leg of the three-legged stool to complement these other two is our capacity to look to and clarify the longer-term issues, and promote educational research and innovation. In a fast-changing knowledge society, all organisations must develop their capacity to understand the bigger picture, to anticipate future changes and to innovate – this is CERI’s particular contribution.”

OECD Secretary-General, Angel Gurría

7. The horizontal approach is particularly useful in light of the tendency for work too often to be excessively compartmentalised. In this respect, the May 2008 conference offered a foretaste of the future in addition to being a unique anniversary occasion. The new Education Horizons activity specifically includes a major horizontal conference each biennium around a broad theme with “the explicit purpose of bringing together ongoing CERI projects in one conference (like the 21<sup>st</sup> Century Learning Conference held in 2008)”. The most appropriate theme for the 2010 horizontal conference will need to be decided well before the end of 2009.

8. The experience of the May 2008 conference thus provides an occasion to reflect on the implementation of this aspect of the next work programme, in terms of the value of such horizontal discussion and dissemination events; the most appropriate themes, timing and location; the best form of documentation, etc. As foreseen in the work programme, it is expected that this will result in a short (50-70pp.) publication around the conference theme. It might also be expected that an initial or partial draft of such a report would be written and on the table for the 2010 event, to be finalised on the basis of the conference inputs and discussion.

9. It was certainly valuable for the May 2008 conference that it was held in Paris in order to permit participation and dissemination of key CERI messages within the Organisation, including with the Secretary-General’s participation. It might well be that future “Horizon” conferences should also be held at OECD headquarters so that key messages are not only disseminated in countries but within the Organisation itself.

### **3. OECD Findings and Issues around Learning**

10. This section draws together the main summary themes and conclusions contained in the conference documentation as well as put forward by conference presenters. It does not pretend to give

comprehensive coverage of the issues and discussions but instead seeks to bring out substantive findings from this body of OECD analysis and from the conference.

### *Learning from the Learning Sciences*

11. Some outstanding lessons can now be drawn from the learning sciences which are increasingly a feature of CERI work, whether on brain research, Innovative Learning Environments or others. This work shows, for instance, how cognition and emotions are inseparable and that learning is most sustainable when it takes place in an environment of emotional security, social stimulation, positive stress, and challenge. It has charted the close links between learning and well-being: that to learn effectively children and youth need to be well nourished, engage in physical activity but also to enjoy times of relaxation. Learning is most sustainable when it is based on intrinsic motivation. This means taking account of students' basic needs for competence, autonomy and belonging. It means helping students to learn to self-regulate and reflect on their own learning, as well as developing self-efficacy. This is now a central part of the CERI work on Innovative Learning Environments (OECD, 2008a).

12. This body of research is increasingly clarifying directions or principles that can be used to guide the development of learning environments or models, both so that they are more effective and so that they are more closely aligned with the needs of the contemporary society and economy (*e.g.* Sawyer in OECD, 2008a). Sawyer's list derived from the synthesis of extensive research in the learning sciences distils both positive messages for enhancing learning and critiques of existing arrangements:

*Customized learning:* Learning will be more effective if it is customized to the learner.

*Diverse knowledge sources:* In constructivist and project-based learning, students gain knowledge from a variety of sources - from the Internet, at the library, or through email exchange with a working professional.

*Distributed knowledge:* collaborating student groups can accelerate learning.

*Incorporating learner preconceptions:* What seems logical or simple to an adult professional is not necessarily for the learner – the curriculum should take account of children's theories and (mis)conceptions.

*The teaching professional:* Teachers are "learning professionals", comfortable with different media for teaching and with a deep understanding of the subject matter, of the means of teaching it, and able to improvise and respond to the particulars of each classroom.

*Assessment:* There are two ways in which today's assessments do not meet the needs of the knowledge society: assessments tend to require that every student learn the same thing at the same time and they tend to assess relatively superficial knowledge, not the deep understanding required by the knowledge society.

13. The aim of "personalising learning" is of growing prominence in policy discussion in some countries, (OECD, 2006a). 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. The emerging aspiration 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. There is no single approach or definition: "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, interest in personalisation reflects a change in social climate, driven by the affluence and value change that arise from sustained economic growth.

14. One of the contributions to the 2006 volume (by Sanna Jarvela) summarized research 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.

“Learning science isn’t rocket science - it’s far more complex than that!”

Petter Skarheim, Norway

### ***Neuro-scientific insights on learning***

15. Drawing on the recent OECD/CERI study (2007a), a number of indicative conclusions were made available to the conference and discussed in detail. The principal messages from the CERI analysis are summarised below.

*Educational neuroscience is generating valuable new knowledge to inform educational policy and practice*

16. The CERI programme on the Brain and Learning shows how wide-ranging is the neuro-scientific contribution and that it takes different forms. On many questions, neuroscience builds on the conclusions of existing knowledge from other sources, such as psychological study, classroom observation or achievement surveys. Even here the neuro-scientific contribution is important because it opens up understanding of “causation” not just “correlation to inform the search for effective interventions and solutions. On other questions, neuroscience is opening up new avenues; without it, for instance, it would not be possible to chart the different patterns of brain activities associated with expert performers compared with novices or why certain learning difficulties are apparent in certain students even when they seem to be coping well with other educational demands.

*Brain research provides important neurological evidence to support the broad aim of lifelong learning*

17. One of the most powerful set of findings concerned with learning concerns the brain’s remarkable properties of “plasticity” – to adapt and grow in relation to experienced needs and practice, and to prune itself when parts become unnecessary – which continues throughout the lifespan, including far further into old age than previously imagined. The demands made on the individual and on his or her learning are key to plasticity – the more one learns, the more one can learn. Neuroscience provides

concrete evidence for the argument that learning is a lifelong activity and that the more that it continues the more effective it is.

*Holistic approaches are needed based on the interdependence of body and mind, the emotional and the cognitive*

18. With such a strong focus on cognitive performance – in countries and internationally – there is the risk of developing a narrow understanding of the purpose of education. Far from the focus on the brain reinforcing an exclusively cognitive bias, it actually suggests the need for holistic approaches which recognise the close interdependence of physical and intellectual well-being, and the close interplay of the emotional and cognitive, the analytical and the creative arts – interactions which are increasingly understood through their effects in the brain. For older people, cognitive engagement, regular physical exercise, and an active social life promote learning and can delay degeneration of the ageing brain.

19. Emotions play a key part in neuro-functioning. An important example is the analysis of fear and stress, which shows how they reduce analytical capacity, and conversely how positive emotions open capacities to learn. This is relevant for the unconfident adult learner as it is for the anxious school student. Neuroscience has also allowed us to understand more fully with a new set of arguments the need to manage or regulate emotions. This is one of the key skills of being an effective learner. Emotional regulation affects complex factors such as the ability to focus attention, solve problems, and support relationships.

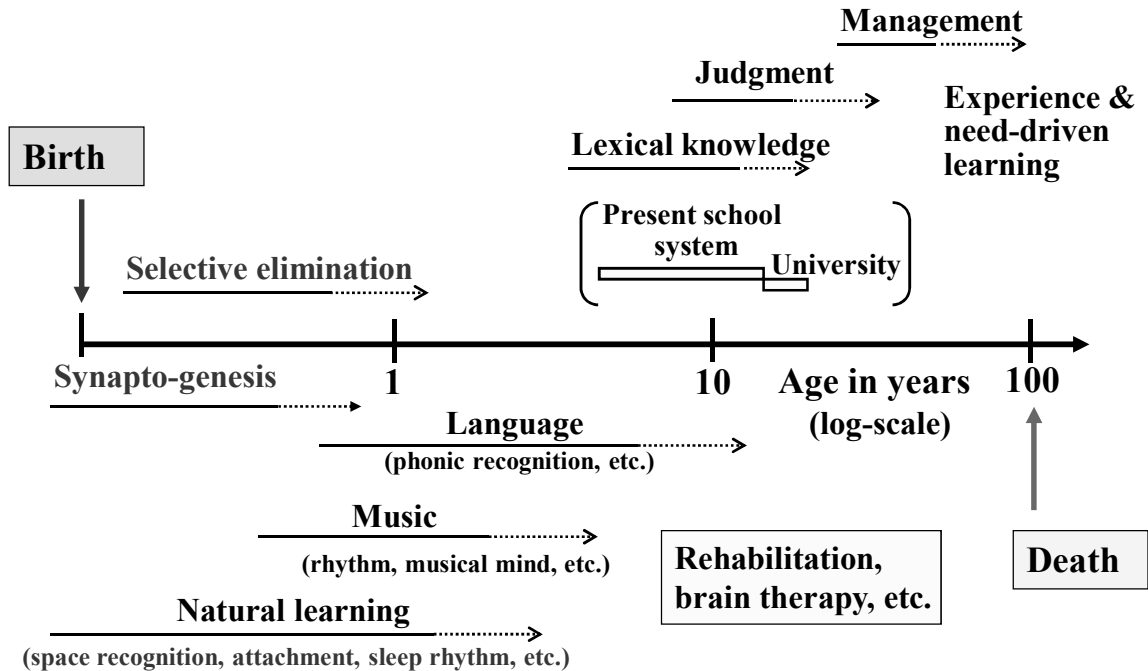
*Neuroscience gives us new insights on the nature of adolescence (“high horsepower, poor steering”)*

20. The insights provided by neuroscience on adolescence and the changes which take place during the teenage years are especially important as this is the period when so much takes place in an individual’s educational career. The secondary phase of education is conventionally covered by this phase, with key decisions to be made with long-lasting consequences. At this time, young people in the midst of adolescence have well-developed cognitive capacity compared with earlier and later years (high horsepower) but emotional immaturity (poor steering). Given the “poor steering” of adolescence and the value of fostering emotional maturity in young people at this key stage, it may well be fruitful to consider how emotional regulation might be recognized in the curriculum and to develop programmes to do this.

*Timing and periodicity in learning to inform curriculum design*

21. The message emerging from the CERI study is a nuanced one: there are no “critical periods” when learning must take place, and indeed the neuro-scientific understanding of lifetime “plasticity” shows that people are always open to new learning. Yet, there are “sensitive periods” – the ages when the individual is particularly primed to engage in specific learning activities. For instance, the earlier foreign language instruction begins, the more efficient and effective it can be. Such learning shows distinct patterns of brain activity in infants compared with school-age children compared with adults: at older ages more areas of the brain are activated and learning is less efficient. Even so, adults are perfectly capable of learning a new language.

# A curriculum based on sensitive periods



Hideaki Koizumi, Hitachi Ltd., Japan

22. These findings support the importance of laying a very strong foundation for lifelong learning, hence further emphasising the key role of early childhood education and basic schooling, not just as ends in themselves but as giving the best possible start. At the same time, there is a danger of over-emphasising the determining importance of the period from birth to three years old on later learning.

## *“New Millennium Learners” and the impact of technology on learning*

23. The emergence of digital native learners is a major contemporary feature of OECD societies; the CERI project on New Millennium Learners aims to grasp this phenomenon by analysing this new generation of learners, their expectations and attitudes, and associated implications for learning and education. There is a growing tension arising from the importance of digital technologies in the daily lives of students – as they are also in the world of adults, particularly at work – but not in the world of classrooms. It is the more acute when students can often see that technological infrastructure is in place in schools, but under-used. Drawing on the extensive analysis carried out by the New Millennium Learners project, the conference considered the results of empirical research on the impact of technology on learning (2008b).

24. Particularly when considering meta-analyses, they give the impression of a very scattered field with only a few efforts made to accumulate knowledge in a way that becomes useful information for parents, educators and policy makers. Nevertheless, a number of messages emerge:

25. First, that there is *solid evidence regarding the effects of technology on cognitive skills development*, particularly visual-spatial skills and non-verbal forms of intelligence. Probably the largest part of the empirical research regarding the impact of digital media use on cognitive skills focuses on the development of visual-spatial skills and another frequent topic is the impact of digital media use on memory skills.

26. Second, *the research base to support claims of a positive impact of technology use on meta-cognitive skills is weak*. Despite the evidence regarding cognitive skills, however, the most appealing domains as those on which technology could have positive impact - information processing, reflective and critical thinking, creativity and, in general, meta-cognitive skills - have not been documented by empirical research.

27. Third, *the effects of digital technologies on socialization are both positive and negative*, adding to an already complex picture of media exposure. On the one hand, it has been shown that time devoted to digital technologies adds to time devoted to other media and thus reduces time spent on family interaction or face-to-face peer interaction. On the other hand, time devoted to digital technologies gives rise to other forms of socialization in a third space, virtual by nature, which is less exposed to adult vision or supervision.

28. Fourth, that there is enough empirical evidence to sustain the idea that *playing videogames which support violence or sexual stereotypes does have a negative effect on young people*, particularly if the use is far from being moderate.

29. Fifth, *there is no conclusive evidence about the effects of technology upon academic achievement*. This is partly for obvious reasons – digital tools for teaching are a set of means that can be used with a wide range of methodologies and strategies, by effective or ineffective teachers, for appropriate or inappropriate tasks. But it is also because the necessary methodological approach, which would involve large longitudinal studies, has not yet been put in place. There is thus intrinsic difficulty in researching the effects of technology on educational performance.

#### **The World as a Classroom**

Technology allows for “unlimited schools“ through:

- Multi-media use.
- Communication with other students.
- Worldwide school partnerships.
- Use of community partnerships.
  - Community services.
  - Experts serving schools.

Anne Sliwka, University of Trier, Germany

***Insights beyond CERI – PISA and PEB***

30. PISA assessments are 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, 2003), 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.

31. OECD’s latest PISA survey of the knowledge and skills of 15-year-olds (2007c) shows that some countries have seen significant improvements in student performance since 2000. Korea further increased its strong reading performance between 2000 and 2006 by 31 score points and Poland went up by 29 points over the same period. Mexico and Greece saw significant improvements in mathematics performance between 2003 and 2006. However, across the OECD area as a whole, learning outcomes have generally remained flat. The 2006 survey also revealed substantial pessimism among secondary school students about environmental challenges and limited enthusiasm for scientific careers.

32. A “PISA argument” for reform is that even in terms of their own cognitive goals, schools across OECD countries as a whole are not outstandingly successful. For instance, in only five OECD countries do more than two-thirds of young people reach or surpass PISA level 3 in reading literacy - the level which involves comprehension and interpretation of moderately complex text, (Canada, Finland, Ireland, Korea, and New Zealand). The average across OECD countries attaining level 3 or above is 57.1% and in 17 OECD countries, 40% or more do not achieve at this level in reading literacy. (OECD 2007c, Chapter 6)

33. PISA results across domains in the 2003 and 2000 surveys show how much lower is interest in mathematics than in reading among 15-year-olds. About half across OECD countries agree that they are interested in the things they learn in their maths lessons, but less than 40% are ready to agree that they do mathematics because they enjoy it. Less than a third look forward to their mathematics classes.

**Motivation to learn at school**

Evidence from PISA 2003 and PISA 2006 shows that this is key.

- Anxiety in learning mathematics is associated with weaker performance in mathematics.
- Enjoyment of learning science is associated with good performance in science.
- School activities to promote the learning of science is associated with good performance in science (excursions, science competitions, extracurricular science projects, science fairs and clubs, etc.).

John Cresswell and Claire Shewbridge, PISA

34. Beyond these domains, the assessment of *cross-curricular competencies* such as ICT and problem-solving skills is an integral part of PISA, (2005c). 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.

35. 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. Problem-solving in technology-rich environments will be an important novel feature of the new PIAAC programme, for which the first main survey of adult skills is scheduled to take place in 2011.

**“All individuals have a right to a quality educational facility...**

...a physical space that supports multiple and diverse teaching and learning programmes and pedagogies, including current technologies; one that demonstrates optimal, cost-effective building performance and operation over time; one that respects and is in harmony with the environment; and one that encourages social participation, providing a healthy, comfortable, safe, secure and stimulating setting for its occupants.”

Conclusion from three PEB/OECD experts' group meetings in 2005-06

36. In sum, PISA results highlight that too many students are not well prepared for the knowledge society in terms of the different literacies and problem-solving abilities. The ambitious definitions of contemporary learning needs increase the challenges even more since they go well beyond academic, cognitive competence, to the meta-cognitive and even socio-emotional development.

***Assessment for Learning***

37. Assessment is vital to the education process. In schools, the most visible assessments are summative: they are used to measure what students have learnt at the end of a unit, promote students, ensure they have met required standards on the way to earning certification or to enter certain occupations, as a method for selecting students for entry into further education, and in general as a way to hold publicly-funded schools accountable. But assessment also serves a formative function, which may be called “assessment for learning” (AfL). In classrooms, this means *frequent, interactive assessments of student progress and understanding to identify learning needs and adjust teaching appropriately*, (OECD, 2005a).

38. The evidence shows that teachers who are systematically using AfL approaches, through differentiation and adaptation of teaching, are better able to raise student achievement and to move towards equity of student outcomes. Assessment for Learning, done well and systematically, is a highly effective means to support of individual learning by such means as keeping systematic track of individual student progress, providing feedback for further learning, stimulating meta- cognition, and empowering learners. It is among the most effective classroom strategies for promoting high student performance. It is also important for improving equity – through its deliberate focus on weaker students and the learning problems they are confronting - and for developing “learning to learn” skills.

39. But there are major barriers to wider practice, including perceived tensions between classroom-based formative assessments, and high visibility summative tests. There may often be a lack of connection between assessment practices and their consequences at the different levels - system-wide, school and classroom.

**Assessment for Learning (AFL) is one of the most effective strategies for promoting high student performance**

The “big idea” behind AfL is the need to use evidence about learning to adapt teaching and learning to meet student needs

Several major reviews of the research - Natriello (1987), Crooks (1988), Kluger & DeNisi (1996), Black & William (1998), Nyquist (2003) - find consistent, substantial effects:

- In real classrooms over extended periods, meta-analyses show that adoption of AfL practices increases student achievement by 0.3 standard deviations (sd).
- One standard deviation of increased teacher quality is associated with an increase of 0.2 sd of student achievement.
- Therefore the range of teacher quality (4 sd) is associated with 0.8 sd of student achievement, with AfL practices the equivalent of half of the “unexplained” difference.

Dylan Wiliam, University of London

***Digital Innovations from Higher Education?***

40. E-learning refers to the use of information and communications technology (ICT), notably on-line learning, to enhance and/or support learning though e-learning activities range widely from the most basic use of ICT through to more advanced adoption (OECD, 2005b). Over 9 in 10 of the UK-based Observatory on Borderless Higher Education (OBHE) respondents in 2004 had or were developing an institution-wide on-line learning strategy. It is probably safe to say that e-learning is growing slowly but surely.

41. But as yet e-learning has not yet revolutionised tertiary education: ICT has had more impact on administrative services than on the fundamentals of teaching and learning. The current immaturity of on-line learning is demonstrated by low adoption of content management systems, where electronic content is split into ‘learning objects’ that can be manipulated and reconstituted for multiple pedagogic purposes: only 6.6% of those responding to OBHE survey of 122 Commonwealth institutions reported institution-wide adoption in 2004.

42. “Open Educational Resources” are digitalised materials offered freely and openly for educators, students and self-learners to use and re-use for teaching, learning and research (OECD 2007b). Examples are pdf files with lecture notes or tests, advanced simulations for science programmes such as physics or chemistry; videos of lectures; images, mp3 files, and so forth. Despite a growing number of OER initiatives, many fundamental questions remain to be answered: who is involved, in what way are they involved, and why?

43. That individuals and institutions give away learning resources for free at first seems counter intuitive. It might best be understood as a part of a new culture and an emerging economic reality. The apparent contradiction between, on the one hand, a growing competition among universities and, on the other, that some share their intellectual capital for free – might not be so contradictory. For some universities, freely sharing learning resources might be a strategy to create a competitive advantage by using unorthodox methods. The CERI analysis predicts a growing debate within the OER movement concerning the role of commercial actors using open resources as part of their business model.

**But.... impact of OER on Students and their Learning?**

To Students: "Have you made use of OER or are you aware of their existence?"

- I use them: 4%
- Have used them 3%
- I am aware but haven't used them: 9%
- Not aware: 78%

Jan Hysten, Metamatrix Sweden, in "Internet Explorers" (forthcoming)

#### **4. Learning-Driven Reform Agendas - Moving Policy and Practice**

44. This section draws together some of the main ideas put forward in the documentation, presentations and discussion of the Learning Conference regarding changes in practice and policy. There was no agreed set of conclusions, but rather themes which emerged defining future agendas.

##### ***Building Effective Schooling, Moving beyond "Good Practice"***

45. The conference discussed how learning can be made effective and some of the implications this has for schooling. Partly this is about integrating the lessons derived from the focus on effective schooling – which is rooted firmly in improving what is currently being done - partly it is about longer-term learning agendas which move beyond improving current arrangements.

46. In the parallel sessions, some of the lessons of effective schooling were addressed. For learning to be effective, it needs to find the balance between direct instruction and active exploration and construction. Students can learn from their peers as well as from teachers; effective teaching uses a range of different methods. It makes room for collaborative, individual, and competitive work. At the same time, competences cannot simply be taught: they have to be actively acquired. Effective schooling makes learning as active as possible, allows for experimentation, and understands "failure" as part of the learning process; it lets students talk about and present their learning and imbues the entire school culture.

47. Dylan Wiliam, of the London University Institute of Education, showed just how different are the conclusions that may be drawn from an educational research tradition that appears at first sight to be relatively uniform. He described "three generations" of effective schooling research, which in maturing over the years has yielded valuable new lessons for policy and practice (see box). This is summarised in the apparently obvious yet critical insight of the "value-added" approach - an effective school is a school full of effective classrooms!

**Three generations of school effectiveness research**

Raw results approaches

- Different schools get different results  
CONCLUSION: Schools make a difference!

Demographic-based approaches

- Demographic factors account for much of the variation  
CONCLUSION: Schools don't make a difference!

Value-added approaches

- School-level differences in value-added are relatively small in most countries
- Classroom-level differences in value-added are large  
CONCLUSION: An effective school is a school full of effective classrooms!

Dylan Wiliam, University of London

48. One of the panellists (Valerie Hannon) stressed the need to move beyond what she described as the “improvement paradigm” towards the futures-oriented “innovation paradigm”. This is the shift from the “best practice” focus of much effective schools work, with strong academic rigour and reliance on R&D, and towards the “next practice” focus. The latter is more closely defined by practitioner innovation, with research supporting development (D&R) rather than development following the lessons suggested by research (R&D). Developing strategies for systematising innovation is one of the defining aims of current CERI work, especially that on Systemic Innovation. The challenge of making this shift is imposing: even in an “innovation-rich” field like introducing ICT into education, as Georges-Louis Baron and Eric Bruillard noted in their presentation on NML, there are many successful innovations but few are sustainable and with little genuine integration into curricula.

Table 1. **The Innovation and Improvement Paradigms**

<b>Innovation</b>	<b>Improvement</b>
<ul style="list-style-type: none"> <li>• Future focus</li> </ul>	<ul style="list-style-type: none"> <li>• Current focus</li> </ul>
<ul style="list-style-type: none"> <li>• Next practice</li> </ul>	<ul style="list-style-type: none"> <li>• Best practice</li> </ul>
<ul style="list-style-type: none"> <li>• Practitioner/user-generated</li> </ul>	<ul style="list-style-type: none"> <li>• Academic/policy-generated</li> </ul>
<ul style="list-style-type: none"> <li>• Adaptive</li> </ul>	<ul style="list-style-type: none"> <li>• Adoptive</li> </ul>
<ul style="list-style-type: none"> <li>• Context sensitive</li> </ul>	<ul style="list-style-type: none"> <li>• Emphasis on fidelity</li> </ul>
<ul style="list-style-type: none"> <li>• Development &amp; Research (D&amp;R)</li> </ul>	<ul style="list-style-type: none"> <li>• Research &amp; Development (R&amp;D)</li> </ul>
<ul style="list-style-type: none"> <li>• Use of trials</li> </ul>	<ul style="list-style-type: none"> <li>• Use of pilots</li> </ul>

Valerie Hannon, Innovation Unit, UK

49. The presentation from analysts at the Institute for Prospective Technological Studies (IPTS), the European Commission Joint Research Centre (DG JRC) based in Seville, boldly sought to combine the futures focus called for by Hannon, with both re-thinking of what these might mean for learning environments or spaces (which may not be schools) with the skills and competences that would be

developed and needed in such spaces. The focus by the IPTS analysts was squarely on digital skills and environments, illustrated with contemporary examples (box), the approach could be broadened beyond the digital focus as part of the study of innovative learning environments. As with some of the other conference presenters, Punie and Ala-Mutka frame their approach with the generic call “for a new vision on learning” and for new (digital) skills.

Table 2. **Learning Spaces, Environments and Digital Skills**

<b>Learning Spaces and Environments</b>	<b>Associated New Digital Skills</b>
<b>Personal digital spaces</b> <ul style="list-style-type: none"> <li>Digital repository with all personal learning materials; well managed; accessible anywhere, anytime (e.g. RSS newsreader, Del.icio.us tags)</li> </ul>	<ul style="list-style-type: none"> <li>Basic computer and networking skills to build, maintain and expand a personal digital repository (throughout life)</li> <li>Information evaluation and management skills</li> </ul>
<b>Connecting and social spaces</b> <ul style="list-style-type: none"> <li>Physical and virtual, connecting spaces where all the actors involved in learning meet (e.g. Myspace, Facebook, CoPs)</li> </ul>	<ul style="list-style-type: none"> <li>Norms and values of online communication, identity management</li> <li>Collaboration and networking skills</li> </ul>
<b>Trusted spaces</b> <ul style="list-style-type: none"> <li>Trust, confidence and reliability of resources and people (e.g. Citizendium, Ebay reputations)</li> </ul>	<ul style="list-style-type: none"> <li>Privacy and security, IPR and copyright skills</li> <li>Trust, confidence and reliability of resources and people (e.g. reputation systems)</li> </ul>
<b>Motivating and emotional spaces</b> <ul style="list-style-type: none"> <li>Enhancing and improving the experience, inviting to learn (e.g. Second Life, Youtube)</li> </ul>	<ul style="list-style-type: none"> <li>Sharing of personal information and learning, openness to others</li> <li>Skills to personalise one's own learning, to know one's objectives</li> <li>Skills to find and use new tools, e.g. videos, virtual worlds (learners and teachers)</li> </ul>
<b>Learning spaces</b> <ul style="list-style-type: none"> <li>Differentiating between time to learn or to do other things</li> </ul>	<ul style="list-style-type: none"> <li>Self-management skills for differentiating time for learning</li> <li>Skills to differentiate between time to learn or to do other things</li> <li>Self-management skills in terms of timing and concentration</li> </ul>
<b>Creative and flexible spaces</b> <ul style="list-style-type: none"> <li>Combining learning modes and styles according to the situation (e.g. Livemocha)</li> </ul>	<ul style="list-style-type: none"> <li>Learning to learn skills, selection of one's best learning style</li> <li>Skills of teachers and organisations to support different ways for learning</li> </ul>
<b>Open and reflexive spaces</b> <ul style="list-style-type: none"> <li>Giving space for thinking, enabling to plug-in again, allowing others to comment, review, suggest... (e.g. blogs, wikis)</li> </ul>	<ul style="list-style-type: none"> <li>Skills to reflect, be open, expect and accept feedback and critique</li> </ul>
<b>Certified space</b> <ul style="list-style-type: none"> <li>Facilitating evaluations and assessments, accreditations for achievements (e.g. ePortfolio)</li> </ul>	<ul style="list-style-type: none"> <li>Self and knowledge presenting skills (e.g. ePortfolio)</li> </ul>
<b>Professional learning spaces</b> <ul style="list-style-type: none"> <li>Sharing/managing knowledge and resources at work and by organizations (e.g. crowd-sourcing, Del.icio.us)</li> </ul>	<ul style="list-style-type: none"> <li>Skills of the organizations to develop facilities and practices to share and manage knowledge and resources between all users</li> <li>Skills to work and share collaboratively in professional environment</li> </ul>

Yves Punie & Kirsti Ala-Mutka, IPTS Information Society Unit

### ***The Focus on Competence***

50. A risk with the search after “effective schooling” is that it can reduce education to processes and mechanics devoid of content – strongly focused on the “how?” but with little to say about the “what?” or the “why?”. Consistent with the focus on learning is the focus on competence, broadly defined i.e. what should young people learn? A widespread argument for reform is framed precisely around the contention that many school systems are simply not effective in developing “21<sup>st</sup> Century Skills”. This came through in a number of the conference presentations and is the position of Keith Sawyer which was circulated as background documentation (OECD 2008, Chapter 2). It informs the long-term “Policy Strand” of the CERI programme on Innovative Learning Environments and is explicit in Michel Lanners’ summary of conference workshop discussions (see below).

#### **Two Major Challenges for Organising Learning in the Future**

- New Millennium Learners use digital resources to learn everywhere except at school – how do we deal with this?
- Learning units - what and where are they? They need to be redefined!

Michel Lanners, Luxembourg

51. Different frameworks for the key competences needed to function in today’s complex demanding society were described in the background documentation or presented by speakers. One such framework, which goes well beyond any particular level or educational setting, was elaborated through the OECD DeSeCo Project (Rychen & Salganik 2003). This identifies key competences under three broad clusters of abilities: *Using tools interactively*: a) to use language, symbols and text interactively; b) to use knowledge and information interactively; c) to use technology interactively. *Interacting in heterogeneous groups*: a) to relate well to others; b) to co-operate; c) to manage and resolve conflicts. *Acting autonomously*: a) to act within the big picture; b) to form and conduct life plans and personal projects; c) to assert rights, interests, limits and needs.

52. PIAAC (Programme for the International Assessment of Adult Competencies) has also defined “literacy” broadly while focusing particularly on the first of the three DeSeCo clusters. The broad definition is: “the interest, attitude, and ability of individuals to appropriately use socio-cultural tools, including digital technology and communication tools, to access, manage, integrate and evaluate information, construct new knowledge, and communicate with others in order to participate effectively in society”. As well as measures of numeracy and literacy, it will assess both skills used at work and problem-solving in technology-rich environments.

53. A somewhat different perspective is provided by the European Parliament and Council with its recommended eight key competences for lifelong learning. They combine some of the literacies recognisable in PISA and national curricula with broader competences. They are: Communication in the Mother Tongue; Communication in Foreign Languages; Mathematical Competence and Basic Competence in Science and Technology; Digital Competence; Learning to Learn; Interpersonal, Intercultural and Social competences, and Civic Competence; Entrepreneurship; and Cultural Expression. The abilities of critical thinking, creativity, initiative-taking, problem-solving, risk assessment, decision-taking, and managing feelings constructively – abilities which are prominent in the different frameworks reproduced here as “21<sup>st</sup> Century skills” - are seen as playing a horizontal role cutting across all eight key competences.

### **21st Century Skills Framework**

#### **Learning & Innovation Skills**

- Critical Thinking & Problem Solving
- Creativity & Innovation
- Communication & Collaboration

#### **Information, Media & Technology Skills**

- Information Literacy
- Media Literacy
- ICT (Information, Communications & Technology) Literacy

#### **Life & Career Skills**

- Flexibility & Adaptability
- Initiative & Self-Direction
- Social & Cross-Cultural Skills
- Productivity & Accountability
- Leadership & Responsibility

Charles Fadel, Global Lead, Cisco Systems, Inc.

54. Flexibility, creativity, communication with peers, problem-solving, and deep thinking are at the centre to all these concepts. These fundamental competences are shaped by much more than schools and education systems. Yet, it is also very useful to know how well such formal systems are contributing in the development of these competences and how able and flexible they are to adapt new principles and dynamics that facilitate their acquisition.

#### ***Addressing the Policy Challenge of Learning-driven Reform***

55. The conference discussed the policy challenges and parameters confronting the major shift implied by seeking to develop systemic learning-driven organised opportunities for all in contradistinction to reforming bureaucratic school systems. Some of the proposed ideas turned around the nature of the organisations in which learning for young people takes place. Where schools are at their most traditional, they tend to be “weak” organisations, in the sense of being hierarchical and uniform and lacking in the complexity needed to address the learning needs of 21<sup>st</sup> century young people. The systems in which they are located, on the other hand, tend to be very robust and bureaucratic. There is need to rebalance organisational strength towards the environments where learning actually takes place.

56. Strong learning organisations call for strong leadership, a focus of related recent OECD analysis (OECD, 2008c). They also need teachers and other educational professionals who enjoy high levels of trust, are secure in changing teaching practices, and who have a collective sense of their own highly-developed professionalism. These are not matters which can be changed overnight; we cannot underestimate the complexity of doing so nor the often slow rate of change involved. Rapid change will anyway often be of surface arrangements rather than the fundamentals of new relationships, new forms of professionalism, and new cultures of learning.

57. Schooling is thus both special and not special as regards the challenge of change. It is special in that it is about the education of each new generation, which makes it a different enterprise from many aspects of economic organisations. But in the human dynamics involved - the role of incentives, ambitions, knowledge and professionalism, accountability and control – schooling is a sector of human activity like

many others and has much to learn from others. This theme is picked up by Tom Bentley in a recent analysis for the CERI ILE project (OECD 2008a).

58. For Bentley, what is striking in the formal universal priority now enjoyed politically by education is that it 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 perhaps, he suggests, their resilience lies in their peculiar *flexibility*, not rigidity. Rather than the formal, rational objectives and accountabilities of the institutional system – the terms of so much school reform - much recent thinking about the nature of social and economic behaviour has focused instead on the evolution of complex adaptive systems. These organisational structures are functional in the sense of creating the predictability and responsibilities needed in order to organise at large scale.

59. Yet, however functional as systems they may be, 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. They result in a combination of stability and incremental change which allow the traditional model of schooling and bureaucratic school systems to adapt continuously to external change. They are thus well able to deflect the disruptive potential of almost any innovation, no matter what its source. The lesson Bentley draws is that, rather than seeking to subvert or bypass the adaptive capacity of existing systems, new reform strategies 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 structures.

60. Dylan Wiliam in his conference presentation discussed important aspects of what this might mean for school reform specifically. He contrasted two opposing factors in any school reform. On the one hand, there is the need for flexibility to adapt to local conditions, resources, etc. On the other hand, there is need for the reform to maintain fidelity to core principles if it is to achieve desired outcomes; in Wiliam's terms, "you need to have a well-thought-out theory of action". In his analysis, some reforms (such as those deriving from the effective schools movement) are too loose whereas others are too tight (such as seeking to base reforms entirely around Montessori principles).

61. This leads to his "tight but loose" formulation: this combines "an obsessive adherence to central design principles" (tight), with accommodations to the needs, resources, constraints, and particularities that occur in any school or district (loose). However, the accommodation should only be made when this *does not conflict with the theory of action of the intervention*. For Wiliam, too many reforms stumble because the *why* is non-existent, under-conceptualized, or not well communicated. He calls for the *why* (the theory of action and research base) explicitly to be woven into the *what* and the *how*, so that end users understand it. Otherwise, they will inevitably make implementation decisions that undercut the effectiveness of the reform.

62. Various strands of recently-published CERI analysis or on-going work promise to make useful contributions to the issues so described. The role of evidence and research has been amply discussed in the report on evidence-based approaches and how these connect to policy and decision-making (OECD, 2007d). The broad aim of taking innovations to scale is the defining core of the on-going work on systemic innovation in education. And, "research-based innovation" is the particular interest of Carl Bereiter and Marlene Scardamalia in the new *Innovating to Learn, Learning to Innovate* volume (OECD 2008a, Chapter 3). By this they mean research aimed at creating innovations for which the guiding criterion is *fruitfulness*. This they contrast with basic research, aimed at understanding the problem of interest, and with decision-oriented research aimed at identifying "best practice" and guiding policy decisions. Research-based innovation allows educators to identify approaches that promise to make

qualitative leaps beyond current outcomes, helping education systems to identify approaches that are worth working to develop as new directions.

63. Hence, the May Learning Conference confirmed the value of much recent and on-going CERI work to provide a special contribution to the international discussion of educational reform, prominent among them the role of evidence, scaling-up innovation, understanding systems and organisations, and designing new learning environments. The theme of driving educational reform – with learning and innovation at the core – was central to the keynote address given by the OECD Secretary-General, and presented in the next section.

## **5. “Drivers for Reform Strategies – Learning and Innovation” - the Secretary-General’s Keynote Conference Address**

64. It is with great pleasure that I address you at this conference which is the highpoint of a year of celebrations of the 40<sup>th</sup> birthday of our Centre for Educational Research and Innovation - CERI. It is no coincidence that this anniversary is shared exactly with those marking the upheavals which took place in France and elsewhere 40 years ago. New analyses and understandings, as well as social and political change, were being sought in the heady days of 1968 with education in the forefront. The OECD was caught up in this fever too, out of which CERI was born.

### ***Global progress, global problems***

65. Let me share with you a few insights on how we here perceive the broader global environment. These are important to set your deliberations about learning in their broader OECD context. We at OECD aim to become the “hub” of a dialogue on global issues. Globalisation has contributed to significant progress but it has also produced a growing number of challenges of increasing complexity and urgency. Climate change, for instance, is a planetary challenge with huge social and economic implications. Poverty worldwide is an obvious and urgent challenge. One billion people don’t have access to clean water, for instance; 2.6 billion have no sanitation services; every year, 14 million people are killed by neglected infectious diseases. These are enormous figures, enormous challenges which affect us all.

66. The OECD is also addressing the two interlinked challenges of population ageing and international migration. The numbers of working aged people decline while the numbers who have retired continue to grow as we live longer and longer, all with far-reaching consequences for education. The pressures of migration come with the stark global inequalities I’ve just described and are rapidly increasing the diversity of all our societies. At the same time, migration also slows population decline in OECD countries and helps to alleviate the fiscal pressures of the ageing society.

67. These challenges not only impact directly on the landscape of education. They help to give direction to what learning should be for: learning about and for a better world, for individual and social enlightenment, for creativity and innovation.

### ***Innovation: the seed of prosperity***

68. CERI has innovation in its name and at the heart of its remit - and rightly so. Innovation is the main driver of progress in all aspects of human and economic activity. At the OECD, innovation is becoming a common thread. Most of our committees and publications, from education to environmental issues, from energy to employment and regional competitiveness, are impregnated with this “magic powder” of innovation. Bearing in mind the growing importance of innovation as a tool to generate growth and meet the great challenges of globalisation, the Ministers of the OECD countries have given us a mandate to develop an Innovation Strategy. This will be a cross-disciplinary package of policy elements and recommendations to understand, compare, and boost innovation, including better metrics to identify

and benchmark innovation capacity and performance. I am very pleased that CERI is taking the lead in the OECD's education work for this Innovation Strategy.

***Raising the Quality of Education, not just Quantity***

69. At the very heart of innovation we have the education system. Education has moved to the top of policymakers' agendas in OECD and developing countries. Economic reasons are prominent - in a highly competitive globalised economy, knowledge, skills and know-how are key factors for productivity and economic growth – but so are the powerful arguments about social inclusion, cultural development, and individual growth. Huge progress has been made in raising education levels in OECD countries. But if this were to mean increasing just the quantity of education without regard to its quality it would at best be expensive inefficiency, at worst a lost opportunity and a waste of money. This is why we at the OECD place a very strong emphasis on developing tools to help countries improve the quality of their education systems. You all know about PISA, which examines how well prepared are 15-year-olds to meet the challenges of today's knowledge societies. This is now being joined by PIAAC, the OECD programme focusing on adults and assessing achievement in the cognitive and workplace skills needed for successful participation in today's work environment.

***CERI is about Research and Innovation***

70. To strengthen our understanding of what works and what does not in Education, we have very interesting contributions by CERI. Its work has not only been about promoting educational research and innovation; it has analysed how well research and innovation are exploited in education systems to raise the quality of learning. It has found fundamental shortcomings in many countries; I will focus on three of them.

71. First, CERI's work on knowledge management has shown that education in general and schools in particular are conventionally poor at managing the very thing at the heart of their "business" – knowledge. Too much educational practice takes place in isolation – individual teachers in individual classrooms - using old-fashioned methods in bureaucratic organisations.

72. Educators tend to be reluctant to exploit the key motors of innovation that many other sectors do:

- i. Research knowledge in education and related fields.
- ii. Networking among professionals and organisations.
- iii. Modular reorganisation of basic structures.
- iv. Using technology to create the opportunities to work differently.

Education thus needs to develop better its own culture of innovation, though this is certainly beginning to happen.

73. Second, a related point: educational R&D is not given the support it needs to effect change and promote innovation. Despite the key role of knowledge-based innovation in education, our systems typically have low levels of investment in educational research; low levels of research capacity; and weak links between research, policy and innovation. A great deal is still to be done - through effective brokerage and promoting collaborative forms of professional development, for instance – to ensure that the research that is going on directly informs the practice of teachers in schools and classrooms.

74. Third, too much of educational decision-making is preoccupied by the short term, with disincentives to innovate. 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. This is understandable perhaps but education has such long-term consequences that a better balance needs to be found between responding to the immediate and working towards the strategic and long term.

75. Finding this balance will mean softening education's pronounced "risk adversity". The parallel is often drawn with heart surgery: you can't tolerate any failures in education - just as you don't want the surgeon to make any mistakes - and hence the call for robust accountability measures to expose any problems the moment they arise. But if the accountability regimes are testing for a very limited range of knowledge and capacities or are so punitive as to stifle any genuine initiative, they will promote neither quality nor innovation. What is assessed and how it is done are critical factors in promoting or hindering innovation and ultimately the quality of learning. I am not pretending that we can wish away the political realities of education systems. We should recognise the sheer complexity of organising learning on a mass scale. Ensuring that thousands or millions of learners and teachers work effectively on a daily basis in 21st century learning environments which offer genuine equality of opportunity is a daunting task for any country to achieve.

***CERI – from the present to the future***

76. I want in conclusion to come back to the key place that I believe that CERI has in the OECD and its family of educational programmes. We have at the OECD developed a very strong capacity for producing comparative educational statistics and indicators. We have strengthened our capacity for policy analysis and advice. The third main leg of the three-legged stool to complement these other two is our capacity to look to and clarify the longer-term issues, and promote educational research and innovation. In a fast-changing knowledge society, all organisations must develop their capacity to understand the bigger picture, to anticipate future changes and to innovate – this is CERI's particular contribution.

77. It has been doing this for 40 years and I can refer to valuable contributions it has made internationally within the past decade. Its forward-looking scenarios for the future of schooling and of higher education – Schooling for Tomorrow and University Futures – have been highly influential in providing tools for long-term thinking which seems so difficult even for the educational community. Its work on the international "learning market" has exploited our privileged international vantage point to offer analysis of genuine significance and high relevance. Providing a forum for leading experts to elaborate the concept of social capital – networking and trust – has provided a very useful counterweight to the conventional economic focus on human capital, as well as broadening the understanding of education and learning outcomes.

78. I referred earlier to educational innovation and R&D, drawing on CERI work which made powerful connections between education, on the one hand, and practices and developments in other sectors. This is something CERI has done so well over the years and widens the terms of debate in countries and shows new possibilities ahead for education. The new focus is on systemic innovation – looking to understand how something as ephemeral and individual as creative innovation can be promoted into the very culture of learning systems. The project on brain research discussed at this conference has been path-breaking in recognising an important nascent field with far-reaching consequences and digesting the rapidly-developing knowledge for an educational audience. It has helped to create new knowledge by fostering dialogue between neuroscientists and educators who otherwise would have occupied separate worlds.

79. This conference shows that these are not just past achievements. There is ambitious new work on New Millennium Learners, which is bringing analytical rigour to understand the importance of the digital age as experienced by the learners themselves. Innovative Learning Environments is a new project pushing at the limits and boundaries of the conventional variables of reform and will offer new models for the future.

80. These examples summarise the particular value of CERI: to identify glimmering but significant signals just off the radar screen to shed light and bring them into focus; to make connections between different and often novel perspectives; to provide an international forum for developing new ideas and knowledge; and all this with an eye always on policy rather than as isolated academic pursuits. I look forward to CERI continuing to make this contribution for many years to come.

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