SUMMARY REPORT OF THE 3rd MEETING OF THE LIFELONG LEARNING NETWORK

The 3rd meeting of the Lifelong Learning network of OECD/CERI's Learning Sciences and Brain Research project took place at the RIKEN Brain Science Institute in Wako-Shi, Saitama, Japan on 21-22 January 2005. The meeting brought together some 30 experts, mixing neuroscience and educational researchers with a few practitioners and policymakers. Participants were present from Australia, Canada, Denmark, Finland, France, Germany, Japan, Netherlands, Spain, UK and USA.

The meeting marked a major step forward in bridging communication between the neuroscientific and education community. This was primarily due to the presence, for the first time, of a solid contingent of educational researchers, and because it was organised to allow extensive interaction and discussion rather than a series of presentations of research results.

In order to form a starting point for discussion, the preparation of 'proposition papers' was requested from each participant ahead of the meeting to help identify key educational messages. These papers, which were distributed at the meeting, are now downloadable from our site at:
http://www.oecd.org/dataoecd/3/9/34391230.pdf

To facilitate a fruitful dialogue, the first day was used as a brainstorming with two parallel sessions, one for the neuroscientists and the other for the educationalists.

The educationalists brainstorming focussed on what educationalists believed they could expect from neuroscientific research in the future in relation to lifelong learning, and what steps might be necessary to promote collaboration between educational research/policy and neuroscientific work. The brainstorming firstly revolved around trying to come up with a common statement that defines learning in a way both educationalists and neuroscientists could find functional for their work. The group was very productive in formulating a non-exhaustive list of provocative questions to pose to the neuroscientists, such as:

- What is the brain's flexibility for learning capacity over the lifespan?
- Is there a timeframe for optimal learning?
- Is there any brain science evidence that could inform education policies and practices for teenagers?
- What environmental factors affect learning?
- Are there different types of motivation and corresponding activity in the brain?
- Can we expect investments in learning for senior adults to effect a "7-fold" health saving?
- Is there evidence from neuroscience regarding the level of involvement in social networks and brain functional activity?
- Is there an alignment between the psychological measures used in education research and the measures of brain activity in neuroscience?
- How can neuroscience inform with regards to the transfer of learning?

The neuroscientific brainstorming required neuroscientists to provide a brief presentation on their current knowledge. The idea was for participants to become familiar with each other's views before meeting with the educationalists, but, more importantly, to discuss the key "take home messages" that should be communicated to and discussed with the educationalists over the following days. The neuroscientists identified what they esteemed to be the key concepts in lifelong learning. The brainstorming laid the ground for the ensuing dialogue with educationalists, which aimed at helping to identify and set a future research agenda. The neuroscientists suggested the seeding of educational trials (like a clinical trial) with controlled evidence-based studies. They also proposed that hypotheses should be rigorously pursued with animal studies.

The main part of the meeting then split into three focus groups of educators and brain scientists for discussion on three main themes: Lifelong learning, plasticity and periodicity; Aging and learning in the lifelong learning perspective; and Early childhood education in the lifelong learning perspective. For each theme, these workshops looked at three horizontal issues that were addressed in the brainstorming sessions, to try to draw some conclusions common to the two fields (education and neuroscience) and identify: key *policy issues*; the existing principles/*knowledge base*, key *knowledge gaps* and where neuroscience could provide research answers.

To sum up the workshop discussions:

The first purpose of the discussions was to identify some key policy issues. Among the many suggestions raised, the first and foremost take home message for policy makers was: the brain is wired for lifelong learning and learning is not limited to the school years. Some of the other policy issues highlighted were:

- the need for teachers to recognise that they are lifelong learners;
- there are potential implications emerging from brain science for teacher training that need to be spelled out, perhaps with specific examination of the existing curriculum and possibly to include a neuroscience component;
- policy-makers should be made aware of the value of conducting field-testing/evaluations on educational proposals/interventions through neuroscientific research;
- the potential for emphasising informal or non-institutional learning at key phases in the life course.

The second task the group discussants were asked to do was to identify principles/the knowledge base. This revealed some very concrete and encouraging facts, such as the decline with age in the number of neurons and their size appearing to be less than previously believed. The neuroscientists stated that there are quantifiable 'temporal profiles' to plasticity illustrating developmental paths over the life course. Current recent research has proved that physical and mental activity enhances learning, memory and brain structure in the aged and that social networks are also extremely important for aged people. It was suggested that these findings also be tested on other age groups, particularly children, to see if the same benefits from physical exercise hold true, and whether the enhancement of social networks should be expanded to other age groups in a society where direct social interaction is potentially jeopardised due to the increasing use of technology.

The third and final challenge for the workshop groups was to identify key knowledge gaps and some good suggestions were made as to how neuroscience could provide research answers. To begin with, it was acknowledged that there appears to be a mismatch of "sensitive" periods for learning with current curriculum structure. Some of the further gaps that were identified were:

- a lack of transfer of knowledge/training;
- the teaching of foreign languages and problems of bilingualism need to be thoroughly researched;
- the effects of nutrition and other environmental factors on learning need to be explored further in educational contexts;
- current research on when the human brain becomes mature as an adult is fuzzy and this needs to be defined, with special focus on what is happening in the adolescent brain and how this influences learning;
- an understanding of the neuroscientific basis for the development of motivation, morals and values is necessary;
- mechanisms that could potentially lead to more informed policy concerning early childhood provisions before and at the start of school need to be pinpointed by neuroscientists.

The neuroscience model is based on a biological model consisting of genes and molecules, whereas education is based on underlying social behaviour. In the future, it is hoped that we will come closer to a

shared model. Although there are at least 40 different types of brain science, brain science as yet does not know everything with respect to learning. However, brain science can be very useful in testing hypotheses generated by cognitive and educational science and it is very important to investigate brain mechanisms used for learning. For future development, it is now necessary to develop a neuroscientific experimental methodology that will be relevant and credible to educators. The focus should be on more cross-sectional and longitudinal combined studies and comparing cohorts that examine different generations. A strong call was made in all the workshops for teacher training to include equipping teachers with basic, sound neuroscientific knowledge to enhance awareness of the brain and how it learns and so teachers can cope with brain related problems in the classroom.

Finally, it was agreed by all that communication between neuroscientists and educationalists should be fostered and that a common definition of learning was considered vital as a starting point for understanding and dialogue between these two groups. Already this meeting's format of collaborative workshops provided a fine example of how given problems can be solved, and open and active knowledge exchanged between neuroscientists and educators.