Introduce specialized teaching for dyscalculia in schools, urge experts

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Specialised teaching for individuals with dyscalculia, the mathematical equivalent of dyslexia, should be made widely available in mainstream education, according to a review of current research published today in the journal *Science*.

Although just as common as dyslexia, with an estimated prevalence of up to 7% of the population, dyscalculia has been neglected as a disorder of cognitive development. However, a world-wide effort by scientists and educators has established the essential neural network that supports arithmetic, and revealed abnormalities in this network in the brains of dyscalulic learners.

Neuroscience research shows what kind of help is most needed – strengthening simple number concepts. This can be achieved with appropriate specially-designed teaching schemes, which can be supported by game-like software that adapts to the learner's current level of competence.

Professor Brian Butterworth, co-author of the paper and a member of the Centre for Educational Neuroscience (CEN) from the UCL Institute of Cognitive Neuroscience, said: "Dyscalculia is at least as much of a handicap for individuals as dyslexia and a very heavy burden on the state, with the estimated cost to the UK of low numeracy standing at £2.4 billion."

"Nevertheless, there are only cursory references to the disorder on the

Department of Education website - no indications are offered for help either for learners, teachers or parents. It's as if the government does not want to acknowledge its existence."

Like dyslexia, dyscalculia is a condition we are born with, and may be heritable in many or most cases. Research from twins and special populations suggests that an arithmetical disability has a large genetic component, but the genes responsible have not yet been located.

Professor Diana Laurillard, another co-author and a member of CEN from the Institute of Education (IOE), University of London, said: "Just because dyscalculia is inherited it does not mean that there is nothing that can be done about it. As with dyslexia, specialized teaching can help. At the IOE we have developed software resources specifically to help children with dyscalculia, based on brain research showing exactly what problems the brain is having."

One of the main challenges of the effort to understand dyscalculia, is for scientists from these very different disciplines to understand each others' methods and results. The creation of interdisciplinary and inter-institutional centres to promote joint work, such as the Centre for Educational Neuroscience established by UCL (University College London); the Institute of Education, University of London and Birkbeck University of London, aims to address this challenge.

Professor Laurillard added: "Results from neuroscience and developmental psychology tell us that dyscalculic learners need to practice far more number manipulation tasks than mainstream learners. Adaptive, game-like programs that focus on making numbers meaningful, emulating what skilled SEN teachers do, can help learners practice beyond the classroom and build the basic understanding they need to tackle arithmetic."

More information: "Dyscalculia: From Brain to Education" *Science*, May 27 2011.

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