Educational Neuroscience as a Tool to Understand Learning and Learning Disabilities in Mathematics

Pekka Räsänen
Niilo Mäki Institute
Jyväskylä, Finland
pekka.rasanen@nmi.fi

ABSTRACT

Becoming numerate is considered as one of the fundamental skills needed in the modern technology-driven society. The latest OECD (2013) report states that âĂIJThe way we live and work has changed profoundly âĂŞ and so has the set of skills we need to participate fully in and benefit from our hyper-connected societies and increasingly knowledge-based economies.âĂIJ The societies invest a lot on education with varying results. For some reasons there still are persons do not reach even a basic level of skills in numeracy or literacy irrespective of the recent advances in education, educational research and educational technologies.

Persons who fail in learning numeracy, even though they have had an opportunity to learn and who, based on their other skills, should have learnt, we call as having specific learning disabilities (SLD), developmental dyscalculia (DD). This discrepancy between learning opportunities, general skills and poor performance in mathematics, has intrigued researchers now more than a century. From the early beginning of the research there has been ideas that it has something to do how the brain of these persons have organized, failed to develop or damaged.

The recent developments in research methodologies, especially in brain imaging and statistical technologies, have opened new windows to analyze these brain related hypotheses. In my presentation I will open some of these windows with examples from functional brain imaging to longitudinal studies based on multivariate statistical analysis.

The new windows show different views from the DD. From one perspective the DD looks like a unitary construct with very specific symptoms in numerical processing. This view has been more typical within the brain imaging research. The other views show a complex where myriad of factors from genetic to learning experiences each contribute with a small share to the large variation of the individual skills. This view has been more typical in behavioural and cognitive studies, especially in longitudinal research. Whether a common ground can be reached, and what it needed for that, is discussed.

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