

The worldwide potential of a Finnish language training game

Spoken and written language skills are central to the acquisition of knowledge, but can present a significant challenge to those with learning disabilities, such as dyslexia. **Heikki Lyytinen** of the Agora Center in Finland explains how their ground-breaking work is expanding the use of technology-assisted tools to support the acquisition of reading skills in this context



The Graphogame helps children master sounds in relation to letter symbols, gradually increasing the level of challenge for individual learners. It has helped thousands of Finnish children, particularly those with dyslexia and other reading disabilities, to improve their reading capabilities
Photograph by Niki Rutanen

Human learning requires a certain level of language skills to acquire knowledge. Although learning is a natural process, those with learning disabilities face significant obstacles in the pursuit of

knowledge. In response, instruction processes and products have been created to assist those with learning disabilities, thus helping them acquire the knowledge and skills they need. However, these methods and

products are likely to be successful in achieving the desired learning outcomes only if they are built upon a sound understanding of the human mind in action, emphasises Heikki Lyytinen, professor of developmental

neuropsychology and chairman of the Agora Center for Human Technology at the University of Jyväskylä, Finland.

The leader of a widely acclaimed longitudinal study of dyslexia in Finnish children, Prof. Lyytinen's work has led to exciting breakthroughs in terms of predicting and preventing difficulties for children learning to read and write. These findings and the concern for dyslexic children have inspired Prof. Lyytinen and his research team to develop technology-assisted tools to support and intensify learning processes for those who find learning difficult. The ensuing work has already yielded successful results, with the Internet-based learning-to-read game *Ekapeli* now benefiting Finnish children nationwide; meanwhile, experimentation in other languages throughout Europe and the wider world is ongoing. "At its core, learning is simply about making connections," explains Prof. Lyytinen. "In reading, the connection is actually a jump, from the spoken word to the written word. The ability for the mind to process the former precedes that of the latter: a child learns spoken language without formal teaching, while instruction is needed to build the connections to written language." Good reading skills are critical to success in today's society, continues Prof. Lyytinen, because the majority of knowledge one gains over a lifetime is derived from the written word.

At the Mind Tech Laboratory of the Agora Center for Human Technology, Prof. Lyytinen guides a number of researchers in multi- and interdisciplinary research that underpins developed and applied technologies aimed at understanding



Assessments are an essential element of understanding the mind in action. This girl's brain activity is monitored as she undertakes a series of post-exercise tests to determine how she has progressed in her foundational reading skills
Photograph by Kirsi-Marja Nurminen

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and why the mind works as it does, or why certain types of technologies or programs are successful or not. So, collaborative efforts improve not only the underlying investigation of the human mind, but also the outcomes of any related product development.

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the human mind. The Lab's primary themes involve numeracy and linguistic learning, skills evaluation, and the brain-related basis of learning and learning disorders. "In order to truly understand the human mind

as psychology, neurology, education, special education, linguistics, statistics, information technology, cognitive neuroscience, and so on," says Prof. Lyytinen. "None of these fields, on their own, have a full picture of how

Translating the Finnish success story
Dr. Ulla Richardson, a linguist, oversees the Graphogame project, which is focused on language learning, and is studying how the Finnish *Ekapeli* success story can be translated and transferred to English, German, and Dutch students. This project demonstrates that multidisciplinary research into a particular reading disorder has many dimensions. In the

case of the Graphogame project, not only has it led to the development of an extremely effective product capable of helping Finnish children develop reading skills, but it has also opened the door to collaborative research worldwide. Research into the precursors of dyslexia in children reading Finnish, a language with a nearly 100 per cent correlation between letters and sounds, helped pinpoint bottlenecks in reading competency development, thus aiding in the development of effective programs to support young readers. Current research concentrates on using child-friendly computer technologies to build the foundational elements of spelling and reading in preschool-aged children, as well as to assist children in written language competency in later schooling. The Graphogame project is just one example of how integrated and collaborative investigation into the mind from various areas of research expertise can plan for and respond to real sets of reading difficulties affecting real children in real learning situations.

language, provided funding is acquired to underwrite the language sounds reprogramming.

The work of Prof. Lyytinen, Dr. Richardson, and other Mind Tech Lab researchers – efforts supported over the years by the EU, the Academy of Finland, the Finnish Ministry of Education, and other organisations in Finland and abroad – underscores the need for interdisciplinary and international collaboration in the development of learning tools. Drawing on the findings of the multidisciplinary Finnish-language dyslexia research, Mind Tech researchers actively contribute to ongoing studies on similar reading disorders in a diverse range of European, African, and south-east Asian languages. Mind Tech researchers' deep understanding of the precursors and expressions of reading disabilities in the Finnish language continues to provide significant assistance to researchers of other languages with more complex phonemic systems,

The Mind Tech Laboratory is one of eight research areas within the Agora Human Technology Center, an internationally recognised and networked research institute focused on interdisciplinary collaborative and innovate research on humans and technology in the knowledge society.

Research within the Mind Tech Lab includes integrated research and technological expertise from multiple scientific disciplines, with emphasis on learning, the evaluation of skills, and the neurological basis for perception.

In order to truly understand the human mind and support individuals with learning challenges, the strengths of many areas of research is required, fields such as psychology, neurology, education etc.

Studies on the possible applications of the Graphogame project will continue into 2009. The goals of this research are twofold. Firstly, it involves providing an efficient program through which children can acquire and comprehend written language as a gateway to further knowledge, independent of how the learning environment or learning skills of the child might be compromised. This is achieved by training learners through materials developed specifically for the unique learning needs of each child that appropriately engage and motivate students to develop these crucial literacy skills. Secondly, one of the core principles embedded in the research is the aim of making the game available to all people who could benefit from it, regardless of their circumstances. Such an open-access program can be adapted to any

and they have already had a positive international impact by improving the understanding needed to support reading acquisition. This work can also have an immediate impact on, for instance, reading acquisition of some African languages, where, like Finnish, direct connections exist between letters and phonemes. The Graphogame, which gives clear instructions for teachers on how they can use the game to support young learners, provides a clear illustration of the benefits of the Mind Tech approach, which Dr. Richardson says can be viewed in a wider context than merely the educational. "If our research and applications toward literacy development eventually prevent children from falling behind their peers, this will enhance these children's quality of life, and thus have a profound effect on the individuals themselves as well as society at large." 



Dr. Lyytinen is professor of developmental neuropsychology at the University of Jyväskylä, Finland. Above photograph courtesy of Petteri Kivimäki

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