

GROMINDS = GRaphQGame and MINDStars Books: Improving Children's Reading and Science Learning

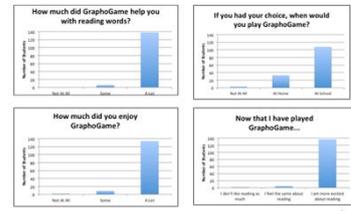
The goal of the GROMINDS project is to develop and demonstrate the promise of global cyberlearning tools that will enable all children to achieve their academic potential. GROMINDS consists of two complementary and synergistic programs, **GraphoGame™** www.graphogame.com, in which children learn foundational reading skills, and **MindStars Books**, in which children learn to reason about science and to read texts fluently and with comprehension. **GRaphQGame + MINDStars Books = GROMINDS**. Our hope is that children who use these books will increase their self efficacy, become proficient readers, and be able to engage in scientific inquiry and discourse. Our project, now in its second year, has made great strides towards this vision. Collaboration between researchers at University of Jyväskylä and Southern Methodist University led to American English and Spanish versions of **GraphoGame™**. Young English learners in the U.S. were fully engaged in the game, and all participating teachers wanted to use the program again in the future. The project also led to development of the **MindStars Books** authoring environment, designed to enable children and adults to create, publish and share **MindStars Books**. A set of eight life science books were developed in which a virtual tutor presented narrated multimedia science explanations in English, Spanish and Finnish, and then engaged children in question-answer dialogs about the science. Pilot studies using these books were conducted in elementary school classrooms in Colorado and Texas with the virtual tutor speaking English and Spanish, and in first grade classrooms in Jyväskylä, with the virtual tutor speaking Finnish. In each study, children demonstrated excellent recall of the science presented in the books, and significant learning gains on subsequent tests that required application of the knowledge to new contexts. Our future work will investigate the benefits of integrating **GraphoGame™** and **MindStars Books** into a single classroom intervention designed to improve science learning, scientific discourse, and reading comprehension.

Children playing GraphoGame™

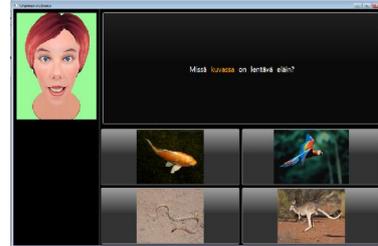


GraphoGame™ User Evaluation from US study

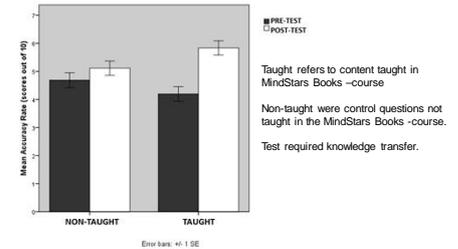
Student Level of Engagement (N = 268)



Finnish version of MindStars Books



Learning data from Finnish MindStars Books study (N = 61)



GraphoGame™

GraphoGame™ (GG) is a family of reading games developed at Agora Center at the University of Jyväskylä. (Fig. 1). The goal of GG is to facilitate learning and mastery of the relationship between the speech sounds and letters of a language to provide the initial foundation for word recognition and reading. GG has numerous language versions, and provides data for educational and research purposes. GG has been demonstrated to improve reading proficiency of children with reading challenges in several languages. The games currently run in Java with Unity-versions scheduled for launch in the near future. GG is widely used in schools in Finland, and has the potential to impact the teaching and learning of early readers world-wide.

MindStars Books

MindStars Books (MSBs) are designed for children and adults to create and publish books on any subject. Authors can create narrated multimedia presentations, design question-answer dialogs to assess students' understanding of the presentations, and provide immediate formative feedback on correct and incorrect answer choices. The authoring tools enable authors to record all of the prompts produced by the virtual tutor in all languages supported by the books. Once an author has typed in a page of text and recorded the sentences on the page, oral reading fluency training is fully automatic. Users can listen to the tutor produce each of the sentences and words on the page, record and listen to themselves read the text, and then receive immediate feedback on how accurately and fluently they are able to read the text independently.

Globally, approximately 780 000 000 people are illiterate, of which 250 000 000 are children. This is due to biological, educational and social problems. Despite the demonstrated benefits, accessibility and cost effectiveness of learning games and intelligent tutoring systems, they are seldom adopted for use in early education. **GraphoGame™** and **MindStars Books** address a global need to provide accessible, engaging and effective learning tools, based on theory and evidence, for teaching and learning basic scholastic skills and subject content. Target markets include publishers, educational agencies at national and local levels, school administrators, teachers and parents.

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Scientifically validated educational technologies and tools enable teachers to provide every student with individualized, adaptive instruction, and to continuously assess their progress, making teachers more efficient and effective. Teachers can shift their efforts from instructors to facilitators of student learning, discovery, creative expression and classroom discourse. Classroom learning can be transformed to support activities in which students collaborate to construct new knowledge, and to create and share work products, including engaging, interactive games, multimedia presentations and spoken dialogs with virtual

The project team is world leader in development and successful implementation of evidence-based, mass-distributed and engaging reading games and tutoring systems in several languages that immerse children in multimedia learning environments that lead to acquisition of foundational reading, learning and discourse skills. The projects' approach builds on decades of research on "what works" in teaching and learning, and extends this research to individualized, adaptive learning programs that optimize engagement, motivation and learning. Our goal is to provide accessible and effective instruction to children throughout the world.

The advent of apps for mobile devices has produced explosive growth in development and distribution of learning games. While these games are often engaging, they are rarely based on scientific principles or evaluated for effectiveness. The theory, research, and technologies that underly **GraphoGame™** and **MindStars Books** have demonstrated their potential to transform instruction and learning. Collaboration with sponsors and business partners is needed to realize this potential.

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