ERASMUS UNIVERSITEIT ROTTERDAM

Erasmus University Rotterdam, the Netherlands
CSC PhD 2015 Project Description

School/Department:	Institute of Psychology
Project Title:	Human Movement of Digital Objects to Enhance Learning in Computer-Based Learning Environments
Abstract:	Our incredible capacity to learn, or, in other words, to acquire skills and alter behavior as a result of experience, is certainly one of the principle variables explaining the success of our species. In this proposal it is argued that considering the way human cognition has evolved can yield novel insights into the functioning of the mind, which may, in turn, advance state of the art instructional techniques for the teaching of complex cognitive tasks. The proposed research attempts to move the field of education to a more solid scientific footing by taking an interdisciplinary approach that builds on cognitive psychology, evolutionary biology, and embodied cognition. A central challenge of the project is to develop new and innovative technology-based instructional methods, which exploit the close intertwining of the human cognition and motor system. The main aim of the research project is to investigate whether manipulation of digital objects through human movement, either by making or observing movements, can be used in computer-based learning environments to foster the acquisition of mathematical skills in primary school children. These computer-based learning environments will be based on emerging educational technologies that afford human movements, such as the interactive whiteboard and Microsoft Kinect™. These so-called gestural interfaces allow students to manipulate digital learning objects through hand and arm movements. Manipulating digital objects through human movement with these interfaces and observing those manipulations are assumed to facilitate learning by enriching the way verbal and pictorial information is coded in our memory, and by reducing the cognitive resources needed for learning. The PhD student will investigate the main hypothesis that manipulating objects through human movement and observing the manipulation of objects through human movement in computer-based learning environments will enhance learning and transfer performance. In addition, it will be explored how these effects on learning and transfer performance are affected by task complexity and the magnitude of the movement.
Requirements of candidate:	Master degree: Yes Background: The candidate needs to have a Master in Educational Psychology, Cognitive Psychology or any other related discipline.

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	IELTS Grade: 7.0 (minimal 6.0 per component) or TOEFL: 100 (minimal 20 per component)
Supervisor information:	Prof. dr. Fred Paas Paas@fsw.eur.nl http://scholar.google.nl/citationsFredPaas http://www.egs3h.eur.nl/people/fred-paas/ Recent publication list, preferably last 3-5 years (1-2 pages) Fred Paas is a Professor of Educational Psychology at Erasmus University Rotterdam in the Netherlands and a Visiting Professorial Fellow at the University of Wollongong, and the University of New South Wales in Australia. His main research interest is in interdisciplinary approaches to the instructional control of cognitive load in the training of complex cognitive tasks. He has (co-) authored over 180 publications in (S)SCI listed journals, which been cited over 14.000 times. A selection of recent publications from 2010-2014: Baars, M., Van Gog, T., De Bruin, A., & Paas, F. (2014). Effects of problem solving after worked example study on primary school children's monitoring accuracy. *Applied Cognitive Psychology, 28*, 382-391. Baars, M., Vink, S., Van Gog, T., De Bruin, A., & Paas, F. (2014). Effects of training self-assessment and using assessment standards on retrospective and prospective monitoring of problem solving. *Learning and Instruction, 33*, 92-107. Castro-Alonso, J. C., Ayres, P., & Paas, F. (2014). Learning from observing hands in static and animated versions of non-manipulative tasks. *Learning and Instruction, 34*, 11-22. Choi, H. H., Van Merrienboer, J. J. G., & Paas, F. (2014). Effects of the physical environment on cognitive load and learning: Towards a new model of cognitive load. *Educational Psychology Review, 26*, 225-244. De Nooijer, J. A., Van Gog, T., Paas, F., & Zwaan, R. A. (in press). Words in action: Using gestures to improve verb learning in primary school children. *Gesture*. Fan, M. H. M., Liu, T. C., & Paas, F. (2014). Effects of digital dictionary format on incidental acquisition of spelling knowledge and cognitive load during second language learning: Click-on versus key-in dictionaries. *Computers & Education, 70*, 9-20. Heijltjes, A., Van Gog, T., & Paas, F. (2014). Improving students' critical thinking: Empirical support for explicit instructions combined with practice. *Applied Cognitive Psychology, 28*, 518-530. Heijltjes, A., Van Gog, T., Lepping, J., & Paas, F. (2014). Improving critical thinking: Effects of dispositions and instructions on economics students' reasoning skills. *Learning and Instruction, 29*, 31-42. Leppink, J., Paas, F., Van der Vleuten, C. P. M., Van Gog, T., & Van Merrienboer, J. J. G. (2014). Effects of pairs of problems and examples on task performance and different types of cognitive load. *Learning and Instruction, 30,* 32-42.

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