

ABSTRACTS

Investigating how instructional materials designed according to CLT principles can support students with high anxiety towards mathematics

Deborah Chadwick - University of Wollongong

Shirley Agostinho - University of Wollongong

Sharon Tindall-Ford - University of Wollongong

Fred Paas - Erasmus University Rotterdam

Cognitive Load Theory (CLT) has informed design principles for instructional materials that provide optimal learning support (Paas, Renkl, & Sweller, 2003; Sweller, van Merriënboer, & Paas, 1998). Much of the research associated with CLT has focused on the subject area of mathematics. Research has also identified mathematics as being a significant source of anxiety for many learners (Hembree, 1990; Ma, 1999). This anxiety, in addition to the cognitive load associated with a task, uses working memory, which is of limited capacity. Previous research has established a link between anxiety and working memory (Ashcraft & Krause, 2007; Beilock & Carr, 2005). However, there has been no research to investigate whether instructional materials designed using CLT principles could assist learners with high maths anxiety. This study presents a novel approach to explore the relationship between mathematics anxiety and cognitive load, and, whether instructional materials, designed in accordance with CLT, incorporating the use of worked examples, provide learning support for students with high maths anxiety. This study comprised three experiments that examined the interaction between the design of mathematics instruction based on CLT and mathematics anxiety in both a secondary school and higher education context and involved mathematics students solving algebra tasks of varying levels of element interactivity. The key finding from this study was that participants with high mathematics anxiety who were presented with instructional materials designed in accordance with CLT principles outperformed participants with high mathematics anxiety who were presented with instructional materials that were non-compliant with CLT principles. This study thus confirmed that instructional materials designed in accordance with Cognitive Load Theory principles can offer support for students with high maths anxiety. The results and implications for future research will be presented.