

How much does reduction in extraneous cognitive load translates into learning performance improvement? A meta-analysis of research evidence.

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Cognitive load theory (CLT) was developed to deal with some of the traditional instructional designs that tended to overlook the human cognitive architecture (HCA). The HCA highlights how learning is likely to be hindered once our limited working memory capacity is exceeded and this causes an instructional design to be unaligned with the basic functioning principles of the human cognitive architecture. Cognitive activity in WM is either relevant (germane load) or irrelevant (extraneous load), but for acquisition and automation to occur, instructional designs for presenting information to be learned should aim at avoiding/reducing extraneous load. CLT has identified several types of effects of extraneous cognitive load reduction on learning outcomes (Sweller, Ayres, & Kalyuga, 2011). The purpose of this research is to present a meta-analysis of studies where instructional design principles of extraneous cognitive load reduction were evident. A systematic literature search was conducted in over a dozen of the available electronic databases including, among others, ERIC, PsycINFO, Academic Search Complete, Education Source, Computers & Applied Sciences Complete, and Psychology and Behavioral Sciences Collection. The search also included reviewing lists of references of previous reviews and major conceptual publications in the field identified 611 primary research papers, published between 2006 and 2016, potentially relevant for the review purposes. Screening of their abstracts by two independent reviewers reduced collection to 156 (Cohen's kappa = 0.73). Subsequent full-text review resulted in inclusion of 102 primary studies (Cohen's kappa = 0.78), some of which feature multiple number of independent effect sizes. The project continues with the objective to extract and synthesize all relevant effects and carry out necessary moderator variable analyses.