

ABSTRACTS

Individual differences in the STM-capacity and learning outcome from three types of multimedia compositions

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The main objective of this study was to investigate the importance of three compositions in multimedia for learning outcome in relation to individual differences in short-term memory (STM) capacity. The study is based on a survey of 396 students at bachelor level (officers, teachers and psychology students). The learning outcomes of three different multimedia compositions (means) were tested: (I) Speech from a visible narrator in a field; (II) Successive presentation/ shifted image and speech; and (III) Multi presentation (simultaneous), both image, labels and speech at the same time. The results showed that the successive presentation (type II) of learning materials through multiple representation forms/channels (speech, pictures and screen text/labels) gives better learning outcome than just speech (Type I). This applied to individuals with low, medium and high STM capacity.

It matched the expected results based on Cognitive Load Theory, integrated Dual-Code Theory and Baddeleys theory of the working memories limited capacity. However, it did not support the principle of subsidiarity (Mayer's "Contiguity Principle") and better learning outcome by integrated and simultaneous multimedia presentations.

Balancing formulas expressing the relationship between learning outcome and different load structures were also developed. The study's main assumption, based on previous empirical and theoretical studies, was that the relationship between cognitive load structure (CLS) and learning outcomes (LO) was:

$CLSType\ III > CLSType\ II > CLSType\ I \rightarrow LOType\ III > LOType\ I > LOType\ II$

Based on this study, the relationship instead became;

$CLSType\ III > CLSType\ I > CLSType\ II \rightarrow LOType\ II > LOType\ I = LOType\ III$

The results showed that visual and verbal channel capacity did not contribute to learning outcome in any of the three tools tested. Some specific STM-capacity types (visual and verbal progressive capacity) and non-verbal intelligence (RAPM) have significance, particularly for exploiting successive presentation (type II) for learning.

Although the tools used in multimedia educational material had a low cognitive load, the individuals with a low capacity learned relatively less than individuals with a higher capacity. This might be related to how different individual perceive stress. A plausible explanation for the differences in learning is that individuals with a low capacity experienced more stress than individuals with a higher capacity.

Keywords: Multimedia learning, short-term memory capacity

(STMC), cognitive load theory (CLT), stress.