

INPLASY PROTOCOL

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The moderating effects of gender, treatment time and design elements in the effectiveness of Emotional Design in Multimedia Learning: A protocol for systematic review.

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Review question / Objective: This systematic review will address the following two questions: 1.How are the effects of emotional design modulated by the gender of learners? 2.How are the effects of emotional design modulated by two intervention characteristics: treatment time and the combination of emotional design features (anthropomorphism, colour and rounded shapes) used ?

Eligibility criteria: Studies must meet the following criteria to be included in the review: (1)written in English between 2010 and 2023, (2)experimental or quasi-experimental design, (3)compared the effects of emotionally-designed lesson materials with neutrally-designed lesson materials in multimedia learning contexts, (4)report (quantitatively) learning outcome measures such as retention, transfer or comprehension. (5)report (quantitatively) outcomes related to positive affect and cognitive load. (6)include information on the gender of participants. (7)include information on the treatment time. (8)include information on the emotional design features used (anthropomorphism, colour, images, etc).

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 04 May 2023 and was last updated on 04 May 2023 (registration number INPLASY202350015).

INTRODUCTION

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time and the combination of emotional design features (anthropomorphism, colour and rounded shapes) used ?

Rationale: Emotional Design in Multimedia Learning involves the design of multimedia lesson materials to theoretically evoke positive emotions in the learner resulting in improved learning outcomes (Um et al.,

2012). It is based on theoretical foundations such as Cognitive Load Theory (Sweller, 1988; Paas 1992) and the Cognitive-Affective Theory of Multimedia Learning (Moreno, 2007). The effectiveness of emotionally-designed materials on achieving the desired mood effect, reducing cognitive load and improving learning outcomes has been shown in two meta-analyses (Brom et al., 2018; Wong & Adesope, 2020). However, the meta-analytic effect sizes were small to moderate and there is a lot of variation in the literature. Recently, an article published showed the effectiveness of Emotional design is dependent on the gender of the learner (Liew et al., 2022). There has also been evidence published previously showing the moderating effects of the combination of emotional design features used (e.g. Facial anthropomorphisms, colour, images and shapes) on the learning outcomes (Uzun & Yilidrim, 2018; Wang et al., 2022).

In this review, the modulating effects of participant gender, lesson time and design elements on the mood, cognitive load and learning outcomes of participants will be thoroughly investigated in an attempt to explain variation in results in the literature.

Condition being studied: The effects of emotional design in multimedia learning.

METHODS

Search strategy: Abstracts and Titles in the databases mentioned above will be searched using the following query: (“emotional design”) AND (“learning gains” OR “learning gain” OR “posttest” OR “post-test” OR “learning outcome” OR “learning outcomes” OR “multimedia learning”). In successive searches, the term “emotional design” was replaced by the following terms: a) (“anthropomorphisms” OR “anthropomorphism”) AND “multimedia learning”, b) (“pleasant colors” OR “pleasant color” OR “aesthetic colors” OR “aesthetic color”) AND “multimedia learning”,

c) (“pleasant colours” OR “pleasant colour” OR “aesthetic colours” OR “aesthetic colour”) AND “multimedia learning”

The search terms (b) and (c) differ only in British vs. US spelling of “color”. Additionally, the following filters will be applied:

- a)Published between 2010 and 2023.
- b)Written in English.
- c)Research articles only.

Participant or population: All learners without restriction to age, gender, or education level.

Intervention: Emotionally-designed lesson materials via manipulation of colour, anthropomorphism, shapes or any combination of these.

Comparator: Neutrally-designed lesson materials via manipulation of colour, anthropomorphism, shapes or any combination of these.

Study designs to be included: Experimental or quasi-experimental studies.

Eligibility criteria: Studies must meet the following criteria to be included in the review: (1)written in English between 2010 and 2023, (2)experimental or quasi-experimental design, (3)compared the effects of emotionally-designed lesson materials with neutrally-designed lesson materials in multimedia learning contexts, (4)report (quantitatively) learning outcome measures such as retention, transfer or comprehension. (5)report (quantitatively) outcomes related to positive affect and cognitive load. (6)include information on the gender of participants. (7)include information on the treatment time. (8)include information on the emotional design features used (anthropomorphism, colour, images, etc).

Information sources: The following online databases will be searched: ERIC, Google Scholar, ProQuest, PsycINFO, PsycARTICLES, ScienceDirect, and Web of Science.

Main outcome(s): The following variables will be compared between genders, treatment times and design features:

- 1.Retention
- 2.Transfer
- 3.Comprehension

Additional outcome(s): Other variables of interest include:

- 1.Change in positive affect (pre- and post-treatment).
- 2.Change in cognitive load (pre- and post-treatment).

Data management: Pertinent studies yielded from database searches will be imported into EndNote and duplicates will be removed.

Quality assessment / Risk of bias analysis: A concerted effort will be made to seek out unpublished manuscripts for inclusion in this study in an attempt to avoid publication bias. Following inclusion of these manuscripts, the Egger's linear regression test will be performed to assess the overall publication bias. Further, the Hawker's Evidence Appraisal Tool (HEAT) and the Cochrane's Risk of Bias Tool will be used to assess the overall quality of the articles/manuscripts included.

Strategy of data synthesis: In this review, a meta-analysis will not be performed, rather a qualitative, narrative analysis will be carried out on the articles included. This analysis will be in the context of the main and additional outcomes mentioned above.

Subgroup analysis: Subgroup analyses will be conducted based on gender of participants, treatment time, and specific combinations of design features used to explore potential moderating effects.

Sensitivity analysis: Articles with low HEAT or Cochrane's Risk of Bias scores will be reported (see item 21 - Quality assessment /Risk of bias analysis).

Language restriction: English.

Country(ies) involved: Malaysia.

Other relevant information: The protocol for this review is based on the Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P) 2015 (Shamseer et al., 2015).

Keywords: Emotional Design; Multimedia Learning; Cognitive Load; Learning; Education; Memory; Anthropomorphism; Colours.

Dissemination plans: The paper detailing the results will be published in a peer-reviewed journal for educational psychology. The results may also be discussed at relevant conferences.

Contributions of each author:

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