The Influence of Visual Representations on Learning from Lessons on Functions

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Introduction

- Interesting, but irrelevant information can distract learners through the *seductive details effect* (Lehman, Schraw, McCrudden, & Hartley, 2007).
- Much of the research on the seductive details effect has been with science textbooks.
- Math textbooks often contain images unrelated to the mathematical concepts being taught (Cooper, Nathan, Clinton, Sidney, & Alibali, 2012).
- Images are often completely irrelevant (decorative) or only relevant to the context of the problem (contextual).
- Decorative images may increase interest, but typically have a negative influence on learning (Durik & Harackiewicz, 2007; Levin, Anglin, & Carney, 1987).
- There is evidence contextual images may assist reading comprehension for some populations (Pike, Barnes, & Barron, 2010).
- The effect of contextual images in learning from mathematics lessons has not been previously examined.

Research Questions

How are the contextual and decorative images processed while reading? 
Does the inclusion of images distract from math-relevant information? 
Does the inclusion of images influence memory of and learning from the lessons? 
Does the inclusion of images influence learners’ opinions of the lessons?

Methods

Participants
41 undergraduate students (6 non-Native speakers of English)

Materials
Four lessons on functions in a between (each lesson was presented in all four conditions) and within-subjects (each participant received a lesson in all of the conditions) design

Apparatus
Tobii X60 eyetracker

Procedure
Read a lesson while eye movements were recorded
Provided opinion ratings for the lesson
Wrote a recall of the lesson
Answered questions based on the lesson (short-answer and problem-solving)

Results

Visual attention towards the contextual and decorative images

Heatmap of typical learner’s fixation data

Total fixation duration on images
Decorative images
Contextual images

Visual attention towards the math relevant information

Total fixation duration for math-relevant information

Influence of images on learning from the lessons

Influence of images on opinions of the lesson

Discussion

- Purpose was to examine the influence of contextual and decorative images on learning of mathematics.
- Little visual attention was directed towards either types of images.
- Neither type of image influenced learning from or opinions of the lesson.
- Compared to text, little visual attention was directed to the graphs.
- Not uncommon for learners to focus on text when text and visual representations are presented together (Cromley, Snyder-Hogan, Luciw-Dubas, 2010; Schuler, Scheiter, Rummer, & Gerjets, 2012).
- May be useful to find ways to direct learner attention to visual representations.

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