PAPER SESSION 1 B – paper 2

Mind maps: Processed as intuitively as thought? Investigating late elementary graders' reading-for-learning patterns in-depth.

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Background Mind maps are colorful representations - including text, images and symbols - that transform information visually (Buzan, 2005, see Figure 1) and are already often incorporated into learner materials. Indeed, the use of graphic organizers to foster text reading and learning is widely encouraged and scientifically underpinned (for an overview see Nesbit & Adesope, 2006). In practice, mind maps (MM) are being advocated as being very intuitive to use to support reading and learning. However, scientific support for their so-called intuitive nature is lacking since mind maps in particular are empirically under investigated. Furthermore, prior research illustrates that late elementary graders might lack sophisticated competences to deal with the complex text-and-map combination (McTigue & Flowers, 2011; Jian, 2016). In this respect, it remains unclear whether students process mind maps as intuitively as thought and which competences they exactly need in order to benefit from them. The present study targets late elementary education, since elementary graders' struggle with text reading and learning, making in-depth insights into this topic at this age pivotal (e.g., Merchie et al., 2014; Tielemans et al., 2016)

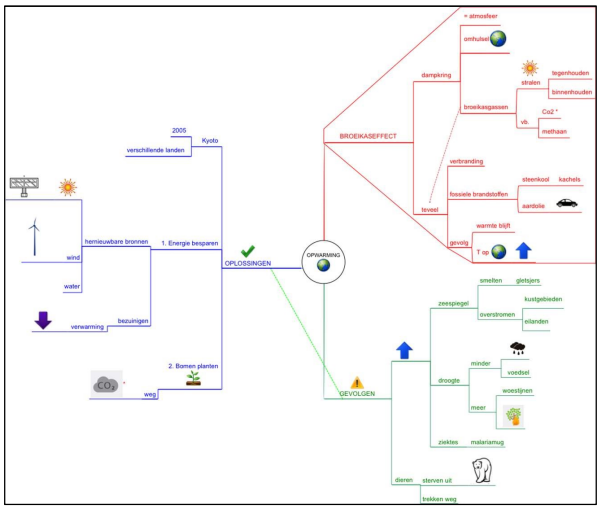

Figure 1. Mind map on global warming.

Aim. This study aims to map late elementary graders' initial competences regarding their effective processing of mind maps in light of text learning. An in-depth exploration of students' MM processing behavior is examined by means of three research questions:
RQ 1: Can different approaches be distinguished in students' MM processing behavior?
RQ 2: Does students' MM processing behavior differ according to the MM presentation (i.e., before or after the text)?
RQ 3: Is there a relationship between students' MM processing behavior and students' learning outcomes?

Methods. A total of 44 elementary students participated in an eye-tracking experiment using the EyeLink Portable Duo (59,1% boys and 40,9% girls, 54,5% fifth graders and 45,5% sixth-graders). After a prior knowledge test, all students studied global warming in a 316-word text and mind map (see Figure 1) while their eye movements were registered. Afterwards a knowledge acquisition posttest and retrospective interview was administered. Students studied the mind map either before (MMT-condition, n=23) or after reading the text for learning (TMM-condition, n=21) (see Figure 2). To answer RQ1 and RQ2, the following data analysis techniques will be applied on the eye tracking data: (1) sequential analysis (Luo et al. 2014, Jian, 2016) and (2) educational process mining (Bannert et al., 2014; Heirweg et al., 2019; Rogiers et al., 2019). Linear mixed effect models will be performed to answer RQ3. Retrospective interview data will complement our findings.

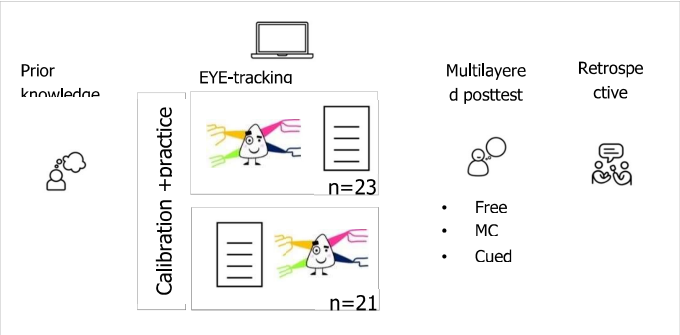

Figure 2. Design of the study.

Results and discussion. Preliminary analyses show a diversity in individual reading-for-learning patterns and students' struggle with grasping the radial structure of the mind map (e.g., they read the MM clockwise instead of horizontally). Detailed analyses will be conducted in the near future. This study is highly relevant, since insights into students' initial competences to effectively use mind maps in reading and learning is currently lacking. Evidence-based didactical guidelines will be provided during the paper session to attune strategy instruction in text-based learning.

References

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