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► **To cite this version:**

Lockman Aalioui, Fares Gouzi, André Tricot. Segmentation effect and eye movement modelling examples in learning renal physiology. 13th International Cognitive Load Theory Conference, Sep 2022, Kingston, Canada. hal-04263753

HAL Id: hal-04263753

<https://univ-montpellier3-paul-valery.hal.science/hal-04263753>

Submitted on 29 Oct 2023

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Segmentation effect and eye movement modelling examples in learning renal physiology

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Introduction

Since van Gog, Jarodzka, Scheiter, Gerjets and Paas (2009), several publications show a positive effect of eye movement modelling examples (EMMEs) on learning. According to Chisari, Mockevičiūtė, Ruitenburg, van Vemde, Kok and van Gog (2020), “EMMEs are instructional videos of a model's demonstration and explanation of a task that also show where the model is looking”. This type of signaling technique is supposed “to synchronize students’ visual attention with the model’s”. Chisari and al. investigated the interaction between prior knowledge and EMMEs. However, in their experiment, EMMEs did not produce the expected interaction nor a simple effect on EMMEs on learning. The authors discuss, among other things, the temporal aspects of their experiment to explain their results.

Temporal aspects of learning support important developments in cognitive load theory over the last 10 years. Transient information effect explains why video presentation can be too demanding (Leahy & Sweller, 2011, 2016), specially for long presentations. The segmentation effect explains why adding pauses during video presentation can increase learning (Spanjers, Wouters, van Gog, & van Merriënboer 2011), for novice learners.

In Chisari and al., the presentation was short (3 min 41 s). Therefore, the lack of effect could be related to this short duration, as in transient information effect. We hypothesized that adding pauses during video presentation may increase learning, especially for novice learners, as in the segmentation effect. We also hypothesized that adding EMMEs may increase learning, especially for novice learners.

Method

195 medicine students (2nd year) participated to a 2 x 2 x 2 experiment. Participants had to learn a 20 min 59 s long video presentation on renal physiology. They were randomly assigned to 4 different conditions: with or with no EMMEs; and with or with no pauses. With pauses, the presentation was 4 min 29 s longer than in the no pauses condition (where it was impossible for the participant to make their own pauses). A pre-test was used to split the group in two: lower and higher prior knowledge. Due to the pandemic situation, the experiment was all on-line.

Results

The maximum performance was 10. We calculated the learning gain as the post-test performance minus the pre-test performance.

	with EMMEs		no EMMEs	
	with pauses	no pause	with pauses	no pause
low prior knowledge	2,76	2,19	2,58	2,03
high prior knowledge	1,17	0,86	1,82	1,46

Table 1. Learning gain according to the EMMEs, pauses and prior knowledge

We obtained a main effect of pauses and prior knowledge on learning gain: students learned more with pauses and when they have low prior knowledge. However, we did not observe an effect of EMMEs. We obtained the following interactions: high prior knowledge students learned more with no EMMEs; low prior knowledge students learned more with EMMEs, especially with EMMEs and pauses.

References

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