EFFECTS OF COGNITIVE AND METACOGNITIVE HINTS ON READING PERFORMANCE IN A DIGITAL LEARNING ENVIRONMENT

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Introduction

In secondary education, learning is constituted by reading[1]. For example, for content courses such as history and geography. However, many learners have difficulties to understand what they are reading and lack strategies to regulate their reading. To support learners in the implementation of strategies during reading hints appear to be effective[2]. The hints provide information about suitable strategies or where specific information can be found[3]. Combining both cognitive and metacognitive hints can contribute to a better performance[3,4].

Research question: What is the effect of cognitive and metacognitive hints on reading performance in a digital learning environment (DLE)?

Method

Participants

In total, 228 first-grade students from three secondary schools participated in the study (mean age: 12,5 years; 48% girls).

Procedure

Students worked in a DLE to practice domain-specific skills and reading comprehension during a four-week intervention period. The first and sixth text were considered a pretest and posttest respectively. During lessons 2 till 5, participants had access to hints. In condition A, the geography section did not want to participate in the study. Thus, these participants only worked with the DLE for history.

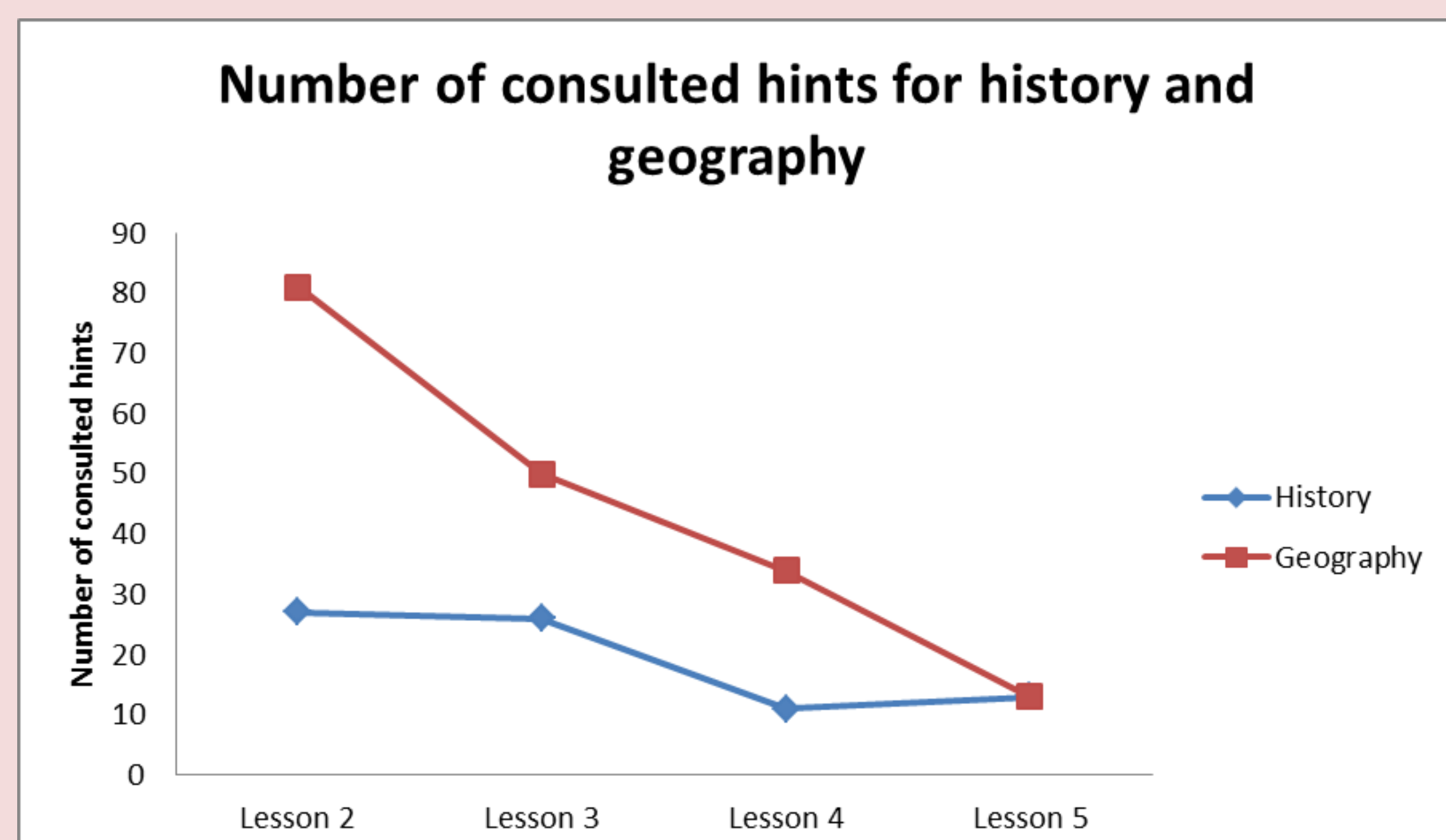|			Access to hints?	
Condition*		n	history	geography
A	Experimental	80	Yes	-
B	Experimental	92	No	Yes
C	Control	56	No	No

*Randomly assigned

Measurements and method of analysis

Reading comprehension is measured with 10 multiple-choice (MC) questions. Participants had two attempts for the submission of their answer. The consultation of hints is determined according to the number of clicks on the hint buttons in the DLE. The analysis consisted of General Linear Model, covariates initial reading performance (i.e., pretest score) and total number of hints.

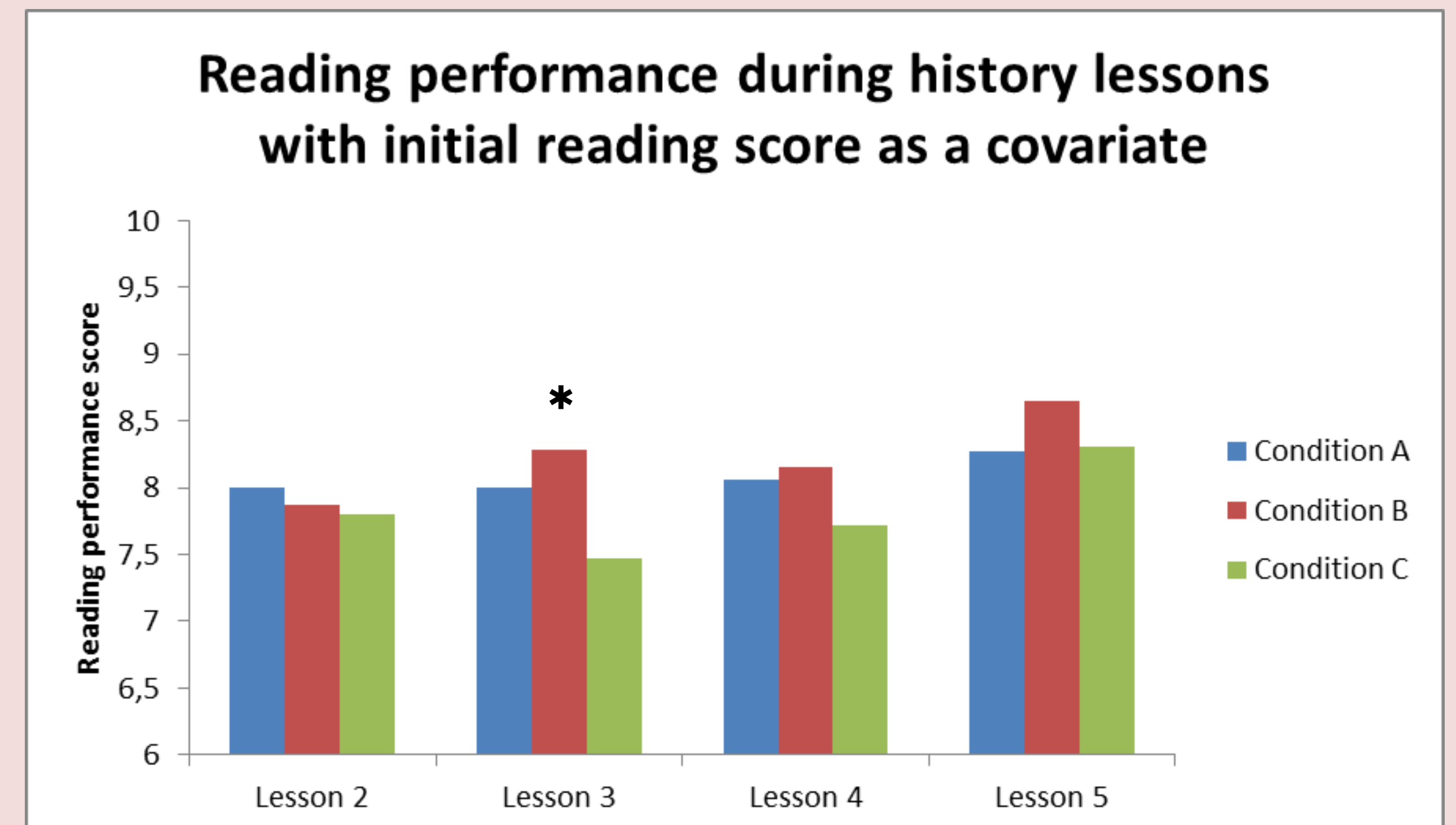| Type	Cognitive hint	Metacognitive hint
When?	Multiple-choice questions	Open-ended questions
Example	You have to connect a cause with an effect. Signalling words, such as 'therefore' or 'because' can help to find that connection.	The title frequently contains one or two important words. Look at the title and decide if that is the case with this text.

Results

Students consulted less hints during the lessons, for both subjects. Students consulted more hints for geography than for history.
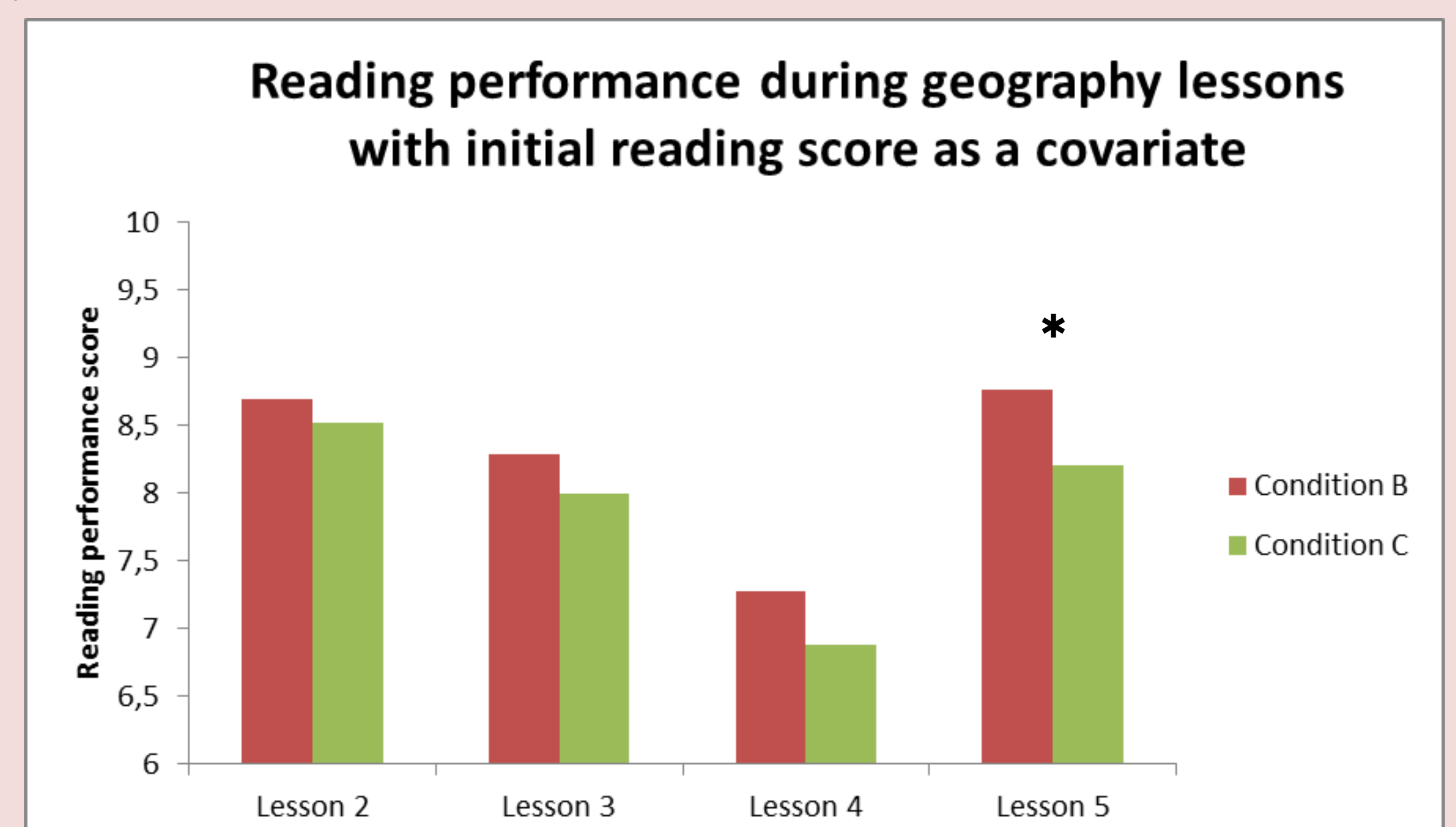

Number of consulted hints for history and geography

Significant differences in reading performance between the conditions (covariate: initial reading score) were found in lesson 3 ($F(2,223) = 5.07$, $p = .007$). Bonferroni posthoc tests indicated significant differences between the control condition ($M = 7.47$, $SD = .21$) and one experimental condition (hints for geography; $M = 8.29$, $SD = .16$). No differences were found with the other condition (hints for history; $M = 8.00$, $SD = .17$).

Reading performance during history lessons with initial reading score as a covariate

Significant differences in reading performance between the conditions (covariate: initial reading score) were found in lesson 5 ($F(1,142) = 4.51$, $p = .035$). Bonferroni posthoc tests indicated significant differences between the control condition ($M = 8.20$, $SD = .21$) and the experimental condition (hints for geography; $M = 8.76$, $SD = .16$).

Reading performance during geography lessons with initial reading score as a covariate

Conclusion & Discussion

For both subjects the consultation of hints decreased during the lessons. Students consulted more hints for geography than for history. A debriefing (i.e., focus group) with three students (condition B) after the intervention indicated that geography texts were considered more difficult than the history texts due to a higher informational density. The hints could possibly help them overcome the difficulties they experience, which resulted in clicking on more hints for geography.

Significant differences in reading comprehension were found in lesson 3 for history and lesson 5 for geography. The number of consulted hints was added as a covariate, but yielded no significant differences between the groups for both lesson 3 for history and lesson 5 for geography ($p > .05$). In the current study showed no effect of hints on reading performance. This could be due to the low use of the consulted hints, which could be linked to students' inability to self-regulate their learning properly. A second explanation could be working with MC questions. The chance of guessing the right answer is relatively high for the second attempt. Students could think it is more effective to guess the correct answer rather than to consult hints.

References

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