

# Effects of Feedback on Learning Strategies in Learning Journals: Learner-Expertise Matters

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## ABSTRACT

*Feedback on learning strategies is a promising instructional support measure. However, research on the expertise reversal effect suggests that if instructional support measures are provided to expert learners, these learners would have to integrate and cross-reference redundant instructional guidance with available knowledge structures, resulting in less available resources for effective learning processes. Thus, feedback might be detrimental for learners who possess high-quality learning strategies. Against this background, the authors used an online learning management system to employ a feedback procedure that included highly elaborated feedback on learning strategies in a learning journal. The effects of this feedback procedure were tested in a field study using a within-subject design with the factor feedback (no vs. yes). Participants were 246 university students who wrote journal entries over an entire term. The results show that providing feedback to low expertise learners is effective, whereas the effectiveness of feedback is reversed regarding high expertise learners.*

*Keywords:* Cognitive and Metacognitive Strategies, Expertise-Reversal Effect, Feedback, Instructional Design, Learning Journals, Learning Strategies, Prompts, Self-Regulated Learning

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## INTRODUCTION

Feedback is a common instructional support measure. It is often part of the teaching process in online instructional design and is usually presented as information to a learner in response to previous performance by the learner's part (Shute, 2008). Feedback thus is a consequence of performance. Generally, feedback is regarded as crucial in improving cognitive skill acquisi-

tion (Moreno, 2004) and has been referred to as one of the most powerful influences on learning and achievement (Hattie & Timperley, 2007). However, despite the widespread acceptance of feedback in online instructional design, empirical studies show that feedback does not necessarily result in performance gains (Hattie & Timperley, 2007; Shute, 2008). The inconsistent effects of feedback might be partly due to interactions between the level of learners' prior knowledge and the scaffolding provided by feedback. In cognitive load theory, such

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interactions are referred to as expertise reversal effects (Kalyuga, 2007; Kalyuga, Ayres, Chandler, & Sweller, 2003). The expertise reversal is a reversal seen in the relative effectiveness from instructional support measures (e.g., providing scaffolding feedback: yes vs. no) when levels of prior knowledge in a domain change (Kalyuga & Renkl, 2010).

Taking the case of providing highly elaborated feedback on learning strategies in a learning protocol, for example, a prototypical instance of such an interaction could contribute to inconsistent effects of feedback as follows: On the one side, for learners who possess low quality learning strategies prior to feedback, highly elaborated feedback might compensate for their insufficient knowledge base resulting in increased performance. For high expertise learners, by contrast, highly elaborated feedback might offer redundant instructional guidance. In this case, due to the need to cross-reference redundant instructional guidance with available knowledge structures (Kalyuga, 2007), feedback might decrease learners' performance. In the field of providing feedback on learning strategies, however, this effect has not yet been taken into account.

In this article we will present arguments based on cognitive load theory as well as empirical evidence that show how highly elaborated feedback on learning strategies in learning protocols can interact with learners' expertise on learning strategies and yield inconsistent effects. In the following sections we will first discuss instructional support measures (i.e., prompts and feedback) and empirical findings with respect to fostering learning strategies in learning protocols. Subsequently, we will link our discussion on fostering learning strategies to the expertise reversal effect and its potential contribution to inconsistent effects of feedback.

## Writing Learning Protocols

A learning protocol, as conceptualized in this article, is a writing assignment for learners to complete as follow-up course work (Berthold, Nückles, & Renkl, 2007). After attending a

lecture or a course, students are required to write their reflections on the learning contents encountered. For instance, learners can reflect on new learning contents by generating examples to establish links between new concepts and prior knowledge (e.g., "An example for high extraneous load is when a presenter always reads aloud the text which he also presents on his slides."). Learners can also reflect about his/her learning process by identifying comprehension problems (e.g., "I did not understand the concept extraneous load.") or by planning regulation activities (e.g., "I have to look it up in a textbook."). When a series of learning protocols is written over a longer period of time, it is termed a learning journal (McCrindle & Christensen, 1995). With respect to learning outcomes, writing a learning journal has proved to be superior over other writing tasks, such as writing a summary (Cantrell, Fusaro, & Dougherty, 2000) or writing a scientific report (McCrindle & Christensen, 1995). This superiority might be due to the fact that learning journals, in comparison to other writing tasks, are explicitly intended to induce beneficial cognitive and metacognitive strategies of self-regulated learning (Nückles, Hübner, & Renkl, 2009) as they are defined by Weinstein and Mayer (1986). This self-regulation view of writing-to-learn (Nückles et al., 2009) has been supported by empirical findings that point to the impact of cognitive and metacognitive strategies for learning outcomes (Berthold et al., 2007; Nückles et al., 2009; Nückles, Hübner, Dümer, & Renkl, 2010). The application of high-quality cognitive strategies has been shown to be a crucial mediator for high learning outcomes (Berthold et al., 2007). Furthermore, the application of high-quality metacognitive strategies was shown to contribute to further increases in learning outcomes (Nückles et al., 2009). In terms of cognitive load theory (Sweller, 2010; Sweller, van Merriënboer, & Paas, 1998), cognitive and metacognitive learning strategies can be referred to as genuine activities that increase the share of germane load in working memory. Germane load, given that the capacity of working memory is limited (Baddeley, 1986), relates

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