

Enhancing self-regulated learning by writing learning protocols

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Abstract

Learning protocols are a self-guided way of writing that allows for elaboration and reflection on learning content. In an experimental study ($N = 103$), we supported protocol writing with prompts to elicit important strategies as postulated by a cyclical model of self-regulated learning. Students received either (a) no prompts, (b) cognitive prompts, (c) metacognitive prompts, (d) mixed prompts without, or (e) including prompts for planning of remedial strategies. Prompting all essential sub-processes of self-regulated learning (group e) fostered students' comprehension best. Thus, with appropriate support, writing can serve as a beneficial medium helping students to self-regulate their understanding of subject matter.

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1. Introduction

Self-regulated learning is the ability to control and influence one's learning processes positively: The learners take personal initiative, apply powerful strategies to attain individually valued learning goals and monitor their understanding in order to detect and eliminate possible comprehension problems (Paris & Paris, 2001; Schraw, 1998; Zimmerman, 2002). Self-regulated learning skills are indispensable at almost all levels of education. Unfortunately, however, the learning behavior of many students rarely conforms to the normative ideal of self-regulated learning as it is typically depicted in current theoretical models (cf. Perels, Gürtler, & Schmitz, 2005; Winne & Hadwin, 1998; Zimmerman, 1999, 2002). For example, powerful cognitive strategies such as the generation of examples to illustrate abstract concepts, or the organization of learning contents through the identification of main ideas and interlinking of concepts (Weinstein & Mayer, 1986) are seldom employed spontaneously. Metacognitive strategies such as monitoring of one's understanding to identify and overcome impasses are prone to be avoided by many students (Nückles, Schwonke, Berthold, & Renkl, 2004).

A learning method that may help to overcome these shortcomings is the writing of learning protocols (Berthold, Nückles, & Renkl, 2007). In a learning protocol, the learners are supposed to apply cognitive and metacognitive strategies. They are instructed to write down their reflections on previously presented learning contents. In addition, they should ask themselves what they do not understand and what can be done to bridge this gap in understanding (Berthold et al., 2007). When a series of such learning protocols is written over a longer period of time, it is called a *learning journal* (McCrinkle & Christensen, 1995; Wong, Kuperis, Jamieson, Keller, & Cull-Hewitt, 2002). We consider learning protocols and learning journals as a promising way of conducting follow-up coursework (Connor-Greene, 2000) and as a method to foster self-regulated learning by writing (Bangert-Drowns, Hurley, & Wilkinson, 2004; McCrinkle & Christensen, 1995).

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In this article we will present an instructional approach as well as empirical evidence that show how strategies that are essential to self-regulated learning can be successfully stimulated through the writing of learning protocols. In the following sections, we will first discuss theoretical conceptions of how writing may contribute to learning. Subsequently, we will link our discussion on writing-to-learn to theories of metacognition and self-regulated learning.

1.1. Theoretical perspectives on writing-to-learn

Learning by writing can be approached from different theoretical perspectives (for an overview see Klein, 1999). Following Britton (1980), writing plays a constitutive role in thinking and learning inasmuch as it shapes our thoughts “at the point of utterance”. The assumption is that a great deal of our knowledge stored in long-term memory is tacit and therefore not directly accessible to us; by articulating our thoughts in the course of writing, this tacit knowledge is made available to our consciousness (Galbraith, 1992). According to this *strong text view*, spontaneous, expressive writing, which allows the writer to develop his/her ideas freely without consideration of rhetorical schemas, should yield the greatest learning gains.

The writing-as-problem-solving view proposed by Bereiter and Scardamalia (1987) is diametrically opposed to the strong text view. Following Bereiter and Scardamalia (1987), successful writing emanates from the writer’s dialectical movement between two problem spaces: a content space (“What do I mean?”) and a rhetorical space (“How do I say what I mean?”). This dialectic between a writer’s attempts to satisfy both rhetoric and content requirements is regarded as crucial for learning because it may lead to a productive reorganization or “transformation” of the writer’s knowledge. Hence, according to this assumption, writers need – in order to learn by writing – not only rich content knowledge but also sophisticated knowledge about rhetorical schemas, so-called genre knowledge.

It is obvious that writing to instantiate a particular genre (e.g., a scientific report, an analytic essay) places high demands on the writer and is likely to overtax novice writers (Torrance, Fidalgo, & García, 2007). Accordingly, Scardamalia and Bereiter (1991) showed in their expert-novice studies that expert writers are much better than novices at controlling their text production in line with rhetorical goals (see also Graham & Harris, 2000). However, their empirical studies leave open the question (1) whether rhetorical writing actually contributes to learning (Klein, 1999), and (2) whether it is especially novice writers who can deepen and expand their knowledge by trying to implement a particular rhetorical genre.

The available empirical evidence suggests that the effects of writing-to-learn interventions are typically rather small, though positive. In their meta-analysis on school-based writing-to-learn interventions, Bangert-Drowns et al. (2004) obtained an average effect size of 0.26 standard deviations, which can be regarded as a small to medium effect (Cohen, 1988). Thus, if according to the strong text view writing inherently fosters learning (Britton, 1980; Emig, 1977), then one would expect to obtain substantially larger effects on learning. Nevertheless, the meta-analysis by Bangert-Drowns et al. (2004) also showed that writing-interventions, which included metacognitive prompts encouraging students to reflect on their knowledge, comprehension difficulties and learning processes, had a significantly larger effect on learning success (Cohen’s $d = 0.44$) compared with writing-interventions without such prompts. Bangert-Drowns et al. (2004) concluded that “the educational importance of writing might not lie in its affinity to personally expressive speech [as suggested by the strong text view, MN], but in the scaffolding that it can provide for metacognitive and self-regulatory processes” (p. 50).

In our approach to writing learning protocols, we seek to combine the strong text view with the self-regulation view suggested by Bangert-Drowns et al. (2004). In line with the strong text view, the writing of a learning protocol is a free and expressive way of writing that allows the learner to personally select which aspects of a learning episode require deeper reflection. In contrast to genres like scientific articles or essays, learning protocols specifically do *not* have a fixed rhetorical structure. Hence, because the rhetorical demands are low, the writing of learning protocols should be especially beneficial for learners with comparatively little writing expertise (which is probably true even for the large majority of university students). On the other hand, following the above-mentioned meta-analytic results, stimulation of metacognitive reflection when writing learning protocols should be very promising especially – as Bangert-Drowns et al. (2004) further suggest – if it were combined with support for the application of cognitive strategies (p. 50). Against this background, we have developed specific prompts to induce both beneficial metacognitive and cognitive strategies in writing learning protocols. In the following section, we will provide a theoretical differentiation between metacognition and cognition and discuss the role of cognitive and metacognitive strategies in current models of self-regulated learning.

1.2. Cognitive and metacognitive strategies in models of self-regulated learning

Following Schraw (1998), cognitive skills are necessary to perform a task while metacognition is necessary to understand how the task was performed. Thus metacognition can conceptually be distinguished from cognition in that it takes cognitive processes or skills as its object (Winne & Hadwin, 1998). Most researchers make a distinction between two components of metacognition, knowledge of cognition and regulation of cognition (Schraw, 1998). Knowledge of cognition or *metacognitive knowledge* includes declarative knowledge about oneself as a learner, as well as procedural and conditional knowledge (that is, knowledge about *how*, *when*, and *why* to use cognitive strategies) also called meta-strategic knowledge (Zohar & Peled, 2008). Regulation of cognition

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