Students' Metacognitive Calibration to Task Complexity

Stephanie Pieschl (pieschl@uni-muenster.de)
Elmar Stahl (elmar.stahl@ph-freiburg.de)
Rainer Bromme (bromme@uni-muenster.de)
Psychology Department, University of Muenster
Fliednerstr. 21, 48143 Muenster, Germany

Keywords: Self-Regulation; Metacognitive Calibration; Task Perception; Task Complexity; Epistemological Beliefs

Introduction

One of the core ideas of many models of self-regulated learning concerns learners' adaptation of their learning process to external conditions of learning scenarios. Additionally, theoretical models as well as empirical studies indicate that these adaptations might be influenced by learner characteristics. Based on the COPES-model (Winne & Hadwin, 1998) we examined learners' adaptation to the external condition of *task complexity* and additionally explored the impact of prior domain knowledge and epistemological beliefs. A first explorative study focusing on the *preparatory* stages of self-regulated learning (Stahl, Pieschl, & Bromme, 2007) showed promising results, e.g. students with "sophisticated" beliefs in uncertain knowledge showed better calibration to task complexity. This study set out to replicate these results. As the *preparatory* stage of self-regulated learning is an important constituent of most theoretical models, it is the exclusive focus of this study.

Method and Results

We selectively recruited university students with different prior domain knowledge, i.e. 52 biology and 50 humanity students. All were administered two questionnaires, one about their epistemological beliefs, e.g. about the *variability* of knowledge. Subsequently, each student was presented with six learning tasks from the topic of genetic fingerprinting representing all categories of Bloom's revised taxonomy (i.e. in ascending complexity: *remember, understand, apply, analyze, evaluate*, and *create*). These tasks had to be evaluated by means of a second questionnaire with the factors *deep processing, dealing with multiple information sourced*, and *surface processing*.

Results indicate that students successfully *discriminated* between tasks of different complexity and that their judgments were significantly related to the underlying dimension task complexity, i.e. well-*calibrated*. Thus, students seem to metacognitively monitor task complexity and adapt their *task definitions*, *goals and plans* adequately. With regard to learner characteristics, prior domain knowledge impacted *discrimination* between tasks, i.e. biology students discriminated on a more fine-grained level than humanities students. As there were no further differences between these groups, it can be concluded that students might rely stronger on their general metacognitive knowledge about task demands and learning strategies instead of on their domain knowledge in this *preparatory* stage of learning. Epistemological beliefs on the other hand elicited multiple effects: e.g., students' "sophisticated" beliefs in variable knowledge in genetics (*CAEB-variability*) were associated with judging *deep processing* strategies more important across all tasks (cf. Figure 1). These results are consistent with those from other empirical studies that indicate a general benefit of "sophisticated" beliefs.

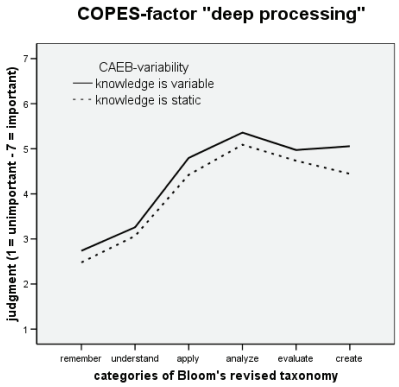

Figure 1: Effect of CAEB-variability

Conclusion

This study scrutinized the *preparatory* stages of self-regulated learning. Results indicate that students seem to be able to successfully monitor presented tasks with regard to their complexity and seem to know reasonably well what kind of *task definitions*, *goals and plans* are adequate, i.e. possess adequate metacognitive knowledge. Such an awareness and knowledge are necessary preconditions for successful self-regulated learning. These results are in line with the COPES-model and furthermore constitute a valuable extension of research about epistemological beliefs as it is still widely unknown how learners' epistemological beliefs might affect their learning processes in detail.

References

Stahl, E., Pieschl, S, & Bromme, R (in press). Task complexity, epistemological beliefs and metacognitive calibration: An exploratory study. *Journal of Educational Computing Research*.

Winne, P. H., & Hadwin, A. F. (1998). Studying as self-regulated learning. In D. J. Hacker, J. Dunlosky & A. C. Graesser (Eds.), *Metacognition in educational theory and practice* (pp. 277-304). Mahwah, NJ: Lawrence Erlbaum Associates.