

Support for self-regulated learning in primary schools through computer-based learning environments – A Qualitative Prestudy

Glena Iten, Laura Müller, Désirée Fahrni, & Doreen Prasse
Schwyz University of Teacher Education, Switzerland

Network 16: ICT in Education and Training (and No Alternative Network applicable)

Further topics: NW 16: Cognitive, social, and motivational processes in ICT-supported environments

Keywords: self-regulated learning, computer-based learning environments, metacognition

Proposal Information (Topic, Research Question, Objective, Conceptual and Theoretical Framework) (558 words, max 600 words)

The increasing integration of personal digital devices in schools in combination with the enhanced use of computer-based learning environments offer new opportunities to support independent and increasingly self-directed learning of students (Galley & Mayrberger, 2018). For students to be able to learn effectively and independently in computer-based classrooms, sufficient self-regulation skills are required (Devolder, van Braak, & Tondeur, 2012). Furthermore, students are expected to be able to effectively apply these skills over a longer period of time (e.g. Boekaerts & Corno 2005). In this context self-regulated learning is defined as the ability to actively plan, implement, monitor and control one's own learning process in which cognitive, metacognitive and motivational components play a central role (e.g. Boekaerts & Corno 2005). Compared to a teacher-centred approach, computer-based learning environments are more open and less structured, which is why such learning environments demand a high level of self-regulatory learning skills such as planning, monitoring and controlling (Devolder et al., 2012). While these offer a wide range of potential to practice self-regulatory learning, they also entail risks, as not all students are able to realize their full potential in terms of learning by using these environments and experience difficulties as they have less prior knowledge or lack the required self-regulation skills (Moos & Azevedo, 2008). Particularly at primary school age, these necessary self-regulation skills are still developing and students often lack motivation and suitable learning strategies, which makes effective learning in computer-based environments especially challenging for younger students (Netcoh, 2017).

However, learning in computer-based learning environments has also opened up new possibilities in terms of formats, frequency, timing and adaptability of metacognitive prompts (Devolder et al., 2012). Research has shown that students can be supported in the application and development of their self-regulation skills using such prompts (Bannert, Sonnenberg, Mengelkamp, & Pieger, 2015). This also allows students to make better use of learning opportunities in their self-directed learning phases. Therefore, such digitally presented prompts often have positive effects not only on metacognitive and strategic learning activities, but also on academic performance (Bannert et al., 2015).

There is little research on self-regulated learning in computer-based learning environments at primary school level, especially on the specific opportunities and risks of metacognitive prompts designed for this age level (Zheng, 2016). Up to now, most research has focused on high school or university students (Devolder et al., 2012). Nevertheless, as Devolder et al. (2012) point out, cognitive prompts can be effective for primary students' self-regulated learning, particularly when they are used during processes in the control phase. However, prompts can also interrupt the learning processes (Manlove, Lazonder, & de Jong,

2007), especially if they are not well designed for the target group (e.g. text based prompts for younger students, see Devolder et al., 2012).

Therefore, the aim of our research project is to examine what challenges primary school students encounter during self-regulated learning in a computer-based learning environment, and how the effective application and development of self-regulated learning activities can be digitally supported by specific metacognitive prompts (see Devolder et al., 2012). Due to the limited research at primary school level, we will conduct a qualitative prestudy to shed more light on the specific opportunities and risks of computer-based learning environments in terms of self-regulated learning for primary school students. Specifically, we want to explore which digital prompts might be supportive for this age group while learning in computer-based learning environments.

Methods (350 words, max 400 words)

We will conduct a qualitative prestudy in April this year, which will encompass observations in classrooms and follow-up interviews with eight primary school students (aged 11, 5th grade). As previous research has shown, low performing students profit the most from interventions promoting self-regulatory behavior (Moos & Azevedo, 2008). Therefore, we will recruit students who have in comparison to other classmates less motivation to learn and encounter more problems learning on their own.

The focus will be on examining which problems these students have in monitoring and regulating their behavior and decisions regarding self-directed learning. In a previously conducted pilot-study with interviews, students primarily reported having little difficulties while learning in the computer-based learning environment. This might be due to a memory or social desirability bias (Wernke, 2013). Thus, as suggested by Wernke (2013), we will choose a more action-oriented approach. While the classroom observations will provide us with a more objective perspective on students' learning strategies and the challenges they encounter, the follow-up interviews using think aloud protocols will give us more insights into the metacognitive self-regulation processes (see Muis et al., 2015). Furthermore, the interviews will help us to assess the reasons for the difficulties they have encountered during learning, and will give us the chance to examine which additional support options in a computer-based learning environment might be helpful from the students' point of view. We will conduct the classroom observations while students are working with a "digital weekly schedule" on the learning platform "*LearningView*". *LearningView* was developed at the Schwyz University of Teacher Education in cooperation with a so-called project-school and has already been implemented in several schools (Hielscher et al., 2017). It aims to support primary school students to manage and organize their work on their weekly schedules. It also enables autonomous documentation of personal learning and work status and allows self-assessment and text-based reflection to be carried out and documented in a learning journal. With the help of this platform, teachers can individualize their teaching and thus the learning process of their students, who can be given extended possibilities regarding the self-regulation of their learning process.

Expected Outcome (239 words, max 300 words)

Based on the framework of self-regulated learning by Greene and Azevedo (2009), we are specifically interested in observing the initial processes of self-regulated learning, which encompass goal setting, planning, and monitoring behavior. All qualitative data - observational and interview data, as well as think-aloud protocols from the prestudy - will be compiled in a theory-based category system (adapted version of the system by Greene and

Azevedo, 2009) and analyzed by means of qualitative content analysis following Mayring (2015). In this contribution, we will present preliminary results of the analysis of the interviews and classroom observations during the use of *LearningView*. In doing so, we will focus on the specific needs and problems of self-regulated learning of students in primary school. Building on the results of the qualitative prestudy, we will develop a prototype of a software-based scaffold for metacognitive processes. In a second prestudy, this prototype will be evaluated in terms of its usability with different students. Based on the outcome of the second prestudy, the prototype will serve as a model to develop the final software-based scaffold. Finally, we will test the effectiveness of the scaffold empirically in a field experiment with 14 fifth and sixth grade classes. The results of the prestudy will help to understand how to take advantage of computer-based learning environments to support students in the improvement of self-regulated learning, which is one of the important 21st century skills regarding ICT literacy (Webb et al., 2018).

References (400 words, max 400 words)

- Bannert, M., Sonnenberg, C., Mengelkamp, C., & Pieger, E. (2015). Short-and long-term effects of students' self-directed metacognitive prompts on navigation behavior and learning performance. *Computers in Human Behavior*, *52*, 293-306.
- Boekaerts, M., & Corno, L. (2005). Self-regulation in the classroom: A perspective on assessment and intervention. *Applied Psychology*, *54*, 199-231.
- Devolder, A., van Braak, J., & Tondeur, J. (2012). Supporting self-regulated learning in computer-based learning environments: systematic review of effects of scaffolding in the domain of science education. *Journal of Computer Assisted Learning*, *28*, 557-573.
- Galley, K., & Mayrberger, K. (2018). Tablets im Schulalltag: Potenziale und Herausforderungen bei der Integration von mobilen Endgeräten an beruflichen Gymnasien. *MedienPädagogik: Zeitschrift für Theorie und Praxis der Medienbildung*, *31*, 36-57.
- Greene, J. A., & Azevedo, R. (2009). A macro-level analysis of SRL processes and their relations to the acquisition of a sophisticated mental model of a complex system. *Contemporary Educational Psychology*, *34*, 18-29.
- Hielscher, M., Tschudi, C., Prasse, D. & Döbeli Honegger, B. (2017). LearningView - ein digitales Werkzeug zur Unterstützung eines offenen Unterrichts. *Bildungsräume 2017*.
- Manlove, S., Lazonder, A., & de Jong, T. (2007) Software scaffolds to promote regulation during scientific inquiry learning. *Metacognition and Learning*, *2*, 141-155.
- Mayring, P. (2015). Qualitative content analysis: theoretical background and procedures. In A. Bikner-Ahsbals, C. Knipping, & N. Presmeg (Eds.), *Approaches to qualitative research in mathematics education. Examples of methodology and methods* (pp. 365–380). Dordrecht: Springer.
- Moos, D. C., & Azevedo, R. (2008). Self-regulated learning with hypermedia: The role of prior domain knowledge. *Contemporary Educational Psychology*, *33*, 270-298.
- Muis, K. R., Psaradellis, C., Chevrier, M., Di Leo, I., & Lajoie, S. P. (2016). Learning by preparing to teach: Fostering self-regulatory processes and achievement during complex mathematics problem solving. *Journal of Educational Psychology*, *108*, 474-492.
- Netcoh, S. (2017). Balancing freedom and limitations: A case study of choice provision in a personalized learning class. *Teaching and Teacher Education*, *66*, 383-392.

- Webb, M. E., Prasse, D., Phillips, M., Kadjevich, D. M., Angeli, C., Strijker, A., ... & Laugesen, H. (2018). Challenges for IT-Enabled Formative Assessment of Complex 21st Century Skills. *Technology, Knowledge and Learning*, 23, 441-456.
- Wernke, S. (2013). Aufgabenspezifische Erfassung von Lernstrategien mit Fragebögen: Eine empirische Untersuchung mit Kindern im Grundschulalter. Waxmann Verlag.
- Zheng, L. (2016). The effectiveness of self-regulated learning scaffolds on academic performance in computer-based learning environments: A meta-analysis. *Asia Pacific Education Review*, 17, 187-202.