

# Analysis of metacognitive activities in pre-service teachers' lessons – case study

Márton Kiss<sup>1,3</sup> and Eszter Kónya<sup>2,3</sup>

<sup>1</sup>University of Debrecen, Hungary; [kiss.marton@science.unideb.hu](mailto:kiss.marton@science.unideb.hu)

<sup>2</sup>University of Debrecen, Hungary

<sup>3</sup>MTA-Renyi-ELTE Research Group in Mathematics Education, Budapest, Hungary

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Depaepe, De Corte, and Verschaffel (2010) argue that teachers rarely, if ever, pay attention to the “how” and “why” of using a metacognitive skill. Dignath and Büttner (2018) confirmed that they mainly teach cognitive and only a few metacognitive strategies. The classroom learning process can be successful only when relevant metacognitive activities (planning, monitoring, and reflection) are made, students' mindsets are considered, and coherent discourse is built (Cohors-Fresenborg, 2019). Planning entails identifying cognitive challenges and structuring cognitive efforts to accomplish particular goals. Monitoring is the control of cognitive processes and their outcomes. Reflection refers to thinking about cognitive activities involved in learning and understanding mathematics (Nowińska, 2019). The question arises as to whether these activities need to be developed in a targeted way in teacher training or whether they can be spontaneously integrated into practice by the end of the training. Our current research investigates metacognitive activities in classroom discourses implemented by pre-service teachers. The answer to the following research question was sought: What characterizes the metacognitive activities that occur in the classroom discourse?

## Method

In their final year of training, 11 pre-service teachers were asked to implement a lesson in class 9 or 10 that included at least one episode in which students actively participated in classroom discourse. The pre-service teachers had not received specific courses on metacognition during their education. We highlighted 3 situations with different objectives from 3 lessons. In Lesson 1, a homework task is presented by a student; in Lesson 2, a sample problem is explained by the teacher, then a practice problem is solved by the class; in Lesson 3, after a short individual work, the problem is solved by the class. As the basis for our analysis, we use the extended version of the category system<sup>1</sup> developed by Cohors-Fresenborg and Kaune (2007) to categorize the metacognitive activities in students' and teachers' utterances. The data collected are based on written notes and audio recordings of lessons.

## Findings

All three pre-service teachers have tried to induce planning, monitoring, and reflection activities, but these are typically done by themselves, with little space for students. The analysis shows that monitoring was the most prominent in the three lessons. The occurrence of planning referred to short steps; comprehensive questions and answers were rarely given. Reflection was only observed in

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<sup>1</sup> [https://www.mathematik.uni-osnabrueck.de/fileadmin/didaktik/Projekte\\_KM/Kategoriensystem\\_EN.pdf](https://www.mathematik.uni-osnabrueck.de/fileadmin/didaktik/Projekte_KM/Kategoriensystem_EN.pdf)

Lesson 3, and this activity was linked to the teacher. In Lesson 1, the students discussed their issues and did not wait for the teacher's confirmation after every sentence. Here the pupils' expressions were the most sophisticated and detailed. In Lessons 2 and 3, the student-student discussion did not take place. In all three lessons, short student and long teacher utterances were observable. Thus, we can highlight strong teacher-centred lesson management. Pre-service teachers' questions were often closed, and occasionally they answered the questions they were asked themselves.

All three lessons showed positive signs in terms of metacognitive activities. However, in the lessons observed, it was clear that most students were not used to expressing their ideas in detail orally, both because the teacher often answers for them and the many closed questions from the teacher do not allow for meaningful discourse. Our experience suggests that it would be helpful to incorporate into teacher training a course that provides guidance on eliciting students' metacognitive activities and making classroom management more learner-centred.

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