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Student Teachers´ Content Knowledge for Solving Elementary School Fraction Exercises

Anne Tossavainen
Luleå University of Technology

The aim of the on-going study is to investigate Swedish student teachers´ abilities in solving elementary school fraction exercises. As a part of a questionnaire, 59 elementary school teacher programme students were asked to solve nine fraction exercises taken from national tests and support materials for mathematics teaching. The analysis of students´ solutions is based on Ball et al.´s framework for mathematical knowledge for teaching. The focus is on how students´ common content knowledge is and whether it corresponds the requirements of elementary mathematics teaching. The preliminary results show limited fraction content knowledge and unstable procedural abilities that do not support the deep understanding of fractions needed in teaching mathematics in a meaningful way.

Research of student teachers´ fraction knowledge

Fractions are often seen to be problematic to teach and learn. Therefore, in order to be able to support elementary students´ learning in mathematics, teachers themselves need a deep understanding of fractions as well as knowledge of how to teach fractions to their students. These abilities are included in Ball´s and her colleagues´ (2008) categories of common content knowledge (CCK) and specialised content knowledge (SCK), which they identified based on Shulman (1986). When analysing 290 Flemish student teachers´ knowledge of fractions, Van Steenbrugge (2012) found that the level of their CCK and SCK lied below a required level and that their CCK mirrored elementary students´ fraction knowledge. Olanoff, Lo and Tobias (2014) report in their research summary based on 43 research articles that student teachers´ CCK seems to be relatively strong when performing fraction procedures but that there is a lack of understanding the meanings behind these procedures. Previous research has also pointed the important role of teacher education in developing student teachers´ fraction knowledge and the need to further research for how to develop this content knowledge (e.g. Olanoff et al. 2014). Van Steenbrugge (2012) concluded in his research that teacher education did not have an impact on the development of student teachers´ CCK and SCK partly because of the limited time used with fractions. These points form the background for the present study investigating the situation in teacher education in Sweden.

Swedish student teachers solving elementary fraction exercises

In order to investigate Swedish student teachers´ ability to solve elementary fraction exercises, a questionnaire was developed and handed out to students in their third year of elementary teacher programme. Altogether 59 students answered voluntarily the questionnaire with nine fraction exercises taken from national tests for grades 6 and 9 and from *Diamant* material (Skolverket, 2013). Data for the current study were collected during a mathematics lecture in the beginning of the second mathematics course in the elementary teacher programme. All the students had already past the first part of their mathematics studies with 15 credits.

While there are a number of ways to represent mathematical content knowledge, the framework from Ball et al. (2008) is chosen to describe student teachers´ content knowledge in solving fraction exercises in this study. The focus is to analyse features of students´ CCK and SCK in exercises with different fraction content. The preliminary analysis support Van Steenbrugge´s (2012) findings of student teachers´ limited content knowledge of fractions. Unlike the conclusion of Olanoff et al. (2014), not even the procedural knowledge of Swedish student teachers can be seen in a stable level according to the current study. Only two of the 59 students answered correctly to all of the nine simple fraction exercises and two students did not get any right answer at all. Most of the students have difficulties in writing mathematical procedures, and most problematic are exercises with multiplication and division; less than 40 % of the participants were able to solve these exercises. Further results and their implications will be presented during the short presentation.

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