

SELF GENERATED EXTERNAL REPRESENTATIONS IN THE CASE OF FRACTIONS

Stefan Schumacher, Jürgen Roth

University of Koblenz-Landau, Campus Landau, Germany

In the student laboratory “Math is more” at the University of Landau students work out curricular content independently. In case of the presented study students worked on “basic ideas” of fractions. Besides the learning of fractions a main focus of the study is the students’ ability to externally represent their cognition process and their insights in form of so called “cognition-protocols”. Previous research on self-generated external representations (ER) focuses on their role in problem solving processes (Cox 1999). Generating ER for the use in “cognition protocols” is underrepresented in the research today.

There are two main research questions, namely: (1) Do students who learn in the student laboratory reach at least the same learning success as students who get taught basic ideas of fractions in a teacher based learning environment at school. (2) How does the learning success of students correlate with the ability to generate ER of their insights and do students benefit in this sector from working in the laboratory.

A total of 190 six grade students take part in the study. The students are split in an experimental group (n=148) who visited the student laboratory and a control group (n=42) who got taught in school. The study contains three measurement points, a pre a post and a follow-up test that is running at the moment.

Tasks (so called “video items”) to measure the ability to generate “cognition protocols” and a test on basic ideas of fractions have been developed and will be presented together with first research results.

It is expected, that the students who got taught in school learn more in general, due to the higher cognitive load of the students working in the laboratory because of the unknown learning environment (Schmidt, Di Fuccia, Ralle 2011). But it can be assumed, that students who are capable of representing their insights externally in independent learning processes achieve higher scores in the fraction test than the ones who are not able to do so, because it’s easier for them to retrace what has already been learned in previous stages of the independent learning process.

References

- Cox, R. (1999). Representation construction, externalised cognition and individual differences. *Learning and Instruction*, 9, 343-363.
- Schmidt, I., Di Fuccia, D. S., Ralle, B. (2011). Außerschulische Lernstandorte- Erwartungen, Erfahrungen und Wirksamkeit aus der Sicht von Lehrkräften und Schulleitungen. *MNU* 64(6). S. 362-369.