

Insights into Design Research on Language-responsive Mathematics and Tertiary Mathematics Education

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Abstract: The talk gives insights into my research and development projects in two contexts. The first one is language-responsive mathematics teaching of low-achieving mono- and multilingual students in German middle schools in the field of fractions. This topic is gaining more and more attention in empirical mathematics education research in Germany especially for the last 8-10 years. Design principles of our relating registers and scaffolding approach for integrating language and mathematics will be outlined as well as results of the quantitative and qualitative analyses of learning gains and learning processes.

The second context of tertiary mathematics education is of huge interest for researchers in Germany at the moment due to decreasing numbers of students studying for a STEM university degree. Next to that, empirical data shows that students' conceptual and procedural knowledge of mathematics when entering university classes is also decreasing. This is why many universities in Germany started supporting first-year students with limited preparedness for university mathematics studies with extra transition classes.

At my University of Education in Freiburg a cooperation with Freiburg University develops a variety of supporting structures; a special focus is put on the future mathematics secondary school teachers. Curricula are being modified to achieve more profession-specificity and coherence between mathematics classes, mathematics education courses, educational sciences and practical teaching experience. One piece in that is a design research project in which a teaching calculus seminar is developed relying on the 4-component-instructional- design approach (4C-ID) by van Merriënboer. Beyond the overall curriculum, the 4C-ID model and our experiences in applying it to teacher education will be presented and discussed.