

CARTOONS IN MATHEMATICS EDUCATION RESEARCH, TEACHER PROFESSIONAL DEVELOPMENT, AND IN THE MATHEMATICS CLASSROOM

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Representations of profession-related requirement contexts (e.g. Buchbinder & Kuntze, 2018), such as classroom situations, have a great potential: they can function, for instance, as a starting point for pre-service teachers to analyse and reflect on particular classroom situations, or to develop ideas on how to provide help to students in a specific situation. Profession-related requirement contexts can be represented by means of different formats; frequently used formats are texts, videos, and cartoons. As discussed elsewhere (e.g. Friesen & Kuntze, 2016), different formats have individual advantages and disadvantages. The cartoon format, however, combines advantages and avoids many disadvantages of other formats: cartoons, for instance, can relatively easily be varied in systematic ways. Further, they allow to reduce the complexity of profession-related situations and to focus on particular aspects, while still providing a high level of authenticity (Friesen & Kuntze, 2016). Cartoons therefore open up a variety of possibilities for research in mathematics education as well as for teacher professional development: for instance, cartoons representing actions of teachers in specific situations (e.g. when a student makes a mistake) can be used to elicit and challenge beliefs of (pre-service) teachers (e.g. Skilling et al., 2021); a stimulus to reflect on alternatives; or to imagine responding to potential teaching situations.

Beyond this, cartoons can also provide various opportunities for students' learning in the mathematics classroom and for corresponding research: when students reflect on situations in which other learners are represented, for instance, cartoons can stimulate metacognitive reasoning (Mevarech, Verschaffel, & de Corte, 2018), e.g. with a focus on strategies for problem solving or on students' mathematical argumentation.

Goals and activities of the seminar

This seminar aims at providing practical insight into the various possibilities of the use of cartoons in learning opportunities and in mathematics education research, with a particular focus on new researchers and teacher educators. A key part of the seminar is the joint development and reflection of cartoons in small groups with the aim of learning how cartoons can easily be designed with the help of a digital tool (without specific prior knowledge requirements), how to use cartoons for a variety of purposes in different contexts, and how to deal with practical challenges. The activities of the

seminar will, further, provide opportunities for exchange and networking between the participants regarding cartoon-based research and teaching related to different topics.

In particular, the activities of the seminar are structured as follows:

Session 1:

- Short introduction of a theoretical framework for the development and use of cartoons and concept cartoons in research, teacher professional development, and in the mathematics classroom (20min)
- Introduction of a digital tool for creating cartoons and the methodology of concept cartoons (20min)
- Development of cartoons and concept cartoons with the digital tool in small groups with a focus on multiple purposes, addressees, and topics; each group is individually supported by a member of the seminar team (40min)
- First reflection and exchange between the groups (10min)

Session 2:

- Continuing and completing collaborative group work on cartoons and concept cartoons, individually supported by the seminar team (45min)
- Presentation, review, and discussion of products developed in the small groups; outlook on further innovative cartoon-based approaches (45min)

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