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# Unpack and repack mathematical activity with pre-service teachers: A research project

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*We present a research project that aims to build a model of mathematical activity that can be used in primary teacher education. This model must be useful both for teacher training and be able to support teachers' practices. We propose the idea of Unpacking and Repacking mathematical activity to achieve this goal.*

**Keywords:** Unpacking, repacking, teacher training, mathematical activity.

## CONTEXT, HYPOTHESIS AND RESEARCH QUESTIONS

Assuming that experiencing mathematical activity (MA) is important in learning mathematics, a corollary for mathematics teacher education is that teachers have to be confronted with an authentic MA in order to learn mathematics, to be conscious of its nature and to be able to deal with it at school. By authentic, we mean an activity that is *open* in the meaning that in it, the didactical contract leaves more mathematical responsibilities to the students than classical tasks in the classroom and is closer to the experts' practice of mathematics (mathematicians).

In order to make effective and efficient the opportunities to experience and think about MA in primary teacher training, conceptual and didactical tools are needed. We aim at building such tools, by tackling the following questions: Can a model of MA and a way to experience and think about it can be proposed in primary teacher education? How primary teacher education can include opportunities using this model in order to develop knowledge of the activity? Do such a model and opportunities make primary teachers use MA in their classrooms and help them to deal with it? Does it impact teachers' conceptions about MA or their conceptions about teaching mathematics?

## THEORETICAL APPROACHES

### Genres

MA involves different genres of activity, that is to say a set of prototypical practices which configure this activity. Research in mathematics education often distinguish mathematizing and modelling; defining; specifying, generalizing and extending; proving (reasoning, demonstrating), among others. Particularly, the MTSK model (Carrillo et al., 2013) develop the knowledge about mathematics as a dimension that is considered as a part of the mathematics teacher specialized knowledge. This dimension includes knowledge of ways of knowing and creating or producing in Mathematics, aspects of mathematical communication, reasoning and testing, knowing how to define and use definitions, establishing relations, correspondences and equivalences, selecting representations, arguing, generalizing and exploring.

### Unpacking and repacking

The model we want to develop must be designed to be used by teachers and teacher educators to think about MA when they solve problems or give opportunities to their student do it. We consider as important to deal with deep epistemological aspects of the MA, in the sense that it is fundamental to understand, through a reflexive MA, what are the objects, the objectives, the ways of validating, etc., in mathematics.

This is why we propose, inspired by Martin (2013), the concept of unpacking the MA, which is the work of separating and analysing each part of the mathematical practice and its role and place in the global process of problem solving. Genres would be a first level of unpacking. Besides, repacking is the part of the work that permits to underline the links between the different parts and levels unpacked and understand how they interplay.

We claim that a teacher who can unpack and repack his/her (and others') mathematical work would be better equipped to deal with MA in the classroom.

## METHODOLOGICAL PLAN

In order to tackle the research questions, we plan to:

- Build a model of MA and its genres, based on specialized research results on each genre, but also on literature on problem solving, advanced mathematical thinking, Theory of Didactical Situations, or other theories dealing with MA;
- Propose problems that permit primary teachers to experience a MA that can be unpacked and repacked, involving different genres – here, using Research Situations for Classroom (Gravier & Ouvrier-Buffet, 2009) may be pertinent;
- Experiment with mathematicians, mathematics educators, and then with primary teachers to analyse the potential for unpacking and repacking;
- Propose a model of unpacking and repacking and experiment it in primary teacher education with selected and well-tried problems;
- Evaluate the impact on teachers' conceptions about mathematics and its teaching, how they feel prepared and how they manage with MA in school.

## REFERENCES

- Carrillo, J., Climent, N., Contreras, L.C., & Muñoz-Catalán, M.C. (2013). Determining Specialised Knowledge For Mathematics Teaching. In B. Ubuz et al. (Eds.), *Proceedings of CERME 8* (pp. 2985–2994). Antalya, Turkey: ERME.
- Gravier, S., & Ouvrier-Buffet, C. (2009). Maths à Modeler: Research-Situations for Teaching Mathematics. In Barbeau, E.J., & P. J. Taylor (Eds.), *ICMI Study 16, Challenging Mathematics in and beyond the Classroom* (pp. 23–29). The Netherlands: Springer.
- Martin, J. R. (2013). Embedded literacy: Knowledge as meaning. *Linguistics and Education, 24*, 23–37.