

## Who's observing what in the classroom? The Joint Action framework in Didactics for discussing teaching quality criteria in teacher-researcher collaborative research

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Over the last decade, collaborative research involving different actors in the school field (teachers, trainers, directors, educational advisors) and researchers has grown significantly. In many cases, collaborative research belongs to the design-based research approach (Cobb et al., 2003) which consists in conducting an iterative process that articulates phases of designing educational interventions, their implementation at various levels (classroom activity, session, programs or school-wide interventions) and the analysis of the results of these educational practices carried out in a collaborative manner between researchers and practitioners (Sanchez & Monod Ansaldi, 2015). The strength of this approach is to handle the complexity of teaching and learning in educational settings (Wang & Hannafin, 2005). However, research results tend to remain very contextualised, and difficulties in generalising and spreading results are often reported (Anderson & Shattuck, 2012).

This paper will focus on the evolution of "Didactic Engineering" as a DBR research type developed in French-speaking didactics of mathematics, for modeling the conditions by which the students learn a specific mathematical content in classrooms. DE is featured by (i) a preliminary analysis of the knowledge contents to be taught, (ii) the design of a teaching unit including a series of learning tasks featuring a potential learning path, then (iii) the implementation of this teaching unit in several classrooms and (iv) analyses of the relation between the learning paths designed and the learning process observed in the classrooms (Artigue, 2015). DE has spread in many subject-domains (e.g, mathematics, language arts, science, physical and artistic education, etc.) and it also evolved as "Developmental Didactic Engineering" (DDE; Perrin-Glorian, 2011) to involve teachers in

elaborating new teaching resources for fulfilling curriculum evolutions, as well as promoting their professional development (Joffredo-Lebrun & Sensevy, 2018; Ligozat & Marlot, 2016; Sensevy et al., 2013). A major challenge in DDE is the discussion and assessment of the results from the different cycles of implementation of teaching units in classrooms from both the teachers' and the researchers' perspectives. In comparing different cycles of DDE, how can we state that teaching practices observed (as set of organised actions meant to support the students' learning) are relevant? What are the criteria that should be discussed to shed light on the dimensions that should be improved? If the analytical categories are too generic, the contents tend to be lost in the discussion. Conversely, if the categories are too specifically related to the content built, then it is not possible to make sense of the teaching process that need to be mastered to target the learning objectives. This paper relies upon the Joint Action framework in Didactics (Sensevy, 2011; 2014; Amade-Escot & Venturini, 2015, Ligozat et al. 2018; for defining a set of criteria enabling teachers and researchers to discuss the quality of the teaching in three cycles of implementation of a Float & Sink teaching unit at primary school. Assessment of teaching quality is carried out with a two grain-size analysis (Ligozat & Buyck, 2022): i) mesoscale analysis description of the knowledge themes developed over the lesson and ii) microscale systematic coding the students' participation to the meaning-making process and the teacher's uptake of the students' constructions in managing the knowledge progression. This approach allows to move the discussion of results in DDE beyond the analysis of selected episodes of classroom practices (as it is usually done in DDE) by providing systematic profiles of the correlation between teaching actions and the knowledge content development.