

Analysing subject-specific aspects of instructional quality via rational task analysis

The development of a framework for the openness of mathematical tasks

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Abstract

Measuring different aspects of instructional quality in mathematics education is a question of great interest in current research. Using established instruments from prior studies, the TEDS-Validate study gathered data on the professional knowledge and competencies of mathematics teachers, their students' achievements and the instructional quality observed during mathematics lessons in order to analyse relations between these three aspects of mathematics instruction.

As the tasks implemented throughout a lesson strongly influence the cognitive activation dimension of instructional quality, the mathematical tasks from the observed lessons were sampled and are examined via rational task analysis. For this purpose, a classification scheme is currently being further developed, departing mainly from an instrument developed within the PISA study and the embedded COACTIV project. In addition to surface features, content-related and procedural competences as well as cognitive and linguistic complexity, we developed categories for special characteristics such as the task's relationship with the real world contexts and its openness. The latter is a matter of interest not only due to open tasks being a prerequisite for problem solving activities but also because of their high potential for differentiation within a lesson.

To gain a deeper understanding of different types of open tasks, the classification scheme distinguishes between the openness of the result and the openness of the solution method. First results from the analysis of approximately 2600 mathematical tasks used within the TEDS-Validate-study show a very limited level of openness in both dimensions. This result points out that still in current mathematics teaching most teachers miss the opportunity to convey a more authentic and realistic picture of mathematics as opposed to the common misconception among students, that mathematics is all about guessing *the* right solution method to reach *the* one right result.