# Teachers’ mathematics textbook awareness

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Even if the textbook is the most important artefact for planning and teaching mathematics, teachers are rarely taught how to understand and effectively use textbooks for planning and teaching mathematics. Thus, teachers often lack in “awareness” of the potential support mathematics textbooks can provide. In this workshop, we discuss what to include in an education for “mathematics textbook awareness” for teachers (as professional development) and for prospect teachers (in teacher education). We also discuss how to measure if and how teachers’ view and use of mathematics textbooks change from such education. The discussions depart from the idea of educative curriculum materials, design principles for such teacher guides and what types of knowledge such material could mediate to teachers and prospect teachers.

## Textbooks and teachers’ textbook awareness in mathematics teaching

The textbook is the most important artefact in mathematics education (e.g. Fan et al., 2013), the major resource for teacher planning and enacting teaching (e.g. Boesen et al., 2014) and operationalizes the steering documents in mathematics (ibid.) Despite these facts, Remillard (2016) state that teachers are generally not taught how to understand and effectively use textbooks for planning and teaching mathematics.

## Textbook reach and educative curriculum materials

Curriculum materials (i.e., textbooks and teacher guides) are documents that are “a part of the routine of schools” (Ball & Cohen, 1996, p.6) and “have reach in the system” (p.6), which positions them as influencing individual teachers at a daily basis. This position of curriculum materials makes them suitable for affecting teachers and could be “designed to place the teacher in the center of curriculum construction and make teachers’ learning central …” (p. 7). They outline five crucial domains for supporting teachers; 1) knowledge of students common understanding of different mathematical fields, 2) teachers’ mathematical content knowledge, 3) address developmental order and timeframe for different mathematical fields, 4) provide strengths and weaknesses of explanatory models and activities and 5) guide teachers in how they *could* act along with reasons for this and not only point out how to act.

Following the ideas of Ball and Cohen (1996), Davis and Krajcik (2005) established nine *design principles* for educative curriculum materials (ECM) for science teaching. Three of them are applicable for mathematics; 1) explaining the mathematical content to the teacher, 2) describing student-related issues such as common misconceptions and 3) describing and explaining different teaching strategies. Following these ideas, Van Steenbrugge and Ryve (2018) relate these three design principles to the Swedish context.

## Design principles for Swedish educative curriculum materials

Van Steenbrugge and Ryve (2018) note that Swedish teachers “… are in need of, and ask for, concrete support to alter the common practice …” (p. 806). Along with the design principles for ECM (Davis & Krajcik, 2005), they describe three principles for what to include in a design of Swedish ECMs; 1) Mathematical content knowledge (describe mathematics concepts; describe mathematics strategies; use visualizations as models for explanations), 2) Student specific content knowledge (describe common student difficulties, misconceptions and mistakes; describe support for students that need more support or more challenges; describe plausible and common strategies students use) and 3) Teaching knowledge (describe aim and goals for lessons; describe models för explanations, tasks and activities and the ideas of them; describe support for how to discuss and summarize the content of the lesson).

Applying these design principles in a teachers’ guide aims at supporting teachers in planning and enacting research based ambitious mathematics teaching, and simultaneously provide opportunities for the teachers to develop their mathematical subject knowledge, knowledge of content and students and knowledge of content and teaching (in terms of Ball, Thames & Phelps, 2008). Thus, they intend to mediate teacher learning from mathematics textbook use, which requires teachers’ textbook awareness.

## Textbook awareness in teacher education and professional development

As teachers base their mathematics teaching on textbooks, it seems reasonable to include *textbook awareness* to teacher education and/or as professional development for teachers. Further, in such education, it seems reasonable to include knowledge of research based educative curriculum materials and design principles for such teacher guides.

In this workshop, we discuss;

* Ideas of what to include in and how to implement *teachers’* *mathematics textbook awareness* in teacher education and as a professional development programme for teachers.
* Ideas of how to measure if and from what the teachers and prospect teachers learn from such implementation, especially in terms of changes in their view and use of mathematics textbooks.

## Time schedule

The moderator (author) uses approximately 10 minutes to present the main ideas of the content of the workshop. After this introduction, we use approximately 15 minutes per item described above.

## References

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