Connecting teachers' use of curriculum resources in planning with mathematical knowledge for teaching

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This presentation reports on an ongoing study, which aims to create more knowledge on the relationship between different types of curriculum resources when identified in the practice of teachers planning collaboratively. These resources are described through the Design Capacity for Enactment framework, augmented with domains of the Mathematical Knowledge for Teaching framework. The aim is to identify and examine the connection, rather than to claim to explain the relation. Preliminary results show that there are many different types of resources used, both digital and analogue, and that teachers' Knowledge of Content and Students and Knowledge of Content and Teaching guide the reasons for what types of resources are used.

Theoretical background

When it comes to teachers' use of curriculum resources, Brown (2011) speaks of a participatory relationship between resources and teachers, described through the Design Capacity for Enactment framework (DCE). The framework describes three types of curriculum resources: procedures, domain representations and physical resources. Teachers use these in three different ways described as offloading, adapting, or improvising, while themselves bringing a teacher resource component, which in this study will be modelled by mathematical knowledge for teaching.

The Mathematical Knowledge for Teaching framework (MKT) (Hill et al., 2008) divides teacher knowledge into two main domains. The first, subject matter knowledge, contains the subdomains common content knowledge (CCK), specialized content knowledge (SCK) and horizon knowledge (HK). The second, pedagogical content knowledge, contains the subdomains knowledge of content and students (KCS), knowledge of content and teaching (KCT) and knowledge of content and curriculum (KCC).

Preliminary research questions are

1. What types of curriculum resources are used by upper-secondary school teachers in Sweden when planning for lessons?
2. What domains of MKT are visited through such planning practice?
3. What connection between teachers' use of curriculum resources and MKT is manifested in such planning practice?

Method

The data used for answering the research questions consist of audio-recorded discussions of upper-secondary school teachers collaboratively planning mathematics lessons, generated within another project, aiming to examine teachers' collaborative practices. There are about 10 discussions with the duration of around 60 minutes each.

The discussions are authentic in the sense that the participating teachers have no specific goal or guidelines other than to plan for their teaching within their everyday practice.

Preliminary results

The preliminary analysis indicates that there is an asymmetry within the types of resources used and the domains of MKT being visited in the discussions. Not all domains of MKT are visited through the teachers' use of different types of curriculum resources within DCE.

		MKT					
		Subject matter knowledge			Pedagogical content knowledge		
		CCK	SCK	HK	KCS	KCT	KCC
DCE	Procedures	x	x			x	x
	Domain Representations	x	x			x	
	Physical resource					x	x

Table 1 – Connecting types of curriculum resources with domains of MKT

For example, the use of the textbook as a 'physical resource' connects with manifestations of KCC and KCT, through 'offloading'.

Discussion

The results will help to report on the current state of practice for upper-secondary school teachers in planning and implications from these results could include different possible ways forward.

For research, the observed connections (or lack thereof) could be further investigated to reveal relationships and governing mechanics between the use of curriculum resources and manifested MKT. It could also help inform designers of curriculum materials for future design of different teacher aids, such as teacher manuals.

References

Brown, M. W. (2011). The teacher–tool relationship: Theorizing the design and use of curriculum materials. In *Mathematics teachers at work* (pp. 37-56). Routledge.

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