Digital curriculum resources (Guidelines)

Technology in Mathematics Education

Lecture 11 – 05/11/24

Five aspects of mathematics that have roles in mathematics learning in all the grades and have to be present in textbooks
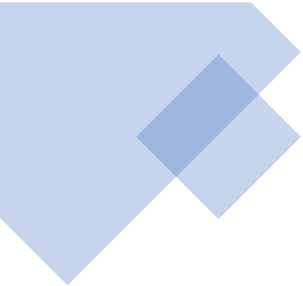
symbolization
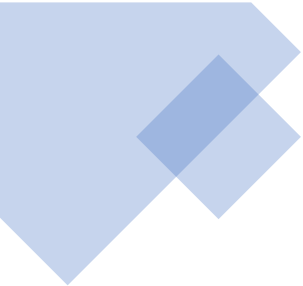
representations

deduction

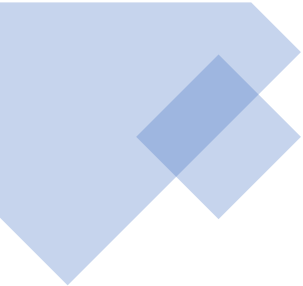modelling

algorithms

Investigating Math Textbooks

The implementation of innovation in curriculum resources in terms of new possibilities for changing students encounter with mathematics is also closely linked to the development of digital curriculum resources. The potentials of increased possibilities for multimodal representations of mathematics, interactive elements, and possibilities for communication and cooperation, are often highlighted in this context (e.g., Choppin et al., 2014). However, translating traditional paper into digital curriculum resources is not a straightforward process. Already the change of representation mode from paper to digital screen gives rise to challenges and affects the representation of content and thus is likely to change students' encounters with mathematics. For example, content that could be surveyed easily on the two pages of a paper curriculum resource needs to be cut down into smaller pieces and rearranged to fit the screen (Usiskin, 2018). Additionally, the affordances of the digital resources have given rise to the implementation of new elements in digital curriculum resources (Choppin & Borys, 2017; Pepin et al., 2016),

such as interactive diagrams (Naftaliev & Yerushalmy, 2013; Yerushalmy, 2005), feedback (Rezat, 2021, this special issue), learner-controlled scaffolding (Edson, 2017), and communication links between teachers, students and parents, to name but a few possibilities. These new possibilities of digital curriculum resources have also attracted researchers to develop a deeper understanding of particular design features or elements of curriculum resources and how they affect the teaching and learning of mathematics. The challenge remains to integrate these new features in the design of e-textbooks in a way that these "genuinely can be more than the sum of the parts" (Bokhove, 2017, p. 113). In this special issue, several papers address the development and use of special features of digital curriculum resources. Edson and Difanis Phillips (2021, this special issue) describe the development of a teacher dashboard in a digital collaborative curriculum resource as a means to support teachers in implementing a problem-based curriculum. This study exemplifies the importance of considering teachers' use and needs when implementing change with digital curriculum resources in

the iterative development of the teacher dashboard. Mesa et al., (2021, this special issue) analyzed teachers' use of questioning devices as specific e-textbook elements. They found four types of interdependent utilization schemes in which the questioning devices were instruments for teacher activity. Confrey and Shah (2021, this special issue) analyzed how teachers participated with classroom assessment data and how this affected their instruction with learning trajectories.

As Adler (2021, this special issue) argues, "the unproblematic integration of new resources into cultural practices, does not lie in the resource itself". There are many other factors that influence to what extent and in what ways curriculum resources can act as a mediator of reform, within certain social and cultural contexts and practices. Among them, we can identify, from the available research literature, some key factors—in the first place, teachers and students—all of which interplay with the implementation of reform through curriculum materials.