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Feedback and discrepancies of a physical toolkit and a digital toolkit: opportunities and pitfalls for mediating the concept of rotational symmetry.

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Summary: In this chapter, excerpts of lessons on using tool-based tasks to teach the concept of 'rotational symmetry' were analyzed. Both the instrumental approach and the theory of semiotic mediation were adopted as theoretical frameworks. We compare a lesson carried out with a tailor-made physical tool and one carried out with the software PowerPoint (a digital tool). The analysis focuses on the opportunities and pitfalls that these two tools offer and on how the tasks could (or could not) exploit the semiotic potential of the tool used. In particular, the notions of feedback and discrepancy are theorized. Hypotheses on these notions in the context of designing and implementing tool-based mathematics tasks are raised. We propose that the critical features of the object of exploration, the discrepancy opportunity and pitfall of the tool and the task as well as the teachers' sensitivity and insights into the discrepancy are important considerations for tool-based mathematical task design. They provide a useful guiding framework for investigating the pedagogical affordances of different mathematical tools. We hope that this chapter can provide insights into how the choice of the tools and the design of tool-based tasks may enhance exploitation of the semiotic potential of the tools.

Classification: U70 G40 G50 D50 D60

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