

ZMATH 2016a.00912

Tropper, Natalie; Leiss, Dominik; Hänze, Martin

Teachers' temporary support and worked-out examples as elements of scaffolding in mathematical modeling.

ZDM, Math. Educ. 47, No. 7, 1225-1240 (2015).

Summary: Empirical findings show that students have manifold difficulties when dealing with mathematical modeling problems. Accordingly, approaches for supporting students in modeling-based learning environments have to be investigated. In the research presented here, we adopted a scaffolding perspective on teaching modeling with the aim of both providing students with adaptive support during their modeling and gradually enabling them to process modeling problems on their own. Two studies that deal with different elements of scaffolding students' modeling processes are reported in this paper. Study I focuses on the adaptive core of scaffolding: Teacher-student interactions (5 teachers, 5 pairs of grade 9 students) during modeling are analyzed with regard to reasons, areas, and intentions of teacher support. Finally, these interactions are evaluated with respect to teachers' adaptations to students' needs in particular situations. Study II uses a series of worked-out examples intended to realize the scaffolding means of demonstrating preferred behaviors in order to prepare the students (4 grade 8 students) to process modeling problems on their own. We examine both students' interactions with the materials and their imitation of demonstrated behaviors during problem solving. The findings of study I indicate that the participating teachers do not have or cannot flexibly activate the skills to support their students adaptively, so the use of materials facilitating scaffolding by employing particular scaffolding means such as demonstration could be beneficial. In turn, the results on students' handling of worked-out examples in study II indicate the importance of teachers' individual support during students' processing of materials. Hence, synergistic forms of support – combining multiple, complementary agents and means – have to be considered for fostering students in modeling-based learning environments.

Classification: M13 D43 C73

Keywords: mathematical modeling; scaffolding; adaptive teaching; worked-out examples

doi:10.1007/s11858-015-0718-z