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ZMATH 2015e.00624

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Developing a network of and for geometric reasoning.

ZDM, Math. Educ. 47, No. 3, 483-496 (2015).

Summary: In this article, we develop a theoretical model for restructuring mathematical tasks, usually considered advanced, with a network of spatial visual representations designed to support geometric reasoning for learners of disparate ages, stages, strengths, and preparation. Through our geometric reworking of the well-known "open box problem", we sought to enrich learners' conceptual networks for optimisation and rate of change, and to explore these concepts vertically across curricula for a variety of grades. We analyse a network of physical, geometric spatial visual representations that can support new inferences and key understandings, and that scaffold these advanced concepts so that they could be meaningfully addressed by learners of various ages, from elementary to university, and with diverse mathematical backgrounds.

Classification: G40 N60 D50
Keywords: geometric reasoning; mathematical tasks; spatial visual representations; conceptual networks; optimization
doi:10.1007/s11858-014-0654-3