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Mathematical modeling with SimCalc: enhancing students' complex problem solving skills using a modeling approach.

Hegedus, Stephen J. (ed.) et al., The SimCalc vision and contributions. Democratizing access to important mathematics. Dordrecht: Springer (ISBN 978-94-007-5695-3/hbk; 978-94-007-5696-0/ebook). Advances in Mathematics Education, 363-381 (2013).

Summary: This chapter argues for a future-oriented, interdisciplinary approach to mathematical problem solving in the elementary school – one that draws upon the engineering domain, using cognitive technological tools. New approaches in mathematics and science education and new forms of thinking and problem solving skills are needed as the world's increasing complexity, competitiveness, interconnectivity, and dependence on technology generate new challenges and demands. The author considers complex problem solving within the mathematics and science curriculum and address how SimCalc MathWorlds® complements and enriches mathematical modeling in solving complex engineering-based problems. He reports on a study in which a class of 9-year olds created several different models for solving a complex problem on rocketry engineering. Results showed that young students, even before instruction, have the capacity to deal with complex interdisciplinary problems. Students created quite appropriate models that adequately solved the problem, by developing the necessary mathematical constructs and processes. The author concludes with a discussion on the appropriateness of a technology-based modeling approach as a means for introducing complex, real-world problems to elementary school students.

Classification: U52 M52 D52

Keywords: modeling; problem solving; computer aided instruction; interdisciplinary approach; cognitive technological tools; science eucation; technology-based modeling; real-world problems

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