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The effects of using exploratory computerized environments in grades 1 to 8 mathematics: a meta-analysis of research.

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Summary: Background: The process of problem solving is difficult for students; thus, mathematics educators have made multiple attempts to seek ways of making this process more accessible to learners. The purpose of this study was to examine the effect size statistic of utilizing exploratory computerized environments (ECEs) to support the process of word problem solving and exploration in grades 1 to 8 mathematics using meta-analysis. Results: The findings of 24 experimental pretest and posttest studies (24 primary effect sizes) published in peer-reviewed journals between January 1, 2000, and December 31, 2013, revealed that exploratory computerized environments produced a moderate effect size (effect size (ES) = 0.60, SE = 0.03) when compared to traditional methods of instruction. A 95% confidence interval around the overall mean – $C_{\text{lower}} = 0.53$ and $C_{\text{upper}} = 0.66$ – indicated nonzero population effect and relative precision. A moderator analysis revealed differences among the effects on student achievement between traditional problem solving approaches and ECEs, favoring the latter. Conclusions: The findings highlight the importance of providing students with opportunities to explore applications of mathematics concepts in classroom especially these supported by computers. A discussion of these findings and their potential impact on improving students' mathematical problem-solving skills, along with implications for further research, follows.

Classification: U72 U73 D52 D53 F92 F93

Keywords: meta-analysis; problem solving; explorations; computers; student achievement

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