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Student misconceptions caused by misuse of technology.

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Summary: Calculators used widely by students, teachers, scientists, engineers and many others provide an interesting case study of a compelling technology that has helped change the way many professionals work. They not only help in enhancing problem solving skills of most individuals, but also help visualise solutions to problems in a better way. Research supports the claim that calculator use improves student performance in computation, concept development, and problem-solving although a growing number of studies show that there may be a class of errors and misconceptions that are induced by calculators. We review some basic ideas of errors in numerical analysis and discuss in detail the concept of round-off error that is often noticed by both college teachers and high school and undergraduate students when working with such computing aids. We then present experimental results on the performance of a variety of computing aids for solving two problems, perform a statistical analysis of data collected from 215 students in the freshmen calculus class at Texas Tech University, and report the findings of this analysis.

Classification: N25 D75
Keywords: calculators; students' misconceptions; rounding; numerical computing