NATIONAL COUNCIL OF TEACHERS OF MATHEMATICS

Calculator Use in Elementary Grades

A Position of the National Council of Teachers of Mathematics

Question

What is the role of calculators in the elementary grades?

NCTM Position

Calculators have an important role in supporting and advancing elementary mathematics learning. The benefits of their selective and strategic use are twofold. Calculators can promote the higher-order thinking and reasoning needed for problem solving in our information- and technology-based society, and they can also increase students' understanding of and fluency with arithmetic operations, algorithms, and numerical relationships.

Although calculators—from simple four-function versions to programmable graphing models—are used routinely outside school for a variety of purposes, their specific use within the mathematics classroom must be selective and strategic, with attention to how such a tool will support and advance learning. More important, the use of calculators does not supplant the need for students to develop proficiency with efficient, accurate methods of mental and pencil-and-paper calculation and in making reasonable estimations. Emphasis and implementation are the critical issues—when and for what purposes should calculators be used in the elementary mathematics classroom?

In a review of 127 research studies on calculator use in K–12 classrooms, Ellington (2003) noted, "Students received the most benefit when calculators had a pedagogical role in the classroom and were not just available for drill and practice or checking work" (p. 456). The key here is that their use was deliberate, tied to specific learning activities and outcomes. Ellington's analyses found that students in classrooms where calculators were used strategically to support and advance learning, when compared with students in classrooms without such calculator use, performed at higher levels on measures of operational skills (a composite of procedural and conceptual knowledge) and problem-solving skills. In addition, students' attitudes toward mathematics were more positive when calculators were a part of the learning process.

As Reys and Arbaugh (2005) assert, "When students are engaged in solving problems, formulating and applying strategies, and reflecting on results, a calculator is an important enabling tool" (p. 93). In this sense, the strategic use of calculators enables elementary students to engage in mathematically rich problems that involve recognizing and extending patterns, testing ideas, and exploring relationships, without getting caught up in the mechanics of rote computation.

As NCTM's Technology Principle states, "Technology should not be used as a replacement for basic understandings and intuitions" (NCTM 2000, p. 25). The proper implementation of the Technology Principle depends on teachers' creating approaches to classroom instruction that appropriately integrate the use of technology into lessons focused on the learning of mathematics.

Resources

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