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Using Calculators in Elementary School

Appropriate use of calculators is an important part of a balanced mathematics education at all levels, including elementary. The National Council of Teachers of Mathematics has elaborated this position in its public statement, *Principles and Standards for School Mathematics* (NCTM 2000).

Students need access to calculators, but they also need pencil-and-paper skills. Balancing these two beliefs is an important part of an elementary teacher's work. What "appropriate" calculator use is, and how it affects students' knowledge of computational procedures, has been the study of research for more than twenty years.

Research studies have shown that students who use calculators are better at understanding mathematical concepts and solving problems (Campbell and Stewart 1993; Hembree and Dessart 1986; Suydam 1987). The same studies confirm that calculator use does not interfere with students' development of computational skills, and in many of these studies, students' pencil-and-paper skills increased when they also had the opportunity to use calculators.

Calculators Are Tools

Calculators are tools, and as such, they are only as effective as the person pushing the buttons. Just as a hammer does not build a house, a calculator does not think or solve problems. That is a job for people, and a job that students can learn early on. Also, just as a hammer does not choose where to put a nail or prevent a nail from going in the wrong board, a calculator does not know what operation to use and cannot keep a person from forgetting a decimal point. These are also jobs for people, and they are exactly the jobs that well-qualified teachers can help students learn. Sometimes a calculator is the right tool for a job, and sometimes it is not. Helping students know when to use a calculator and when not to use one is exactly what a teacher should do.

Calculators Allow Students to Solve Challenging Problems

One of the most important ways in which students can use calculators is to solve problems that they would not be able to solve otherwise. With a calculator, all students can deal with real problems arising from the school cafeteria, a class fund-raising project, or a news event, even if the numbers involved are large or messy. Whenever a teacher has a class working on developing problem-solving skills and computational procedures are not the main point of the lesson, calculator use might be appropriate. Students can develop their decision-making and problem-solving skills far beyond what they would be able to do if they were limited to numbers that they could handle quickly using pencil and paper.

Computation Is Important

Students must learn how to add, subtract, multiply, and divide. This includes knowing basic addition and multiplication facts. Students will learn these skills at different times, depending on their age, development, and previous experiences. Teaching students how to perform reliable computational procedures is a reasonable goal of elementary programs. As important as pencil-and-paper skills is the ability to perform mental calculations that give exact answers as well as estimates of reasonable answers. Development of these mental computa-

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tion skills should also be part of the elementary mathematics curriculum in order to help students judge their own computational results, whether done with paper and pencil or with a calculator.

Conclusion

Technology surrounds children, just as it does adults. Prohibiting the use of calculators or ignoring their potential benefits in schools will not make calculators go away. Many adults never used calculators in a mathematics classroom, yet calculators are vital tools in their daily work. Many have simply come to rely on calculators too much as a way to avoid doing arithmetic. Many never had teacher guidance and school experience to learn to make decisions about when and how calculators might be helpful and appropriate. Helping students learn to make these decisions and develop problem-solving skills lies in the hands of well-qualified teachers.

The teacher is the key

Using calculators in the elementary classroom is not an all-or-nothing decision. An effective teacher knows that sometimes students must put aside the calculator as they practice their mental mathematics skills or as they work with models to develop an understanding of computation. An effective teacher also knows that if the lesson is about problem solving, the calculator can be a powerful and useful tool.

No one wants students to become more dependent on calculators than on their own thinking. The best way to avoid this is for students to learn mathematics well, using a variety of tools.

References

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[For a summary of calculator studies, see *Handheld Technology and Student Achievement: A Collection of Publications*, an independent study conducted by the McKenzie Group, 2002.] ▲