

The Data on Calculators

There is no evidence to justify the widespread use of calculators in classrooms.
By Tom Loveless

The use of calculators in elementary school classrooms generates intense debate. The National Council of Teachers of Mathematics (NCTM) first expressed its support for calculators in 1974. It reissued the endorsement in 1980, calling for schools to “introduce calculators and computers into the classroom at the earliest grade practicable.”

In 1989, the NCTM recommended that calculators be used in grades K-4, admonishing schools, “clearly, paper and pencil computations cannot continue to dominate the curriculum.”

In 1990, the National Research Council issued “Reshaping School Mathematics,” a report that urged “the replacement of most paper-and-pencil drills with calculator-based instruction” starting in kindergarten. Because calculators “diminish the role of routine computations,” the report advised, “young children can instead be given activities with calculators that emphasize discovery and exploration.”

Critics of calculators believe they may impede learning, especially when used by students who haven’t memorized basic facts (for example, $2+2$, 6×7 , $14-9$) or learned how to add, subtract, multiply, and divide on paper. The risk is that calculators will become a crutch for students.

Worse yet, young children may never acquire a deep understanding of how numbers work if, on first exposure to mathematical operations, they merely push buttons to arrive at answers.

Surveys show that professors in schools of education believe calculators should be used more often in teaching math. But teachers want them used less, and a large majority of the public thinks that they shouldn’t be used at all with young children.

Are test scores related to calculator use?

The test results from the National Assessment of Educational Progress (NAEP) and the Third International Mathematics and Science Study (TIMSS) provide an interesting perspective on the calculator issue. On both tests, calculator use was correlated with lower math scores.

Nine-year-olds who reported that they used calculators in class every day had the lowest NAEP scores of any response category, while students using calculators only once or twice per month had the highest scores.

A similar pattern is evident on the TIMSS. Frequent calculator use is negatively correlated with math achievement in several countries. A vast majority of students in the highest-scoring nations (Japan, Singapore, Korea) report that they never use calculators in math class.

Causality cannot be inferred from these data. Low student achievement may just as easily ‘cause’ calculator use as the other way around.

Imagine a teacher facing mandates that students know how to convert fractions to decimals and solve multi-step problems using percents. But on the first day of school, the teacher finds that students can’t even add or subtract whole numbers. Out come the calculators.

Great care must be taken when interpreting studies that try to gauge the effects of an educational practice without taking into account students’ initial test scores. Evaluated inappropriately, practices intended to be compensatory can appear harmful.

It is clear that research thus far hasn’t resolved the calculator dispute. It is also safe to say that we need to test and verify the benefit of new technologies before they become central elements of classroom practice.

Providing access to new technologies, only to learn later that they hinder learning, does not advance the cause of educational quality.

Frequency of Calculator Use TIMSS 1994-95, Grade 4

NEVER

Country	% of Students	Mean Score
Australia	25	545
Canada	51	532
England	15	510
Hong Kong	95	593
Israel	24	522
Japan	89	602
Korea	93	616
Netherlands	90	579
New Zealand	18	495
Norway	89	510
Singapore	96	634
United States	34	534

SOME LESSONS

Australia	67	566
Canada	43	546
England	74	524
Hong Kong	3	492
Israel	60	541
Japan	11	561
Korea	5	579
Netherlands	10	592
New Zealand	61	512
Norway	8	498
Singapore	3	511
United States	53	565

MOST LESSONS

Australia	8	512
Canada	6	493
England	11	474
Hong Kong	2	--
Israel	16	525
Japan	1	--
Korea	2	--
Netherlands	0	--
New Zealand	21	475
Norway	3	429
Singapore	1	--
United States	13	507

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