

6th Graders with Disabilities using 4-function Calculators: What one study says

Research Note 4

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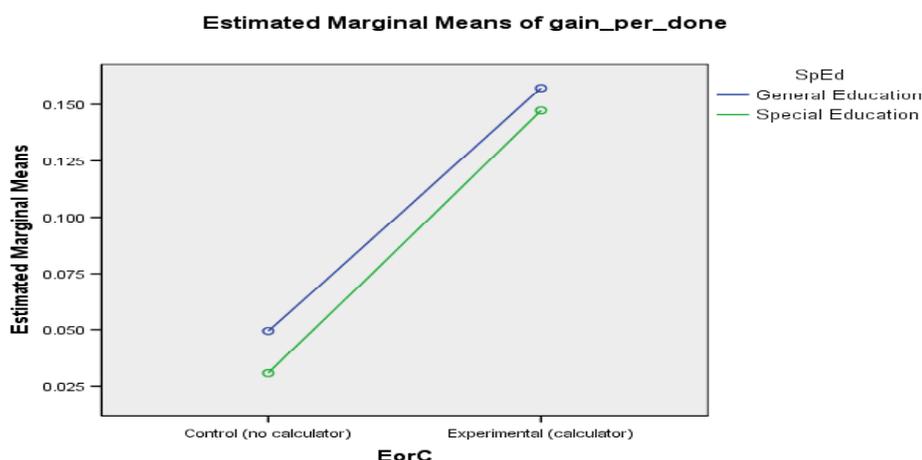
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We compared the achievement gains of special education and general education students in 6th grade. Included were 89 students from two rural Michigan school districts, three schools, and six teachers. The school districts were demographically similar, except for district size. Students were administered a pre-test and post-test. Each test was 28 items aligned with the Michigan 6th grade math standards, primarily focused on the Number Sense strand. Calculator use was not permitted on the pre-test; on the post-test, students were randomly assigned to either use or not use graphing calculators. In addition, an 11-item calculator use and attitude survey was administered.

Students with disabilities performed better when they used a calculator, but still not as well as students without disabilities when they used a calculator.

Average post-test results are compared in the graph below. The graph shows that that special education students benefited as much from graphing calculator use as general education students did, though the special education students still performed less well.



Additional analysis showed that general education students gained more from pre- to post-test.

We also examined the approach students with disabilities took to answering the questions on the test. We concluded that:

- Students with disabilities appeared to inconsistently use a calculator:
 - They did not use them on every problem.
 - When using them, they did not always employ the correct operation.
- When they used them, they still often completed just the basic operations. This suggests that students with disabilities need: (1) increased attention on problem-solving, (2) increased attention on how to use a calculator, or (3) both.

Students with disabilities also displayed less work when they used a calculator on the post-test.

We also found that usage of calculators in class by the students with disabilities was less than expected. We concluded that:

- The students may not be reminded enough to use a calculator.
- They were too often told NOT to use a calculator.

Teachers indicated that they often did not allow their students to use calculators on basic math facts and mental math activities. This may be contrary to current brain research which suggests there are different parts of the brain for declarative (i.e., basic facts/mental math) and procedural math knowledge.

- They were not allowed to use calculators on tests enough, especially considering this state allows calculators as a standard accommodation on the state assessment.

However, students with disabilities had generally positive attitudes towards calculator use:

- Almost 75% indicated a calculator helped them in math class.
 - Over 50% indicated a calculator helped them on computation problems.
 - Over 1/3 (39.1%) indicated a calculator helped them on word problems.
This supports that students with disabilities have trouble solving word problems and a calculator cannot overcome their challenge of how to manipulate the numbers and answer the question.
- Over 2/3 would use a calculator if given a choice.
- Over 2/3 enjoyed using a calculator.
- Almost 2/3 (65.1%) indicated they would use a calculator on a test if given the choice.

Calculators are a common accommodation for students with disabilities and on state tests, and NCTM has called for every student to have access to an appropriate calculator. Nonetheless, calculator use by students with disabilities has been rarely studied. Like all research, our study has limitations: it used a limited number of students, and we found the tests were too long for the class to complete in a period. Our findings raise the question that use of calculators in teaching of students with disabilities may not be consistent with state and national policies or learning theory. The findings also suggest, however, that students with disabilities benefit from their use as much as general education students, though calculator use does not close the achievement gap.

Reference:

Bouck, E.C. (2006) "Sixth graders with disabilities use of calculators: Dividing it out." Presented at the Technology and Media Division Conference, San Diego, CA, November 10, 2006.