

The Effects of the TI-Navigator System on Student Achievement (Algebra I)

Background and Design

A Southern state participated in a study to see if the effect of using the TI-Navigator System on student scores was significantly different than students using traditional TI-84 silver calculators. The project used a quasi-experimental rolling design with the control schools using just the TI-84 Silver calculator along with regular instruction and the experimental schools using the TI-Navigator System.

| Demographics of Sample (n = 756, Grades 9 - 12) | | |
|--|-------------|-------------|
| | Sample Size | % of Sample |
| Free- and reduced-lunch (FRL) | 413 | 54.6% |
| Specific Learning Disability (SLD) | 54 | 7.1% |
| FRL & SLD | 29 | 3.8% |
| FRL or SLD (At-Risk) | 437 | 57.8% |

Research Foci

1. Focused on changes in student understanding and attitudes when technology was used in Algebra I.
2. Used two types of technology: TI 84+ Silver calculators and Navigator System.
3. Targeted at-risk students (Special education, free/reduced lunch).

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Analysis and Results

T-tests were performed to look for evidence of a significant difference in mean change in score, between treatment and control groups. All of the tests had the same result: at the 5% significance level they did not show evidence of a significant difference. An item response theory analysis identified seven questions as most discriminating based on correlation. These questions were tested for a difference in mean response between treatment and control groups. None of the questions showed a difference beyond one standard deviation.

Conclusions

The lack of statistical significance may indicate some interesting trends. Teacher logs showed that the instructional techniques used, in either group, tended to be algorithmic in nature and not indicative of conceptual development. Some teachers were uncomfortable in setting up the equipment and delayed using it at the beginning of the academic year. This affected frequency and type of use. We feel this is evidence that the calculator became an electronic algorithm rather than a tool to help the students understand concepts at a deeper level. The use of the TI-Navigator system as a teaching and learning tool could be more effective if it is used in a way that focuses on conceptual understanding.



Future involving HCI

We could be researching ways to ensure that teachers are comfortable enough with technology to be using it as a tool to enhance learning. Research involving usability testing, observation, ethnography, and professional development are relevant and warranted. Other technologies could also be compared and developed to contribute to algebra students' conceptual skill development.