

# digits™

## Evidence of Effectiveness



A Summary of the  
Longitudinal Randomized,  
Control Trial – Interim  
Report Conducted by  
Gatti Evaluation, Inc.

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# digits Summative Research Overview

Pearson strongly believes that its programs should be proven through scientific research to increase student achievement. As such, it contracted with independent research group Gatti Evaluation, Inc., to conduct a longitudinal randomized, control trial of its digits math program. The first year of the study was conducted with 6<sup>th</sup> and 7<sup>th</sup> grade students over the 2011-12 school year, and will continue with 7<sup>th</sup> and 8<sup>th</sup> grade students in the 2012-13 school year. This report summary presents the evaluation design and methods, an assessment of program usage and implementation, student performance results, and a discussion of the findings from the first year of the study.

## Study Design and Research Questions

The purpose of this study is to assess the longitudinal effectiveness of the *digits* math program in helping students attain critical math skills and to document usage and implementation of the *digits* program. The study employed an experimental randomized, control trial research design. That is, teachers within each research school were *randomly assigned* to either use the *digits* program with their students (also referred to as the “treatment” group) or to continue using their current school math program (also referred to as the “comparison” condition).

The study addressed the following overarching evaluation questions:

1. Do students using *digits*, over the course of the initial school year of implementation, demonstrate a significant improvement in math achievement?
2. How does the math performance of students using *digits*, in their first year of implementation, compare to that of students using their current math program?
3. How are teachers implementing the *digits* program?
4. What are teachers’ perceptions of the quality and utility of the *digits* program?

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## Participants and Setting

Gatti Evaluation recruited eleven schools to participate in the study, including schools in AZ, IL, KY and MI. The final analytic sample was comprised of 94 classrooms and 2,109 students. The study schools were members of public school districts located in suburban and urban areas. The study sample demonstrated considerable variation in ethnicity and socioeconomic status as evidenced by eligibility for free or reduced lunch status, as well as a wide range of math ability levels as evidenced by previous year state math assessment data. Figure 1 presents the full study sample demographics broken out by school.

Figure 1 Digits RCT School Year One Sample Demographic Information									
Group	Grade	Student Count	Percent In Low Achieving Group	Percent Not English Proficient	Percent Free/ Reduced Lunch	Percent Caucasian	Percent Hispanic/ Native American	Percent African American/ Caribbean	Other Ethnicity or No Information

### Arizona District 1

Digits Comparison	6	104(100%) 80(99%)	35% 48%	4% 8%	43% 49%	39% 37%	39% 42%	13% 18%	9% 4%
Digits Comparison	7	71(100%) 74(100%)	31% 54%	3% 5%	54% 50%	38% 39%	48% 47%	9% 11%	6% 3%

### Arizona District 2

Digits Comparison	6	133(96%) 71(100%)	67% 63%	11% 6%	73% 83%	28% 21%	46% 45%	7% 9%	19% 25%
Digits Comparison	7	133(96%) 80(95%)	66% 78%	6% 4%	61% 84%	42% 11%	29% 50%	9% 8%	20% 32%

### Illinois District 1

Digits Comparison	6	19(100%) 39(100%)	47% 21%	0% 0%	21% 36%	95% 97%	0% 0%	0% 0%	5% 3%
Digits Comparison	7	20(100%) 52(100%)	35% 27%	0% 0%	40% 35%	95% 100%	0% 0%	5% 0%	0% 0%

### Illinois District 2

Digits Comparison	6	47(100%) 41(100%)	30% 85%	0% 0%	32% 51%	94% 88%	0% 5%	0% 5%	6% 2%
Digits Comparison	7	61(100%) 49(100%)	13% 84%	0% 0%	28% 20%	98% 92%	0% 6%	0% 2%	2% 0%

### Kentucky District

Digits Comparison	6	140(99%) 140(99%)	37% 45%	0% 1%	40% 50%	91% 86%	2% 3%	3% 7%	4% 5%
Digits Comparison	7	153(99%) 143(99%)	27% 43%	.7% 0%	36% 48%	90% 87%	1% 0%	5% 9%	4% 4%

### Michigan District

Digits Comparison	6	125(100%) 113(99%)	70% 59%	0% 0%	77% 70%	49% 43%	2% 2%	38% 46%	11% 10%
Digits Comparison	7	123(97%) 124(100%)	56% 61%	0% 0%	66% 61%	33% 32%	3% 4%	53% 53%	12% 11%

I. The lower achieving sample constituted those students with GMADE scores one grade equivalent below their current grade level at baseline (ex., those 6th graders scoring at or below the 5.0 grade equivalent).

## Measures

Multiple measures were used to assess student achievement, program implementation, and student attitudes.

Evaluators selected the Group Mathematics Assessment and Diagnostic Evaluation (GMADE) to measure changes in student math skills because of its broad visibility and acceptance in the field and high technical merit. The GMADE is a standardized, norm-referenced assessment that is group-administered. It offers parallel forms, with Form A administered within one month of the start of school and Form B administered within one month of the conclusion of school. The GMADE is not a timed test, but generally takes 60 – 90 minutes to complete. The GMADE offers an overall Math score, as well as three subtests; Concepts and Communication, Operations and Computation, and Process and Applications. The subtests address students' knowledge of mathematics facts and language, use of basic computational algorithms and operations, and the ability to solve problems presented in written form, respectively.

In order to measure program implementation and teacher perceptions, evaluators collected data through observations, surveys, and interviews with math teachers. Math teachers (treatment and comparison) also completed weekly implementation logs. This information provided researchers with a detailed data source on what was occurring in treatment and comparison classrooms in terms of math instruction, and allowed researchers to identify areas of overlap in terms of content taught and activities. The biannual classroom observations and interviews or focus groups with classroom teachers provided critical insight into the nature of use and the effectiveness of the math materials used with treatment and comparison students.

Additionally, student academic attitude surveys were administered in Fall 2011 and Spring 2012. The survey was developed by Gatti Evaluation, and included questions related to general math attitude, confidence, motivation, and self-perceived aptitude.

# Student Performance Results

## Results for *digits* Students

Students using *digits* achieved statistically significant gains in math achievement during their first year of program implementation. All *digits* students, across both 6th and 7<sup>th</sup> grades, experienced large gains on the GMADE Total and the three subtests.

Figure 2. *digits* Student GMADE Total Score: Beginning to End of Year Gains

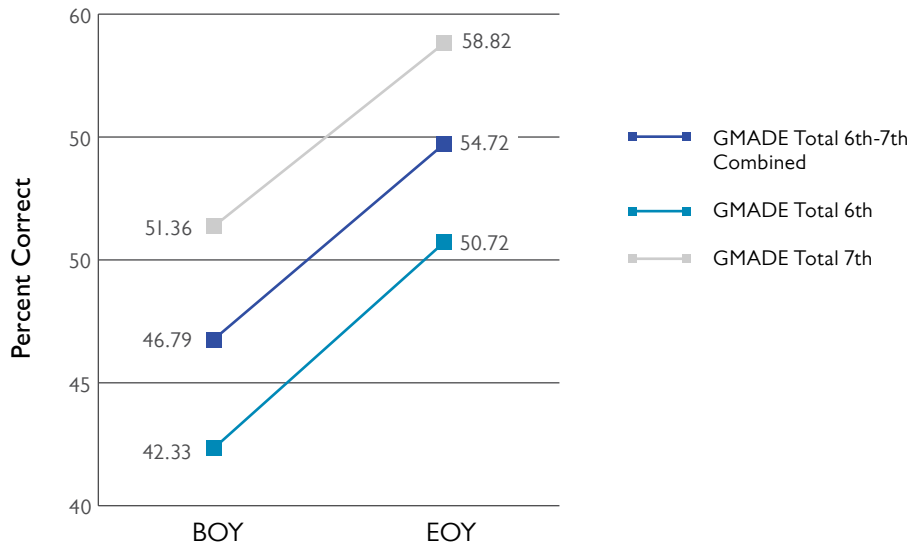
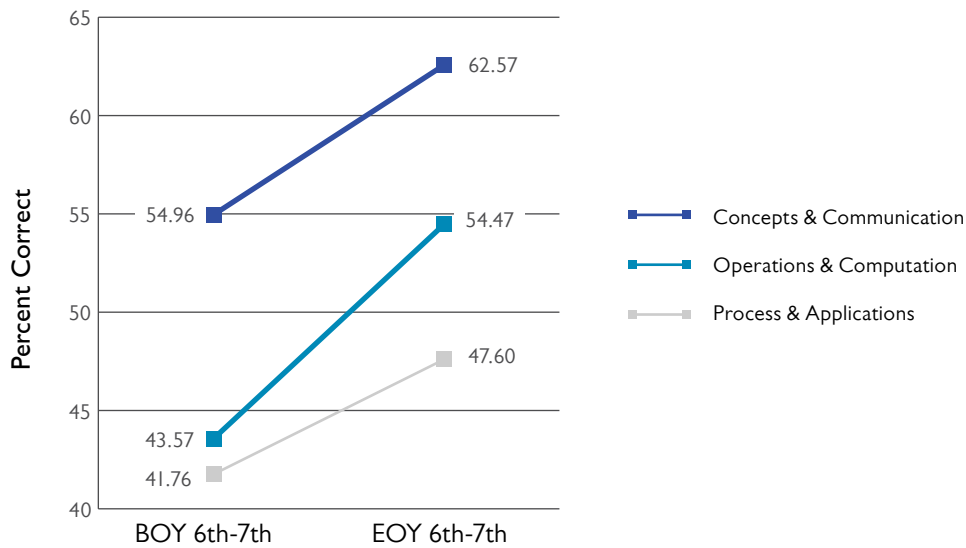


Figure 3. *digits* Student GMADE Subtests: Beginning to End of Year Gains



## Results for *digits* as Compared to Other Math Programs

Evaluators conducted analyses to examine how *digits* students performed in comparison to students using other math programs. Results showed that 6<sup>th</sup> and 7<sup>th</sup> grade student using *digits* performed similarly to their peers using other math programs on the GMADE Total. When results were broken out by grade levels, comparison students significantly outperformed *digits* students in 6<sup>th</sup> grade while 7<sup>th</sup> grade students performed similarly regardless of their math program.

These findings were not surprising given that the *digits* program is aligned to the Common Core, while the comparison programs were aligned to the existing state standards. All schools participating in this study were still required to administer the state assessment in 2011-12, and therefore had to work with the *digits* program to determine how to meet their current state standards. In addition, the *digits* program was brand new to teachers. They received training on the program the week prior to school beginning, and were required to solely implement the *digits* program for the entire school year. Given these challenges, it was notable that the combined 6<sup>th</sup> and 7<sup>th</sup> grade results indicated that *digits* students performed similarly to their peers after just one year of program implementation.

### *digits* Implementation

The majority of *digits* teachers implemented the program with moderate fidelity. There were two teachers that implemented with low fidelity and four teachers that implemented with high fidelity, the remainder were classified as moderate implementers.

Given that this was the first year of implementation, the amount of teachers who implemented with moderate fidelity was expected. In addition, *digits* teachers had to creatively find ways to cover content that was expected for their state standards during the 2011-12 year. We expect that implementation fidelity will increase for teachers in the second year of the study as their states prepare to test on Common Core standards.

# Participant feedback

## Student Attitudes

In addition to providing evidence of efficacy, Gatti Evaluation investigated other outcomes associated with use of the *digits* program. The full results of the report, Pearson *digits* Longitudinal Efficacy Study: Interim Report, are available on the Pearson Education (www.pearsoned.com) website.

When *digits* students were surveyed as to their opinions of the program, the majority (58%) demonstrated an overall positive attitude toward the *digits* program. Several notable themes emerged, including; 89% of the students felt the online homework was helpful in their learning and 80% liked how the digital hosts explained the math content.

Students also felt *digits* made math instruction more fun, more interesting, and math made more sense to them. *digits* students also reported that they both look forward to their math class and preferred the *digits* program to their previous math program.

## Teacher Attitudes

The teacher response to the *digits* program was overall positive. Teachers particularly enjoyed:

- Decreased lesson preparation time,
- Decreased time spent grading and scoring assignments,
  - Sixth grade teachers reported saving 169 minutes a week and 7<sup>th</sup> grade saved 300 minutes a week with *digits* autograding,
- Ease of lesson planning,
- High levels of student engagement and attentiveness,
- Strong Vocabulary and Math Writing,
- Useful intervention lessons,
- Leveled homework for their various learners, and
- Immediate remediation for their students when completing homework online.

Teachers were creative when working with students who did not have access to the internet at home. Some schools let students go to the computer labs during study hall or breaks, while other schools worked with local libraries to load *digits* and/or opened their computer labs before or after school. Multiple teachers reported that their students enjoyed the online homework so much that they did not like to complete paper and pencil assignments when required by the teacher.



## Conclusion

This study indicates that *digits* is effective at significantly increasing student math achievement. Furthermore, the combined 6<sup>th</sup> and 7<sup>th</sup> grade results indicate that a digital math program in its first year of implementation can perform comparably to print math programs that have been implemented for several years. Teachers and students using *digits* reported satisfaction with the program. In particular, teachers were very happy with the amount of time they saved in lesson preparation and grading over the course of the year. In sum, scientific research indicates that the *digits* program is an effective and useful program for both teachers and students.

## About Gatti Evaluation, Inc.

Gatti Evaluation was founded in 2003 to provide assistance in researching current topics in education and biomed. Gatti has extensive experience managing and consulting larger research projects for Fortune 500 companies and major academic institutions. Gatti researchers hold advanced degrees in Research Methods and Education. They also collaborate with numerous hand-picked, world-renowned researchers, practitioners, and academic research centers. Learn more at [www.GattiEval.com](http://www.GattiEval.com).