

Imagine Math Facts: Significantly Improved Math Fact Fluency and Automaticity

Background

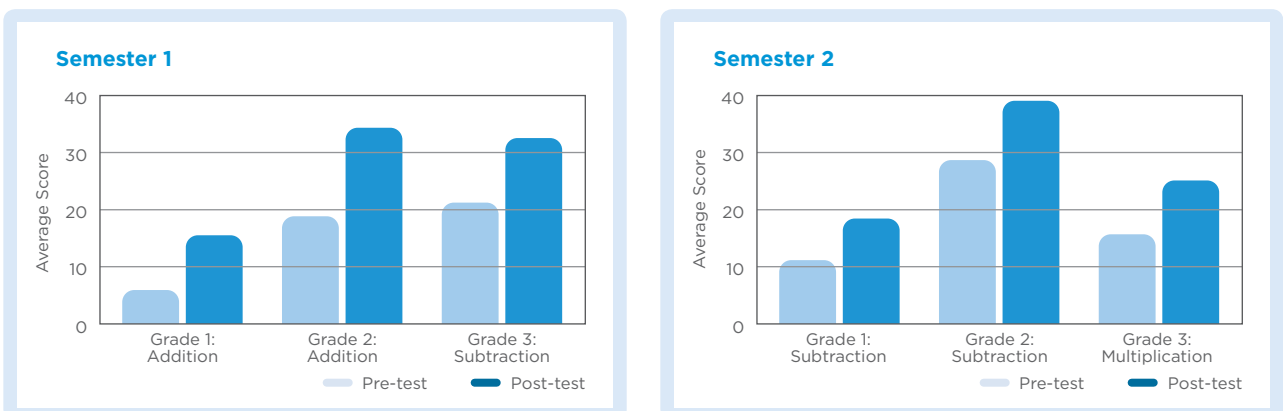
The development of math fact fluency and automaticity is a core requirement for later success in advanced mathematics (Nelson, Parker, & Zaslofsky, 2016; Steel & Funnell, 2001). To be considered fluent and automatic, a student must be able to rapidly recall the correct solutions to basic math operations including addition, subtraction, multiplication, and division (Geary, 2011). Despite the importance of developing these skills, several national groups, including the 2008 National Mathematics Advisory Panel, have found that “few curricula in the United States provide sufficient practice to ensure fast and efficient solving of basic fact combinations and execution of the standard algorithms.” (NMAP, 2008)

Given this context, the Imagine Math Facts program is designed to improve math fact fluency in elementary age students. The game-based program builds math fact fluency and automaticity by differentiating instruction for each student, providing repeated and focused practice on previously unlearned math facts, with constant and immediate feedback while maintaining engagement through exciting and rewarding gameplay.

Study Procedures

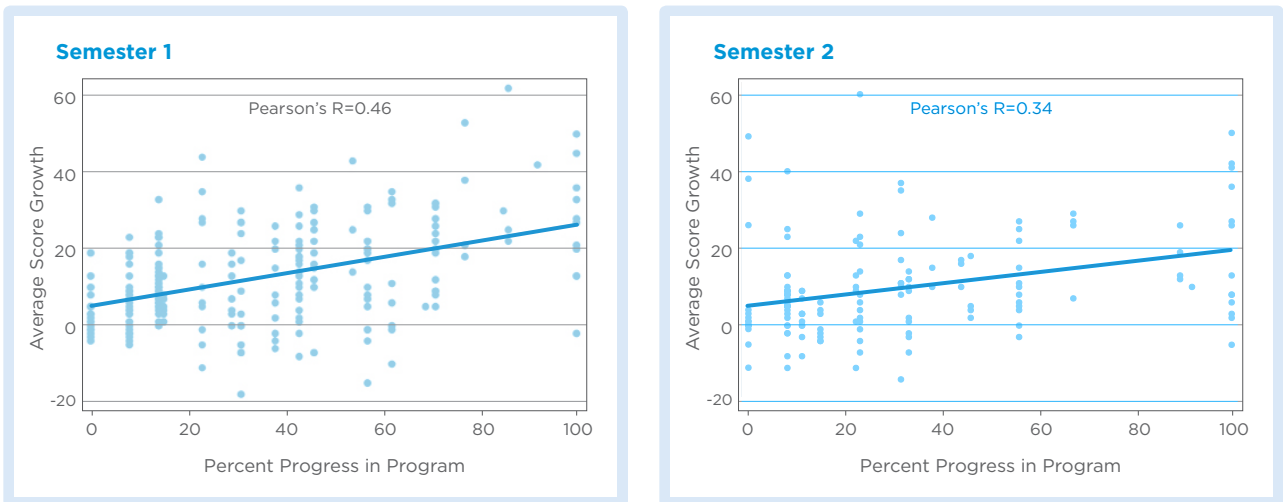
During the 2018-2019 school year, a southern Texas school implemented Imagine Math Facts in grades first through third grade to help improve addition, subtraction, and multiplication fact fluency and automaticity. Since students typically need only 6-10 weeks to complete all Imagine Math Facts exercises for each math fact family (addition, subtraction, etc.), students practiced different math fact families in each semester. During the first semester, first and second grade students practiced addition while third grade students practiced subtraction in the program. In the second semester, first and second grade students practiced subtraction while the third graders worked on multiplication.

Figure 1. Average Pre- and Post-Test Performance by Grade.



To determine the impact of using the Imagine Math Facts program, teachers administered 3-minute, 100-question math fact tests at the beginning and end of each semester. Students were instructed to complete as many problems as possible within the time limit. The number of correct responses was used as the final score.

Figure 2. Correlation between Percent Progress in the Imagine Math Facts Program and Average Post-Test Performance.



Results

Students using Imagine Math Facts logged approximately two hours on average in the program during both the first and second semesters.

Figure 1 presents the average pre- and post-test scores by grade for students who used Imagine Math Facts during each semester of the 2018-2019 school year. Students in all three grade levels experienced significant improvements in math fact fluency and automaticity after using the program. Figure 2 demonstrates the positive correlation between progress within the Imagine Math Facts program and change in performance between the pre- and post-tests.

The results show students using the program in this Texas school during the 2018-2019 school year experienced significant improvements in math fact fluency and automaticity as demonstrated by performance on the 100-question math facts assessments. Given these findings, we would expect comparable results for other students who use the Imagine Math Facts program with fidelity.

References

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- National Mathematics Advisory Panel (2008). *The Final Report of the National Mathematics Advisory Panel*. Washington, DC.
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