

# Report on the Impact of Sproglit's *Kyle Counts* App on Math Performance

## Abstract

A randomized, controlled experiment was conducted in five 1<sup>st</sup> grade classrooms to determine whether *Kyle Counts*, an addition and counting game designed by Sproglit, LLC for the iPad, improves performance on grade-appropriate tests of addition and number sense. *Kyle Counts* uses a proprietary graphical depiction of numbers known as the *Math Arrow*, which is intended to make numerical patterns appear more intuitive to children. Understanding “number sense” and developing addition skills are crucial to a child’s future success in school.

## Key Findings

- Students in the first tested group played *Kyle Counts* for ten minutes a day for five days. After playing *Kyle Counts* for a total of 50 minutes, their mean scores on an arithmetic test rose by 0.887 points, equivalent to a 7.58% improvement and an increase of 27% of the standard deviation.
- Students in the second tested group played *Kyle Counts* for 2 to 5 days. Their scores improved by .676 points, equivalent to a 5.77% improvement and an increase of 21% of the standard deviation.
- Students who scored above the mean in a pretest, increased their scores by a greater degree, equivalent to an improvement of 8 to 11 percent.
- The test scores cited above suggest that children playing *Kyle Counts* improve their knowledge of addition and number sense and that even a small increase in playing time is associated with higher scores.

## Experiment Design

We employed a randomized, controlled, crossover experiment in five 1<sup>st</sup> grade classrooms. After administering a 20 question pre-test, we matched students into pairs based on their performance on the pre-test. We randomly selected one student from each pair to be in the treatment group and the other into the control group.

The treatment group used the app for ten minutes each day for five days. On the final day all students took another 20-question test with the same types of questions as the pre-test. We then reversed the groups and the control group was allowed to use the app for ten minutes each day for the next five days (though some classrooms experienced slightly fewer days due to end-of-year activities). At the end of those five days all of the students took a final 20-question test. Our final analysis sample includes all pairs of students for which both students took all three tests and includes 68 students.

## Results

The table below provides the results from the experiment. The outcome variable is the student’s test score which has a mean of 11.7 and a standard deviation of 3.22. The treatment effect represents how much more the test scores of the students in the treatment group improved relative to those in the control

group. Columns 1 and 2 provide the treatment effect for the students assigned to the treatment group during the first and second week respectively. The standard errors of each estimate are provided in parentheses.

The results indicate that students who were randomly assigned to use the app during the first week scored 0.887 points higher on the next test (an increase of 27% of the standard deviation) relative to the control group. When we flip the treatment to the control group, we find that this set of students also has a large increase in performance with their scores improving by 0.676 points (or 21% of a standard deviation) relative to the students who were not using the app that week. The increase is likely lower because many of the students in the second group had fewer days to use the app due to end-of-year activities. The third column provides the combined effect across the two groups which produced an average increase of 0.706 points or 22% of a standard deviation.

The final column examines whether the impact app differs based on a student's baseline math performance. The baseline test scores varied from 1 to 19 with 80% of the students scoring between 8 and 15. We include an interaction term between the student's baseline score and the treatment effect and find the app had an even larger impact on students who had the highest levels of initial performance.

	Week 1	Week 2	Combined	Combined
Treatment Effect	0.887 (0.703)	0.676 (0.697)	0.706 (0.539)	0.725 (0.531)
Treatment Effect * Baseline performance				0.139 (0.146)
Baseline performance				0.627 (0.102)
Observations	68	68	136	136

## Conclusion

This study investigated whether a new math learning app, *Kyle Counts*, using a new graphical depiction of numbers called the *Math Arrow* could improve addition skills and number sense among first grade children. In this controlled experiment *Kyle Counts* showed significant promise, increasing scores on a grade-appropriate arithmetic test. Furthermore, the researchers who administered this study reported that the children greatly enjoyed the experience of playing *Kyle Counts*.