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Randomized Control Trial Study of K-3 Students Demonstrates Greater Scantron Reading Assessment Performance for Imagine Language & Literacy Users

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Abstract

Supplemental education technology tools such as those that provide computer-assisted instruction may provide important academic value to elementary age students in developing literacy and language skills. A randomized control trial of students within five schools was conducted in a northwestern school district in the United States of America to evaluate the academic impact of the Imagine Language & Literacy program on student literacy outcomes. In one school, K–3 students who used the program were found to have achieved test scores that were significantly greater than students who did not use the program during the 2013–2014 school year. The results of this study provide evidence of the effectiveness of supplemental literacy tools such as Imagine Language & Literacy in improving student outcomes in literacy development.

Keywords: Literacy, Education Technology, Computer-Assisted Instruction.

Introduction

Prior research evidence indicates that education technology such as computer-assisted instruction can positively impact student growth in literacy and language development (Cheung & Slavin, 2013; Macaruso & Rodman, 2011). Many of these digital solutions provide particularly valuable supports to struggling readers or similar students requiring academic support by identifying specific skill or knowledge gaps and building customized instructional pathways that address these learning deficiencies (Basham et al., 2016; Holmes et al., 2018).

Imagine Language & Literacy, a digital literacy and language solution developed by Imagine Learning, is an adaptive supplemental program designed to improve literacy and language achievement through customized instruction in phonemic awareness, phonics, vocabulary, fluency, comprehension, grammar, and language development (both academic and conversational). Within the program, students initially complete a benchmarking assessment that places them in content appropriate for their instructional needs. For example, struggling students may receive instructional content that focuses on foundational literacy skills whereas advanced students may receive instructional content that allows for further development of complex literary comprehension. Ultimately, the program assists teachers in differentiating instruction and providing individualized supports for students of all academic levels.

During the 2013–2014 academic year, a school district in the northwest partnered with Imagine Learning to conduct research using Imagine Language & Literacy. The objective of the study was to evaluate the impact of the Imagine Language & Literacy program on student outcomes in literacy development as measured by the Scantron Reading assessment.

Materials and Methods

Procedure. The research design was a randomized control trial with students in Grades K–3. While all were invited, five of the nine total elementary schools in the school district volunteered to participate in the study. All K–3 students within each of the five elementary schools were initially enrolled in the study. Each of the participating schools were classified as Title 1 schools and, on average, enrolled 8% Black, 30% Hispanic, and 58% White students. Due to exposure to the Imagine Language & Literacy program in the previous school year, intervention and control students labelled as having Limited English Proficiency were excluded from the study.

Within each participating school, random assignment was blocked on class. Therefore, half of the students in each participating classroom were randomly assigned to the intervention condition and half were assigned to the control group. This randomization procedure was specifically implemented to account for potential teacher effects such as differences in teacher experience, education, or other factors that might influence the outcomes evaluated in this study. By employing this blocked randomization procedure, we can be confident that any

observed effects would be due to the intervention under study as opposed to factors related to teacher differences.

Students assigned to the intervention group used the Imagine Language & Literacy program as recommended during the 2013–2014 school year. Outside of the use of the Imagine Language & Literacy program, students in both the intervention and control groups uniformly received the same typical classroom instruction for reading/English language arts. Further, access to any additional supplemental literacy programs outside of Imagine Language & Literacy was made equally available to all students regardless of assigned study condition. The only difference in literacy instruction between the intervention and control conditions was the implementation of the Imagine Language & Literacy program for the intervention students.

Treatment Fidelity. Students who used Imagine Language & Literacy were assigned to use the program for between 80-100 minutes per week. Usage was monitored throughout the study with participating administrators and teachers having access to usage reports on demand. Additionally, the Imagine Learning research team verified that the students assigned to use Imagine Language & Literacy met usage targets throughout the study.

Measure. The Scantron Reading Performance Series assessment was used to measure student achievement in reading. This standardized assessment measures Reading Foundations, Phonological Awareness, Phonics, Text Comprehension, and Vocabulary. The Scantron Reading Performance Series is a research-based, criterion-referenced computer-adaptive assessment that tracks student growth over time.

Analysis. Study data was analysed for each school separately and in aggregate. To ensure students in the control and intervention groups were similar, k-nearest-neighbours matching was done for each analysed school for students' pre-test scores, gender, and grade. The effect size (Cohen's d) and level of statistical significance using t-tests were measured for each school. Students labelled as being on an Individualized Education Program (IEP) were not included in these analyses.

Results and Discussion

In four of the five schools evaluated in the study, performance between intervention and control students was not found to be significantly different. However, results from one school (School A) showed statistically significant (p = 0.032) differences between the overall pre- and post-test scaled scores for the control (n = 51) and intervention groups (n = 51), with Imagine Language & Literacy users outperforming their peers (Table 1). The effect size was .44 (Cohen's d), which is a moderate effect.

Table 1. *Summary of School A Student Performance on the Scantron Reading Performance Series Assessment*

Assignment	*n*	Pre-Test Score	Post-Test Score	Growth	*p* value	Cohen's d
Control	51	1777	1913	136	0.032	0.44
Intervention	51	1744	1949	205		

Conclusions

This study provides evidence that Imagine Language & Literacy users derived significant literacy skill development from using the program. Results for students at one school indicate a moderate effect for reading skill development. The results of this robust randomized study demonstrate that the effect is likely due to program utilization, which was at recommended levels, and not to chance.

Some considerations temper the interpretation or generalizability of these findings. Due to the locality of this study within a single school district, the results are specific to the participating district and may not generalize to other locations. Further, limited sample sizes within each participating school tend to reduce statistical power and, in the case of this study, may have reduced the likelihood of detecting statistically significant differences between study conditions or potentially inflated measured differences. Future studies with larger sample sizes would increase the statistical power to detect any real differences between study conditions.

This study is also supported by several strengths. For example, the blocked randomized research design is a valuable strategy for accounting for a variety of possible teacher effects. With this design, we can be confident that the observed findings are not influenced by variations in teaching experience, strategy, or similar factors. Further, while not typically required for randomized control trials, the overlay of statistical matching confirms similarity between study groups and increases confidence in the accuracy of the observed results. Finally, the utilization of a standardized, research-based assessment to measure student outcomes increases confidence in the accuracy and potential reproducibility of the study findings.

Ultimately, this study adds to the growing evidence that the utilization of digital supplemental education programs such as Imagine Language & Literacy by elementary age students provides significant benefits in literacy skill development.

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Data Availability

Data requests for this study may be submitted to drew.berrett@imaginelearning.com.

Conflicts of Interest

All manuscript authors are employed by Imagine Learning, the developer of the Imagine Language & Literacy program. This association may create a perceived bias in the value and outcomes of this study.

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