Closing the App Gap: Improving Children's Phonological Skills

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The purpose of our study was to examine the efficacy of Learn with Homer, an application designed to improve school readiness skills on children's early literacy development. Specifically, the trial focused on children's speech-to-print development, recognizing that the skills of phonological awareness and the understanding of the alphabetic principle are strongly predictive of school readiness. Our goal was to better understand how a carefully targeted application, with an evidence-based instructional design, could help to improve children's skills and potentially close the gap for low-income children. Given what is known about the 'summer slide,' for poor children in particular, providing phonological awareness in a highly motivating program might be especially critical, given the significant differences in children's early language skills as they enter kindergarten, right 'at the starting gate.'

The study was conducted in seven Head Start classrooms, with an initial sample of 95 children. Children were randomly assigned to treatment and control groups. Demographic statistics are reported in Table 1 for the final sample ($N = 82$). Children in the study were primarily African American, a smaller percentage of Hispanic children, and one Asian child. There were no Caucasian children in the sample. All participants were eligible for free and reduced lunch. Receptive language scores, as measured by the PPVT, indicated that children were one standard deviation or more below average.

Prior to the start of the study, children were individually assessed on the following measures:

- Print Knowledge Subtest (standardized TOPEL[1])
- Phonological Awareness Subtest (standardized TOPEL)
- Rhyming Subtest (criterion-referenced PALS[2])
- Alphabet letters—upper case
- Alphabet letters—lower case
- Letter sounds
- Decoding
- PPVT[3]

As shown in Table 2, there were no significant differences in school readiness skills prior to treatment with the exception of phonological awareness. In this case, the control group was significantly higher on phonological awareness skills when compared to the treatment group.

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[1] TOPEL refers to the Test of Preschool Early Literacy.
[2] PALS refers to the Phonological Awareness and Literacy Screening.
[3] PPVT refers to the Peabody Picture Vocabulary Test.

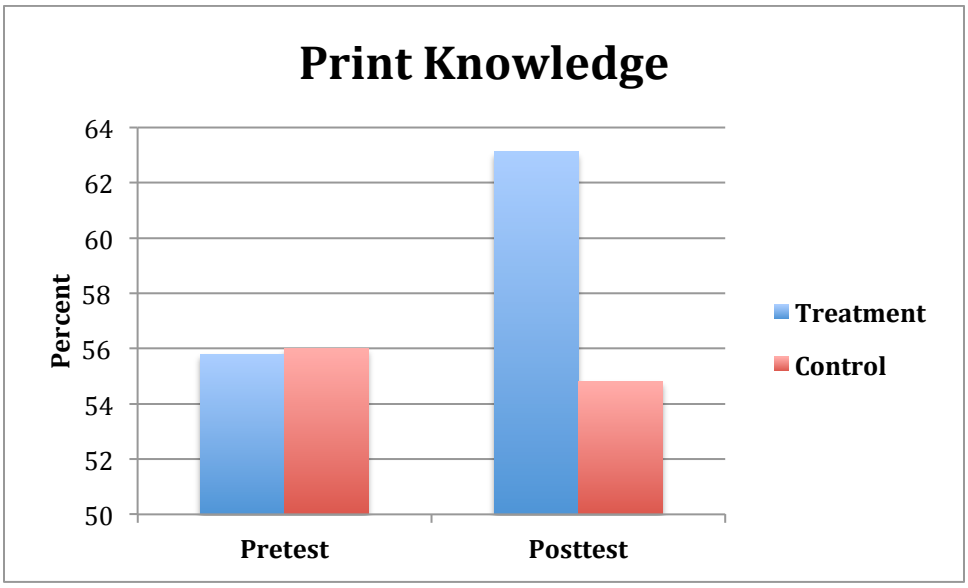
The Intervention

Teachers were asked to cluster the children in each classroom into small groups ($N = 4$ or 5). Each child in the group was given an iPad with an application already loaded. Based on random selection, some groups received a music and math app, while others received the Learn with Homer app, which is targeted toward developing phonological skills. Children put on their earphones and would then proceed to work on a lesson independently, at their own pace, for approximately 12–15 minutes. Moderators circulated throughout the time to ensure that children were engaged in the activity or to help them get back on track, if necessary. Their role was to moderate the intervention and not to teach. All instruction was conducted on the applications themselves.

Within the six-week period, children completed six lessons on Learn with Homer. Average dosage, therefore, was 450 minutes or 7.5 hours of treatment. Those in the control group did not have a sequenced program. In this respect, the 12–15 minutes of activity each day was spent on various games and activities that were available on the app. At the end of the six-week period, posttests were administered using similar procedures as the pretests.

Results

Treatment group scores exceeded those of the control group on six of the seven measures (there were no differences in decoding). Significant group differences were recorded for three measures: print knowledge, phonological awareness, and letter sounds.

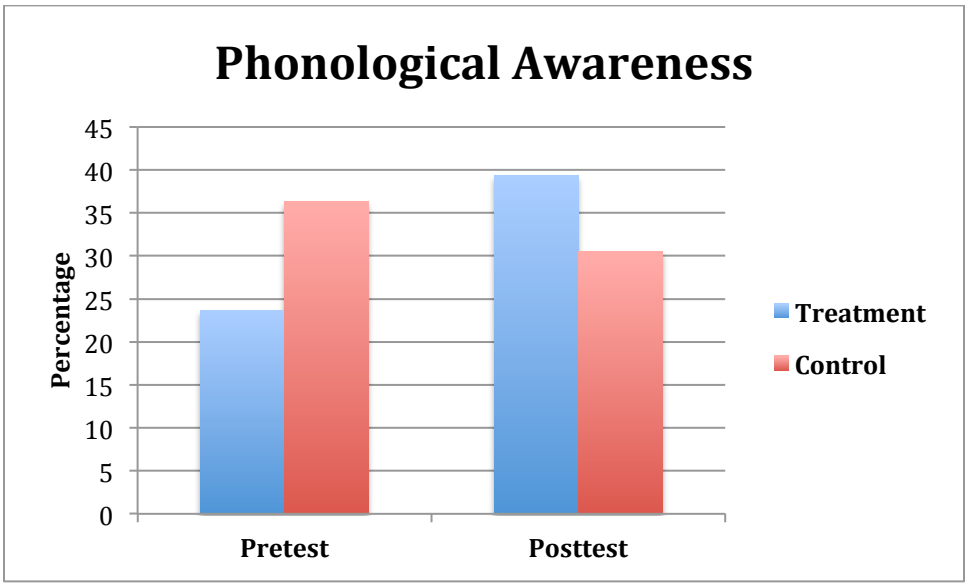


*Effect size: .28, $p = .046$

Figure 1. Print Knowledge

This graph indicates that the treatment group surpassed the control on the standardized

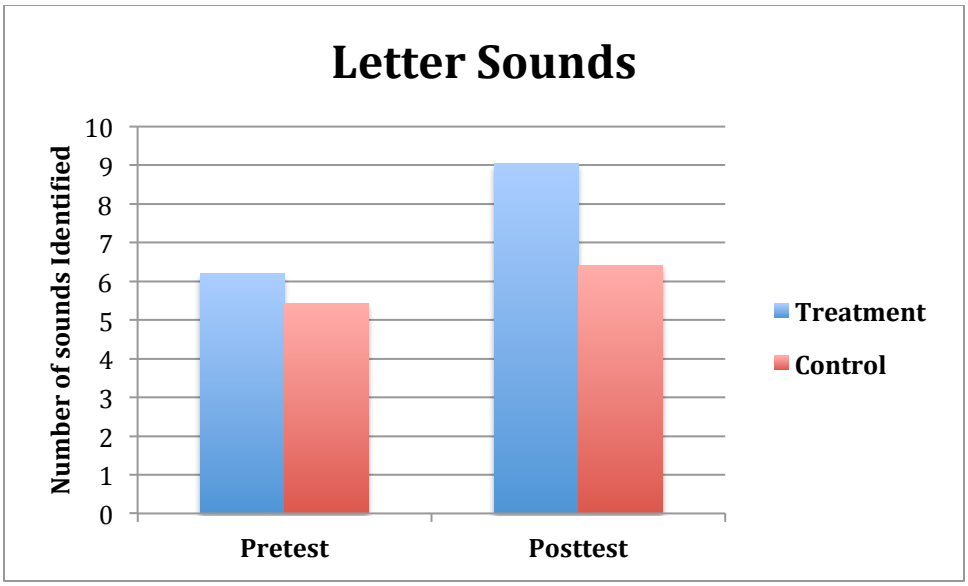
measure of print knowledge. Differences were statistically significant. Effect size was modest.



*Effect size Cohen's d = .31, p = .053.

Figure 2. Phonological Awareness

This figure displays an interesting pattern. Initial differences between the treatment and control groups for phonological awareness at pretest were significant (Table 2), indicating that the control group was superior in the skill prior to the start of the trial. However, over the summer and despite continuing enrollment in preschool, the control group's scores declined significantly. While, in the treament group, children's scores on phonological awareness grew significantly, overtaking the initial differences between the groups. These differences between the groups at the end of the trial were statistically significant. At posttest, children in the treatment group were beginning to approach the norm on this important skill.



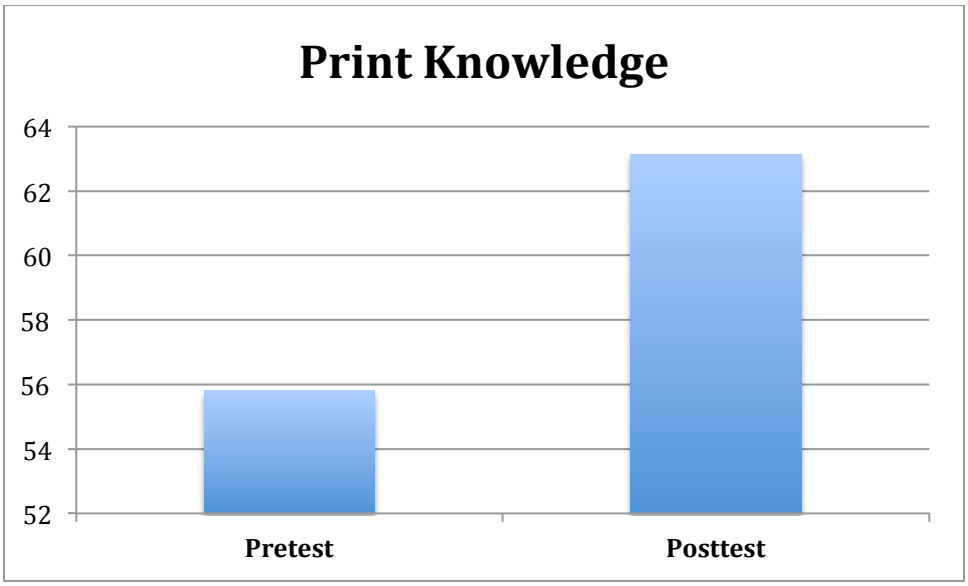
*Effect size Cohen's d = .34, p = .056

Figure 3. Letter Sounds

The initial differences on letter sounds between the treatment group and the control group were not significant. Following the treatment, however, there were significant differences between the groups. Scores for the control group remained essentially flat, suggesting limited attention to letter sounds throughout the summer. On the other hand, scores grew significantly higher on letter sounds for the treatment group.

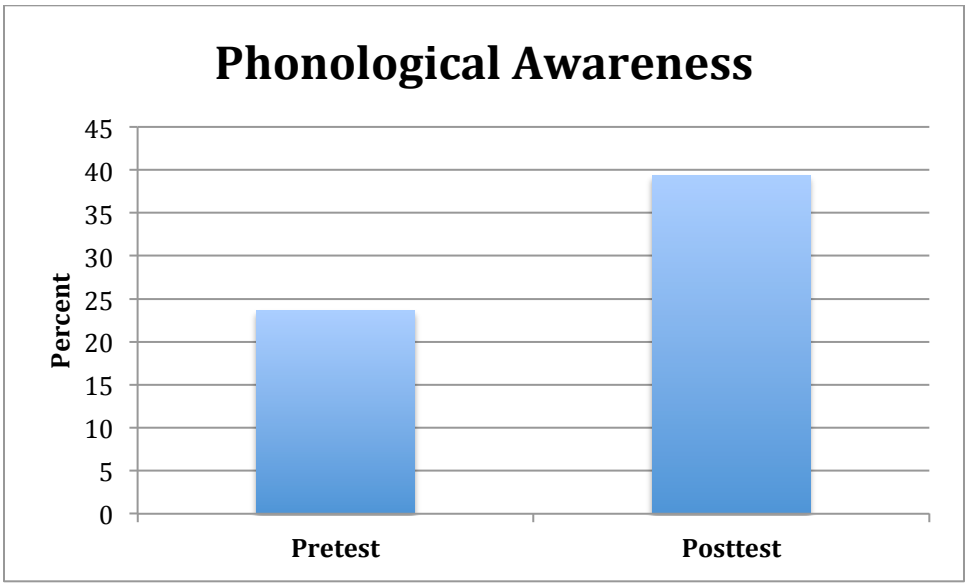
Gains Made Over the Summer

The next series of graphs examines children's growth over the summer, focusing on the treatment group, in particular. Paired *t*-tests were conducted for all subtests. With the exception of the alphabet letters—upper case, all measures indicated statistically significant gains over the summer. Significance scores as well as effect sizes accompany each graph.



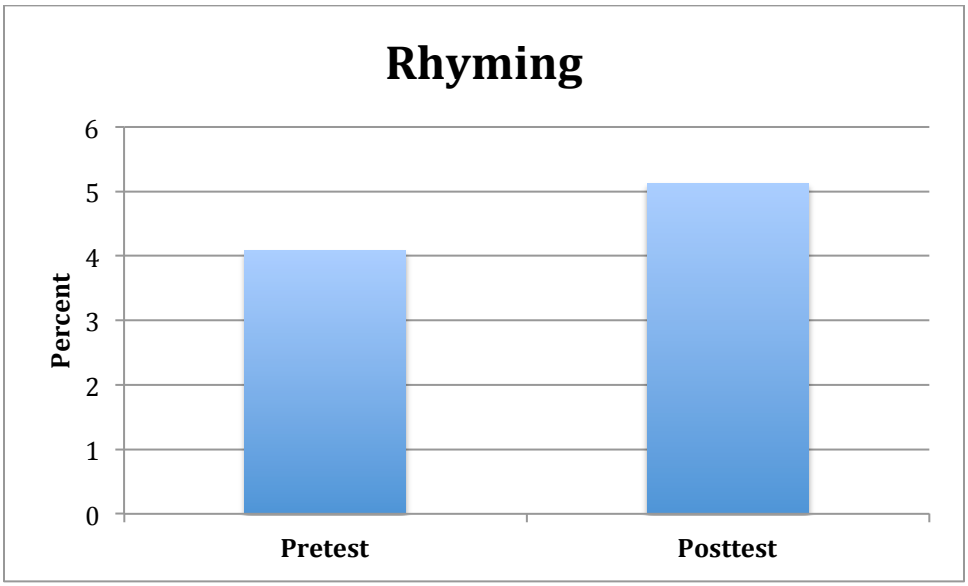
*Effect size, Cohen's d = .23, p < .001

Figure 4. Print knowledge: Pretest to Posttest Gains



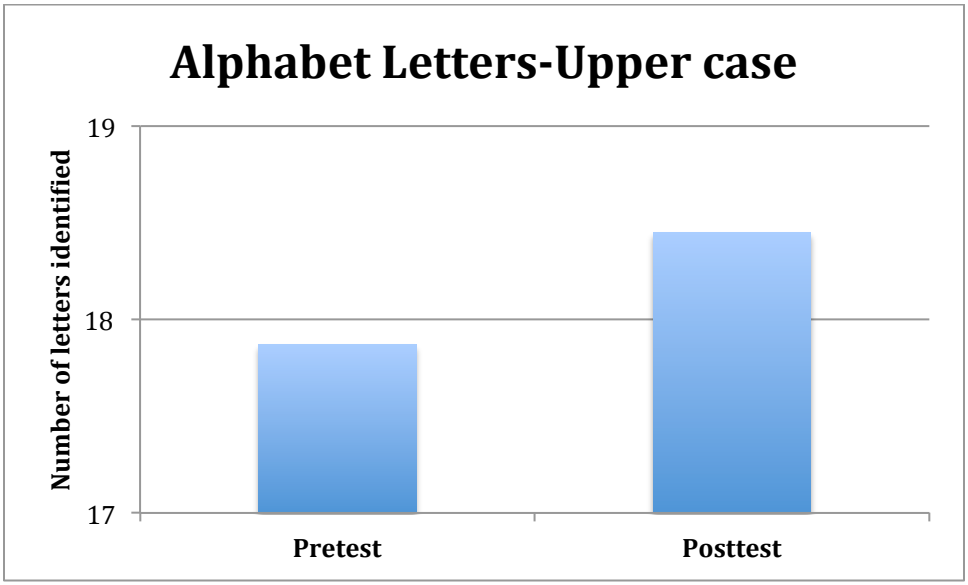
*Effect size, Cohen's d =.63, p = .002

Figure 5. Phonological Awareness



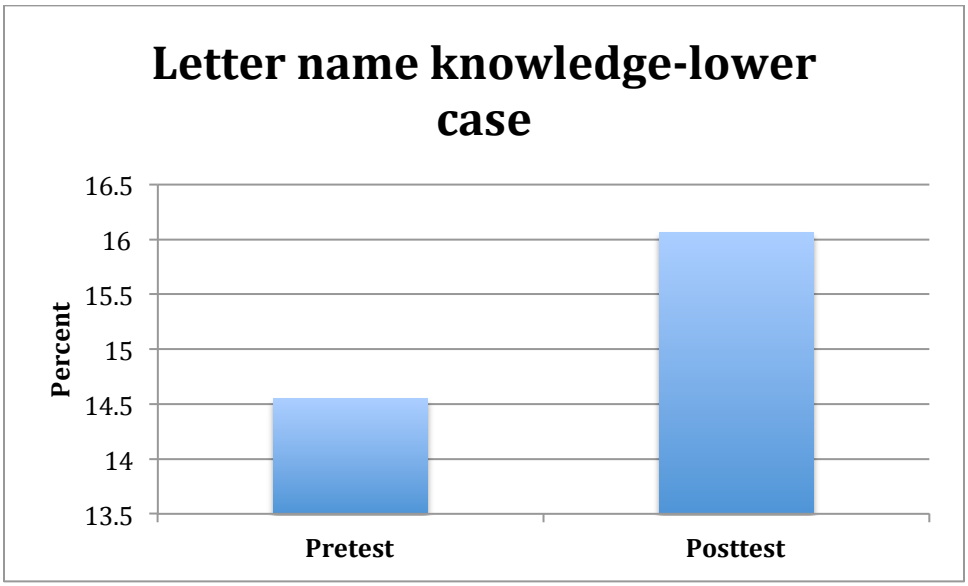
*Effect size, Cohen's *d* = .47*; p* = .002

Figure 6. Rhyming



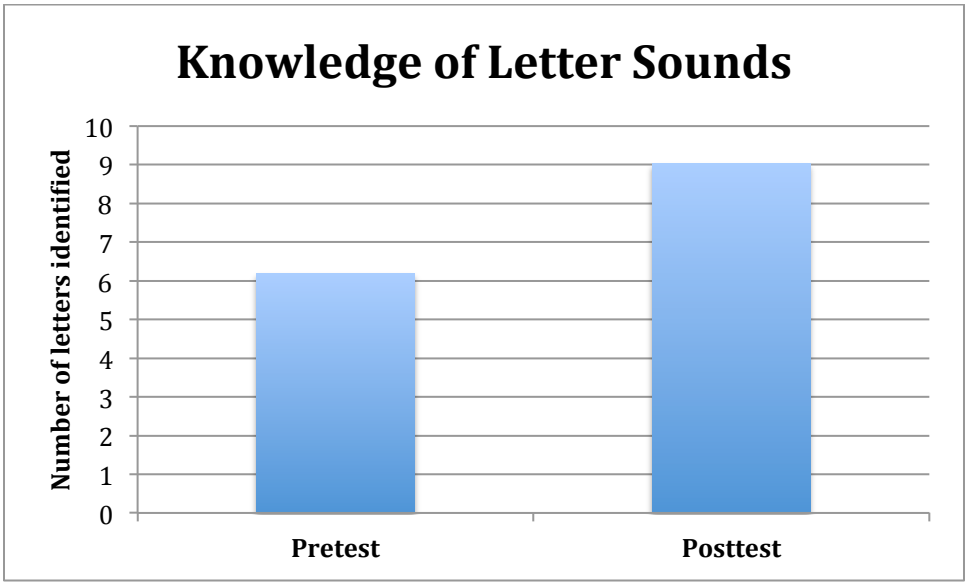
*Effect size Cohen's *d* = .06, *p* = n.s.

Figure 7. Alphabet letters—upper case



*Effect size, Cohen's *d* = .16, *p* = .005

Figure 8. Alphabet letters—lower case



*Effect size, Cohen's *d* = .38, *p* = .001

Figure 9. Letter Sounds

Summary

This study indicated measurable effects for children's growth in phonological awareness and in developing an understanding of the speech-to-print connections in early literacy development. Children in the treatment group exceeded those in the control group in three areas in particular: print knowledge, phonological awareness, and letter sounds. For the treatment group specifically, children made statistically significant gains in all skills measured, with the exception of the identification of the alphabet's upper case letters. These results indicate that Learn with Homer significantly improved children's school readiness skills.