

# *The Effects of Two Computer-Based Reading Software Programs on Student Reading Performance*

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## **Abstract**

*Reading below grade level at the elementary level continues to be an ongoing nationwide trend in many schools. With an increasing amount of struggling readers and the rising use of educational technology, it is important for school systems to understand the effectiveness of various types of available technology applications to support student reading performance among struggling readers. With this in mind, school systems must know how to determine which technology applications are more effective for increasing student performance with reading. This study focused on two computer-based reading software programs that claim to aid in improving student reading performance, ABCmouse and Starfall. Participants included 20 second grade students who were randomly assigned to two comparison groups. Data from this technology-based intervention was collected and analyzed to determine which reading software programs had the greatest impact on student performance with reading.*

**Keywords:** *technology, Starfall, ABCmouse, reading, software programs*

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## **Introduction**

Recent reports for student performance with reading in the United States have shown minimal gains among 4<sup>th</sup> and 8<sup>th</sup> grade students, as well as persistent gaps between high- and low-performing students (U. S. Department of Education, 2017). This report also revealed that over 60% of fourth graders were not reading at a basic level of proficiency. In order to provide effective interventions to support reading instruction, teachers must assess the types of reading problems that are prevalent among

students. Identifying effective reading interventions for students is a critical step during this reading-to-learn phase of learning (Chall, 1983).

It is vital for teachers to understand the complexity of challenges associated with low reading performance. Spear-Swerling (2015) described three common profiles for struggling readers: specific word-reading difficulties, specific reading comprehension difficulties, and mixed reading difficulties. Students who experience specific word-reading difficulties

have problems related directly to reading words. Students who experience specific reading comprehension difficulties have poor reading comprehension with at least average word-reading skills. Students who have mixed reading difficulties have a combination of weaknesses with both word-reading skills and core comprehension areas.

Reading skills are generally acquired during the early elementary years (Chall, 1983). Vernon-Feagans et al. (2010) contended that many instructional reading programs used to foster the development of early reading skills were ineffective. Vernon-Feagans et al. described two groups of early elementary children who failed to profit from instructional reading programs adopted by schools. The first group included students who entered elementary school with adequate oral language skills but had trouble with the relationship between oral language and printed words. The second group entered elementary school with problems in oral language skills, vocabulary, and print-related phonological knowledge. The second group of students was larger than the first group and composed of mostly of low-income children. Similarly, Cheung and Slavin (2013) explained that some early elementary students struggle to learn to read because they are unable to use automaticity when decoding words. Automaticity is an important skill because it promotes fluent and effortless word pronunciations (Nageldinger & Rasinski, 2016). Furthermore, some students are proficient with decoding words effortlessly, but they may not comprehend words or sentences because they lack accurate understandings of word meanings.

### **Review of Literature**

Students who have trouble with reading during the early elementary years are at a greater risk of low-reading performance in future grade levels (Lesnick, Goerge, Smithgall, & Gwynne, 2010). Beyond high school, falling behind in school has more serious consequences and long-term life effects. Adults with lower levels of literacy and education are more likely to be

unemployed or earn an income that falls below the poverty level.

Teachers are able to improve student performance with reading using well-planned interventions. Cheung and Slavin (2013) asserted that a great number of reading interventions have been proposed and utilized with low-performing readers. These interventions include improvements with the initial teaching of reading, one-on-one tutoring, small-group tutoring, comprehensive school reform, and the use of technology applications. Among these interventions, the use of technology applications has become one of the most popular and flexible intervention tools to accommodate the diverse needs of students within different settings. Pindiprolu and Forbush (2009) emphasized that challenges associated with the development of early reading skills are best addressed with computer-based reading software programs. Computer-based reading software programs should provide students with systematic and explicit instruction as needed with the five early reading skills area of phonemic awareness, phonics, fluency, vocabulary, and comprehension (National Reading Panel, 2000).

### **Two Computer-Based Reading Software Programs**

One of the many advantages of computer-based reading software programs is that the technology application may be offered in both school and home settings. This provides students with additional time to practice reading skills independently. Pindiprolu and Forbush (2009) explained that many parents do not have the knowledge and skills required to teach reading in an explicit and systematic manner. However, computer-based reading software programs can help to overcome this barrier and enable parents to assist with the reading needs of their children. Computer-based reading software programs also allow for differentiation among all students, as each program is equipped with lessons ranging from easy to challenging levels. Some programs may even adapt instruction automatically according to the

students' reading level. Additionally, computer-based reading software programs capture the attention of students through appealing sensory engagement, kid-friendly modalities, interesting graphics, and innovative activities that provide feedback to reinforce the acquisition of essential reading skills (Karchmer-Klein & Shinas, 2012). With respect to the reinforcement of essential reading skills, Karemaker, Pitchford, and O'Malley (2008) noted that computer-based reading software programs offer features that support the development of word recognition skills, such as highlighting words as they are read and providing sound for the expression of unfamiliar words.

### **ABCmouse**

Various studies have explored the use of computer-based reading software programs and their effect on students reading performance. Early education experts, commissioned by Age of Learning (2016), conducted three large-scale experimental studies to examine the effectiveness of ABCmouse with respect to student reading performance. The first study was conducted among 320 students from 11 different schools located in Southern Florida. Findings showed that students who used ABCmouse accelerated their reading skills after the first eight weeks, whereas students in the control group took an average of 16 to 24 weeks to make the same progress. The second study was conducted among 1,900 students from multiple school districts in South Central Texas. Findings revealed significant gains among students who used ABCmouse in the areas of phonics, phonemic awareness, vocabulary, and letter knowledge. The third study was conducted among 4,500 students throughout the nation who used home subscriptions for ABCmouse. Findings demonstrated increases in reading scores by more than 50% for letter identification, phonemic awareness, and sight word recognition.

Lozano and Ponciano (2016) conducted a comprehensive assessment of school readiness that examined how increased use of ABCmouse affected kindergarten preparation. Based on

their findings, Lozano and Ponciano reported that on average, for every additional 100 ABCmouse learning activities completed, there was a 3.6% boost in school readiness scores. Similarly, Thai and Ponciano (2016) investigated the effect of ABCmouse usage among students who were identified as at-risk for school failure. In this study, prekindergarten teachers integrated ABCmouse into their instruction without specific requirements for amount of usage. The results indicated that the more ABCmouse learning activities completed by a prekindergarten student, the greater their kindergarten readiness scores at the end of the school year.

### **Starfall**

Starfall was developed as a free website for children who are in preschool through 2<sup>nd</sup> grade (Chase, 2007). Starfall reinforces language development and is appropriate for all students, including English language learners (ELLs) and students with special needs. Starfall offers a variety of reading activities on four different reading levels that promote the development of reading skills through repetition, graphics, and interactive opportunities games, activities, songs, and stories.

Metis Associates (2014) assessed the implementation and overall impact of Starfall usage among 431 kindergarten students enrolled in a school with Title I status on student reading proficiency. Among this sample, 267 students received Starfall instruction and 164 did not. Findings indicated that a significantly larger proportion of kindergarten students who used Starfall reached proficiency or higher during the spring administration of the Developmental Reading Assessment (2<sup>nd</sup> ed.).

Although ABCmouse and Starfall reading software programs are widely used in elementary classrooms, a gap in the literature exists regarding the effectiveness of each program. This study sought to determine which reading software program had the greatest impact on the reading performance of elementary students.

## Method

### Participants

Participants were 20 monolingual English-speaking 2<sup>nd</sup> grade students enrolled at an elementary school located in South Central Texas during the 2017-2018 school year. At the time of this study, the school was classified as a Title I school campus and served a large number of English language learners.

### Data Collection and Analysis

Participants were first administered a pretest in October to determine their reading level. The pretest was a school-district adopted reading benchmark tool to identify instructional and independent reading levels for students (Fountas & Pinnell, 2016). Student reading levels were categorized as Below Average (i.e., reading levels A-J), Average (i.e., reading levels K-M), or Above-Average (i.e., reading level N or higher).

After the pretest was administered, participants completed activities delivered by two computer-based reading software programs (i.e., ABCmouse, Starfall) for five weeks. Participants were randomly divided into two equal groups, and each group completed

learning activities with their designated reading software program for 15-minutes a day, three times a week. After the fifth week, participants completed a post-test using the same school district adopted reading benchmark tool (Fountas & Pinnell, 2016). Comparisons were made between the pre- and post-test results to identify any changes with reading levels.

## Results

### ABCMouse Results

The pretest and posttest findings for the 10 participants who used ABCmouse are shown in Table 1. Data analyses revealed improved reading levels for the five ABCmouse participants who were categorized as Below Average with the pre-test reading benchmark tool (i.e., Anna, Cassandra, Rebekah, Chris, Megan). Anna, Cassandra, Rebekah, Chris each demonstrated an increase of two reading levels. Of these four participants, Anna and Cassandra advanced to the Average category. Although Megan did not demonstrate any reading level increases, she did show improvement with fluency by increasing the number of words she read correctly per minute, as well as improvement with comprehension by the number of questions she answered correctly.

Table 1

*Pretest and Posttest Scores for ABCmouse Participants*

| Participant | Pretest Reading Category | Posttest Reading Category |
|-------------|--------------------------|---------------------------|
| Anna        | Below Average            | Average                   |
| Kassandra   | Below Average            | Average                   |
| Rebekah     | Below Average            | Below Average             |
| Chris       | Below Average            | Below Average             |
| Megan       | Below Average            | Below Average             |
| Melissa     | Average                  | Above Average             |
| Beto        | Average                  | Average                   |
| Sam         | Average                  | Average                   |
| Michael     | Above Average            | Above Average             |
| Juan        | Above Average            | Above Average             |

Data analysis also revealed improved reading levels for the three ABCmouse participants who were categorized as Average with the pre-test reading benchmark tool (i.e., Melissa, Beto, Sam). Melissa demonstrated an increase of two reading levels, which advanced her to the Above Average category. Beto also demonstrated an increase of two reading levels, but he remained in the Average category. Although Sam did not demonstrate any reading level increases, he did show improvement with fluency by increasing the number of words he read correctly per minute, as well as improvement with comprehension by the number of questions he answered correctly.

Lastly, data showed improvements for the two ABCmouse participants who were categorized as Above Average with the pre-test reading benchmark tool (i.e., Michael, Juan).

Michael demonstrated an increase of three reading levels, and Juan demonstrated an increase of two reading levels.

### Starfall Results

The pretest and posttest findings for the 10 participants who used Starfall are shown in Table 2. Data analysis revealed improved reading levels for the three Starfall participants who were categorized as Below Average with the pre-test reading benchmark tool (i.e., Randy, Mark, Rosa). Randy demonstrated an increase of two reading levels, and Mark and Rosa each demonstrated an increase of one reading level. However Randy, Mark, and Rosa were still considered Below Average as the reading level increases were not enough to advance them to a higher category.

Table 2

*Pretest and Posttest Scores for Starfall Participants*

| Participant | Pretest Reading Category | Posttest Reading Category |
|-------------|--------------------------|---------------------------|
| Randy       | Below Average            | Below Average             |
| Mark        | Below Average            | Below Average             |
| Rosa        | Below Average            | Below Average             |
| Esperanza   | Average                  | Above Average             |
| Tameka      | Average                  | Above Average             |
| Cindy       | Average                  | Above Average             |
| Aaron       | Average                  | Average                   |
| Carlos      | Above Average            | Above Average             |
| Jennifer    | Above Average            | Above Average             |
| Jules       | Above Average            | Above Average             |

Data also showed improvements among three of the four Starfall participants who were categorized as Average with the pre-test reading benchmark tool (i.e., Esperanza, Tameka, Cindy). Esperanza and Tameka demonstrated an increase of three reading levels, thus advancing both of them into the Above Average category. Cindy demonstrated an increase of one reading

level, but she was still categorized as Average. Although Aaron did not demonstrate any reading level increases, he did show improvement with fluency by increasing the number of words he read correctly per minute, as well as improvement with comprehension by the number of questions he answered correctly.

Lastly, data showed improvements among the three Starfall participants who were categorized as Above Average with the pre-test reading benchmark tool (i.e., Jules, Jennifer, Carlos). Each of these three participants demonstrated increases with their reading levels. Carlos demonstrated an increase of three reading levels, Jennifer demonstrated an increase of two reading levels, and Jules demonstrated an increase of one reading level.

### **Comparison of Starfall and ABCmouse**

When comparing the two computer-based reading software programs used in this study, the number of participants who were categorized as Below Average with the pre-test reading benchmark tool and demonstrated an increase of one or more reading levels was 40% among ABCmouse users and 30% among Starfall users. For participants who were categorized as Average with the pre-test reading benchmark tool and demonstrated an increase of one or more reading levels was 20% among ABCmouse users and 30% among Starfall users. For participants who were categorized as Above Average with the pre-test reading benchmark tool and demonstrated an increase of one or more reading levels was 20% among ABCmouse users and 30% among Starfall users.

### **Discussion**

This study presented findings that resulted from the use of two computer-based reading software programs, ABCmouse and Starfall, among students in a 2<sup>nd</sup> grade class at a school classified as Title I. Student reading performance was determined using a school-district adopted reading benchmark tool to identify instructional and independent reading levels for students (Fountas & Pinnell, 2016). In this study, students were randomly assigned to complete learning activities associated with their designated reading software program for 45-minutes a week for five weeks. Findings revealed reading level increases with 85% of participants, which aligned with previous

research that examined use of these two reading software programs (Age of Learning, 2016; Lozano & Ponciano, 2016; Metis Associates, 2014; Thai & Ponciano, 2016). Reasons for reading level increases may be attributed to the targeted practice that participants received with each of the five essential components of reading as identified by the National Reading Panel (2016). ABCmouse and Starfall included opportunities for participants to develop their reading skills for phonemic awareness, phonics, fluency, vocabulary, and comprehension.

The results of this study can be used to inform school districts of the benefits associated with computer-based reading software programs for student reading performance. Based on these findings, a school campus or school district should consider utilizing technology resources to promote reading success among all students. We encourage teachers and administrators to equip all classrooms with appropriate technology supports, such as providing students in the early elementary grades with subscriptions to ABCmouse and Starfall. By doing so, teachers may use these programs to provide students with engaging opportunities to develop essential literacy skills both in school and away from school. Applying these proactive measures during the early elementary years may help to remove barriers that prevent students from experiencing success with reading. Future research should also be conducted to determine the impact of continuous use of reading software programs on student reading performance.

There were a few limitations to this study that may impact generalizability of reported findings. First, there was a small number of participants. Although students were randomly assigned to reading software programs, the total sample size consisted of only 20 participants. Another limitation was that there was no control group. Using a control group would have helped determine if reading level increases were attributed to reading software program usage versus regular classroom instruction.

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