Using the Lexia Reading Program to Increase NWEA MAP Reading Scores in Grades 1 to 3

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Abstract

This study evaluated the efficiency of the Lexia Reading Program in 132 early elementary school students in an inner-city school in Hartford, Connecticut. Students who met the criteria were assigned to the experimental Lexia group, and other students were randomly assigned to a comparison group. The NWEA MAP was used to provide pre and post measures of literacy skills. Results indicated that students who used Lexia outperformed students in the control group ($p < .01$): their MAP scores increased from 157 to 174, a 17-point increase, while the control group's scores increased from 166 to 171, a 5-point increase. The Lexia reading program appears to be an effective tool to improve the literacy skills of struggling first- to third-grade readers.

Introduction

Most children will learn to read under normal conditions, regardless of the mode of reading instruction. However, at least 20% of children cannot master this task. Reading becomes even more difficult after third grade, when only 30% of students reading below grade level can rectify the discrepancy (Morra & Tracey, 2006). Thus, educators are continually looking for ways to improve the reading skills of learners in the early grades, particularly those with the most difficulties reading. They are also looking for methods that will encapsulate student interest and assist in information delivery.

In today's world, mobile devices are ubiquitous. Children start to use these devices at a very early age, with the time they spend looking at a screen outweighing their experiences with printed materials. Educators are therefore seeking avenues to use these devices to reach children. This study examined the effectiveness of one technology-assisted reading program, Lexia, in a group of first through third graders, comparing their results with those of a control group.

Background on Lexia Reading

Lexia Reading, one of the main programs marketed by Lexia Learning Systems, is a computer-based supplementary reading tool aimed at improving reading skills (What Works Clearinghouse, 2009). It has an age range of 4 years to adult and can also be used for English language learners. The Lexia Reading program focuses on six key processes involved in learning to read, beginning with phonological awareness and building up to abstract comprehension that engages higher-level thinking skills (Lexia Learning Systems, n.d.). Lexia provides explicit, systematic, personalized learning on fundamental reading skills and delivers real-time performance data without stopping to administer a test (Lexia International, 2011). This

technology-based approach accelerates reading skill development, predicts students' year-end performance, and provides teachers data-driven action plans to help differentiate instruction.

Lexia is designed to supplement and complement classroom instruction but can also be used as the only mode of reading instruction for struggling readers (Lexia Learning Systems, 2010). A student may work independently with the Lexia program, whether at home, at school, in the library, or at the park through the software's web-based app or iPad app.

Lexia uses games and multisensory interactive activities to build skills while explicitly providing instruction in phonemic awareness and phonics to promote gains in vocabulary, fluency, and comprehension (Lexia Learning Systems, 2010). As students begin Lexia, they are placed at a level that matches their ability. To progress through the levels, they are required to complete tasks. Once those tasks are successfully completed, students can then move up to higher-level tasks. Each lesson includes detailed instructions, and the program provides instant feedback when a question is answered incorrectly. Lessons follow a logical sequence and build upon previously mastered concepts to help students improve in all areas of reading as they move through each level. Based on its framework, Lexia appears to support most reading curricula in the US. The Lexia website makes the claim that Lexia programs are backed by rigorous scientific evidence.

Methods

The research was performed at a school that uses the Lexia reading program as a remedial tool. Students in grades 1 to 3 were chosen for the program after receiving a low score on the spring 2016 Northwest Evaluation Association (NWEA) MAP reading test (i.e., ≤160 for grade 1, ≤174 for grade 2, or ≤188 for grade 3). The NWEA MAP reading test accurately measures performance in reading and determines whether a student performs on, above, or below

grade level in reading. In these computerized adaptive tests, the difficulty of each question is based on how well a student answers all the previous questions. As the student answers correctly, questions become more difficult. If the student answers incorrectly, the questions become easier. In an optimal test, a student answers approximately half the items correctly and half incorrectly.

In addition to having a low score on the NWEA MAP test, students had to meet one of three additional criteria to receive the Lexia intervention: (1) be classified as special education, (2) be an English language learner, or (3) have other documented reading problems. Students who met these criteria followed the normal classroom curriculum but were required to use Lexia for at least 60 minutes per week for the 2016-2017 school year. Some students spent significantly more time than others with the program, but the general requirement was 60 minutes per week for the program to be successful.

For this study, students were assigned to the control group or the Lexia group through simple randomization. In each of the three grade levels, 22 students were included in the control group and 22 in the Lexia group. Due to the school's limited license, if a student scored low on the NWEA MAP but did not fall into the other categories, the student was not chosen for the Lexia program. Students in both groups had an equal chance of being selected for this research. G*Power 3.1.7 was used to determine a sufficient sample size to ensure empirical validity (Razali & Wah, 2011). Calculations showed that for a dependent sample *t* test with one tail, a generally accepted power of 0.80, and an assumed medium effect size, approximately 34 participants were required to achieve empirical validity within a 95% confidence interval (DeCarlo, 1997). Thus, the sample size of 132 in this research was considered sufficient.

The study compared spring 2016 and spring 2017 MAP scores among the 66 students who received the Lexia intervention and the 66 randomly chosen control students. Summary

statistics were calculated for each interval and ratio variable. Frequencies and percentages were calculated for each nominal variable. Two tests—a paired samples *t* test and Wilcoxon signed rank test—were used to compare 2016 results between the groups, compare 2017 results between the groups, and compare 2016-2017 results for each group separately. These tests were chosen because in addition to analyzing the signs of the differences between the Lexia and the control group, they also take into account the magnitude of the observed differences. Before conducting the tests, the data's skewness and kurtosis were calculated. When the skewness is ≥2 or ≤ –2, then the variable is considered to be asymmetrical about its mean. When the kurtosis is ≥3, then the variable's distribution is markedly different than a normal distribution in its tendency to produce outliers (Conover & Iman, 1981).

Results

Table 1 shows that the Lexia group had a greater improvement in 2017 scores compared with the control group: MAP scores increased from 157 to 174, a 17-point increase, while the control group's scores increased from 166 to 171, a 5-point increase. Generally, the rate of academic growth is related to the student's starting status on the measurement scale; students starting out at a lower level tend to grow more. In general, an increase of 10 points or more is considered an improvement, and the Lexia group showed improvements beyond the standard. In addition, the Lexia group had an overall higher score in 2017 than the control group. In grade 1, the Lexia group had a 21-point increase while the control group had a 7-point increase; in grade 2, the Lexia group had an 18-point increase while the control group had a 7-point increase; and in grade 3, the Lexia group had a 20-point increase while the control group had a 10 point increase (Figure 1).

The requirements for skewness and kurtosis were met. Table 2 shows the statistical comparisons using the paired samples *t* tests, and Table 3 shows the comparisons for the Wilcoxin signed rank tests. While the Lexia group scores were significantly different from those of the control group in 2016, they were not significantly different in 2017 because the gap had closed. The difference between 2017 scores and 2016 scores for the Lexia group was statistically significant using both statistical techniques.

Discussion

This study supported the efficacy of the Lexia program in a group of first through third graders with low reading test scores who were also identified as having special needs, being an English language learner, or having documented reading difficulties. Results showed that the Lexia group as a whole had a greater improvement in 2017 scores than the control group and, in fact, had higher scores in 2017 than the control group.

Improving the reading skills of young learners through technology-assisted reading programs has been deemed effective over the years but is not without controversy. Computer reading programs have improved the reading speed, comprehension, and spelling of children previously labeled as reading disabled (Ness, Couperus, & Willey, 2013; van Wyk & Louw, 2008). Feliciani (2013) indicated that improvements in reading skills as a result of using a computer reading program by students encompass many areas of the learners' development, such as social learning, collaborative learning, finer perceptual motor skills, confidence, and a general improvement in other subject areas. Özbek and Girli (2017) studied the effectiveness of a tablet computer-aided intervention program and concluded that the program improved the reading fluency of students with learning disabilities and that students generally had a positive view about the intervention.

However, others like Al-Bataineh and Brooks (2003) have questioned the use of computers as a mode of instruction for young children in the classroom. Opponents of computer-assisted learning argue that while technology provides greater access to information and new ways for students to learn, it can hinder creative problem-solving and cognitive development. This controversy led Lynch and Warner (2004) to investigate the use of computers in Texas child care facilities. Directors of licensed child care programs responded to a survey of 12 questions about computer use in their centers, indicating that the most important goal for children's use of computers was to extend concepts learned in the classroom. The study concluded that computers should only be used to enhance learning and not as the only mode of learning.

Regardless of whether computers are used as a mode of instruction or to enhance learning, computer-aided instruction has gained widespread acceptance in schools because children use computers to escape the bounds of the classroom. Educators constantly look for methods that will encapsulate student interest and assist in information delivery. The goal of every teacher is to help students develop the research and analysis skills they will need later in life, rather than depending on teachers or textbooks for knowledge and direction. According to Dong and Newman (2016), any program that helps students attain that goal is essential to student success and should be integrated as a learning modality.

A large number of computer software packages have been marketed to schools. Some of these packages appear to offer effective solutions to some of the most intractable problems faced by teachers and many, such as Lexia, now target students who might be described as presenting with special needs.

Other studies of Lexia have been published. O'Callaghan, McIvor, McVeigh, and Rushe (2016) evaluated the effectiveness of the Lexia Reading Core5 intervention with 4- to 6-year-old

pupils in Northern Ireland. Using analysis of covariance to control for baseline scores, they found that the group receiving the Lexia Reading Core5 intervention had significantly greater gains in reading ability than the control group. On the other hand, Ness et al. (2013) evaluated the effectiveness of the Lexia reading program among elementary school children in New Zealand and concluded that students who used Lexia did not outperform students in the control group. The authors considered the evidence base for Lexia to be equivocal and noted that articles in support of Lexia have all been written in the context of the United States. Ness et al. (2013) stated that Lexia was given a rare opportunity to tailor its program to schools' varying curricula.

Standardized reading tests allow for comparisons in student achievement scores across schools, ensure accountability for teachers, and can inform instruction for educators. When Lexia was evaluated using student tests other than the NWEA MAP, gains were seen similar to those from this study's MAP test. In a study focusing on low-performing kindergartners, students using Lexia Reading made significantly greater gains than a control group as measured by the Group Reading Assessment and Diagnostic Evaluation (GRADE), Level K. This test measures phonological awareness, early literacy skills, letter-sound correspondence, listening comprehension, and word reading. Group differences were particularly notable for the word reading subtest (Macaruso & Rodman, 2011). In another study, kindergartners using Lexia Reading significantly outperformed students in the control group on the Gates-MacGinitie Reading Test, Level PR (Pre-Reading), which measures phonological awareness, letter-sound correspondence, and listening comprehension. Group differences were more pronounced for low performers (Macaruso & Walker, 2008).

Clearly, improving the reading scores of at-risk students in younger grades is a priority as indicated by various researchers because remedial reading lessons becomes difficult after third

grade (Morra et al. 2006) . Lexia appears to be an effective tool to facilitate these important gains and in this district was an easy program to implement and was well received by the students.

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Table 1

Summary statistics table for the Lexia group and control group, 2016 to 2017

Variable	*M*	*SD*	SE_M	Skewness	Kurtosis
Lexia group (n = 66)	2.06	0.74	0.09	-0.10	-1.15
2016 MAP scores	157.05	16.41	2.02	-0.09	-0.74
Hours on Lexia	21.83	6.08	0.75	0.18	-0.66
2017 MAP scores	173.59	15.03	1.85	0.31	0.03
Control group (n = 66)	2.05	0.75	0.09	-0.07	-1.21
2016 MAP Scores	166.20	15.81	1.95	-0.04	-0.75
Hours on Lexia	0	0	0		
2017 MAP scores	170.94	25.21	3.10	-3.34	18.69

Table 2

Wilcoxon signed rank tests for the Lexia group and control group, 2016 to 2017

Comparison	*V*	*Z*	*p*
2016: Lexia vs control	501.5	–3.60	<0.001
2017: Lexia vs control	1093	–0.58	0.560
Control: 2016 vs 2017	184.0	–5.81	<0.001
Lexia: 2016 vs 2017	45.5	–6.71	<0.001

Table 3

Paired samples t tests for the Lexia group and control group, 2016 to 2017

Comparison	*t*	*p*	*d*
2016: Lexia vs control	–3.91	<0.001	0.57
2017: Lexia vs control	0.83	0.409	0.13
Control: 2016 vs 2017	–1.96	0.055	0.23
Lexia: 2016 vs 2017	–12.10	<0.001	1.05

Note. Degrees of Freedom for the *t*-statistic = 65. *d* represents Cohen's *d*.

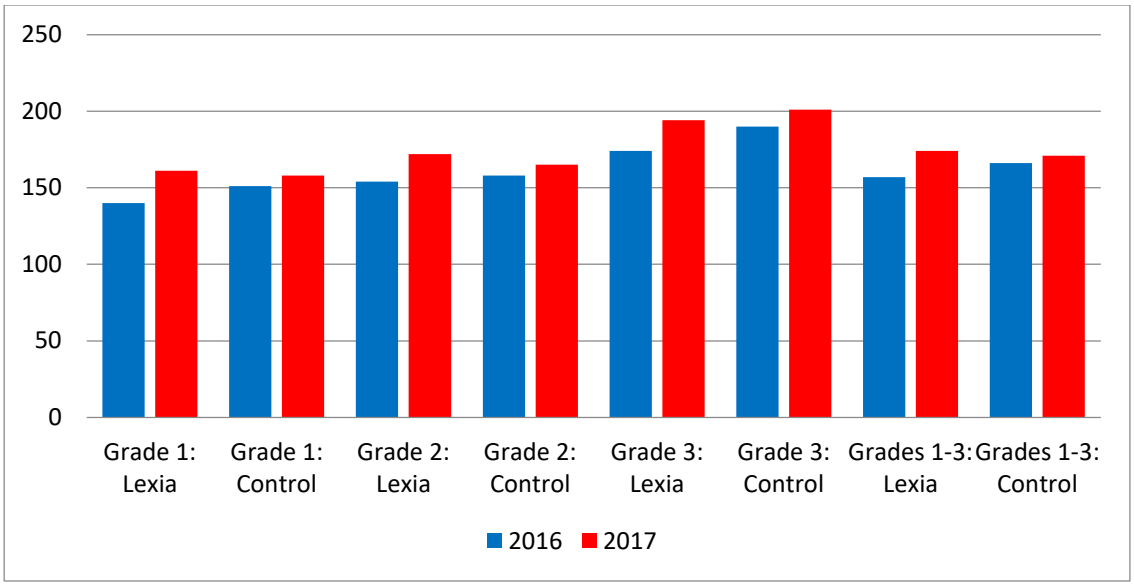

Figure 1. 2017 versus 2016 MAP scores for the Lexia group and the control group for each grade level individually and for the combined groups as a whole.