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**THE EFFECTS OF LEXIA PHONICS BASED READING
SOFTWARE ON FIRST GRADERS' LEXIA COMPREHENSIVE
READING SCORES**

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Abstract

The research conducted in this paper provides information about using computer software to remediate reading skills in first grade. The pre- and posttest is the Lexia Comprehensive Reading Test (2001). This research was conducted in a first grade classroom with 22 students of which half were in the experimental group. Students were matched using Lexia Comprehension Reading test scores and randomly divided into the two groups. The experimental group used the Lexia Phonics Based Reading Program (2004) for 30 minutes a day 3-4 times a week to build upon individual needs. After one month, the posttest was administered. The experimental group increased their overall scores more than the control group on the Lexia Comprehension Reading Test, $F(2,17) = 50.8, p < .001$. These findings are promising, but data need to be collected for longer periods of time and measuring subtest skills may yield valuable information.

I have taught first grade for three years at Rosa Taylor Elementary School. As a first grade teacher, I have learned the importance of administering a reading diagnostic tool to assess the students' reading skills and comprehension levels throughout the school year so that instruction can be tailored to their needs. For the past two years we have used the Lexia Comprehensive Reading Test three times a year. We test the students in the fall, winter, and spring. We use the data to help identify student's strengths and weaknesses and modify our teaching methods accordingly. For the 2004-2005 school year, our school purchased "prescriptives" that accompany the Lexia test called the Lexia Phonics Based Reading Program. The program consists of leveled phonics skills practice set up in a game format that the students practice in order to build their reading skills. In my research, I instructed half of my class to use this new software to see if it would improve my students' reading skills. My principal was supportive of my research and eager to review the data as it related to student achievement. Due to budgetary restraints, the software was purchased only for kindergarten and first grade. More software would be

purchased for older students if the research outcomes proved worth the investment. Since we have a large population of special needs students, we were interested to see if using the program would increase their achievement as well. The software has been shown to be successful with learning disabled, non-English speaking students, and adults in developing their reading skills according to Bob Lemire, the Founder, Treasurer, and Chairman of Lexia Learning Systems, Inc.

Our school purchased the Lexia materials from Educational Learning Systems (ELS, www.elsystems.com). ELS focuses on selling educational software in Florida and Georgia. There are several case studies concerning the Lexia software which can be reviewed on their websites at www.elsystems.com or www.lexialearning.com. In addition, the following review of literature focuses on how the Lexia software helps dyslexic, Hispanic, and low-leveled readers.

Help for Dyslexic Students

Renee Herman (Founder, Director) is credited for developing the Herman Method. She developed this method by working with dyslexic students from 1964 to 1973. She determined that dyslexic children learn best through their senses and began to study theories from Fernald, Gillingham, Montessori, Orton and Strauss (Herman, 1995). She began giving students a multi-sensory education like Montessori schools provide. She believed computers were beneficial sensory tools, especially for dyslexic students. She showed great gains in reading scores for children using the Herman method. "On the average, students gained a minimum of one grade level in word recognition for each year of instruction. Growth in reading comprehension was even greater, with students frequently averaging an annual growth of two grade levels or more...This indicates that early diagnosis of a reading disability and prompt initiation of corrective measures are critical to ensure academic success at school" (Herman, 1995, p. 20). The studies were conducted with Latino, Caucasian, and African-American students demonstrating that ethnic background does not make a difference when being taught through the Herman Method.

"Computer-Aided Instruction" (CAI, www.k8accesscenter.org) is a way to teach or remediate students, mainly those with disabilities. Students with dyslexia report that "reading is slow, inaccurate, and hard work. To extract meaning from text, they usually find that they have to proceed slowly, re-read passages frequently, struggle to decode unfamiliar words, and interrupt their reading frequently to recover from fatigue and stress" (Elkin, 1998, p. 4). These students often have the ability to understand spoken language at a normal or fast rate. This is one reason why computer based reading programs show gains in reading with dyslexic students. Computers offer a

teaching style that is different than what a teacher can offer. They provide immediate feedback so that the student does not continue to practice inaccurate skills. Computers are also more competitive in nature than teachers. This encourages the student to work towards the next level. Teachers may advance to the next subject matter when a student has not mastered the current skill. A computer will stay at the level that the student is currently functioning until the skill is mastered. This helps to eliminate frustration for the student and they are less likely to quit trying. Some computer programs not only make the child compete against themselves but compete against other students as with the computer program, Accelerated Reader (CAI, www.k8accesscenter.org).

Accelerated Reader is a computer program that tests reading skills, such as comprehension, after a student has completed a book. Each book is worth a set amount of points according to the readability formula for books. The students work to increase their points so that they can compete against other students in the school for prizes and/or awards. This program helps teachers "guide instruction and help the student select more reading materials" (A.R., www.renlearn.com) based on the reports given from the tests. In conclusion, "Reading (computer) programs are beneficial to reading instruction because they allow students to learn at their own pace; teach phonics with sound, student interaction, and immediate feedback; and allow students to read animated books" (CAI, www.k8accesscenter.org).

Help for Hispanic Students

Lexia based reading programs have shown benefit with low income, Hispanic students, too. These programs have, "reduced the need for intensive and costly staff training and it makes replication of the intervention easier to achieve for most schools" (Stevens, 2000, p. 1). One of the teachers interviewed by David Stevens (2000, p. 2) was asked why the software was so effective and she replied, "One of the reasons that it works is that it does so much repetition. It never gets tired like a teacher might. Let's say a student can't hear the difference between the 'e' and 'i' sounds. By about the third time they have gone over it in class, the teacher is about to quit. But the computer just keeps saying 'good job, try again', and in a voice that doesn't get rattled." When asking a teacher at Tornillo Elementary School if technology made a difference, she replied, "It seems so boring to us we can't imagine why it works. But their reading speed improves and so does their comprehension, and they never get bored" (Stevens, 2000, p. 9). The teacher was referring to the software not having any cutesie graphics so that the child can focus on the lesson and not the characters. David Stevens (2000) refers to it as "edutainment". According to

the teachers being interviewed, test scores have dropped since the case study due to the school not being able to fund the costs of the computer software any more. These are just a few examples that prove that Lexia reading-based software can benefit Hispanic students. It is unfortunate that there is not enough funding to provide something this simple in order to increase literacy.

Another finding stated that “only 41 percent of blacks and Hispanics use computers at home, compared with 77 percent of whites. At the same time, 31 percent of students whose families earn less than \$20,000 annually use computers at home, compared with 89 percent of those whose families earn more than \$75,000.” (Flanigan, 2004). This could be why Lexia based reading programs have shown benefit with low income and Hispanic students. Those students do not have computer resources at home to remediate needed skills; therefore, when they have access to the computer at school they show great gains.

Help for Low-Levelled Readers

The main goal of Lexia Phonics Based Reading, according to McCabe (2003), is to “develop and reinforce automatic word recognition skills essential to fluent reading and comprehension.” McCabe (2003, p. 13) concluded that the software “did show statistically significant positive differences in the gain scores of the treatment group compared to the gain scores of the control group.” The Lexia class had higher mean gain scores than the control group. According to Ruth (1997), the “child behavior checklist results and teacher comments indicated that about half the students in the program showed improvement in behavior and/or academic performance.” Out of four teachers interviewed, there were at least fifteen students that had improved in self-confidence or in their academics due to the Lexia software (Ruth, 1997). Children who are trained on reading remedial software over a three month period show twice the gain in word recognition when compared to an untrained group (Olson, Wise, Ring, & Johnson, 1997). Students have been shown to increase their phonological skills and better performance on targeted words tests, but not necessarily higher with word recognition with reading software. Once again, this shows that Lexia, or similar programs, work for various subgroups of learners.

The literature provided a wealth of knowledge about using Lexia and other computer software to build upon students' reading abilities. The purpose of this research study was to determine if students who use Lexia's computer software prescriptives will increase their scores

and overall achievement from the time the Lexia test was given in August to the time the test was given again in November. It was expected that students in the first grade who used the Lexia Phonics Based Reading Software would raise their overall scores on the Lexia Comprehensive Reading Test more than the students who did not use the software.

Method

Participants

This research takes place in Macon, GA. According to the 2000 Census, Macon has a population of 97, 255. The racial makeup of the city is 35% White, 62% African American, 1% Hispanic or Latino of any race and 2% other racial groups. The participants were a first grade classroom at Rosa Taylor Elementary School. The community around Rosa Taylor is very supportive and active with the student's academics. According to the school's SACS 2002 report: the average enrollment was 541; 25 of the 91 sixth graders enrolled had attended since Kindergarten. There was an increase of minority groups over the past five years from 37% to 49%; the majority to minority transfers increased from 19% to 27%. According to education level surveys completed by our parents—2% did not complete high school, 4% earned a GED, 22% completed high school, 7% earned a technical diploma, 26% attended some college, 26% earned a college degree, and 11% attained an advanced degree. As of 11/30/01, there were 261 males, 290 females, 51% white, 43% black, 3% Hispanic, 1% Asian-Pacific, 1% Multi-racial, and .5% American Indian. We also had 42% on free/reduced lunch.

In 2003-2004, the school district was re-zoned and the student body and teachers moved to the Tinsley Elementary School building due to Rosa Taylor Elementary School being rebuilt. By doing this, the school absorbed half of the Tinsley student population. The demographics changed tremendously according to 2002-2003 Annual Report Card and 2003 Profiles Report (<http://reportcard.gaosa.org/k12/reports> & <http://www.gsci.org/ReportCenter/reportcenter.jsp>). The name was then changed to Taylor at Tinsley Elementary School and demographics were then as follows: 43% white, 47% black, 4% Hispanic, 17% Students with Disabilities, 3% Limited English Proficient, & 53% Eligible for Free/Reduced Meals.

The participants in this study were 22 first graders for the 2004-2005 school year. There were nine males and fourteen females in the class. The racial ethnicity consisted of eight African Americans, twelve

Caucasians, and two others (Hispanic). There were two to three high level students (one of which was in a gifted class), three to four low level students (four students were in early intervention programs for reading and math), and the rest of the students were average. The students were grouped into a control and experimental group according to their pretest scores on the Lexia Comprehensive Reading test. The Lexia scores of the students were carefully considered and students were paired using matched-paired sampling (high-high, low-low, etc.) A coin was then flipped to determine which column would be the experimental group and which would be the control group. The research was conducted with two heterogeneous groups.

Instrumentation

The Lexia Phonics Based Reading computer software is supplemental to the Lexia Comprehensive Reading Test (www.lexialearning.com). The Lexia Comprehensive Reading Test evaluates the student's reading ability and skills. This test measures and records the students' scores and produces in-depth reports. You can print individual, class, grade-level, school or district reports in order to compare scores. Once a testing session is completed, this program prescribes the individual student games that address a student's specific instructional needs. The games are on the Lexia Phonics Based Reading computer software. This software is designed to be used with limited teacher assistance. The teacher must help the student log-in and the program automatically selects which games the student is able to access. Within each game, there are many ability levels. The computer starts the student out on the level at which the test results deem their own instructional learning level. If the student masters this level, they move up to the next level. If the student fails at this level, the computer program moves them down a level. The students are able to practice reading skills, such as: phonemic awareness, sound-symbol correspondence, word attack skills, and over 2,000 vocabulary words. This software also tracks the student's frustration level. According to Bob Lamire, (Founder, Treasurer, and Chairman of Lexia), the teacher should check this level daily. He (telephone conversation, July 22, 2004) stated that you should not check their frustration level to see how many they missed but to see if any gain has been made. I had the honor of speaking to Mr. Lamire when I called the Lexia hotline to find out more information about the Lexia program. He said, "This is a self-administered test" and "great gains will be made using this software." The main goal of this supplemental software is that all students can learn fundamental reading skills quickly and with little teacher assistance. Lexia also meets the requirements of the "No Child Left Behind" (NCLB) act. It is a part of the

Reading First initiative program that is designed to meet the educational goals of NCLB (www.lexialearning.com).

Procedures

For this research, APA ethical standards were used by asking permission from the principal before beginning the study. The whole first grade class was assessed in August 2004 on the Lexia Comprehensive Reading Test. The class was then separated into two groups using the results from the test. Within each group, there were low to high achieving students. The students were grouped using matched-paired sampling according to their overall Lexia score. The experimental group worked on the Lexia Phonics Based Reading computer software 30 minutes a day for 3-4 days per week. The control group was not allowed to use this software during the research period. However, the control group was allowed to use the software after the completion of this research study. Since the diagnostic test was administered in its usual fashion no changes were made to the reading curriculum. In November, the students were reassessed using the Lexia Comprehensive Reading Test. The scores were recorded "posttest". The pretest and posttest scores were then compared to determine which group made the greatest gain in overall points on the Lexia Comprehensive Reading Test.

Data Analysis Plan

This was a quantitative research study conducted using Lexia Comprehensive Reading Test scores. The scores were recorded for all of the students (control and experimental) in four categories of the Lexia program: Kindergarten Readiness, Phonics & Decoding, Basic Sight Words, and Reading Informal. The students were assessed in August 2004 and their results were recorded under the "pretest" section of the attached spreadsheet. Students were assessed again in November 2004 and their results were recorded under the "posttest" section of the attached spreadsheet. Analysis of covariance was used with the posttest total score as the dependent variable and the pretest total scores as the covariate. Multiple Analysis of Variance was used on the subtest post test results to see if there was a difference in the two groups.

Results

The purpose of this research study was to determine if students who use Lexia's computer software would achieve a greater increase in overall scores from the time the Lexia test was given in August to the time the test was given again in November. It was expected that students in the first grade who used the Lexia Phonics Based Reading Software would score higher on the Lexia Comprehensive Reading Test than the students who did not use the software.

A MANOVA was used to compare the four pretest scores by group. There was no statistically significant difference, $F(4,15) = 0.54$, $p = .71$. See Table 1. The experimental group means were higher for Kindergarten Readiness and Phonics and Decoding. However the control group means were higher for Basic Sight Words and Reading Informal. The total battery mean for the control group was 25.6 (SD = 12.8) and for the experimental group was 25.7 (5.4). An independent samples t test on the total posttest scores by group was not significant, $t(18) = 0.02$, $p = .98$.

A MANOVA was used to compare the four posttest scores by group. There was no statistically significant difference by group, $F(4,15) = 0.98$, $p = .45$. See Table 2. The means of the experimental group were higher at posttest for three of the four dependent variables and on the total battery score.

Using ANCOVA to compare the two groups on the posttest total scores with the pretest total scores as the covariate, the differences in favor of the experimental group were statistically significant $F(2,17) = 50.8$, $p < .001$. The effect size was .84 (Partial Eta Squared). The correlation between the pretest total and the posttest total was $r = .93$, $p < .001$.

Discussion

The results showed that the data supported the hypothesis. The experimental group did score higher overall on the total Lexia score. On the Lexia Comprehensive Reading Test, there were four subtests: Kindergarten Readiness, Phonics & Decoding, Sight Words, and Reading Informal. The experimental group scored higher on three out of the four subtests on the total battery. The area that the control group scored higher on was the reading informal section. The reason for this was probably because the Lexia Phonics Based Reading software did not remediate the students in this area. The students did not have to practice reading stories and answering questions like they do on the Lexia test. I would like to conduct this experiment again over a longer period of time and see if I come up with the same results. If the student's were given longer than a month for the remediation, they would probably score higher and the results on the MANOVA would show a significant difference. Because this research only lasted one month, the only significant difference that showed up was on the ANCOVA when the posttest total scores were compared using the pretest total scores as the covariate. Another test was run and it showed that the matched paired sampling was almost perfect. One reason for the increased standard deviation was due to a special edu-

cation child being in the classroom. It was noticed that the higher students, whether being in the experimental or control group, gained more points and scored higher in all subtests than the lower students. The experiment showed that the Lexia Phonics Based Reading computer software helped to increased everyone's overall Lexia score, but it increased the scores of the higher achievers even more than the others.

These findings did not agree with the research that was previously found. According to David Stevens (2000) and Ruth (1997), this software should have really helped the Hispanic and low-leveled readers. These were the students who made the lowest gains overall. This may be due to the fact that they were not remediated for a long enough period with the computer software. The research did verify McCabe's (2003, p. 13) findings, the software "did not show statistically significant differences" when comparing the two groups individually on the subtests. It was when the overall test scores were compared that a significant difference showed up. McCabe also said that the students should "develop and reinforce automatic word recognition skills essential to fluent reading and comprehension" (2003, p. 13). If this was true, then the experimental group would have scored higher on the reading informal section than the control group and this is the one section that the experimental group scored lower on. Once again, this was probably due to the short research time period. This experiment will be tried again, but at least three months of remediation using the software will be allowed before testing occurs again using the Lexia.

There were several threats to validity for this research. One major threat was that the research was unable to begin on time due to moving into a new school building. The research was put on hold until all of the supplies and computers were dispersed. There were only two computers in the classroom at the beginning of the school year which was sufficient enough to administer the pretest, but the experimental groups were unable to begin using the software program until more computers arrived. This is why the research took place over one month instead of three months like was initially planned. After the additional computers were delivered, we had to wait for the Lexia Phonics Based Reading software to be installed on the server. The research began before the software was installed, but once the software was in place all of the student's progress had been erased so the students had to start out at the lowest levels on the games and work their way back up again. The other threat was that the Lexia test did not allow everyone to take the pretest in the fall as planned. The students who attended Kindergarten at Rosa Taylor Elementary School the year before were unable to be tested because their records had not

been updated to first grade. The end of the year Kindergarten scores for those students were counted as their pretest scores. From past experience, the student's end of the year spring scores are similar to their early fall scores making these scores a reasonable baseline to which to compare the posttest scores. These threats to validity were uncontrollable, but every attempt was made to make the research valid.

In conclusion, the information gained from this study proved to be very useful to the administrator and teachers at this school. They were unaware of the impact this simple program would have on the students. Not only was it easy to use but was effective in increasing student achievement. An added bonus was that the students did not even realize that they were increasing their literacy abilities...they just thought they were having fun playing a computer game. The students really enjoyed "winning the game" and going on to the next level. They did not realize that "winning the game" was also a joy to their teacher as they were improving their reading skills while having fun.

Table 1
Pretest Descriptive Information

		Q		V	N
P	a	6	8	3	0
	b	4	9	3	0
	c	5	8	9	0
R	a	6	0	5	0
	b	4	3	8	0
	c	5	5	9	0
P	a	6	0	5	0
	b	4	0	3	0
	c	5	5	4	0
P	a	6	3	4	0
	b	4	5	8	0
	c	5	0	3	0

Table 2
Post-test Descriptive Information

		G	M	D	N
R	G	8	6	0	
	H	0	0	0	
	S	0	4	0	
R	G		8	0	
	H		1	0	
	S	2	2	0	
B	G	6	0	0	
	H	0	0	0	
	S	6	3	0	
D	G	8	3	0	
	H	2	9	0	
	S	0	4	0	

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