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**Final Report**

**Accelerated Reader vs. Non-Accelerated Reader:  
How Students Using the Accelerated Reader Outperformed The Control Condition  
In a Tightly Controlled Experimental Study**

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## **Abstract**

**Using an experimental design where teachers were randomly assigned to treatments, where reading time was held constant for all students in the study, and where all the students had access to books that were appropriate for their level of skill, the Accelerated Reading program (AR), with its system of quizzing students on books read and providing immediate feedback was contrasted with the control condition where quizzes were not taken. Students in the study were in grades three and five. The study ran for six months, from September to March.**

**Data analysis on gain scores from pretest to posttest showed the experimental group that used the AR system with quizzes that provided immediate feedback on books read significantly outperformed the control students in the following ways:**

- Passage Comprehension. The experimental group that used the AR program significantly outperformed their controls in passage comprehension.**
- Passage Comprehension. The fifth graders in the experimental group significantly outperformed their fifth grade controls in passage comprehension.**
- Passage Comprehension. The least able readers in grades three and five outperformed the least able readers in the control condition in passage comprehension.**
- Vocabulary. Students using the AR program significantly outperformed the least able students in the control condition in vocabulary.**

**In this study we found that students in the AR program, that provided immediate feedback on quizzes they took on books read, had significantly higher achievement than the students in the control condition who did not take quizzes on the books they read.**

### **Background Leading to this Study.**

**In 1997 the United States Congress found itself in a dilemma. Congress wanted to support literacy education with financial grants but found that there were so many conflicting claims about the best approach to reading instruction that it did not know which approach to support. This dilemma was not new because exactly thirty years earlier Professor Jean Chall of Harvard found herself in a similar predicament with regard to whether an early emphasis on meaning or decoding was the best approach to beginning reading instruction. Her research on this topic led her to write her highly influential book called “Learning to Read: The Great Debate”.**

**In order to help Congress resolve the issue of what were the best approaches to beginning reading, Congress asked the National Institute of Child Health and Human Development, in consultation with the Secretary of Education, to convene a national panel of experts to assess the status of research-based knowledge on how to teach children to read. What Congress wanted were recommendations about the most promising approaches to instruction that were based on solid research evidence. In essence, the principle that Congress was establishing was that important decisions about how to teach reading should be based on reliable scientific evidence. In order to meet the mandate, a National Reading Panel (NRP) was established and I was a member of that Panel.**

**There are several hundred thousand data based studies of beginning reading instruction in the research literature, and the NRP task was to review as much of this literature as possible and to make recommendations about specific approaches**

that could lead to reading improvement. Given the magnitude of the task, the NRP had to establish screening criteria in order to reduce the number of studies that had to be reviewed. One of the first decisions the panel made was that correlational studies would be excluded because studies using this procedure could not indicate causation. For example, if a correlational study found that good readers read more than poor readers, could one conclude that good readers became better because they read more? Not necessarily. One could make a case that certain students started as good readers, and they read more because reading was easy and enjoyable for them. Thus, one could argue, it was not that more reading made them better but that they started as better readers. Due to the difficulties in determining cause and effect in correlational studies, the NRP decided that in order to make valid recommendations it had to limit itself to experimental or quasi-experimental studies because this approach allowed one to determine causation.

Quite aside from the actual recommendations made by the NRP about how to conduct early reading instruction, one of the major legacies of this group seems to be its emphasis on data-based empirical evidence for educational decision-making, and the gold standard for decision-making were the findings from experimental and quasi-experimental designs. While the NRP has had its critics, the critics have not said that conclusions from experimental studies were wrong, only that other types of research should have been examined as well.

### The Purposes for this Study.

Why has the work of the NRP served as the introduction and background for this study of the Accelerated Reader vs. the Non-Accelerated Reader? There was already an abundance of correlational data showing the effectiveness of the Accelerated Reader. The study to be described in this article was different from the others in that it used an experimental design which allows one to determine causality. Specifically, if the group of students assigned to the Accelerated Reader condition came out ahead of the students who were not using the accelerated reader, we would be able to conclude that the superiority was caused by the Accelerated

**Reader Program and not to some extraneous factor. Secondly, this study is important because it meets the standards now being advocated for educational decision-making, namely that decisions should be based on empirical data-based designs that permit causality to be determined.**

### **The Accelerated Reader: Enhancing Achievement Through Reading Books**

**It is a common educational practice in this country to encourage students to read books in the belief that skill in reading is partly an outgrowth of the amount of time and practice students devote to independent reading. In order to motivate and monitor student independent reading, schools resort to a variety of practices such as requiring a book report or a parent's signature verifying that the student has read the books. Another widely used method schools use to encourage reading is to use Accelerated Reader software. In fact, the Accelerated Reader (Renaissance Learning, Inc.) program is the most widely used reading software found in schools.**

**To date, there have been thirty-nine studies supporting the effectiveness of Accelerated Reader when used in combination with Reading Renaissance instructional recommendations. In one of these studies, for example, Lawson<sup>1</sup> found that library circulation (an indicator of amount that students are reading) increased six-fold after implementation of the Accelerated Reader . Walberg<sup>2</sup> found substantial gains in reading achievement at the state level associated with use of Accelerated Reader, and Peak and DeWalt<sup>3</sup> reported that students using Accelerated Reader had improved reading scores and attitudes compared to a control group'.**

**The purpose of the study reported here was to test the effectiveness of the Accelerated Reader using a quasi-experimental research design that meets the**

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<sup>1</sup> Lawson, S. (2000). Accelerated Reader Boosts Student Achievement. CSLA (California School Library Association) Journal 23, no. 2, 11-12.

<sup>2</sup> Walberg, H.J. (2001). Final Evaluation of the Reading Initiative: Report to the J.A. & Kathryn Albertson Foundation Board of Directors. J.A. & Kathryn Albertson

<sup>3</sup> Peak, J. and DeWalt, M.W. (1994). Reading Achievement Effects of Computerized Reading Management and Enrichment. ERS Spectrum 12, No. 1, 31-34.

standards of the National Reading Panel recommendations for research based educational decision making. In other words, do the findings from this Accelerated Reader vs. No-Accelerated Reader study support the continued use this program?

What is the Accelerated Reader (AR)? In schools that use the AR system, students are encouraged to read books whose readability level matches the student's level of reading skill. Students read books that are at their appropriate reading level because they have used the Star Reading Test. This test, which takes about ten minutes, is interactive with the student, is computer administered, and when completed indicates the readability level that is appropriate for the student. The Star Test can also be used to measure growth in reading from pretest to posttest as the students advance from one readability level to another.

After the student finishes reading a book that is at the appropriate level, the student takes a short, computer administered AR quiz on the book to insure that the student has read the book carefully. After completing a quiz the student is assigned points based on the readability level of the book, its length, and the score the student got on the quiz.

The AR program incorporates many principles that we know enhances learning such as:

**Increased Practice Time.** The students are motivated to read independently because we assume that increased time spent reading improves achievement (Schermer, Wu, and Samuels, 2003). Students are encouraged to attribute success or failure to their efforts. The teacher's role is to help the students make the appropriate link.

Students are encouraged to believe that in reading they will do well if they work hard and they will fail if they do not (Alderman, 1990).

**Motivation.** Motivation to read for students using AR occurs in several ways. Reading books and taking quizzes on them takes on game-like qualities, in that points are awarded to each student based on the readability level of the book, the length of the book, and the score the student gets on the test. Students are motivated to read because they are reading books matched to their reading level, and this enhances their enjoyment of reading.

**Appropriate Reading Level.** Each student in the AR program takes the Star Reading Test and this test assigns a zone of proximal development (ZPD) which is the readability level for the student that is challenging and enjoyable and leads to maximum development. According to Vygotsky (1981), tasks within the ZPD promote maximum cognitive growth. Vygotsky claimed that children learn little if they perform tasks that are already easy for them. They learn the most if they have challenging tasks with an adult nearby to help them when needed.

Books in the school library are color coded to designate different text readability levels. When in the library, students select color-coded books that conform to their zone. Thus, students are reading books at their appropriate skill level.

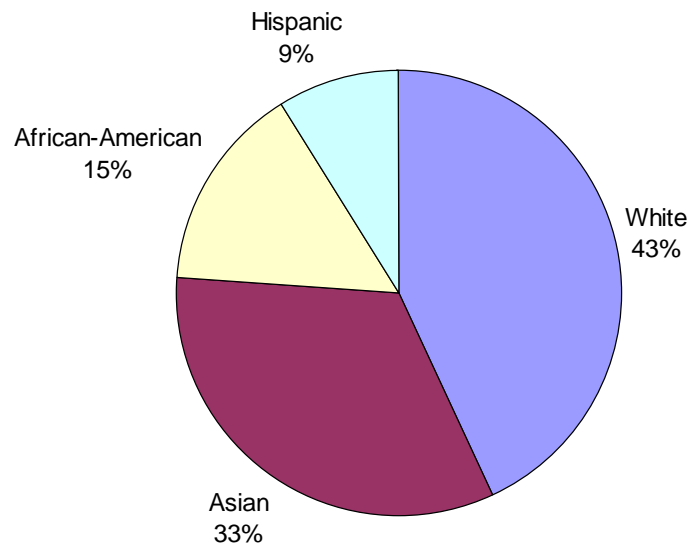
**Information Feedback.** After the student takes a short computer administered quiz on the book the student has read, both the teacher and the student receive information on the student's performance. A minimal score of 85% on the quiz is desired in order to encourage careful reading of the book. The older view of feedback was that it served as reinforcement, while current views see it as information used by the student to alter thinking and problem solving so as to achieve the desired goals of instruction (Cooper, 1993).

**Personalized Goal Setting.** Students read their library books carefully because they want to score at least 85% correct on the quiz, and they read a lot of books because that is one way to accumulate a large number of points.

What the AR program does is to encourage students to read books independently and it then monitors how carefully they read the books. Although teachers attempt to do the same thing, the AR program seems to do the job more easily than the teacher can. For example, in typical classrooms, when students read and then do a book report, often the teacher does not have time to read the report immediately, so the feedback to the student is often delayed. In addition, while many students enjoy reading, they find that the requirement of having to write a report on a just read book is burdensome. AR does not have these problems because the student does not write a book report, quiz results are available immediately, and the student knows what level books to select to read.

### Setting for the AR vs. No-AR Study.

This study was done in St. Paul, Minnesota at Hayden Heights Elementary School. It had 532 students. Sixty-four percent of the students at this school received free or reduced priced lunch compared to the state average of 28%. Ethnicity of the school consisted of 43% White, 33% Asian (Hmong), 15% African-American, and 9% Hispanic (shown in Figure 1). All the third and fifth graders enrolled in Minnesota public schools take the Minnesota Comprehensive Assessment (MCA) examination in reading to determine how well the state is doing on standardized measures of achievement and to allow between school comparisons. In 2001 on the MCA test, at Hayden Heights Elementary School where this study was done, 26% of the third graders were at or above grade level in reading achievement compared to the state average of 49%, while at grade five, 32% of the students were at or above grade level, compared to the rest of the state where 63% were at or above grade level. Comparing reading achievement at Hayden Heights Elementary School to the rest of the state, one notes that the students in the school lagged considerably behind the rest of the state, and that the poverty level of the students, as indicated by the number of free lunches, is considerably higher than the rest of the state. In summary, the ethnicity of the school, the economic indicators, and the achievement level of the students suggest that this school is a representative inner-city elementary school.



**Figure 1. The ethnicity of Hayden Heights Elementary School where the study was done.**

## Research Design

A 2 X 2 X 2 design was used. The first factor was grade level. Classrooms from grades three and five were used. The second factor was the experimental vs. control condition. In the control condition there were 39 students, 20 from grade five and 19 from grade three. In the experimental condition there were 35 students, 19 from grade five and 16 from grade three, for a total of 74 students in the study overall (shown in Table 1).

Table 1. The sample size for experimental and control groups by grade.

Grade	Control (No AR)	Experimental (AR)
3	19	16
5	20	19

Both the Accelerated Reader and the Non-Accelerated classes had exactly the same amount of time (15 minutes) allocated to in-class independent silent reading of books, as well as the same amount of time (15 minutes) that the teacher read books aloud to them. In addition, all the students received 60 minutes of reading instruction during their language arts block. Students in the Accelerated Reader condition and students in the Non-Accelerated Reader condition had access to books in the school library that were color coded to represent ZPD where the students could read at an appropriate level for their ability.

In the experimental classrooms when the children were finished with a book they took a computer administered quiz on the book they had read, and got immediate feedback on how well they did. These students were told that acceptable quiz scores had to be eighty-five percent or higher. In the control classrooms the children also read books independently, but they did not take quizzes on the books. Teachers in the control groups encouraged students to read library books at their ZPD and they should read them carefully, but reading at the ZPD was not mandatory.

**When the students in the control Non-Accelerated Reader condition finished reading a book they did not take a computerized quiz. In essence, the non-accelerated reader condition mirrored what happens in regular classroom where students are encouraged to read and they do not take a quiz on the books they have completed.**

**In this study the experimental variable was the quiz taken on the computer which provided immediate feedback to the student. With the exception of the computer administered quiz and immediate feedback, all other factors such as time spent reading, the match between student reading achievement level and books selected to read, and type of reading program were the same for the experimental and control students.**

**Although the researchers did not randomly assign students to classes, the teachers themselves made an effort to distribute students equitably to avoid a biased distribution. In this study the researchers were able to randomly assign treatments to the classes. All four teachers in this study were experienced, averaging 22.5 years of experience. The least experienced had ten years of service and the most experienced had 29 years.**

### **Materials and Tests**

**Star Reading Test. Students were pre- and post-tested on the Star Reading test (Renaissance Learning). This is an individually administered, nationally normed computer-adaptive assessment of a student's level of reading achievement that takes about ten minutes to complete. It has been validated with a nationally representative sample of more than 60,000 students. It's scores correlate with results on popular nationally normed standardized tests. As the student takes the test the questions asked adjust to each student's response pattern. When the test is completed the Star provides sixteen measures on the student. For purposes of the research, the Star Test provided an objective measure of each student's reading achievement grade equivalent.**

**Curriculum-Based Measures (CBM).** The CBM reading test (Deno and Marston, 1987) is individually administered and it can be easily and quickly given. The test consists of a passage that ranges in length from about one hundred words to several hundred depending on the reading ability of the students being tested. Instructions to the students are to read the passage orally and the student reads orally for one minute. The most important dependent variables on the CBM is the word per minute oral reading rate. Oral reading rate has been considered by some researchers to be an indicator of reading fluency. These CBM tests have been widely researched and have proven to be reliable, valid indicators of reading outcomes such as speed and comprehension. These simple, easy-to-administer tests of reading have been found to correlate highly with standardized tests of comprehension and reading achievement (Good and Jefferson, 1998; Marston, 1998; Fuchs, Fuchs, and Maxwell, 1988; Deno, Mirkin, and Chiang, 1982).

**GRADE: Group Reading Assessment and Diagnostic Evaluation** (American Guidance Service, 2001) is a new norm-referenced, research-based test of reading achievement that provides for each grade level alternative forms (A and B). The GRADE was normed on a nation-wide sample of over 33,000 students at 148 test sites, and each item on the test was subject to analysis to prevent item bias by gender, race/ethnicity, and geographic region. Students in the research study reported in this article were given GRADE tests for sentence and passage comprehension, form A in the pre-test and form B in the post-test. Third grade students in this study were administered the tests designated for that grade level and fifth grade was administered tests designated for that grade level. These tests were administered by the classroom teachers.

**Time-on-Task.** During the course of the study, students in the control and the experimental classes were observed during the independent reading time at random times during the study by a research assistant. The purpose of the observation was to determine the extent to which the students spent their time in class reading their books. The assistant had a sheet with the name of each student in the class. Then the assistant observed the student for six seconds. If the student was reading a plus sign was put next to the student's name. If the student was not reading a minus sign was

placed. Numerous observations per student were possible for each independent reading period. This procedure allowed us to compute a percentage of time the students were on and off task. Our observations of the students for the experimental and control classes indicated the students were on task about 90% of the time and there were no differences in time-on-task among the classes.

### **Procedure**

The study ran for six months, from September to March. Experimental and control classrooms had a ninety minute reading block so that all the students in the study had the same amount of time devoted to reading. During the sixty minutes of the reading block the experimental and the control teachers conducted what may be termed a balanced reading program (Pressley, 1998), where the students were given explicit instruction in word recognition and comprehension skills combined with reading or listening to authentic texts.

For the next fifteen minutes of the reading block both the control and experimental teachers conducted what is termed a “Reading To” program. Each day when “Reading To” the students the teacher read good literature to the whole class while the students listened. Discussions were held on various aspects of the book such as its plot, characterization, emotional reactions of the characters to events in the story, and outcomes.

During the final fifteen minutes of the reading block the control and the experimental teachers conducted an “Independent Silent Reading ” program. In this reading situation the students in both the control and experimental classrooms read books independently for fifteen minutes each day. Since there was information for each student’s reading grade level, all the students in the study were able to select color-coded books from the library that matched their level of reading ability. The only difference between the control and the experimental students, which is critical in this study, is that the experimental students after completing a book took a quiz that was administered by a computer, and the students got immediate

feedback on how well they did on the quiz. The control students also read books independently for the same amount of time but they did not take a quiz.

The study lasted six months, from late September to early March. Pretest and posttest data were collected from all students in the study. One of the tests that all the students took was the Star Reading Test (Renaissance Learning). This test is given individually with a computer and it provides norm referenced reading scores for grades one through twelve in about ten minutes of testing time. The Star Test provided each student with a reading grade equivalent, and this score was used to guide the student into selecting books at the school library that were at the student's zone of proximal development, or recreational reading level. The school library had a large number of books that were color-coded. Each color indicated a readability level of the book so that students could select books that matched their level of reading skill. Because all the students in the study took the Star Test, it was possible during the fifteen minute independent reading time to have control and experimental students reading books that matched their level of reading skill. The second way that grade level equivalent scores from the Star Reading Test were used was to measure changes in reading achievement from pre-to posttest.

A research assistant administered Curriculum Based Measurement (CBM) tests individually to each child. These test passages were selected from passages designed by Deno and Marston (1987). What has proven to be so attractive about the CBM tests is that each test takes only one minute to administer. As the students read orally from short test passages, each student was recorded on tape. Students were given typical CBM instructions. They were told to "Read out loud the way you would ordinarily read." After reading orally for one minute the student's score is the number of words read accurately in that brief time period. Students at the third grade were given the CBM passages that Deno and Marston indicated were appropriate for the third graders and the fifth grade students were given the passages that were designated for the fifth graders. At the pre-test and post-test each student read three different CBM passages and the average word per minute rate was taken. The three CBM passages that the third grade took averaged 216 words in length and their Flesch-Kincaid grade level averaged 2.5. The three CBM

passages that the fifth grade took averaged 217 words in length and their Flesch-Kincaid grade level averaged 4.7.

At the time of the post-test three additional transfer CBM passages from the Deno and Marsten manual were taken that the students had never seen before were given, and these transfer passage were at the grade level of the student.

In addition to the CBM tests, Classroom teachers gave the GRADE achievement tests in sentence and passage comprehension. In summary, the data gathered for each student included reading grade level, speed of oral reading, and two measures of comprehension. The gain scores from pre-test to post-test became the unit of analysis.

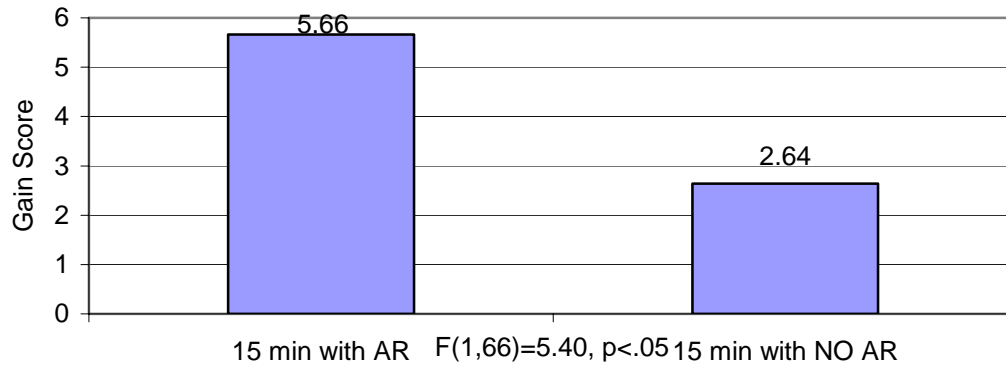
## Results

Analysis of time on task during independent silent reading revealed that both the control and the experimental students were on task 90% of the time.

The gain scores from pretest to posttest were analyzed using multiple analysis of variance (MANOVA). On the AGS GRADE test in passage comprehension, grades three and five students who were in the experimental group using the AR program were significantly better than the control group ( $F(1,66) = 5.40, p < .05$ ), as seen in Figure 1.

**Results: Accelerated Reader vs. No-Accelerated Read**

**Figure 1. Gain Scores on AGS-passage Comprehension for grades 3 and 5 students**

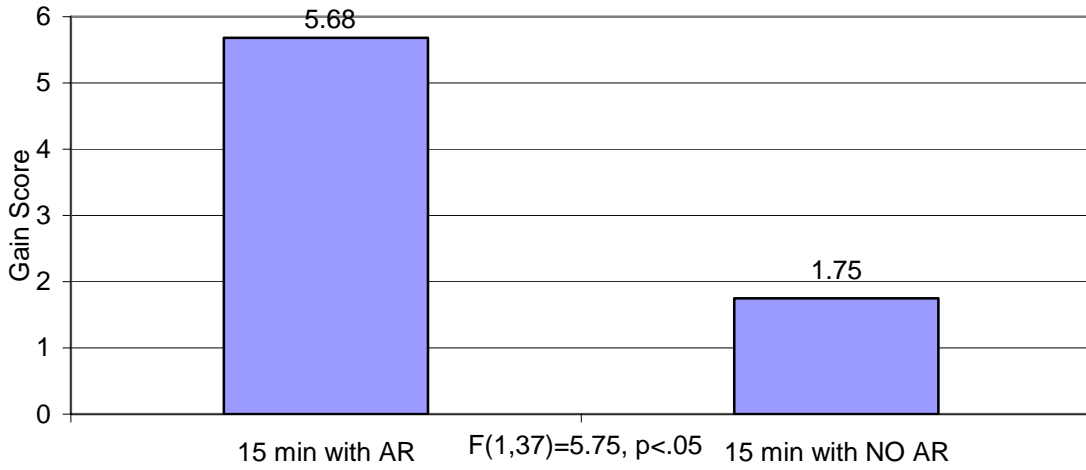


**\* During the study, the AR group made a gain of 5.66 points and the no-AR group gain was 2.64 points.**

**On the AGS GRADE passage comprehension test, the fifth graders in the experimental group using AR were significantly better ( $F(1,37) = 5.75, p < .05$ ) than the fifth graders in the control group that did not use the AR, as seen in Figure 2.**

**Results: Accelerated Reader vs. No-Accelerated Read**

**Figure 2. Gain Scores on AGS Passage Comprehension for 5th grade**

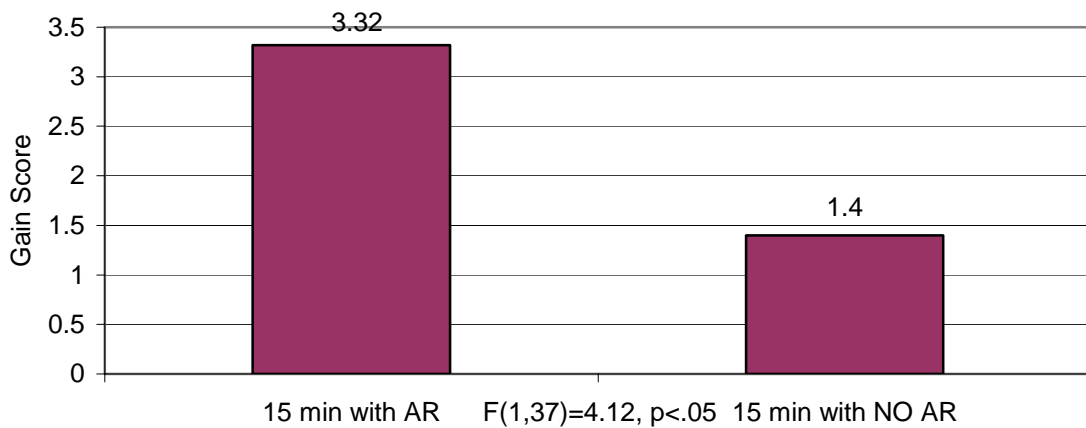


**\* The Accelerated Reader group gained 5.68 points while the No-Accelerated Reader group gained 1.75 points.**

**On the AGS GRADE vocabulary test, the gain score for the fifth grade students who used the AR was significantly greater ( $F(1,37) = 4.12, p<.05$ ) than the gain score for the control students who did not use AR, as seen in Figure3.**

**Results: Accelerated Reader vs. No-Accelerated Read**

**Figure 3. Gain Scores on AGS Vocabulary for 5th grade**

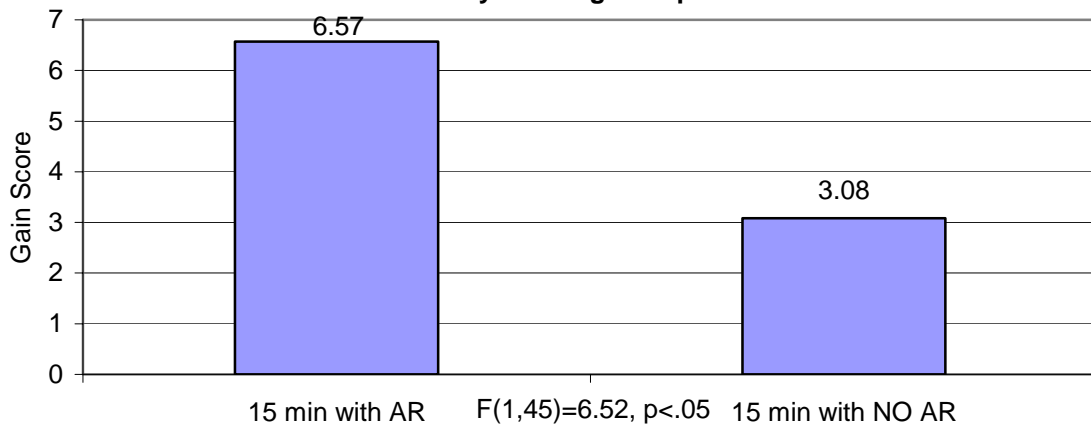


**\* The Accelerated Reader group gained 3.32 points while the No-Accelerated Reader group gained 1.4 points.**

Looking just at the low ability readers for both grade three and five, we find that the gain score in passage comprehension on the AGS GRADE test was significantly higher ( $F(1,45) = 6.52, p < .05$ ) than students who did not use AR, as seen in Figure 4.

#### Results: Accelerated Reader vs. No-Accelerated Read

Figure 4. Gain Scores on AGS-Passage Comprehension for Low Ability Reading Group



\* The Accelerated Reader group gained 6.57 months while the No-Accelerated Reader group gained 3.08 months.

#### Discussion

**In American schools students are encouraged to read books independently with the idea that reading will improve reading achievement. The manner used by teachers to monitor student reading varies, but one of the ways is to use the AR program and its quizzes. The rapid feedback on quizzes is part of the AR program, and we wanted to test its effect using an experimental design. The reading program for the students in the experimental and control groups was the same with regard to time allocated to reading, teacher expertise, and availability to books in the school library. Students in both groups were encouraged to select books for independent reading that were appropriate for their level of skill and they were encouraged to read their books carefully. During independent silent reading, students in both groups were on task 90% of the time. Data analysis from this study showed that students using the AR system significantly outperformed their controls on the following Grade reading tests:**

- In passage comprehension, experimental students outperformed their controls.**
- In passage comprehension, the fifth graders outperformed their fifth grade controls.**
- On vocabulary, the fifth graders outperformed their fifth grade controls.**
- In passage comprehension, the poorest readers in the experimental group significantly outperformed their poor reader controls.**

**Given these results, one may conclude that the AR program with its immediate feedback on quizzes taken on books read had a positive effect on student achievement in comprehension and vocabulary.**

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