The Accelerated Reader Program's Relationship To Student Achievement On The English-Language Arts California Standards Test

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Abstract

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This study aimed to investigate the potential of the Accelerated Reader (AR) program to positively impact student scores on the English-Language Arts California Standards Test (CST). The degree of attention placed on student reading achievement and improvement in high-stakes student standardized test scores in the state of California, as well as the rest of the country, requires an examination of this potential relationship. The results of such an examination can help teachers determine how to best use their resources. Previously published studies have attempted to determine the relationship between the AR program and student achievement. The results have been mixed. This study used eighth grade student data collected from the AR program over one school year, and compared the data to the same students' "Reading Comprehension" and "Literary Analysis" reporting clusters on the English-Language Arts CST scores.

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Introduction

The Accelerated Reader (AR) Program is now used in half the school districts in the United States. This program (owned by the Renaissance Learning Company) provides schools with software that allows students to select a book and then take a multiple choice comprehension quiz on the book at a computer. Students earn points based on the number of words each book contains and its reading difficulty, along with the number of correct responses on each quiz. Each student is assigned a semester point goal based on his or her reading level (as determined by an AR diagnostic test called the Standardized Test for Assessment of Reading (STAR)). The STAR generates a grade equivalent (GE) score that can be used to guide students to read books at an appropriate reading level. Unlike an ordinary Silent Sustained Reading (SSR) program, the AR program also allows teachers to easily monitor the reading progress of their students based on their test-taking records and assigned reading levels. Teachers can access the software to generate a variety of reports to help identify individual student strengths and weaknesses, based on the students' scores on the quizzes, the number/reading level of books read during the semester, and progress toward their respective semester point goal.

The AR program is without a doubt a very popular reading management program. This commercial program touts the capability to raise student reading comprehension levels and create lifelong learners. However, the program has its share of critics who question its impact in reading comprehension gains, and overall student progress on standardized tests. These critics question the effectiveness of a reading management program that emphasizes the use of quizzes, points and rewards, and challenge the program's impact on long-term student motivation.

Statement of the Problem

English teachers in the state of California are faced with the annual burden of raising student scores on the English-Language Arts California Standardized Test (CST). The CST contains 75 multiple-choice questions and consists of five different reporting clusters, to include Word Analysis and Vocabulary; Reading Comprehension; Literary Response; Written Conventions; and Writing Strategies. The purpose of the CSTs is to determine student achievement of the California academic content standards for each grade or course. The CSTs are a major component of California's accountability system for districts and schools. Individual student CST results, along with school/district wide results, are eventually mailed to parents, and these results are highlighted in local and major newspapers.

Formidable obstacles such as the high number of English Language Learners, the effects of poverty, cultural attitudes about education, varying degrees of family support for students, and limitations on the time required to adequately teach all the standards make this burden an overwhelming challenge for teachers. As such, teachers are constantly looking for those effective strategies that will help prepare students to raise test scores on the CSTs. The AR Program is seen by many teachers as an effective tool to supplement direct teacher reading instruction and help students improve their reading comprehension levels. If the AR Program does indeed possess the capability to improve student achievement on standardized tests, then such achievement should be seen on the CST from those students who are active participants in the AR Program. Such a relationship needs to be explored.

Importance of the Study

This study is important because of the relationship between independent reading and reading achievement. The renowned linguist Dr. Stephen Krashen, an expert in reading comprehension and its effects on language acquisition, has noted that there is consistent evidence that those students who have access to books read more, and that those students who are provided with more time to do recreational reading show better gains in reading achievement than comparison students (2003). The AR Program emphasizes such reading time and access to books. However, this program is not just a proponent of sustained silent/independent reading; it is a reading management program that provides teachers with the capability of providing a means to monitor the progress of their students' independent reading, and it also uses quizzes, as well as point and reward systems. The quizzes confirm for the teacher that a student has actually read the book. The rewards serve as a form of extrinsic motivation. These features are extremely popular with many teachers. However, these same features of the AR Program have drawn criticism for being too threatening for many students and actually reducing internal

motivation to read. Critics contend that quizzes and points lead to some students being forced, or resorting to reading books they ordinarily would not choose to read solely to get more points. Another point of contention is the fact that the AR Program does not have a role for teachers to provide direct instruction in reading strategies.

The question thus becomes, does such a program still result in gains on standardized tests? Adding to the controversy is the fact that there have not been a great number of peer-reviewed research articles on the AR Program, probably because commercial products are rarely evaluated in academic journals.

Purpose of the Study

The information presented in this study will assist teachers to analyze the value of the AR Program in preparing students for high-stakes standardized test such as the CST. Teachers will be able to better understand the AR Program's potential for improving CST test scores, specifically in terms of the Reading Comprehension and Literary Analysis reporting clusters of the English-Language Arts CST. In short, the information in this study should help teachers know if school resources spent on the AR program (in terms of time, money, and teacher/student effort) are indeed well spent.

Analyzing the degree of AR program participation in terms of a comparison to particular English-Language Arts CST cluster scores provides a more specific, detailed picture than a comparison to the overall English-Language Arts CST scale scores. Although the English-Language Arts CST scale score consists of five different reporting clusters, focusing on the relationship between student AR participation and, specifically, the Reading Comprehension and Literary Analysis reporting cluster scores, is relevant because teachers generally promote greater AR participation with the precise aim of improving the reading comprehension and literary analysis skills of their students.

Research Questions

The research questions to be answered throughout this study are:
- To what extent is there a relationship between the top AR program point earners (regardless of their grade equivalent reading level) and achievement in the Reading Comprehension reporting cluster of the English-Language Arts CST?
- To what extent is there a relationship between the top AR program point earners (regardless of their grade equivalent reading level) and achievement in the Literary Analysis reporting cluster of the English-Language Arts CST?

Review of the Literature

There are numerous research studies that explore the relationship between the AR program and student reading achievement and/or student reading motivation. Although most educators agree on the general concept that the more reading a student does, the better reader that student will become, most of the studies addressing the AR program focus on the quiz, point and incentive features of this reading management program and try to answer whether these features have a positive impact on student reading achievement/motivation.

In an article entitled *"Reading Achievement: Effects of Computerized Reading Management and Enrichment"* the authors Janie Peak and Mark W. Dewalt used a quasi-experimental design to study the effect the AR program had on increasing the readings

scores of ninth graders. The research intended to answer the question of whether a sustained implementation of the AR program's reading management software led to increased achievement on the California Achievement Test (CAT) for middle school students. This causal comparative study compared students from two schools within the same North Carolina county school system. The two schools were similar in curriculum requirements, and used the same basic reading lists, standardized testing programs, textbooks, and tests. The difference between the two schools was the presence of the AR program. The ninth grade students of one school had used the AR program in junior high, and in grades four through six at their elementary school, whereas the students at the other school did not have access to the program. The study used random sampling to collect 50 ninth graders from college prep classes at each school. The researchers collected third, sixth, and eighth grade CAT reading scores for the students. A mean CAT scale score was calculated for each group for each grade, along with a calculation of the average gain per year for each group. The study found that students from the school that used the AR program for five consecutive years had a mean CAT scale score of 715.6 in third grade, a 761.6 score in sixth, and 788 in eighth grade. From third to sixth grade they had a 15.3 average yearly gain, and from sixth to eighth grade an average yearly gain of 13.2. In comparison, the control group had a mean CAT scale score of 724.3 in third grade, 755 in sixth grade and an eighth grade score of 766, with a 10.2 average yearly gain for the third to sixth grade period, and only a 5.5 yearly gain from sixth to eighth grade. (Peak and Dewalt, 1994, p. 32) The study concluded that a computerized reading management program could increase the reading scores of early adolescents in a college prep program.

In an article entitled *"Accelerated Reader: What are the lasting effects on the reading habits of middle school students exposed to Accelerated Reader in elementary grades?"* Linda M. Pavenotti, Kathryn M. Brimmer and James Cipielwski investigated whether seventh grade students who were exposed to the AR program during elementary school were more likely to do more reading of books than those who did not have much exposure to the AR program. The study sought to investigate the Renaissance Learning Company claim that the AR program produces lifelong learners. The study examined 1,771 students in ten different middle schools in three school districts during a one-month period. Two districts used the AR program and one did not. Each student was given the Title Recognition Test (TRT), an instrument that acted as "a proxy indicator of children print exposure, based on previous studies that showed using an instrument with actual book titles interspersed with foils can determine relative levels of recreational reading done by upper elementary and middle school students." (Pavonetti, et al. 2002, p. 303) The TRT involved students recognizing a checklist of books with actual titles and foils. The study's findings did not support the claim that the AR program produces lifelong learners. In comparing students in all three districts, dividing them into two groups, those who had AR in elementary school and those who did not, the study showed no statistically significant difference between groups. An additional analysis of TRT scores conducted by districts also resulted in inconclusive results, although the results suggested that those students in districts where the AR program was not used in elementary school were reading more relative to their AR-exposed peers.   This study was significant because of its conclusion that students would not become lifelong readers based on the use of tests, points or incentive programs.

A more positive relationship between the AR program and reading achievement was found in an article by S.R. Vollands, K.J. Toppings and H.M Evans entitled *"Computerized self-assessment of reading comprehension with The Accelerated Reader: Action Research."* This study consisted of a quasi-experimental study that looked at the effect of the AR program on fifth and sixth grade students from two schools in economically disadvantaged areas of Scotland. The study attempted to analyze the hypothesis that at-risk students could improve their reading achievement by utilizing the AR program. The study participants included at-risk students who had special needs and were English Language Learners. In one group sixth grade students from a school read 15-30 minutes a day and took AR quizzes. Comparison students read for thirty minutes a day and gave written feedback on books. In the second school, sixth grade students in the treatment classroom read for 15-30 minutes a day, but were involved in a marginal implementation of the AR program. All students were pre-tested and post-tested using norm referenced tests. The study found that despite having less reading time than comparison students, the students who used the AR program showed greater statistically significant gains in reading achievement, to include reading comprehension and reading accuracy. (Vollands, et al. 1999, p. 209)

In an article entitled *"The Effects of the Accelerated Reader Program on the Reading Comprehension of Pupils in Grade Three, Four, and Five"* Robert A. Johnson used a one group pre-test post test design with intact groups of classes. The treatment consisted of three types of AR usage; Low participation in the AR program (0-20 points); Average participation (21-74 points); and High participation (75 points and above). All of the 755 students in the study attended seven inner city Title I elementary schools. In this year long study, 166 students were third graders, 247 were fourth graders, and 282 were sixth graders. Students were tested at the beginning and end of the school year with the Gates-Macginitie Reading Test. The study found that all three usage groups improved their reading skills as measured by the Gates-Macginitie Reading Test. Students who read the most (High participants) gained 2.24 years on the Gates-Mcginitie Reading Test. Average participants gained 1.52 years. Low participants gained .73 of a year. The study concluded that the AR program could be effective if the participating students are willing to do the supplemental reading. The study also concluded that the students who read below grade level and would benefit most from the AR program had the least participation.

Keith J. Topping and Terry Paul examined the AR program in a study entitled *"Computer-Assisted Assessment of Practice at Reading: A Large Scale Survey Using Accelerated Reader Data."* The study analyzed the relationship between practice at reading, student performance, and the organizational features of the school system. The study attempted to analyze the question of whether student reading achievement as scored on tests was positively related to the amount of in-school reading practice. The study further examined student performance differences on a state-by-state basis. The study collected data from schools using the AR program via the use of a mail survey, in which 2,193 schools responded with data on 659,214 students in grades K-12. Data collected included AR points for each student during the course of the school year, as well as standardized tests scores. The study found that students scoring in the high quartile of standardized testing read 3.4 to 4.1 times more than low quartile scoring students. The top five percent of readers read 144 times more than the bottom five percent. In regards

to state-by-state comparison, the study used state reading performance as ranked by the National Assessment of Education Progress (NAEP) study by the US Department of Education, a study that ranked the 39 participating states in terms of student reading performance. The study found that high performing states had an average NAEP score of 221.4 and an AR points per student average of 39.2. Average performing states had an average NAEP score of 213.3 and an AR mean of 25.1. Low performing states had an average NAEP score of 202.0 and a mean AR point of 24.7. The study concluded that there was "evidence of a positive relationship between the amount of reading practice and ability in reading." (Topping and Evans, p. 226) The study did concede, however, that it is possible that that more able readers choose to read more, rather than that more practice increases reading ability.

In an article entitled *"Teacher Effectiveness and Computer Assessment of Reading"* Keith J. Topping and W.L. Sanders used AR data from 62,739 students from grades 2 to 8 in Tennessee schools, along with data obtained from the Tennessee Value-Added Assessment System (TVAAS), the "largest longitudinally merged data base of student achievement." (Topping and Sanders, 2000, p. 305) For the purposes of this study, TVAAS data was used as a measure of teacher effectiveness. AR program data was used to measure student reading effectiveness. In this study AR data was merged with TVAAS teacher effectiveness data. The results of the study indicated that teacher effectiveness increased as AR implementation improved. The study found that "the volume of reading done by students and their success in reading comprehension (as measured by percent correct on AR tests) appear to have a positive impact on teacher effectiveness in terms of value added to student achievement as measured by TVAAS." (Topping and Sanders, 2000, p. 328). The study did not, however, establish a causal relationship that "operates in only one direction." (Topping and Sanders, 2000, p. 329) The researchers recognized that effective teachers might create a "classroom ethos which leads to pupils reading more…for instance…the amount of reading could be a barometer or teaching effectiveness, as well as a cause." (Topping and Sanders, p. 329)

Stephen Krashen reviewed experimental evidence on the AR program in an article entitled *"The (Lack of) Experimental Evidence Supporting the Use of Accelerated Reader*. Krashen was especially interested in studying the AR program's elements related to taking computerized testing and incentives related to points/goals. In this article, Krashen focused his critique on those independent researcher studies featured on the Renaissance Learning Company web site. He first focused on fourteen studies that utilized standardized tests to measure student progress but did not use a comparison group. According to Krashen, the results of the studies were "not impressive" and the positive claims "diminish when we consider published data from the school districts and the state and/or examine the reported data carefully." (Krashen, 2003, p. 24) Krashen then analyzed those studies in which a real control group was used. His analysis included a critique of Peak and Dewalt (1994), and Pavonetti, Brimmer & Cipielewski (2000), as well as the studies conducted by Volland, Topping and Evans (1996) and Volland, Topping and Evans (1999). Krashen concluded that a clear advantage for AR students was found in only one study (Peak and Dewalt, 1994). Finally, he examined studies that researched the impact of AR points. Krashen finally concluded that his analysis found the AR program's element related to tests and points is not supported by research.

Joette Stefl-Mabry also conducted a review of previous AR program studies in an article entitled *"Computer-Aided Reading Promotion: Accelerated Reading--Silent Sustained Reading Camouflaged in a Computer Program?* In this study the author compared and contrasted the finding of several studies pertaining to the AR program to studies that analyzed the importance of SSR. Although Stefl-Mabry recognized the merits of SSR in improving reading achievement, the author challenged the quizzing element of the AR program, finding no significant research findings that could identify how much academic gain was due to the AR program and its quiz/points element and how much was due to the SSR element. She concluded "students and teachers need to be provided with regularly scheduled times to read, without the typical pressure to demonstrate or prove what they have read…This does not involve a simple decision to allocate for a technological book-keeping solution…" (Stefl-Mabry, p. 16).

In summarizing the results of this review of literature, it is obvious all researchers recognize the value of reading programs that encourage students to read books as part of a silent sustained reading program. However, the researchers differ on the issue of how to implement such a program, with most critics questioning the testing/points aspect of the AR program. The review of literature illustrates the need to continue examining the AR program and its impact on student achievement using different methods of analysis. Most importantly, the review makes evident there is an absence of any studies attempting to examine the relationship between the AR program and student achievement on the CST.

The California Standardized Tests (CSTs)

The CSTs are a major component of California's Standardized Testing and Reporting (STAR) Program (note: California's STAR program is not related to Reading Renaissance's STAR diagnostic reading assessment). The primary goal of California's STAR program is to help measure how all students are learning required academic skills. California's STAR program measures and evaluates student achievement of the state's content standards. The STAR program test results, along with other available information, help school staffs form a detailed picture of their students' academic achievement (CST Technical Report, 2007).

All students enrolled in grades 2 through 11 in California public schools on the day testing begins are required to take the CSTs. There are a total of 38 CSTs offered for different subjects in different grades. Students in grades two through eleven are required to take the English-Language Arts CST. All CSTs are comprised of four-option multiple-choice items.

CST results play a major role in the calculation of each school's Academic Performance Index (API). These results are also used for determining if elementary and middle schools are making Adequate Yearly Progress (AYP) in helping all students become proficient on the state's content standards as required by the No Child Left Behind (NCLB) Act of 2001.

CST results are reported using scale scores, which ranged from 150 to 600 for each test. In addition, the CST test performances for each student were categorized into one of the following performance levels: far below basic, below basic, basic, proficient, and advanced. Each performance level indicates how well a student is achieving the California content standards tested. The minimum scores defining basic and proficient

were 300 and 350, respectively. In terms of raw scores, a student needs at least 49 correct responses to score at the proficient performance level, and 34 correct responses to score at the basic performance level.

The English-Language Arts CST consists of 75 multiple-choice questions. These 75 questions are further divided into 5 different reporting clusters. These clusters include Reading Comprehension (18 questions); Literary Analysis (15 questions); Word Analysis (9 questions); Writing Strategies (17 questions); and Writing Conventions (16 questions). California schools receive score reporting information that includes student performance on these reporting clusters. This information is reported in terms of percent of correct scores for each reporting cluster.

The Accelerated Reading Program's STAR Reading Assessment

The AR program's STAR is a computerized diagnostic reading assessment developed by the Reading Renaissance Company. The STAR reading assessment requires students to read passages of varying difficulty—the difficulty changes based on a student's responses—as a means of determining a student's reading level. The STAR eventually assigns each student a grade equivalent (GE) reading level. For example, a GE reading level of 8.0 would be comparable to the level of an average 8th grader; a GE reading level of 4.5 would be comparable to the level an average 4th grader after five months of school. This GE reading level is further used to assign semester AR point goals. For example, a student with a GE reading level of 10.0 would be assigned a semester AR point goal of 60 points; a student with a GE reading level of 4.0 would be assigned a semester AR point goal of 25 points. Finally, the GE reading level is also used to assign a Zone of Proximal Development (ZPD) for each student. This ZPD provides each student with a reading level range to select books appropriate to his/her reading level. Students in this study were administered the STAR reading assessment at the beginning of each semester.

Methodology
Participants

The site of the study was a Title I middle school (Grades 7-8) in San Diego, California; approximately 50% of the 1040 students qualify for free or reduced lunch. Approximately 75% of the school's population came from a Hispanic background, and approximately 15% from a Filipino-American background. This study tracked the AR and CST records of 180 students; this number represented one-third of the students comprising the 8th grade class of school year 2005-2006.

All students attending this school were required to participate in the AR program. Throughout school years 2004-2005 and 2005-2006 students attended a 45-minute *Advisory* class at the beginning of each school day, during which time students were required to participate in a SSR period. Students used this period to read their AR books, take computerized AR multiple choice tests after completion of each AR book, maintain a school-furnished AR logbook to record daily reading progress, and complete a brief literary analysis of each book in their respective AR logbooks prior to taking the computerized test (The brief literary analysis involved student's answering questions that requested descriptions of the book's main events, climax, resolution, theme, and main characters). Advisory class teachers were responsible for monitoring student

participation in the AR program by regularly reviewing the entries in the student AR log books, as well as reviewing the computerized AR records/reports available for each student/class.

Students were assigned a semester AR point goal at the beginning of each semester (AR books are assigned point values based on the number of words in the book and its reading difficulty). The semester goals were based on the results of the AR program's STAR reading assessment administered at the beginning of each semester. Semester point goals ranged from 21 for weaker readers, to 81 for advanced readers. Students were encouraged to select books within their respective assigned ZPDs (books within the appropriate student reading level). AR progress was used to determine the "Citizenship" grade of each student in Advisory classes.

English teachers used student AR progress as an academic grade determinant; 10% of a student's English grade was based on progress made in relation to attaining the assigned semester AR point goal (i.e., students attaining 100%-90% of their goal received the equivalent of an A for AR reading; 89%-80% a B, etc). English teachers also played a major role in monitoring the AR semester goal progress of each student, periodically taking time in their English classes to review student AR log books, as well as the AR computerized records/reports available for each student. And these English teachers also assigned 20 minutes of AR reading as a daily homework assignment.

Students also received school-sponsored incentives for reaching certain AR point milestones. These incentives included raffle tickets, pencils, pins, certificates, free lunch snack items, and coupons to receive a free food item at a popular local fast food restaurant.

During SY 2004-2005 and 2005-2006, all English teachers at the middle school utilized a common English curriculum developed by the publishers Holt, Rinehart and Winston. This common curriculum involved teachers utilizing a common pacing guide, textbook, and accompanying supplemental instructional materials. Consequently, the three 8th grade teachers contributing student records to this study all attempted to address the same curriculum matters in their classrooms during SY 2005-2006.

Design

This study used a causal comparative design that compared groups of 8th grade students that differed on pre-existing attributes.

180 8th grade student records pertaining to respective CST scores and AR participation (points earned) were collected from the rosters of three 8th grade English teachers for SY 2005-2006. The 180 records were selected based on the student scores of the 8th grade (SY 2005-2006) CST English results. Selected records consisted of 90 students scoring within the "basic" performance level on the 2006 English-Language Arts CST, and 90 students scoring within the "proficient" performance level. Records of students scoring in the "advanced", "below basic", and "far below basic" performance levels were avoided due to extreme reading level concerns. The selection of student records was also limited to students who had attended the middle school (and had thus participated in the AR program) for both 7th and 8th grades, to ensure participation of students thoroughly familiar with the school's expectations of student AR participation.

The 180 student records were formed into five comparison groups based on their SY 2005-2006 (8th grade) AR goals and records:

- Group 1: Students possessing combined 1st and 2nd semester AR goals of 100 or more points, and who earned 100 or more AR points. (High Reading Level/High AR Participation)
- Group 2: Students possessing combined 1st and 2nd semester AR goals of 100 or more points, but earning less than 100 AR points. (High Reading Level/Average to Low AR participation)
- Group 3: Students possessing combined 1st and 2nd semester AR goals of less than 100 points, and earning 100 or more points. (Average to Low Reading Level-High AR Participation)
- Group 4: Students possessing combined 1st and 2nd semester AR goals between 65 and 99 points, but earning less than 100 AR points. (Average Reading Level/Average to Low AR participation)
- Group 5: Students possessing combined 1st and 2nd semester AR goals between 64 and 21 points, and earning less than 100 AR points. (Low Reading Level/Average to Low AR Participation)

The AR goal cut-off of 100 points equated to the combined 1st and 2nd semester goals assigned to students scoring the equivalent of an 8.0 GE reading level on the AR program's STAR reading assessment. The AR goal cut-off of 64 points represented the goal assigned to students scoring the equivalent of a 5.0 GE reading level on the STAR. Consequently, students assigned to the "Average Reading Level" category possessed AR point goals appropriate to 5.1 to 7.9 GE reading levels.

A comparison of student scores on the 8th grade English-language arts CST for each group were examined using two different one-way Analyses of Variance (ANOVA); specifically, for the English-Language Arts CST reporting cluster scores for "Reading Comprehension" and "Literary Analysis". The Reading Comprehension reporting cluster consisted of 18 multiple choice questions on the 2006 CST (8th grade). The Literary Analysis reporting cluster consisted of 16 questions. Reporting cluster scores are reported by California's STAR program as a "percentage of correct responses" figure (i.e., a student's score of 72% on the Reading Comprehension reporting cluster reflected 13 of 18 questions answered correctly).
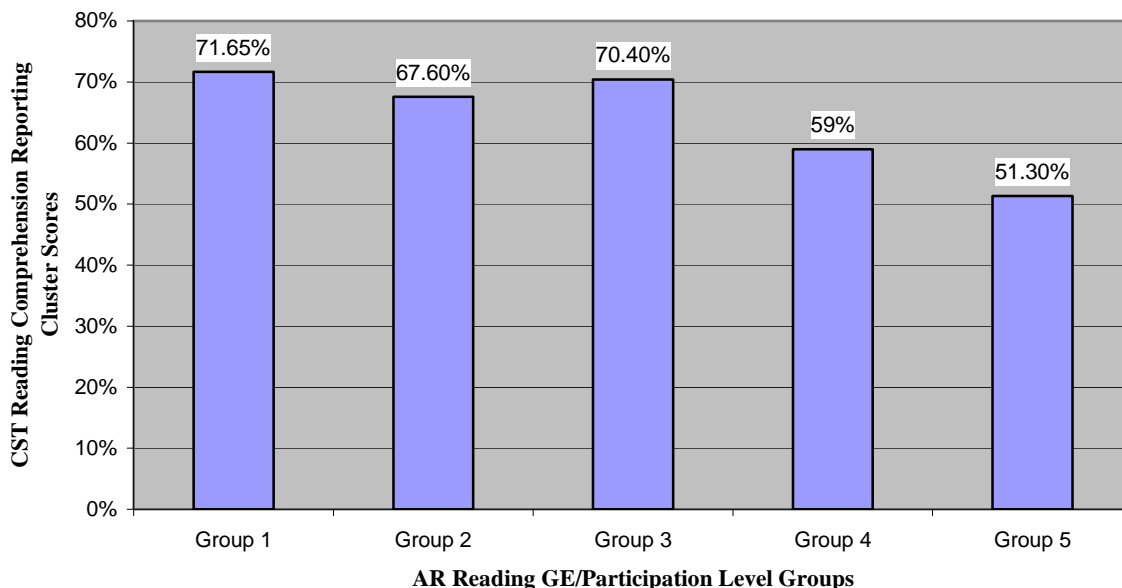
Results

The results indicate high AR participation can play a role in improving CST English-Language Arts Reading Comprehension reporting cluster scores (See Figure 1). When the 8th grade English-Language Arts CST Reading Comprehension reporting cluster scores were compared for all five groups, it was observed that those students belonging to Group 1 met expectations with a mean score of 71.65 % (percentage of correct responses) on this reporting cluster of the English-Language Arts CST; this percentage was the highest of the five groups. However, Group 3 produced a near equivalent mean score of 70.4 %. Consequently, Group 3 scored higher than the Group 2 mean score of 67.6%, and higher than the mean scores of Group 4 (59%) and Group 5 (51.3%). The one-way ANOVA revealed a significant main effect for the Reading Comprehension reporting cluster mean scores ($F(4, 176)=15.17$, MSE=3.75, $p<0000003$).

Accordingly, by increasing reading practice through high AR participation, one group of students (Group 3) was able to outperform a group with higher reading levels and less AR participation (Group 2), and nearly match the scores of another group with

higher reading levels and a similar level of AR participation (Group 1). This same group (Group 3) was also able to outperform a group with similar reading levels and less AR participation (Group 4). As expected, this group (Group 3) also outperformed a group with lower reading levels and lower AR participation (Group 5).

Figure 1. Comparison of CST Reading Comprehension Reporting Cluster Scores by AR Reading GE/Participation Levels


The results of the study also suggest high AR participation can play a role in improving English-Language Arts CST Literary Analysis reporting cluster scores (See Figure 2). When the 8th grade English-Language Arts CST Literary Analysis reporting cluster scores were compared for all five groups, it was observed that the mean score for Group 1 was, as expected, the highest of the five at 68%. Of particular note, however, was the Group 3 mean score of 64.75%, which was higher than Group 2 (59%), Group 4 (52.4%), and Group 5 (49%). Accordingly, by increasing reading practice through high AR participation, students in Group 3 were once again able to outperform groups possessing higher or equal reading levels, as well one group with lower reading levels. However, the gap between Group 3 and Group 1(a group with higher reading levels and similar AR participation) mean scores was greater than that found when previously comparing Reading Comprehension reporting cluster scores. The one-way ANOVA revealed a main effect for mean Literary Analysis reporting cluster scores. ($F(4, 176) =$

12.75, MSE = 3.76, p<0000003).

Group 3's mean score, relative to the other four groups, especially Groups 1, 2 and 4,

Figure 2. Comparison of CST Literary Analysis Reporting Cluster Scores by AR reading GE/
Participation Level
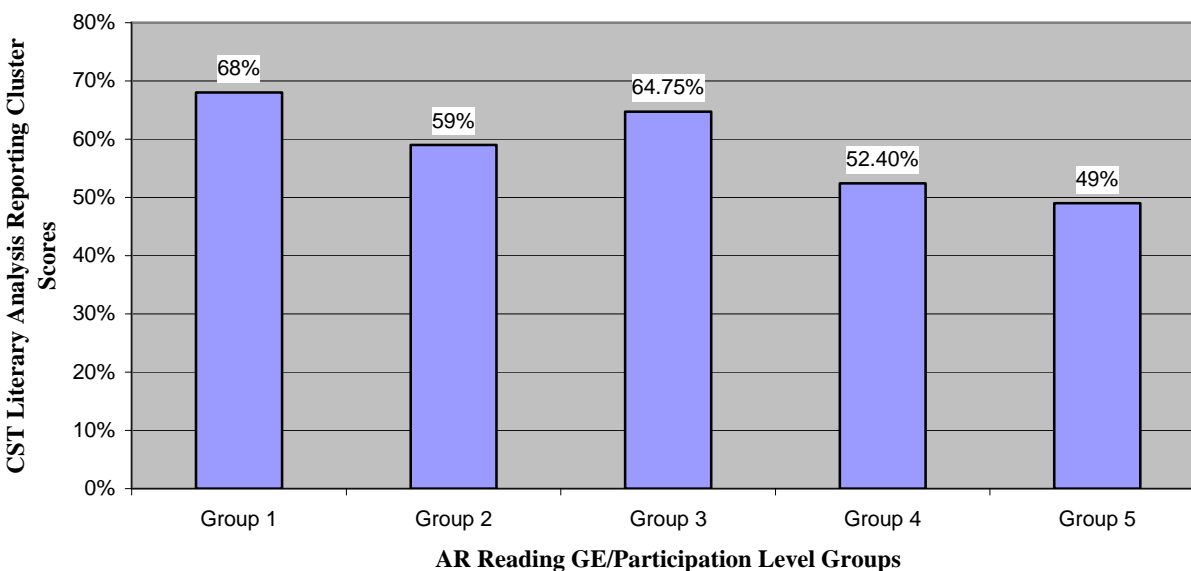
reflects the following benefits provided by high AR program participation:
- More reading practice.
- More practice answering reading comprehension-type questions via AR computerized tests (taken after the completion of each AR book).
- The reading of books appropriate to the student's reading level (the student's assigned ZPD).

One cannot conclude that the difference between reading comprehension/literary analysis skills among the five groups is solely attributable to AR participation. In spite of experiencing a common English curriculum taught by all three English teachers participating in this study, the students in all five groups could be expected to have encountered a number of normal variations in the way standards were addressed in their respective English classrooms. For example, some teachers could naturally be expected to be more effective in teaching literary analysis skills, while others might be more effective in teaching reading comprehension skills. These students could also be expected to have encountered different teaching styles in other core and elective classes, specifically teaching styles related to the development of reading comprehension skills. Furthermore, there exists the possibility that the GE reading levels determined by the AR program's STAR reading assessment--and the accompanying AR goals--do not provide a sufficient degree of reliability. If such is the case, the difference between the students reading levels in Groups 1 and 2, and those in Groups 3 and 4 might not be as distinguishable as they appear in this study. This supports the theory mentioned in this paper's "Review of Literature" that more talented readers merely choose to read more,

instead of the possibility that more reading practice, regardless of reading level, leads to better scores on the CST.

Finally, the results indicate a majority of the student records in this study fit the criteria for the Low AR Participation level. A total of 94 students (or 52 % of the student records included in this study) earned 64 points or less during the school year; 64 points represents the yearly AR point goal for a student with a GE reading level of 5.0. Only 49 students (or 27% of the student records comprising this study) qualified for this study's High AR Participation level by earning at least 100 points during the school year.

Discussion

The results of this study suggest that strong participation in the AR program can be effective in improving reading comprehension and literary analysis scores on a standardized test, even when reading levels are factored out. These results further suggest that teachers should promote high AR participation rates from all their students as one way of preparing for the CST. However, the relatively low AR participation rate found among the majority of student records involved in this study indicates that increasing the number of students scoring at least 100 AR points might prove too difficult. As mentioned previously, this school already devotes 45 minutes daily to AR reading. English teachers already use AR reading progress, in terms of AR goal attainment, as an English academic grade determinant. And the school already provides a number of incentives to promote the attainment of AR goals. Yet, the degree of resistance to reading remains strong among many students. If the school seeks to promote significantly higher AR participation rates from more students, such promotion must be done in a creative, more effective manner. A non-creative, less effective manner runs the risk of negatively affecting student motivation with a heavy-handed approach that fails to stress the love of reading and/or the positive value of setting and attaining personal goals. Such an approach may indeed produce less AR participation in the long run. School demographics also play an important role. Developing a better approach is especially challenging in a school that has a significant number of students coming from family backgrounds that do not necessarily cultivate an early and natural exposure to books in the household. The expectation of instilling a greater love of reading, as well as a habit of daily reading, may not be something that can be accomplished in just two years of middle school, regardless of the use of various positive and negative incentives.

In spite of the above challenges, the possible benefits of having more students achieve high AR participation are indeed worth examining in terms of the school scoring higher on high stakes standardized tests. The results of this study indicate that attaining 100 or more AR points in a school year can contribute to a group of students increasing their English-Language Arts CST Reading Comprehension and Literary Analysis reporting cluster scores each by at least 5% over that of groups with greater or equal reading level skills. 5% on each reporting cluster equates to two more correct questions on the English-language Arts 75-question test. The potential positive effect this percentage difference can make on a California school's API grows with the number of students attaining the high AR participation milestone of 100 points.

<u>Conclusions</u>

This study provides evidence suggesting that more reading practice through high AR participation (at least 100 AR points in a school year) can result in higher scores on the Reading Comprehension and Literary Analysis reporting clusters of the English-Language Arts CST. This evidence specifically suggests that high AR participation can result in students with relatively certain reading level skills actually outperforming students with higher or equal reading skills. Based on these results, one can project higher school-wide CST test scores resulting from more students joining the high AR participation ranks. This study also recognizes the possibility that higher test scores by one group of students can also be attributed to various factors such as individual teacher effectiveness pertaining to the instruction of content standards. Finally, the results of the study indicate that, in spite of a serious school-wide effort, the amount of reading practice at this school is low, and that producing more students willing to join the high AR participation ranks will pose a significant challenge.

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