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An Investigation of the Relationships between Accelerated Reader® and Other Factors and Value-Added Achievement in Tennessee Public Schools

Carl William Chaney
University of Tennessee - Knoxville

To the Graduate Council:

I am submitting herewith a dissertation written by Carl William Chaney entitled "An Investigation of the Relationships between Accelerated Reader® and Other Factors and Value-Added Achievement in Tennessee Public Schools." I have examined the final electronic copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Education, with a major in Educational Administration.

Dan R. Quarles, Major Professor

We have read this dissertation and recommend its acceptance:

C. Glennon Rowell, Mary Jane Connelly, Thomas W. George

Accepted for the Council:

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Vice Provost and Dean of the Graduate School

(Original signatures are on file with official student records.)

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Mary Jane Connelly

Thomas W. George

Acceptance for the Council:

Dr. Anne Mayhew
Vice Provost and Dean of Graduate Studies

(Original signatures are on file in the Graduate Student Services Office.)

An Investigation of the Relationships between Accelerated Reader® and Other Factors and Value-Added Achievement in Tennessee Public Schools

A Dissertation

Presented for the

Doctor of Education

Degree

The University of Tennessee, Knoxville

Carl William (Bill) Chaney

May 2002

Dedication

This dissertation is dedicated to my mother, Dr. Virginia Miles Chaney, who taught school for 66 years without interruption, who always hoped that I would earn a terminal degree, and who never wavered in her encouragement of my intellectual pursuits.

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I wish to thank the following persons and all others who greatly assisted me in the preparation of this dissertation. Together they provided the encouragement and gentle prodding that sustains efforts of this kind.

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Abstract

This study investigated the relationships between value-added achievement in Tennessee public schools that include grades one through five and selected independent variables. The schools' use of the reading practice and monitoring software known as Accelerated Reader® (AR) was of particular interest, as considerable research has suggested its effectiveness in raising achievement in reading and other subjects.

Data were (1) the dependent variables, cumulative three-year average (1999, 2000, and 2001) Tennessee Value-Added Assessment scores in reading, language, math, science, and social studies; (2) independent variables school enrollment, per pupil annual expenditure for the system, percentage of students in the school eligible for free or reduced price meals, and percentage of minority students in the school; and (3) whether and to what extent AR had been purchased and implemented at each school since August 1, 1999. Four levels of AR ownership/implementation were classified as (1) ownership without any "model classrooms," (2) having one or two model classrooms, (3) having three or more model classrooms, or (4) being certified as a "model school."

Multiple regression analysis was used to search for statistically significant relationships between the independent demographic variables and AR use and the dependent variables of value-added achievement at the .05 level of significance, in the hope that a useful model could be designed for predicting value-added achievement from AR use, school enrollment, per pupil expenditure, free or reduced-price meal eligibility, and minority enrollment.

Analysis of the data uncovered almost no significant relationships or school-level effects. In no instance was AR implementation a significant factor in relation to value-added achievement *at the school level*. While no useful regression model was developed from this study, one significant finding was that, in schools ending at grade six, school enrollment and especially minority enrollment are negatively correlated with math achievement.

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CHAPTER 1

INTRODUCTION

Background

As technology has become increasingly infused into the educational landscape, more and more educational software is being developed and marketed. With this increased variety of technology tools from which to choose, educators need more than ever before to know which software programs can be expected to have a significant impact upon student learning. With an increasing emphasis on accountability and performance, administrators and teachers want to employ proven methods and tools to produce the greatest possible gains in student achievement.

It is generally accepted that reading skills are an essential key to learning, and that as students read more, read more broadly, and with greater comprehension, they are able to master all school subjects more quickly and easily. And since it is estimated that America's K-12 students spend an average of only seven minutes per day reading (Institute for Academic Excellence, 1996), there is obviously room for improvement. In an effort to systematize reading instruction and practice, many schools have implemented computer-based programs to determine students' reading level, test their comprehension, and track their progress. The most widely used computer reading management program in Tennessee is Accelerated Reader® (AR), a system for managing and encouraging literature-based, developmentally appropriate reading practice for students, promulgated by Advantage Learning Systems (1993). AR is actually the original component of a

system now known as Reading Renaissance® (RR) and henceforth used synonymously, which in turn is part of a comprehensive school improvement program marketed as School Renaissance™. Reading, writing, and math skills are all targeted in this suite of computer applications and school-improvement tools.

More than 50,000 schools have purchased AR across the country since its introduction in the early 1990's. A significant number of Tennessee elementary schools have been using AR for several years, but it is reasonable to assume that the level of program implementation varies from school to school. As with most educational efforts and emphases, significant results are more likely to be observed when the program is vigorously and intensively implemented.

Several dozen studies have reported mixed, although generally favorable, results of the effect of AR upon achievement in reading and other subjects, library circulation, attitudes toward reading, and even school attendance. In one of the largest studies to date, the Tennessee Value-added Assessment System (TVAAS) records of almost 63,000 Tennessee students in grades 2-8 in the 1996-97 school year were examined in relationship to a number of AR variables, including numbers of books read, readability level, and AR "points" earned, which are based upon reading comprehension quiz scores (Sanders & Topping, 1999). Analysis of the data revealed that "value added" generally increases with both reading volume and percentage correct on AR quizzes. A 1997 study (Paul, Swanson, Zhang, & Hehenberger) analyzed the Terra Nova® achievement test scores and TVAAS gains for students in grades 3-8 in several hundred Tennessee schools, simply comparing schools that had purchased AR with those which had not. In

all grades and subjects, schools that owned AR outperformed schools that did not own AR. In this study, however, *level of implementation* was not considered.

It could be argued, also, that this superior achievement is attributable to other factors, or even that *a priori* more "progressive" schools have a tendency to purchase AR. But a previous study (Paul, Vanderzee, Rue, & Swanson, 1996) analyzed test data for 2,500 AR schools with 3,500 socio-economically matched non-AR schools and found statistically significant differences in overall academic achievement between the AR schools and the control schools. The same study revealed an increase in gains with increased length of time schools had used AR.

The question remains, however, whether the factor of AR utilization and implementation—alone or in combination with other variables—has a significant effect upon "value-added" achievement in Tennessee schools. Since hundreds of thousands of dollars are being spent, and thousands of hours for students, teachers, and librarians are being used each year on AR in Tennessee alone, educators really need to know whether the program is effective and, if so, under what conditions and circumstances.

Accelerated Reader®

AR is not a method of teaching the skill of reading, nor of increasing reading speed, as the name might imply. Rather, AR is fundamentally a system of computerized testing and record keeping, whose goal is to increase literature-based reading practice at levels appropriately challenging to the reading development of students. The program is based upon a list of over 25,000 books, each of which has been assigned a reading level,

based upon a widely used readability index (Paul, Vanderzee, Rue, & Swanson, 1996). Each book is assigned a “point value” derived from its length and reading level. The basic formula for this calculation is as follows:

$$\boxed{\text{AR Points} = (10 + \text{Reading Level}) \times (\text{Words in Book}/100{,}000)}$$

Procedurally, the student:

1. Selects a book from the list;
2. Reads the book;
3. Goes to a computer, either in the library or classroom on a network, and takes a five- to twenty-item, multiple-choice test, developed and validated by AR, about the content of the book.

The test replaces the traditional book report or other assessment tool to give the teacher some reasonable assurance that the student has read the book. Provided that the student scores a minimum of 60 percent on the quiz, the program awards the student AR points according to this formula:

$$\boxed{\text{AR Points Awarded} = (\text{Percentage Correct on Quiz}) \times (\text{Book's AR Point Value})}$$

The combination of test scores and points earned, along with the student’s reading level, is tracked by the software and reported to teachers, students, parents, and administrators by means of a variety of reports. A thorough explanation of AR methodology is provided by Sanders and Topping (1999), pages 3-5.

As AR has evolved and become a component of Reading Renaissance®, its sponsors have developed various levels of implementation to recognize those teachers

and schools that are adhering to the program's tenets more vigorously. For purposes of this study, schools' levels of implementation are classified in Table 1.

The Tennessee Value Added Assessment System (TVAAS)

TVAAS was developed by then-University of Tennessee Professor William Sanders in the 1980's, and its deployment mandated by the Tennessee legislature in 1992, to provide unbiased estimates of the influences that school systems, schools, and teachers have upon the academic gains of students in the State's 138 school systems (Sanders & Topping, 1999). The legal authority also requires the use of fresh, non-redundant, equivalent achievement tests each year for students in Tennessee public schools in grades two through eight. The achievement-testing program is known as TCAP, or Tennessee Comprehensive Assessment Program. The specific achievement test selected for use is the Terra Nova®, published by CTB-McGraw Hill. Students are tested in five major subject areas: reading, math, language, science, and social studies, using both norm-referenced and criterion- or curriculum-referenced items. Test items for each year's administration are drawn from a large bank of equivalent items, at least 70% of which must be new in relation to the previous year's tests. Terra Nova® has been subjected to rigorous examination of its psychometric properties and been found to be valid and reliable (Williams, 1989; Bock & Wolfe, 1996).

From the largest longitudinally-merged database of student achievement in the United States, TVAAS inputs students' scale scores derived from the Terra Nova® into a system of mixed-model, multivariate statistical analysis to eliminate the problem of

Table 1: Classification of Schools by Level of AR Implementation

AR Level	Description
0	School has not purchased AR.
1	School has purchased AR and is presumed to be using the program, but does not have any Model Classrooms.
2	Model Classroom certification has been awarded to one or two classes/teachers in the school, based upon specific criteria as set forth in the Model Classroom Checklist (Appendix A).
3	Model Classroom certification has been awarded to three (3) or more classes/teachers in the school, based upon specific criteria as set forth in the Model Classroom Checklist.
4	Model School certification has been awarded to schools in which all classes are utilizing AR, at least five teachers or 30% of reading teachers (whichever is greater) have achieved Model Classroom certification, and the school has met other criteria as forth in the Renaissance Model School Criteria (Appendix B).

missing data resulting from students' missing tests, changing schools, changing districts, or moving out of state. TVAAS estimates of school, system, and teacher effects have been virtually uncorrelated with socio-economic factors and prior achievement (Sanders & Topping, 1999). A thorough discussion of the technical aspects of TVAAS may be found in Sanders, Saxton, & Horn (1997).

In the fall of 2000, the State of Tennessee released its first-ever "report cards" on each public school system and school in the State (Report Card, 2000). In addition to demographic and other academic achievement data, schools encompassing grades K-8 posted three-year average TVAAS achievement gains. These value-added scores in reading, math, language, social studies, and science measure how much students in each school learned, on average, as measured against a national norm gain on the Terra Nova® achievement test. The 2001 achievement and value-added data are available at on-line at the Web site of the Nashville *Tennessean*.

Purpose of the Study

The purpose of this study was to determine the relationship between the use of AR and four other variables and the achievement of students in Tennessee public schools over the past three years. In addition to level of AR implementation, the variables of (1) school enrollment, (2) percentage of students on free or reduced-price meals, (3) racial composition of the student body, and (4) per-pupil expenditure of the school system were examined.

Since the achievement test data reflect the average of testing done in the spring of 1999, 2000, and 2001, it seemed logical that, in order for AR/RR to have significant impact upon student achievement, the program would have had to be in place by the beginning of the 1999-2000 school year, at a minimum. In addition, not many schools had purchased and implemented since that time, most having done so earlier. Therefore, the study used a cut-off date of August 1, 1999, for purchase of AR, and schools' levels of implementation were considered as of that date.

The Research Question

The fundamental research question for this inquiry was this: "What are the effects of AR, at various levels of implementation, in combination with other selected variables, upon student achievement in Tennessee public schools encompassing grades K or 1 through 5 or above?"

Significance of the Study

The results of this study should help guide educational leaders in Tennessee and other states in their quest for programs that offer potential for significant positive impact upon student achievement. While some previous research points to the efficacy of AR, no statewide analysis of value-added gains in relation to AR implementation has been performed. Findings of this research were expected to indicate under what conditions or circumstances, and at what levels of use, AR can be expected to have a significant impact upon student achievement.

Limitations and Delimitations

This study was delimited to:

1. The "report card" data on Tennessee public schools as compiled in the fall of 2001 by the Tennessee Department of Education and reported at the Web site of the Nashville *Tennessean*.
2. Those schools for which three-year average value-added scores were available.
3. The schools reported by the School Renaissance Institute as having, or not having, implemented AR at some level.

The study was limited by:

1. The accuracy of the data supplied by the schools report card.
2. The accuracy of the data supplied by School Renaissance Institute.
3. The fact that the implementation data supplied by the School Renaissance Institute did not take into account the total number of classrooms in the school.
4. Lack of indication as to the grade levels certified as having "Model Classrooms."
5. Lack of indication as to whether any Model Classrooms were at the grade levels tested.

Assumptions

The researcher assumed the following:

1. Schools that had purchased AR on or before August 1, 1999, but had not received any Model Classroom certifications, were nevertheless utilizing the program to some extent.

2. The Tennessee Value Added Assessment System is a valid measure of gains in student achievement from year to year.
3. Use of the three-year-average TVAAS gain statistic as a criterion variable tended to minimize “spikes” and other testing anomalies that examining a single year’s gains might have permitted.
4. The additional predictor variables identified above were the factors most likely to have significant effects within the regression analysis.

Definition of Terms

The following terms with which some readers may be unfamiliar are used in this study. They are defined as follows:

Accelerated Reader® (AR) is a computer-based system for managing and encouraging literature-based, developmentally appropriate reading practice for students, promulgated by Advantage Learning Systems (1993).

Institute for Academic Excellence™ is the research and development arm of School Renaissance®, formerly known as Reading Renaissance™, originally known as Advantage Learning Systems®.

Model Classroom™ is the designation applied to teachers or classrooms meeting the criteria for AR set forth in the Model Classroom Checklist (Appendix A.)

Model School™ is the designation applied to schools meeting the criteria as set forth in Appendix B.

Reading Renaissance™ (RR) and School Renaissance™ (SR) are names applied to the systems of implementation of AR and other programs, all marketed under the umbrella term of

Renaissance Learning™, which is the current parent company of AR.

Tennessee Comprehensive Assessment Program (TCAP) is the state's mandated system of tracking student achievement in public schools. It consists of standardized norm-referenced and criterion-referenced testing in several subject areas in grades two through 12.

Tennessee Value-Added Assessment System (TVAAS) is a statistical procedure developed by Dr. William Sanders for estimating student achievement gains from year to year by comparing scale scores on the Terra Nova® achievement tests, using mixed-model multivariate analysis to control for extraneous variables. TVAAS scores are reported as percentages of expected gains. The system is also used to compare groups of students, teachers, schools, and school systems. The public has access only to school-level data.

Terra Nova® Achievement Tests are norm-referenced and criterion-referenced batteries of objective tests published by CTB-McGraw Hill and administered to students in grades two through eight under the TCAP.

Summary of Chapter 1

Tennessee's educators, like their counterparts across the nation, are seeking ways to enhance student achievement. Various programs have been developed to help achieve

this goal. One of the most widely used such programs is Accelerated Reader® (AR). While its authors and publisher claim that it is effective in increasing reading practice and comprehension, and improving achievement in other school subjects, scientific research on the subject is incomplete and inconclusive.

This study of the relationships between AR implementation, together with other variables, and student achievement in Tennessee was designed to add to the body of knowledge about which programs tend to enhance value-added achievement.

Organization of the Study

This study was organized in the following manner:

Chapter 1 provides a background on the subject, information about AR and its implementation, information about the Tennessee Value-Added Assessment System (TVAAS), the purpose of the study, the research question, the significance of the study, limitations and delimitations of the study, assumptions upon which the study rests, definitions of possibly unfamiliar terms, and a summary of the chapter.

Chapter 2 is devoted to a review of the literature extant on AR. Four categories of research are reviewed: (1) research conducted or sponsored by the School Renaissance Institute; (2) dissertations and theses; (3) journal articles, reports, and papers; (4) unpublished "field reports" from schools and districts.

Chapter 3 addresses the methodology of the study, the subjects, data collection and classification procedures, and statistical methods and procedures.

Chapter 4 includes the findings and analysis of the data, presented in a series of tables and charts with interpretation of results.

Chapter 5 is a summary of the study, conclusions, and some recommendations for further research.

CHAPTER 2

REVIEW OF RELATED LITERATURE

Introduction

Considering the number of schools using AR and the monetary and time investment represented, there is not a great deal of independent research on its effectiveness reported in the educational literature. This chapter provides a review of selected writings in these four categories: (1) Large-scale research by the School Renaissance Institute, formerly known as the Institute for Academic Excellence, publishers of AR; (2) a few dissertations and theses which have examined AR with respect to its effect on student achievement, reading practice, attitudes, and library circulation; (3) journal articles, reports, and papers by educators relating to the use of AR; (4) unpublished "field reports" from schools and districts using AR. Within each category, the research tending to favor the use of AR will be reviewed first, followed by the research tending to question its efficacy.

Institute Research

The "landmark" study by the Institute for Academic Excellence (1996) collected reading performance data for 659,214 students in grades K-12 during the 1994-95 school year. Analysis of the data revealed the following points:

- Average reading practice among all students is 7.1 minutes per day.
- Reading practice declines markedly after fifth grade.

- High school students spend as much time practicing reading as do kindergarten students—about three minutes per day.
- When ranked according to the amount of reading practice they do, students in the top 5% read 144 times as much as students in the bottom 5%.
- Students in the highest performing states on the National Assessment of Educational Progress (NAEP) engaged in 59% more reading practice than students in the bottom quartile of the states.
- Students in schools with populations of 200 or fewer engage in twice as much reading practice as do students in school of 1,000 or more.
- Students in private schools practice reading 67% more than students in public schools.

An earlier study by the Institute (1993) collected reading and math standardized scores from 10,124 students in grades 1-9 in 136 schools nationwide during the school years 1991-92. Predicted reading improvement ranged from 1.3 to 26.9 percentiles per 100 AR points earned by the students. Greater improvement was found for lower-ability readers, but all students seemed to benefit from reading practice. Predicted math improvement ranged from 1.9 to 11.7 percentiles per 100 AR points earned.

Paul, Vanderzee, Rue, and Swanson (1995) collected attendance and standardized test data for 2,511 AR schools and 3,500 socio-economically matched non-AR control schools in Texas. AR schools displayed statistically significant superior performance in all subject areas tested: reading, math, science, social studies, and writing. Gains in

academic performance increased with the length of time the school had been using AR. Attendance was also better at AR schools.

In a study (Paul, Swanson, Zhang, and Hehenberger, 1997) with similarities to the proposed one, the TCAP/TVAAS scale scores and gains of almost 700 Tennessee schools for the 1995-96 school year were examined in relation to the schools' use of AR. In this study, AR implementation was simply categorized in one of three ways: (1) an AR school if the school had purchased the program prior to September, 1995; (2) a non-AR school if it had not purchased AR as of June, 1997; or (3) a Transition school if it purchased AR at any time after August, 1995. Only the scale scores and TVAAS gains for one year were used as the criterion variable. In each of the 30 grade-subject pairs, AR schools had higher adjusted mean scale scores than non-AR schools. AR schools had a higher adjusted mean *gain* in all grades and subjects except in reading, science, and social studies in grade 5. In reading, language, and math in all grades, "Transition" schools performed at a level above that of non-AR schools but below that of AR schools.

Yet another Institute study (1999) analyzed the 1998-99 reading practice and achievement data for 12,984 students, grades 1-9, in 50 Idaho elementary, middle, and junior high schools. Compared to a national sample of their peers, the students in AR schools gained an average of 1.84 normal curve equivalents (NCE's) in reading. An important aspect of this study is that the level of reading growth was found to be nearly twice as high for students in schools with Model Classrooms as it was for those in schools where no staff members had received Reading Renaissance® training.

Dissertations and Theses

Morse (1999) monitored the reading practice and assessment performance of 60 first-, second-, and third-grade students for eight months, using the Standardized Test for the Assessment of Reading (STAR) as a pre- and post-test. She found that students who earned 50 or more AR points had significantly greater achievement gains than those who did not.

Analysis of variance by Kunz (1999) on data from the Illinois School Report Card factors of school district size, grade level, reading program, and average reading scores demonstrated significant positive interaction for AR. Bork (1999) compared students in two parochial elementary students in a similar fashion to that of Morse (above) and found moderate positive correlation between reading level as measured by STAR and AR points earned. No significant relationships were found for age, grade, or gender.

Howard (1999) wished to learn whether recreational reading, using Accelerated Reader, influenced reading vocabulary, comprehension, and attitude when socioeconomic status was low. Seven Title I schools in urban Southeastern Virginia participated in pre-testing in September/October 1998 and post-testing in May/June 1999. Two independent variables, each with three levels, were manipulated: (1) Type of AR Usage, i.e. low (0–20 points), average (21–74 points), high (75 and above points); and (2) Grade Level, i.e. three, four, and five. Dependent variables reading, vocabulary, and comprehension were measured using the Gates-MacGinitie Tests of Reading, Form L, on 755 students. The dependent variable attitude was measured on 515 students who completed the Elementary Reading Attitude Scale (ERAS). Positive findings were as follows: (1) At pre-testing

75% or greater of all students tested below grade level in both reading vocabulary and comprehension. At post-testing, after the AR treatment had been administered for the duration of the school year, the percentage of students testing below grade level for reading vocabulary and comprehension significantly decreased. (2) Results of the Multivariate Analysis of Variance (MANOVA) were significant for Type of AR Usage and Grade Level effects. When Type of AR Usage was considered, significant differences between pre-test and post-test assessment of vocabulary and comprehension were noted. (3) Review of the data for the mean difference in vocabulary and comprehension by Grade Level and Type of AR Usage indicated that as participation in the AR program increased, the mean score differences also increased. (4) Analysis of Variance revealed that only the “Type of AR Usage” effect was significant.

Vega (1999) wished to help raise reading levels in a third grade class of at-risk students. Sixty-three percent of the students in the study were reading below grade level in the (1997–1998) school year and had been experiencing low reading abilities since first grade. They participated in AR from October to May. At the end of the study, 75 percent of the subjects were reading on or above grade level. Twenty percent were still reading below grade level, compared with 63 percent at the beginning of the study.

Rogers (2000) examined AR in a middle Georgia elementary school to determine its perceived impact on students' reading experiences, attitudes, and habits. The subjects of the study were a selected group of fifth graders and their teachers, with both groups participating in structured oral individual interviews and three student focus group discussions. Standardized test scores were also examined. Analysis of the collected data

indicated that the program had a meaningful impact on students. Both teachers and students perceived the program as being successful in getting students of all abilities and interests to read with high frequency and on a wide variety of subjects. AR impacted students' reading abilities as well, as measured by their high reading scores on a nationally norm-referenced standardized testing instrument and teacher opinion.

Nancy Facemire (2000) examined the effect of AR on the reading comprehension scores of third grade students in a socio-economically disadvantaged area of West Virginia. The experimental group of students was encouraged to read and test on books supported by the AR program. The STAR program was used to pre-test and post-test students and the group scores were used to ascertain if significant growth in reading comprehension occurred in the experimental group. Analysis of the data in this study did suggest that a significant difference could be attributed to AR.

Mitchell Pratt's dissertation (1999) used an *ex post facto* non-randomized design to compare students' achievement at two Utah elementary schools, one using AR and one not. While he found no statistically significant differences in score on the Utah Core Assessment Series test or the Stanford Achievement test, Pratt points out that AR implementation was not complete.

In a limited study, McKnight (1992) examined the reading motivation, habits, and attitudes of a fifth grade class. This study found that the majority of students greatly improved after using AR for 11 weeks.

A doctoral study by Teresa Spradley (1998) compared the reading, math, and language achievement of 47 sixth graders in an AR school with those of 47 students

randomly selected from three other non-AR schools in the same district, controlling for gender and economic status. ANCOVA's and multiple linear regression analyses were interpreted to reveal significant increases in reading and language for the students using AR, and in reading, language, and math for students above the poverty level.

A correlational study by Holman (1998), however, uncovered no statistically significant relationship between AR points earned and reading comprehension gain on the Iowa Test of Basic Skills for 170 randomly-selected fourth and fifth grade students at Early County (GA) Elementary School. Neither did Mary Knox (1996) find significance at the .05 level for vocabulary, reading comprehension, nor number of books read by 77 fourth- and fifth-graders in AR as compared to students in a teacher-directed reading improvement program.

McMillan (1996) selected a sample of 214 fourth grade students from three elementary schools in a mid-urban district. The experimental group participated in AR during the school year, but did not improve their reading comprehension skills significantly (as measured by the Texas Assessment of Academic Skills) compared with those who did not use AR. Library circulation records did reveal that the AR students checked out more books, longer books, and books with a higher reading level.

Journal Articles, Reports, and Papers

Sanders and Topping's (1999) analysis suggested that both student reading volume and percentage correct on AR quizzes have a positive impact on teacher effectiveness as measured by TVAAS. Among their conclusions are the following:

- In general, value-added rises with increased numbers of books read by students, and increasing percentage correct on AR quizzes.
- Teachers completing Reading Renaissance training were significantly more effective than control teachers who had not.
- Model Classrooms had higher effectiveness in fourth and fifth grades.

Peak and Dewalt (1994) tracked the progress of 50 ninth-grade students who had used AR since third grade. The AR students displayed improved reading attitudes and posted higher reading scores on the California Achievement Test (CAT) than a control group of 50 students.

Vollands, Topping, and Evans (1999) reported on quasi-experimental action research that evaluated AR for 51 sixth grade students in two schools in severely socio-economically disadvantaged areas. They found that the program, even when less than fully implemented, yielded gains in reading achievement superior to gains from regular classroom teaching and an alternative intensive method for 38 control students, as well as significant improvement in girls' reading attitudes.

A University of Texas study (1998) correlated AR points earned and quiz percentage correct to the probability of students' passing the reading portion of the Texas Assessment of Academic Skills (TAAS). Fifth grade students at Barbers Hill Elementary School were studied during the 1996-97 school year. Results indicated that students earning more than 55 AR points and scoring more than 85% correct of AR quizzes have a 95% chance of passing the TAAS reading exam. Students below these levels have a 17% chance of passing.

Goodman (1999) evaluated the effectiveness of AR as implemented at Gardner Middle School in San Manuel, Arizona, during the period April 1997 to April 1998. Two hundred eighty-two students in the seventh and eighth grades were pre-tested and post-tested with the Gates-MacGinitie Reading Tests Form K (pre-test) and Form L (post-test). The mean pre-test scores and post-test scores were compared, using t-tests to determine if there were statistically significant gains or losses. Students exhibited statistically significant improvement in vocabulary and in total scores (vocabulary and comprehension combined) in all areas.

On the other hand, researchers like Prince and Barron (1998) have suggested that while there may be positive benefits to computerized reading programs and awards, there may be greater negative consequences to their use: "Studies suggest that use of the widely known Accelerated Reader Program alone cannot create better lifelong learners. Educators need to examine practices that have worked well in the past and work hard to establish sound principles that will produce able learners and readers" (abstract.) Betty Carter (1996) warns that although the computerized reading management programs increase library circulation and standardized test scores, they have drawbacks. She asserts that such programs "devalue reading, diminish motivation, limit title choice, restrict materials selection and collection development, discourage independent selection of books, emphasize testing rather than needs, and fail to make the best use of school resources." (p.24).

Roseneck *et al* (1996) surveyed fifth-grade students in three Lee County, Florida, schools. Two hundred twenty-two surveys were completed and the results tabulated.

Results indicated no relationship between the use of AR and frequency of library use or attitudes toward reading and the media center. Mathis (1996) presented the findings of a study of the use of AR to increase the reading comprehension scores on the Stanford Achievement Test (SAT) of sixth-grade students compared with the previous year when they did not use the program. Subjects for the study were 30 sixth-grade students from a rural farm community in north central Illinois. Results indicated that, after a year of exposure to the AR program, there was no statistically significant increase in reading comprehension scores from the fifth to the sixth grade.

Field Reports from Schools and Districts

Table 2 summarizes selected field reports from schools and districts across the country using AR. This information has been reported to the Institute for Academic Excellence (1999) and has not been verified independently.

Summary of Chapter 2

Independent researchers have attempted to verify the effectiveness of AR in a number of studies of various sizes and types. Some of these studies have concluded that AR use is effective in improving reading comprehension, practice, and/or attitudes. A few investigations have pointed to a link between AR use and higher achievement in other subjects. Research conducted or sponsored by the School Renaissance Institute or its associated entities has invariably confirmed the efficacy of AR. There remain, however, a number of dissertations, theses, and research projects that have found no

Table 2: Field Reports from Schools and Districts – Summary
Institute for Academic Excellence (1999)

School or District	Location	Results
Monroe County	Key West, FL	After AR implementation, reading achievement gap narrowed by 57% on Stanford Achievement Test, 9th Edition (SAT 9).
Craven County	New Bern, NC	After Reading Renaissance (RR) implementation, pass rates on state proficiency test increased from 66% to 81% in reading, 62% to 79% in math.
Shelby Oaks Elementary	Memphis, TN	RR implemented in 1997-98; 1998 mean gain for reading 95% above national average; math, 27.8%; language, 67.3%.
Horizon Elementary	Jerome, ID	During two-year period of Model Classroom certification, reading growth increased 4.74 and 4.35 NCE's, respectively.
Harris Elementary	Mesa, AR	After implementation of Reading Renaissance®, 470 students in grades 2-6 gained an average 12.6% in reading in one year on SAT 9.
Hobbton Elementary	Newton Grove, NC	After implementation of Reading Renaissance® (RR), 222 students in grades 3-5 led the district in reading and math on the state's end-of-grade tests; reading performance achievement gap decreased by 54%-57%.
Grant Elementary	Muscatine, IA	After school-wide RR implementation, library circulation increased 500%; Iowa Test of Basic Skills (ITBS) reading comprehension scores improved from the 40th to the 70th percentile; attendance increased from 92% to 96%.
Pittsburg Middle	Pittsburg, TX	In first two years of RR implementation, all 500 students averaged 4.23 years' growth on Stanford Diagnostic Reading Test.
Buford Elementary	Buford, GA	With RR implementation, ITBS scores for 830 students indicated three years' reading growth in a two-year period.
Collins Elementary	Collins, MS	Percentage of 255 children in grades 2-4 reading below grade level dropped from 67% to 33% in one year.
Miramonte Elementary	El Monte, CA	In a controlled study, AR was implemented with 80% of the school's 3rd through sixth graders. After three months, the AR students achieved 28% higher reading scores on the SAT 9.

Table 2 (continued): Field Reports from Schools and Districts – Summary
Institute for Academic Excellence (1999)

Cottonwood-Oak Creek School District	Cottonwood, AR	After AR and RR implementation in two elementary and two middle schools, mean reading percentile scores on the SAT 9 increased seven points in one year.
Bryan Independent School District	Bryan, TX	RR was implemented district-wide in 14 elementary schools and three middle schools with 10,000 students. Total *growth* in Texas Assessment of Academic Skills (TAAS) pass rates ranged from 12.3% in reading to 23.4% in math in two years.
Heritage Middle	Middlebury, IN	After RR implementation, 125 sixth graders averaged reading growth of 1.5 years in one year, larger gains for students with initially lower abilities.
McCamey Primary	McCamey, TX	In six months of using RR, 38 second graders experienced reading growth of 1.5 years, 6 percentile rankings, and 3.2 normal curve equivalent units (NCE's).
Coleridge Community School	Coleridge, NE	During one year of full RR implementation, 52 students, grades 3-6, averaged 2.1 years' growth on Comprehensive Test of Basic Skills (CTBS).
W. Alonzo Locke Elementary	Memphis, TN	AR was implemented school-wide in 1997-98. TVAAS reading gains for the 170 students in grades 3-5 were 47% higher than in previous year. 100% of Locke's students are minority and qualify for free or reduced-price lunch, and the mobility rate is 32%.

connection between AR use and better readers or higher achievement in other academic subjects.

The preponderance of the literature, published and unpublished, suggests that, under certain conditions, AR is an effective tool for increasing reading practice and comprehension among grade-school students. Some studies have pointed to a link between its use and higher achievement in other school subjects. A few studies have been critical of the program for its uncreative approach and low-level questions, casting doubt upon its usefulness in stimulating higher-order thinking in students.

CHAPTER 3

METHODOLOGY

Introduction

The purpose of this study was to determine whether statistically significant relationships exist between levels of AR/RR implementation and student achievement in Tennessee public schools that include grades one through five in reading, language, math, science, and social studies. In order to control for potential extraneous factors, this analysis also included the following school variables: (1) school enrollment; (2) percentage of students on free or reduced-price lunch; (3) racial composition of the student body; and (4) per-pupil expenditure of the school system. This chapter describes the subjects of the study, data collection procedures, statistical methods and procedures, and computer-assisted data analysis.

Subjects

The subjects of this study include all Tennessee public schools that contain grades 1-5. The schools identified for the study are taken from the directory of schools on the Web site of the Tennessee Department of Education.

Data Collection

Of the 2,262 active schools and educational institutions recognized and listed by the Tennessee Department of Education, 781 public schools serve students in grades 1-5.

Table 3: Schools in the Study by Grade Structure and Grades Tested

Grades Contained	# Schools	Grades Tested
PK, K, 1-5	373	3,4,5
PK, K, 1-6	163	4,5,6
PK, K, 1-8 or higher	245	6,7,8
Total	**781**	

These schools are divided into three groups for purposes of this study, as outlined in Table 3.

Since the skill of reading is usually taught by the time students complete the fifth grade, it is this group of schools that comprise the subject population for this study. This is the first of three major sources of data for the investigation.

The second data stream comes from the purchase and implementation records maintained by School Renaissance Institute, Inc., Madison, WI, promulgators of AR/RR. The Institute has agreed to provide information concerning which Tennessee schools have purchased AR, when this purchase was effected, and what implementation level should apply to purchasing schools, as stated in Chapter 1 and according to Table 1 (page 5). This information is for statistical purposes only and has been treated as confidential, according to written agreement between the researcher and the Institute.

The third source of data is the Tennessee 2001 Schools Report Card, available on-line at the Web site of the Nashville *Tennessean*. This site provides, for each school, the following items of information pertinent to this study:

(1) percentage of students on free or reduced-price lunch, a measure of socioeconomic status;

(2) per-pupil expenditure for the district;

(3) total pupil population in the school;

(4) percentage of minority students; and

(5) three-year-average value-added achievement gains in reading, math, language, science, and social studies.

Methods and Procedures

The statistical analysis involved in this study required the construction of a sizeable database including the above information about schools in Tennessee that include grades 1-5. In addition to the necessary directory-type information, the required fields were as follows:

- percentage of students on free or reduced-price lunch;
- per-pupil expenditure for the district;
- total pupil enrollment;
- percentage of minority students;
- three-year-average value-added achievement scores in reading, math, language, science, and social studies;
- level of AR/RR implementation.

In addition to calculating the respective correlations between each variable and the value-added scores in each subject, multiple linear regression was used to calculate the effects of the selected variables ($X_{1...6}$) upon the criterion variable (Y) (value-added score) for each of the five subjects: reading, language, math, science, social studies. The

level of AR/RR implementation was entered into the regression as a dummy variable based upon group membership, as described in Hinkle, Weirsma, and Jurs (1994). This procedure yielded a multiple *R,* estimating the relationship between the value-added scores and all the predictor variables; an R^2, or the percentage of variation in the value-added score explained by variations in the predictor variables; an adjusted R^2, reflecting the sample size; the standard error of the estimate; and coefficients and their significance for each of the predictor variables at the .05 level of significance.

Interpretation of these results indicated the relative contribution of each of the predictor variables to the variation in value-added scores for each subject. In this way it was possible to estimate the effects of AR/RR implementation within the context of the other predictor variables. Finally, the means of the value-added scores in each of the five subjects were compared for all schools in the study based upon level of AR implementation. Analysis of variance was employed to determine whether differences in the means were significant at the .05 level.

CHAPTER 4

FINDINGS AND ANALYSIS OF DATA

Introduction

The Tennessee public schools which are the subjects in this study were initially divided into three groups: all schools including grades one through five, but ending at grade five (n = 373); all schools including grades one through five, and ending at grade six (n = 163); and all schools including grades one through five, and ending at grade eight or higher (n = 245). Thus, a total of 781 schools became the subject population for the study.

Data for the study were derived from three sources. The collection process began, as stated in Chapter 3, with a list of all 1,965 active Tennessee public schools downloaded from the Tennessee Department of Education Web site. This list included school names, grade levels, identification codes, addresses, districts, and other demographic data. The school list was filtered to eliminate schools that did not include grades one through five, i.e. grades in which the subject of reading is traditionally given priority in the curriculum. Value-added achievement data, the second data source for the study, were obtained through the cooperation of, and from a spreadsheet created by, Dr. Benjamin Brown of the Tennessee Department of Education. The third source of data, including school enrollment, percentage minority population, district per-pupil expenditures, and percentage of students on free or reduced-price lunch (% F&RL), was the State's online publication of the School Report Card, issued annually and available online at the Web site of the Nashville *Tennessean*. Value-added achievement data

and/or other variables (enrollment, percentage minority, or percentage on free or reduced-price lunch) were unavailable for 40 of the schools. Therefore, 741 schools remained in the study as valid cases.

The next step in the process of data collection and analysis was the merging of value-added achievement scores into the spreadsheets with the other variables for the schools. The descriptive statistics for the data are presented in Table 4.

The achievement scores were obtained, as noted previously, in electronic format from the Tennessee Department of Education. The statistic of interest in each subject was the cumulative three-year (1999, 2000, and 2001) average value-added gain as a percentage of the national norm gain. The scores ranged, as noted in Table 4, from a negative 19.2% for one school in language to 216.1% for another school in science.

Next, the demographic variables for each school (per-pupil expenditure for the district, total school enrollment, percentage minority enrollment, and percentage of students eligible for free or reduced-price lunch) for the 2000-2001 school year were obtained from the Tennessee School Report Card, online at the Web site of the Nashville *Tennessean*. Table 4 also illustrates that per-pupil expenditure ranged from $4,281 per year in Smith County to $7,376 per year in Alcoa. School enrollment within the schools for this study ranged from 58 students at Shady Valley Elementary School in Johnson County to 1,603 students at Snowden School in Memphis. Both percentages of minority students and students eligible for free or reduced-price meals ranged from 0% to 100%.

Table 4: Descriptive Statistics – Tennessee Public Schools Including Grades One through Five – Value-Added Scores, Per Pupil Expenditures, School Enrollment, Percentage Minority Enrollment, and Percentage on Free- and Reduced-Price Lunch – Fall 2001

	N	Minimum	Maximum	Mean	Std. Deviation
Reading	743	-12.5	183.2	102.885	20.857
Language	743	-19.2	199.4	91.330	24.937
Math	743	56.9	176.8	106.228	18.877
Science	743	32.6	216.1	110.998	18.836
Soc. Studies	743	2.0	193.0	109.636	21.039
$/Pupil Expend.	763	4281	7376	5723.30	649.76
Enrollment	759	10	1603	488.71	240.18
% Minority	759	0	100	23.59	33.02
% F&RL	759	0	100	51.86	26.33
Valid N (listwise)	741				

Finally, the factor of AR implementation level was coded for each school with data supplied by the research department of Renaissance Learning®, parent company of AR. Data were available on 764 of the subject schools in the study. Five mutually exclusive categories of AR implementation were identified and coded as to group membership. If the school had not purchased AR ("AR0"), then all four columns received "0's." The "AR1" column received a "1" if the school had purchased AR prior to August 1, 1999, but had no model classrooms. The "AR2" column received a "1" if the school had certified one or two model classrooms. The "AR3" column received a "1" if the school had certified three or more model classrooms. The "AR4" column received a "1" if the school had certified as a model school in AR implementation. Table 5 summarizes the various levels of AR implementation by school group.

Figures 1 through 4 illustrate that, in all three groups of schools, the vast majority of the schools (89%) have purchased AR prior to August 1, 1999, but relatively few schools (10%) have documented more vigorous levels of implementation. Among schools ending at grade six, none of the schools have achieved "Model School" status.

Data Analysis and Findings

Excel® spreadsheets containing the data above were developed to analyze the data for each of the schools in the study: per-pupil expenditure in the district; total enrollment in the school; percentage of minority enrollment; percentage of students on free or reduced-price lunch as a measure of socioeconomic status; level of AR implementation; cumulative three-year average value-added gains as a percentage of the

Table 5: Numbers of Schools by Level of AR Implementation and School Group, Tennessee Public Schools including Grades 1-5, as of August 1, 1999

Group	AR0	AR1	AR2	AR3	AR4	Total N
1-5 Schools	32	317	10	10	4	373
1-6 Schools	26	114	8	12	0	160
1-8 Schools	24	177	8	21	1	231
TOTAL	82	608	26	43	5	**764**

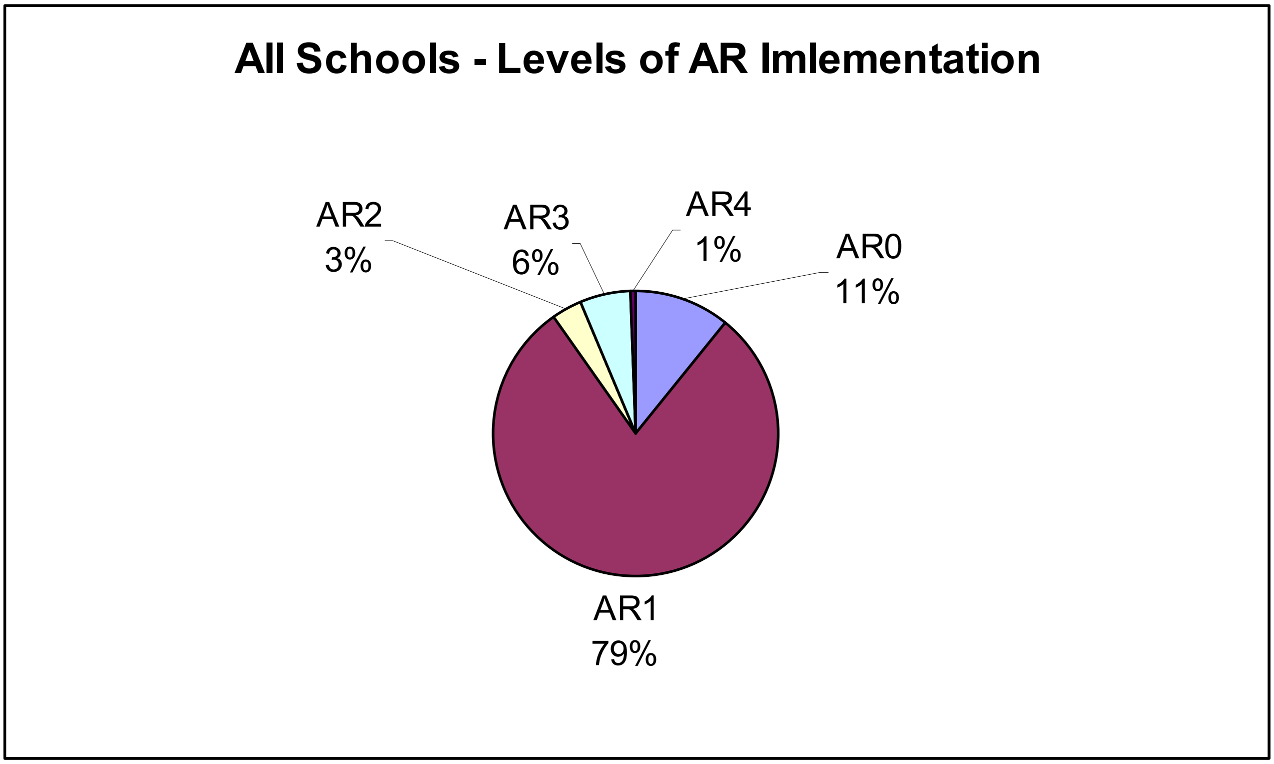

Figure 1: All Schools – Levels of AR Implementation

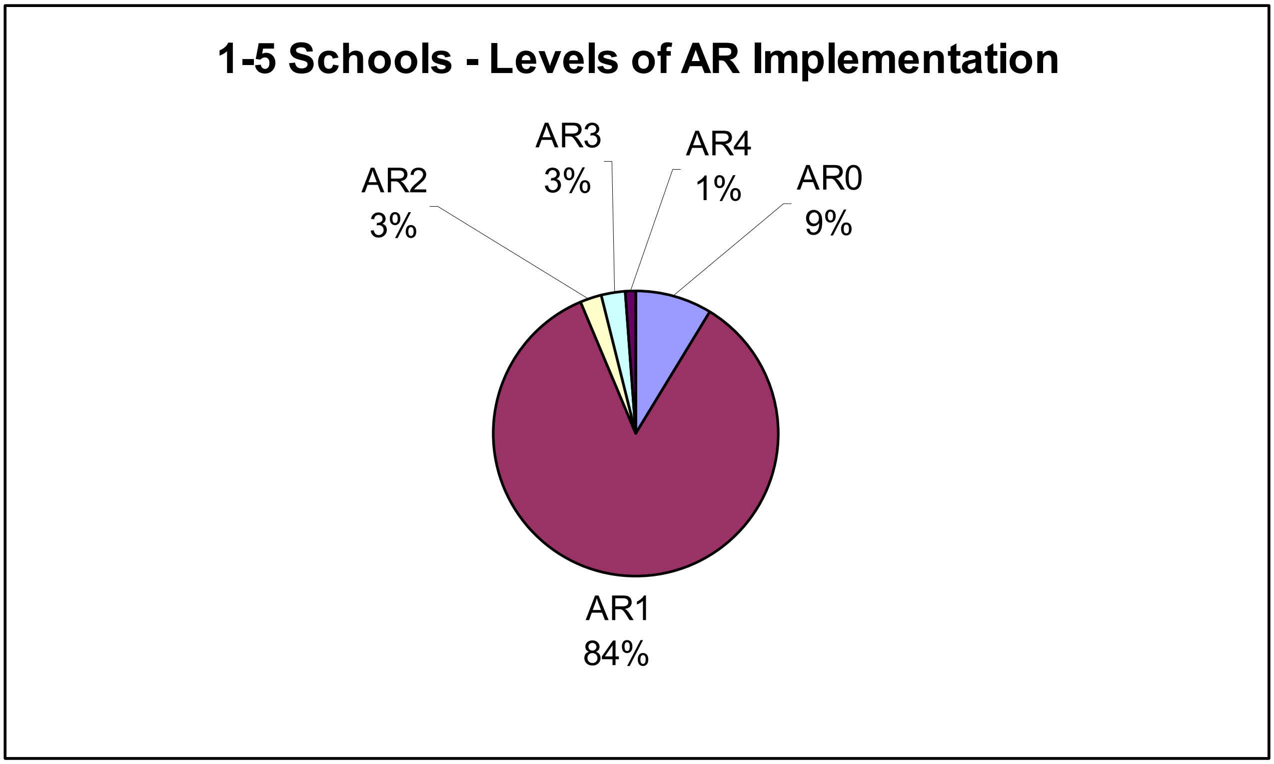

Figure 2: Schools with Grades 1-5 – Levels of AR Implementation

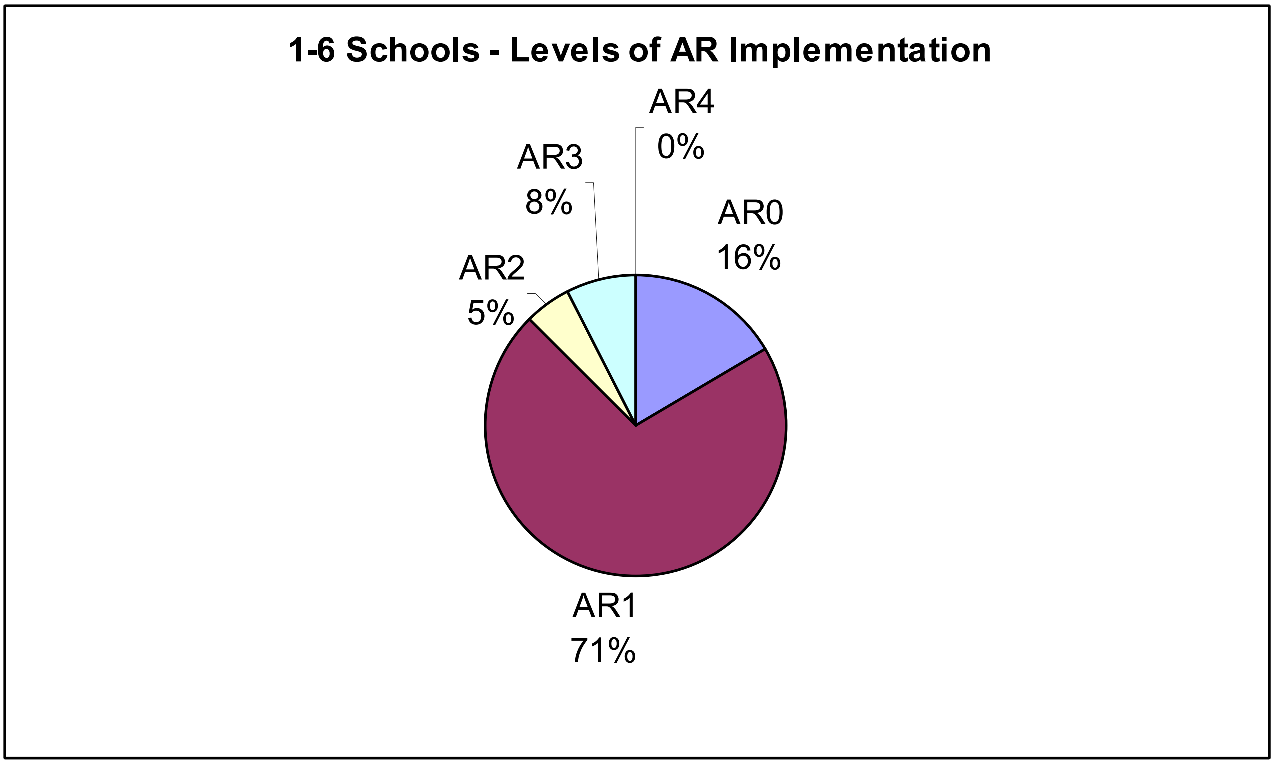

Figure 3: 1-6 Schools – Levels of AR Implementation

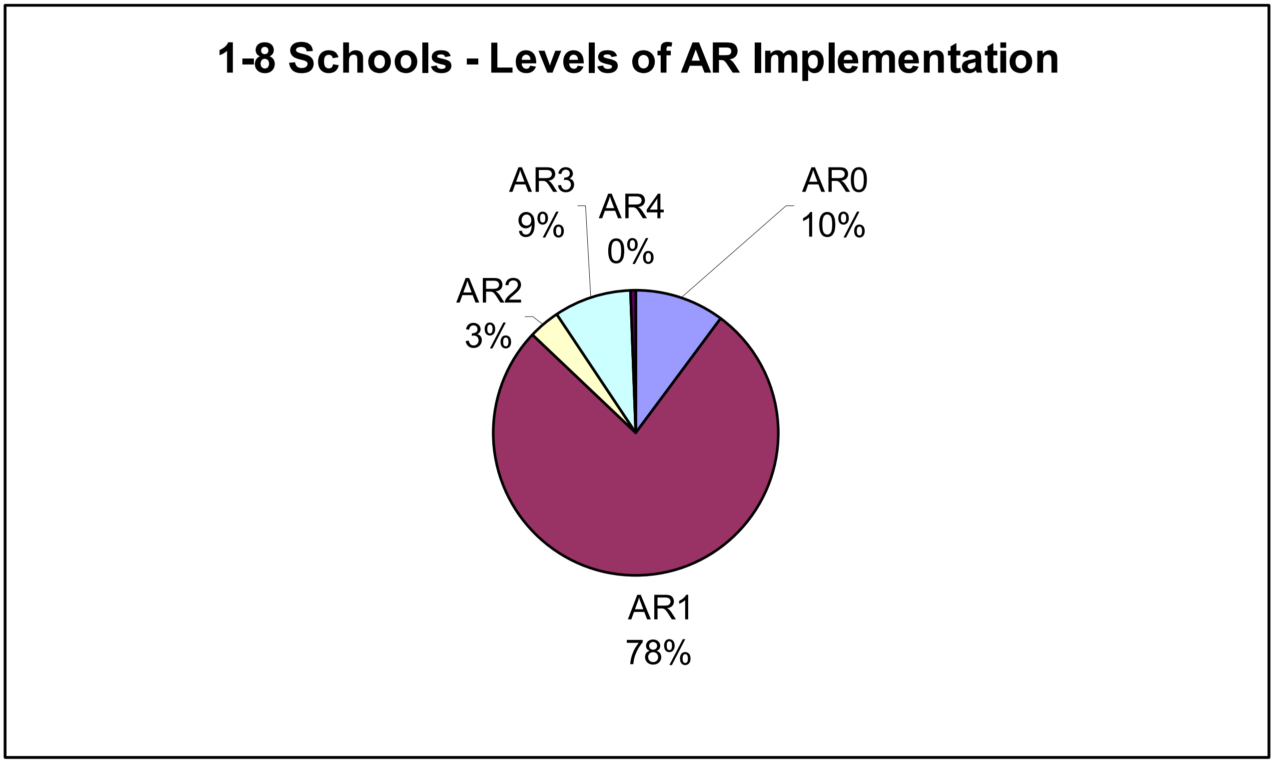

Figure 4: 1-8 Schools – Levels of AR Implementation

national norm expected gain on the Terra Nova® achievement tests in reading, language, math, science, and social studies. Three spreadsheets were initially constructed, one for each of the types of schools identified: those schools including grades one through five but ending at grade five; those schools including grades one through six, but ending at grade six; and those schools including grades one through eight (regardless of whether they ended at grade eight.)

Multiple regression analysis in the general form was first performed for each of the school groups, using SPSS® for Windows Student Version, to determine the relationships between the independent variables and the criterion variables of achievement gains for each of the five subject areas. The results of this analysis are presented in Tables 6 through 25 on pages 41 through 66, with interpretation of the results, beginning with the group of schools ending at grade five.

In the analysis depicted in Table 6, the small adjusted R square, or coefficient of multiple correlation, (.021), the statistical significance of the regression ANOVA's being greater than alpha (.052), and the small Beta weights of the predictor variables indicate that a very small amount of the variation in the criterion variable (**reading** scores) for this group of schools is explained by the variation in the combination of predictor variables (per-pupil expenditure, school enrollment, proportion of minority or socioeconomically disadvantaged students, or the school's level of AR implementation.)

As was the case when reading was examined, the **language** regression model (Table 7) did not reveal significant statistical relationships between language achievement and AR level of implementation. Only the variables of percentage minority

Table 6: Regression Analysis – TN Public Schools Ending at Grade 5 – Value-Added Reading Achievement as the Criterion Variable, Spring 2001

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.207[a]	.043	.021	22.779

a. Predictors: (Constant), AR4, % F&RL, AR2, AR3, $/Pupil Expend., Enrollment, AR1, % Minority

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	8097.999	8	1012.250	1.951	.052[a]
	Residual	180054.9	347	518.890		
	Total	188152.9	355			

a. Predictors: (Constant), AR4, % F&RL, AR2, AR3, $/Pupil Expend., Enrollment, AR1, % Minority

b. Dependent Variable: Reading

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	5% Confidence Interval for	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	83.512	16.269		5.133	.000	51.514	115.509
	$/Pupil Expen	.891E-03	.002	.127	2.089	.037	.000	.009
	Enrollment	.857E-03	.006	.039	.611	.542	-.009	.016
	% Minority	9.64E-02	.056	-.134	-1.731	.084	-.206	.013
	% F&RL	7.11E-02	.062	-.083	-1.144	.253	-.193	.051
	AR1	-2.075	4.733	-.032	-.438	.661	-11.383	7.233
	AR2	6.825	8.866	.047	.770	.442	-10.613	24.262
	AR3	-8.045	8.615	-.058	-.934	.351	-24.990	8.900
	AR4	-8.628	12.429	-.040	-.694	.488	-33.072	15.817

a. Dependent Variable: Reading

Table 7: Regression Analysis – TN Public Schools Ending at Grade 5 – Value-Added Language Achievement as the Criterion Variable, Spring 2001

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.328[a]	.107	.087	20.676

a. Predictors: (Constant), AR4, % F&RL, AR2, AR3, $/Pupil Expend., Enrollment, AR1, % Minority

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	17831.312	8	2228.914	5.214	.000[a]
	Residual	148334.6	347	427.477		
	Total	166166.0	355			

a. Predictors: (Constant), AR4, % F&RL, AR2, AR3, $/Pupil Expend., Enrollment, AR1, % Minority

b. Dependent Variable: Language

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	79.640	14.766		5.393	.000
	$/Pupil Expend.	2.705E-03	.002	.075	1.273	.204
	Enrollment	2.122E-03	.006	.023	.370	.711
	% Minority	-.148	.051	-.220	-2.934	.004
	% F&RL	-.144	.056	-.179	-2.553	.011
	AR1	-5.725	4.295	-.094	-1.333	.184
	AR2	-5.243	8.047	-.038	-.652	.515
	AR3	-2.304	7.820	-.018	-.295	.768
	AR4	-.254	11.281	-.001	-.023	.982

a. Dependent Variable: Language

enrollment and proportion of students on free or reduced-price lunch had any significant association with language, and the relationship was slightly negative.

In relation to **math** achievement (Table 8), as with language, AR implementation was not a significant contributor to the regression. Only percentage minority and socioeconomic make-up of the school make a significant, albeit negative, contribution to the model.

None of the variables in the **science** achievement equation (Table 9) appear to have a significant relationship to science achievement within this group of schools, with the possible exception of the percentage of students on free or reduced-price meals. This factor actually seems to be associated with slightly higher science gains. The analysis of **social studies** achievement (Table 10) in this group of schools reveals a significant negative relationship with percentage of minority students, and with more intensive levels of AR implementation (AR3 and AR4.)

Summary of Analysis of Schools Ending at Grade Five

None of the foregoing regressions in this group of schools resulted in adjusted R square values that would yield a reliable prediction model of the selected variables with respect to value-added achievement in any of the five subjects. It is impossible to assert, based upon these data, that the variation in value-added-achievement among these schools does not occur by chance. Nevertheless, some interesting, if inexplicable, negative associations are evident.

Table 8: Regression Analysis – TN Public Schools Ending at Grade 5 – Value-Added Math Achievement as the Criterion Variable, Spring 2001

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.369[a]	.136	.117	19.743

a. Predictors: (Constant), AR4, % F&RL, AR2, AR3, $/Pupil Expend., Enrollment, AR1, % Minority

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	21379.312	8	2672.414	6.856	.000[a]
	Residual	135252.1	347	389.776		
	Total	156631.4	355			

a. Predictors: (Constant), AR4, % F&RL, AR2, AR3, $/Pupil Expend., Enrollment, AR1, % Minority

b. Dependent Variable: Math

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	118.041	14.100		8.372	.000
	$/Pupil Expend.	6.395E-04	.002	.018	.315	.753
	Enrollment	2.745E-03	.005	.030	.502	.616
	% Minority	-.157	.048	-.240	-3.252	.001
	% F&RL	-.154	.054	-.197	-2.857	.005
	AR1	-4.508	4.102	-.076	-1.099	.272
	AR2	-6.426	7.684	-.048	-.836	.404
	AR3	-2.939	7.467	-.023	-.394	.694
	AR4	-8.347	10.772	-.042	-.775	.439

a. Dependent Variable: Math

Table 9: Regression Analysis – TN Public Schools Ending at Grade 5 – Value-Added Science Achievement as the Criterion Variable, Spring 2001

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.214[a]	.046	.024	20.426

a. Predictors: (Constant), AR4, % F&RL, AR2, AR3, $/Pupil Expend., Enrollment, AR1, % Minority

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6971.902	8	871.488	2.089	.036[a]
	Residual	144769.9	347	417.204		
	Total	151741.8	355			

a. Predictors: (Constant), AR4, % F&RL, AR2, AR3, $/Pupil Expend., Enrollment, AR1, % Minority

b. Dependent Variable: Science

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	107.229	14.588		7.351	.000
	$/Pupil Expend.	2.564E-04	.002	.007	.122	.903
	Enrollment	-2.67E-03	.006	-.030	-.472	.637
	% Minority	-6.77E-02	.050	-.105	-1.355	.176
	% F&RL	.165	.056	.214	2.955	.003
	AR1	-3.364	4.244	-.058	-.793	.429
	AR2	-5.974	7.950	-.045	-.752	.453
	AR3	-8.863	7.725	-.071	-1.147	.252
	AR4	-13.690	11.144	-.070	-1.228	.220

a. Dependent Variable: Science

Table 10: Regression Analysis – TN Public Schools Ending at Grade 5 – Value-Added Social Studies Achievement as the Criterion Variable, Spring 2001

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.314[a]	.099	.078	22.113

a. Predictors: (Constant), AR4, % F&RL, AR2, AR3, $/Pupil Expend., Enrollment, AR1, % Minority

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	18574.853	8	2321.857	4.748	.000[a]
	Residual	169682.0	347	488.997		
	Total	188256.8	355			

a. Predictors: (Constant), AR4, % F&RL, AR2, AR3, $/Pupil Expend., Enrollment, AR1, % Minority

b. Dependent Variable: Soc. Studies

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	93.552	15.793		5.924	.000
	$/Pupil Expend.	4.355E-03	.002	.113	1.916	.056
	Enrollment	2.025E-03	.006	.020	.330	.741
	% Minority	-.244	.054	-.340	-4.522	.000
	% F&RL	2.403E-02	.060	.028	.398	.691
	AR1	-8.125	4.594	-.125	-1.769	.078
	AR2	-9.959	8.607	-.068	-1.157	.248
	AR3	-20.996	8.363	-.151	-2.510	.013
	AR4	-26.747	12.065	-.123	-2.217	.027

a. Dependent Variable: Soc. Studies

Schools Ending at Grade Six

Tables 11 through 15 display the regression analyses for value-added achievement in the five subject areas for schools ending at grade six. A brief interpretation of any significant results follows.

None of the schools ending at grade six are classified as AR4 ("Model School".) With respect to **reading** achievement (Table 11), no variable gave evidence of significant contribution to the prediction equation. Although the adjusted R square value indicates that only about 9% of the variability in **language** achievement (Table 12) is explained by the selected variables, there appears to be a positive correlation between language achievement and classification as an AR1 school.

The factors examined seem to have a greater impact upon **math** achievement (Table 13) among the schools ending at grade six. Almost one third (.291) of the variation is accounted for in the model. Although AR use does not seem to be factor, school enrollment and especially racial composition of the school (standardized beta coefficient -.424) are negatively associated with math achievement for this group of K- or 1-6 schools.

Science achievement (Table 14) is not significantly related to this combination of variables, but there appears to be a very weak negative relationship between minority enrollment and AR1 status and this subject. Only percentage of minority enrollment seems to be related significantly at the .05 level to **social studies** achievement (Table 15).

Table 11: Regression Analysis – TN Public Schools Ending at Grade 6 – Value-Added Reading Achievement as the Criterion Variable, Spring 2001

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.152[a]	.023	-.022	18.994

a. Predictors: (Constant), AR3, Enrollment, AR2, % F&RL, $/Pupil Expend., AR1, % Minority

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1291.984	7	184.569	.512	.825[a]
	Residual	54479.255	151	360.790		
	Total	55771.239	158			

a. Predictors: (Constant), AR3, Enrollment, AR2, % F&RL, $/Pupil Expend., AR1, % Minority

b. Dependent Variable: Reading

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	89.874	18.454		4.870	.000
	$/Pupil Expend.	1.422E-03	.003	.052	.481	.631
	Enrollment	-4.75E-03	.008	-.055	-.587	.558
	% Minority	-6.38E-02	.070	-.136	-.914	.362
	% F&RL	-7.77E-03	.078	-.012	-.100	.920
	AR1	1.012	4.570	.025	.221	.825
	AR2	.805	8.053	.009	.100	.921
	AR3	-1.527	7.068	-.022	-.216	.829

a. Dependent Variable: Reading

Table 12: Regression Analysis – TN Public Schools Ending at Grade 6 – Value-Added Language Achievement as the Criterion Variable, Spring 2001

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.361[a]	.131	.090	24.342

a. Predictors: (Constant), AR3, Enrollment, AR2, % F&RL, $/Pupil Expend., AR1, % Minority

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	13432.325	7	1918.904	3.238	.003[a]
	Residual	89475.845	151	592.555		
	Total	102908.2	158			

a. Predictors: (Constant), AR3, Enrollment, AR2, % F&RL, $/Pupil Expend., AR1, % Minority

b. Dependent Variable: Language

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	82.064	23.650		3.470	.001
	$/Pupil Expend.	3.121E-03	.004	.085	.824	.411
	Enrollment	-2.88E-02	.010	-.245	-2.775	.006
	% Minority	-.107	.089	-.168	-1.201	.231
	% F&RL	7.401E-02	.099	.082	.745	.458
	AR1	14.259	5.856	.254	2.435	.016
	AR2	16.111	10.321	.138	1.561	.121
	AR3	16.777	9.057	.174	1.852	.066

a. Dependent Variable: Language

Table 13: Regression Analysis – TN Public Schools Ending at Grade 6 – Value-Added Math Achievement as the Criterion Variable, Spring 2001

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.568[a]	.322	.291	14.208

a. Predictors: (Constant), AR3, Enrollment, AR2, % F&RL, $/Pupil Expend., AR1, % Minority

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	14494.052	7	2070.579	10.256	.000[a]
	Residual	30483.918	151	201.880		
	Total	44977.970	158			

a. Predictors: (Constant), AR3, Enrollment, AR2, % F&RL, $/Pupil Expend., AR1, % Minority

b. Dependent Variable: Math

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	138.003	13.804		9.997	.000
	$/Pupil Expend.	-2.42E-03	.002	-.099	-1.093	.276
	Enrollment	-1.28E-02	.006	-.165	-2.116	.036
	% Minority	-.179	.052	-.424	-3.429	.001
	% F&RL	-1.09E-02	.058	-.018	-.188	.851
	AR1	-3.258	3.418	-.088	-.953	.342
	AR2	-6.408	6.024	-.083	-1.064	.289
	AR3	-2.601	5.287	-.041	-.492	.623

a. Dependent Variable: Math

Table 14: Regression Analysis – TN Public Schools Ending at Grade 6 – Value-Added Science Achievement as the Criterion Variable, Spring 2001

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.315[a]	.099	.057	20.136

a. Predictors: (Constant), AR3, Enrollment, AR2, % F&RL, $/Pupil Expend., AR1, % Minority

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6739.684	7	962.812	2.375	.025[a]
	Residual	61222.793	151	405.449		
	Total	67962.477	158			

a. Predictors: (Constant), AR3, Enrollment, AR2, % F&RL, $/Pupil Expend., AR1, % Minority

b. Dependent Variable: Science

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	136.416	19.563		6.973	.000
	$/Pupil Expend.	-2.22E-03	.003	-.074	-.708	.480
	Enrollment	-4.95E-03	.009	-.052	-.576	.565
	% Minority	-.152	.074	-.292	-2.050	.042
	% F&RL	.112	.082	.153	1.359	.176
	AR1	-9.646	4.844	-.212	-1.991	.048
	AR2	-14.942	8.537	-.158	-1.750	.082
	AR3	-10.582	7.492	-.135	-1.412	.160

a. Dependent Variable: Science

Table 15: Regression Analysis – TN Public Schools Ending at Grade 6 – Value-Added Social Studies Achievement as the Criterion Variable, Spring 2001

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.442[a]	.195	.158	19.038

a. Predictors: (Constant), AR3, Enrollment, AR2, % F&RL, $/Pupil Expend., AR1, % Minority

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	13285.990	7	1897.999	5.237	.000[a]
	Residual	54726.560	151	362.428		
	Total	68012.551	158			

a. Predictors: (Constant), AR3, Enrollment, AR2, % F&RL, $/Pupil Expend., AR1, % Minority

b. Dependent Variable: Soc. Studies

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	120.133	18.496		6.495	.000
	$/Pupil Expend.	2.206E-03	.003	.074	.744	.458
	Enrollment	-1.34E-02	.008	-.140	-1.651	.101
	% Minority	-.159	.070	-.306	-2.276	.024
	% F&RL	-.106	.078	-.144	-1.359	.176
	AR1	.658	4.580	.014	.144	.886
	AR2	3.023	8.071	.032	.374	.709
	AR3	-4.596	7.084	-.059	-.649	.517

a. Dependent Variable: Soc. Studies

Summary – Schools Ending at Grade Six

Among Tennessee public schools including grades one through five, but ending at grade six, no regression model of the variables in this study explains even one third of the variation in value-added achievement in any of the five subjects examined. Thus, the null hypothesis is not rejected and it must be concluded that the multiple correlation among the variables in this group is not significantly different from 0. In other words, variation in the achievement levels at these schools could have occurred as easily by chance as from the influence of AR use, per-pupil expenditure, school enrollment, percentage of students on free or reduced-price meals, or percentage minority students in the school.

In math, however, and to a lesser extent in science and social studies, total school enrollment and percentage minority enrollment are negatively associated with value-added achievement. By far the strongest statistical relationship found in this study, as measured by the size of standardized beta coefficients, regardless of grade levels in the school, was between minority enrollment and math achievement. In fact, the Pearson Correlation Coefficient between the math achievement and percentage minority at these 160 schools (-.535) is significant at the .01 level. In other words, *for schools ending at grade six,* the higher percentage of minority enrollment in the school, the lower is likely to be the mean value-added gain in math.

Schools that Include Grades One through Eight

Among schools that include grade eight, per-pupil expenditure appears to have a significant positive relationship with **reading** achievement (Table 16), as does AR4

Table 16: Regression Analysis – TN Public Schools Ending at Grade 8 or Higher – Value-Added Reading Achievement as the Criterion Variable, Spring 2001

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.307[a]	.094	.061	15.387

a. Predictors: (Constant), AR4, % F&RL, AR3, AR2, % Minority, $/Pupil Expend., Enrollment, AR1

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5343.595	8	667.949	2.821	.005[a]
	Residual	51377.274	217	236.762		
	Total	56720.869	225			

a. Predictors: (Constant), AR4, % F&RL, AR3, AR2, % Minority, $/Pupil Expend., Enrollment, AR1

b. Dependent Variable: Reading

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	81.485	14.429		5.647	.000
	$/Pupil Expend.	6.366E-03	.003	.166	2.314	.022
	Enrollment	-8.27E-03	.005	-.136	-1.795	.074
	% Minority	.102	.065	.112	1.568	.118
	% F&RL	-.115	.058	-.148	-1.990	.048
	AR1	-1.965	3.243	-.052	-.606	.545
	AR2	.144	6.303	.002	.023	.982
	AR3	-4.004	3.276	-.098	-1.222	.223
	AR4	36.459	15.756	.153	2.314	.022

a. Dependent Variable: Reading

(Model School) status. A negative correlation is observed with percentage free and reduced lunch.

AR use does not seem to be related to **language** achievement (Table 17) in these schools, but a slight negative correlation is observable between school size and lower socioeconomic status. The adjusted R square of .000 indicates that there is no discernable predictive validity between the variables in this model and **math** achievement (Table 18) in these schools. There simply is no relationship among these variables and **science** achievement (Table 19) in these schools. Likewise, the combination of variables in this model appears to have no predictive value for **social studies** achievement (Table 20) in schools ending at grade eight or above.

Summary – Schools Including Grades One through Eight

Only the regression analysis of value-added reading achievement yielded any findings approaching statistical significance for schools in this group. It appears that in schools where more money is spent per-pupil, fewer students are on free or reduced-price meals, and AR is most vigorously implemented, there is a slightly higher probability of increased value-added reading achievement.

Analyses of All Schools Combined (Regardless of Ending Grade Level)

When there were no apparent relationships of significance at the school level between value-added achievement and the factors of AR implementation, per-pupil expenditures, percentage of students on free or reduced-price meals, and percentage of

Table 17: Regression Analysis – TN Public Schools Ending at Grade 8 or Higher – Value-Added Language Achievement as the Criterion Variable, Spring 2001

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.241[a]	.058	.023	21.991

a. Predictors: (Constant), AR4, % F&RL, AR3, AR2, % Minority, $/Pupil Expend., Enrollment, AR1

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6473.352	8	809.169	1.673	.106[a]
	Residual	104941.0	217	483.599		
	Total	111414.3	225			

a. Predictors: (Constant), AR4, % F&RL, AR3, AR2, % Minority, $/Pupil Expend., Enrollment, AR1

b. Dependent Variable: Language

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	101.641	20.622		4.929	.000
	$/Pupil Expend.	3.922E-03	.004	.073	.998	.319
	Enrollment	-1.35E-02	.007	-.159	-2.045	.042
	% Minority	6.740E-02	.093	.053	.728	.467
	% F&RL	-.209	.082	-.193	-2.546	.012
	AR1	-3.132	4.635	-.059	-.676	.500
	AR2	-2.101	9.008	-.017	-.233	.816
	AR3	1.365	4.682	.024	.291	.771
	AR4	35.813	22.519	.107	1.590	.113

a. Dependent Variable: Language

Table 18: Regression Analysis – TN Public Schools Ending at Grade 8 or Higher – Value-Added Math Achievement as the Criterion Variable, Spring 2001

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.189[a]	.036	.000	16.554

a. Predictors: (Constant), AR4, % F&RL, AR3, AR2, % Minority, $/Pupil Expend., Enrollment, AR1

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2192.440	8	274.055	1.000	.437[a]
	Residual	59462.768	217	274.022		
	Total	61655.208	225			

a. Predictors: (Constant), AR4, % F&RL, AR3, AR2, % Minority, $/Pupil Expend., Enrollment, AR1

b. Dependent Variable: Math

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	107.319	15.523		6.913	.000
	$/Pupil Expend.	1.694E-03	.003	.042	.572	.568
	Enrollment	-1.03E-02	.005	-.163	-2.074	.039
	% Minority	1.927E-02	.070	.020	.277	.782
	% F&RL	-.158	.062	-.196	-2.556	.011
	AR1	1.781	3.489	.045	.510	.610
	AR2	4.213	6.781	.047	.621	.535
	AR3	2.409	3.524	.057	.684	.495
	AR4	-2.288	16.951	-.009	-.135	.893

a. Dependent Variable: Math

Table 19: Regression Analysis – TN Public Schools Ending at Grade 8 or Higher – Value-Added Science Achievement as the Criterion Variable, Spring 2001

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.197[a]	.039	.003	13.672

a. Predictors: (Constant), AR4, % F&RL, AR3, AR2, % Minority, $/Pupil Expend., Enrollment, AR1

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1640.943	8	205.118	1.097	.366[a]
	Residual	40564.286	217	186.932		
	Total	42205.229	225			

a. Predictors: (Constant), AR4, % F&RL, AR3, AR2, % Minority, $/Pupil Expend., Enrollment, AR1

b. Dependent Variable: Science

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	119.491	12.821		9.320	.000
	$/Pupil Expend.	-5.31E-05	.002	-.002	-.022	.983
	Enrollment	-8.05E-03	.004	-.154	-1.967	.050
	% Minority	9.069E-02	.058	.115	1.576	.117
	% F&RL	-9.76E-02	.051	-.146	-1.909	.058
	AR1	-6.04E-02	2.882	-.002	-.021	.983
	AR2	4.635	5.600	.063	.828	.409
	AR3	-.815	2.911	-.023	-.280	.780
	AR4	13.383	14.001	.065	.956	.340

a. Dependent Variable: Science

Table 20: Regression Analysis – TN Public Schools Ending at Grade 8 or Higher – Value-Added Social Studies Achievement as the Criterion Variable, Spring 2001

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.200[a]	.040	.004	17.146

a. Predictors: (Constant), AR4, % F&RL, AR3, AR2, % Minority, $/Pupil Expend., Enrollment, AR1

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2645.370	8	330.671	1.125	.348[a]
	Residual	63791.154	217	293.968		
	Total	66436.524	225			

a. Predictors: (Constant), AR4, % F&RL, AR3, AR2, % Minority, $/Pupil Expend., Enrollment, AR1

b. Dependent Variable: Social Studies %

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	110.912	16.078		6.898	.000
	$/Pupil Expend.	1.698E-03	.003	.041	.554	.580
	Enrollment	-3.51E-03	.005	-.054	-.684	.494
	% Minority	.124	.072	.126	1.715	.088
	% F&RL	-.124	.064	-.147	-1.926	.055
	AR1	-2.070	3.614	-.051	-.573	.567
	AR2	3.207	7.023	.035	.457	.648
	AR3	-3.015	3.650	-.068	-.826	.410
	AR4	7.961	17.557	.031	.453	.651

a. Dependent Variable: Social Studies %

minority students, it was determined to combine the schools without regard to the ending grade level to learn whether any significant correspondences could be noted among the variables of interest. First, multiple regression analysis was performed on the combined school list, looking for any significant contribution of the independent variables to variation in achievement. In the absence of statistically significant relationships between AR implementation and value-added achievement in any subject or grade level, much less the emergence of any useful prediction models, it was of interest to see whether there was *any* observable, if not statistically significant, difference in achievement, by level of AR implementation. Thus one-way ANOVA's were performed to determine whether differences in the means of the value-added achievement scores by category of AR implementation were statistically significant at the .05 level. None of the mean differences were significant. However, the means of the achievement scores were charted by category of AR implementation so that the differences can be visualized.

Consistent with earlier findings when schools were disaggregated by groups according to grade levels served, no effective prediction model emerges from the variables included to explain variation in **reading** achievement (Table 21). It is noted that minority enrollment and socioeconomic status are negatively associated with reading achievement.

Within the context of the weak adjusted R square (.041) that excludes this model from explaining the variation, it may be seen that minority enrollment is negatively correlated to **language** achievement (Table 22). Although only about 10% (adjusted R square = .103) of variation in **math** achievement (Table 23) can be explained by this

Table 21: Regression Analysis – All TN Public Schools Including Grades 1-5 – Value-Added Reading Achievement as the Criterion Variable, Spring 2001

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.200[a]	.040	.029	20.457

a. Predictors: (Constant), AR4, % F&RL, AR2, AR3, Enr., $/Pupil, AR1, % Minority

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	12738.282	8	1592.285	3.805	.000[a]
	Residual	306347.5	732	418.507		
	Total	319085.8	740			

a. Predictors: (Constant), AR4, % F&RL, AR2, AR3, Enr., $/Pupil, AR1, % Minority

b. Dependent Variable: READING

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	93.470	9.174		10.188	.000
	$/Pupil	3.239E-03	.001	.102	2.253	.025
	Enr.	-1.86E-03	.004	-.021	-.511	.610
	% Minority	-8.68E-02	.034	-.139	-2.517	.012
	% F&RL	-9.28E-02	.038	-.115	-2.464	.014
	AR1	-1.363	2.578	-.026	-.529	.597
	AR2	1.115	4.787	.010	.233	.816
	AR3	-6.325	4.002	-.071	-1.580	.114
	AR4	2.702	9.494	.011	.285	.776

a. Dependent Variable: READING

Table 22: Regression Analysis – All TN Public Schools Including Grades 1-5 – Value-Added Language Achievement as the Criterion Variable, Spring 2001

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.226[a]	.051	.041	24.441

a. Predictors: (Constant), AR4, % F&RL, AR2, AR3, Enr., $/Pupil, AR1, % Minority

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	23542.464	8	2942.808	4.926	.000[a]
	Residual	437278.5	732	597.375		
	Total	460820.9	740			

a. Predictors: (Constant), AR4, % F&RL, AR2, AR3, Enr., $/Pupil, AR1, % Minority

b. Dependent Variable: LANG

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	107.696	10.961		9.826	.000
	$/Pupil	-1.21E-03	.002	-.032	-.705	.481
	Enr.	-1.44E-03	.004	-.014	-.332	.740
	% Minority	-.120	.041	-.160	-2.911	.004
	% F&RL	-4.63E-02	.045	-.048	-1.029	.304
	AR1	-4.677	3.080	-.075	-1.519	.129
	AR2	.113	5.720	.001	.020	.984
	AR3	4.227	4.781	.040	.884	.377
	AR4	.332	11.343	.001	.029	.977

a. Dependent Variable: LANG

Table 23: Regression Analysis – All TN Public Schools Including Grades 1-5 – Value-Added Math Achievement as the Criterion Variable, Spring 2001

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.336[a]	.113	.103	17.895

a. Predictors: (Constant), AR4, % F&RL, AR2, AR3, Enrollment, $/Pupil, AR1, % Minority

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	29907.377	8	3738.422	11.675	.000[a]
	Residual	234401.8	732	320.221		
	Total	264309.2	740			

a. Predictors: (Constant), AR4, % F&RL, AR2, AR3, Enrollment, $/Pupil, AR1, % Minority

b. Dependent Variable: Math

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	113.724	8.025		14.171	.000
	$/Pupil	1.525E-03	.001	.053	1.213	.226
	Enrollment	-5.88E-03	.003	-.074	-1.848	.065
	% Minority	-.110	.030	-.193	-3.635	.000
	% F&RL	-.162	.033	-.221	-4.907	.000
	AR1	-2.566	2.255	-.055	-1.138	.255
	AR2	-2.685	4.188	-.026	-.641	.522
	AR3	-2.057	3.500	-.025	-.588	.557
	AR4	-6.296	8.305	-.027	-.758	.449

a. Dependent Variable: Math

combination of variables, clearly it is much more related to minority enrollment and socioeconomic status than to AR. **Science** achievement (Table 24) does not appear to be related in any significant way to any of the variables in this study. Although this model, like previous attempts, fails to explain a significant amount of the variation in **social studies** achievement (Table 25), it is worth noting that per-pupil expenditure and vigorous AR implementation are positively related to achievement, while minority enrollment is a negative.

<u>Summary – All Tennessee Public Schools Including Grade One through Five</u>

For the entire study group of 764 schools, no regression model could be designed from the variables in question to explain a significant measure of the variability in value-added achievement in reading, language, math, science, or social studies. In general, schools' minority enrollment and number of students on free or reduced-price meals are negatively correlated with reading, language, and math achievement. In social studies, dollars spent per-pupil by the district and vigorous AR implementation may have some benefits, but minority enrollment is inversely related to achievement.

<u>Differences in Mean Value-Added Achievement Scores by AR Implementation</u>

Table 26 presents an analysis of the variance among achievement means by category of AR implementation.

Obviously, average **reading** achievement (Figure 5) is generally higher at AR schools than non-AR schools (Cat. 0), and tends to go up with increased implementation,

Table 24: Regression Analysis – All TN Public Schools Including Grades 1-5 – Value-Added Science Achievement as the Criterion Variable, Spring 2001

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.156[a]	.024	.014	18.693

a. Predictors: (Constant), AR4, % F&RL, AR2, AR3, Enrollment, $/Pupil, AR1, % Minority

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6385.538	8	798.192	2.284	.020[a]
	Residual	255791.7	732	349.442		
	Total	262177.3	740			

a. Predictors: (Constant), AR4, % F&RL, AR2, AR3, Enrollment, $/Pupil, AR1, % Minority

b. Dependent Variable: Science

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	117.568	8.383		14.024	.000
	$/Pupil	-4.51E-04	.001	-.016	-.343	.731
	Enrollment	-5.47E-03	.003	-.069	-1.647	.100
	% Minority	-3.80E-02	.032	-.067	-1.206	.228
	% F&RL	6.747E-02	.034	.093	1.961	.050
	AR1	-4.315	2.356	-.092	-1.832	.067
	AR2	-4.232	4.374	-.041	-.967	.334
	AR3	-5.664	3.657	-.070	-1.549	.122
	AR4	-9.806	8.675	-.043	-1.130	.259

a. Dependent Variable: Science

Table 25: Regression Analysis – All TN Public Schools Including Grades 1-5 – Value-Added Social Studies Achievement as the Criterion Variable, Spring 2001

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.248[a]	.061	.051	20.501

a. Predictors: (Constant), AR4, % F&RL, AR2, AR3, Enrollment, $/Pupil, AR1, % Minority

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	20126.240	8	2515.780	5.986	.000[a]
	Residual	307654.3	732	420.293		
	Total	327780.6	740			

a. Predictors: (Constant), AR4, % F&RL, AR2, AR3, Enrollment, $/Pupil, AR1, % Minority

b. Dependent Variable: Soc. Studies

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	102.174	9.194		11.113	.000
	$/Pupil	3.449E-03	.001	.107	2.394	.017
	Enrollment	-2.95E-03	.004	-.034	-.810	.418
	% Minority	-.144	.035	-.227	-4.173	.000
	% F&RL	-6.35E-02	.038	-.078	-1.682	.093
	AR1	-4.433	2.583	-.085	-1.716	.087
	AR2	-.897	4.798	-.008	-.187	.852
	AR3	-7.393	4.010	-.082	-1.843	.066
	AR4	-19.323	9.514	-.075	-2.031	.043

a. Dependent Variable: Soc. Studies

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the notable exception being those schools in "Category 3" (three or more model classrooms.) It must be noted, however, as displayed in the ANOVA, that the differences do not reach the .05 level of statistical significance.

Value-added **language** achievement (Figure 6) is actually higher (though not significantly) in non-AR schools (Cat. 0) than in schools that own AR but have no model classrooms (Cat. 1). Then higher levels of average achievement are observed until one looks at the five "Model" schools (Cat. 4), whose mean language achievement is actually lower than the schools with three or more model classrooms but without Model School status. Again, these differences in means are not significant at the .05 level.

Likewise, it is observed that the Model Schools (Cat. 4) have a lower mean value-added achievement in **math** (Figure 7) than schools in all other AR categories. It must be borne in mind, however, that this category includes only five schools, certainly not a sufficient number of cases to allow definitive conclusions to be drawn about the effectiveness of AR, and that the differences in the mean math achievement are not significant at the .05 level.

Certainly a different picture emerges when one looks at **science** achievement (Figure 8). An almost steady decline in value-added achievement can be seen as the level of AR implementation increases in vigor. Non-AR schools (Cat. 0) actually post the highest mean gains in science, and Cat. 4 schools the lowest, although not to the .05 level of significance.

Table 26: One-Way ANOVA – All TN Schools Including Grades 1-5 – Value-Added Achievement by AR Category of Implementation

		Sum of Squares	df	Mean Square	F	Sig.
Reading	Between Groups	1403.282	4	350.820	.806	.522
	Within Groups	321383.3	738	435.479		
	Total	322786.6	742			
Language	Between Groups	4501.438	4	1125.359	1.818	.123
	Within Groups	456899.0	738	619.104		
	Total	461400.5	742			
Math	Between Groups	386.643	4	96.661	.270	.897
	Within Groups	264005.0	738	357.730		
	Total	264391.7	742			
Science	Between Groups	1702.187	4	425.547	1.201	.309
	Within Groups	261568.3	738	354.429		
	Total	263270.4	742			
Soc. Studies	Between Groups	2008.566	4	502.142	1.135	.339
	Within Groups	326442.5	738	442.334		
	Total	328451.0	742			

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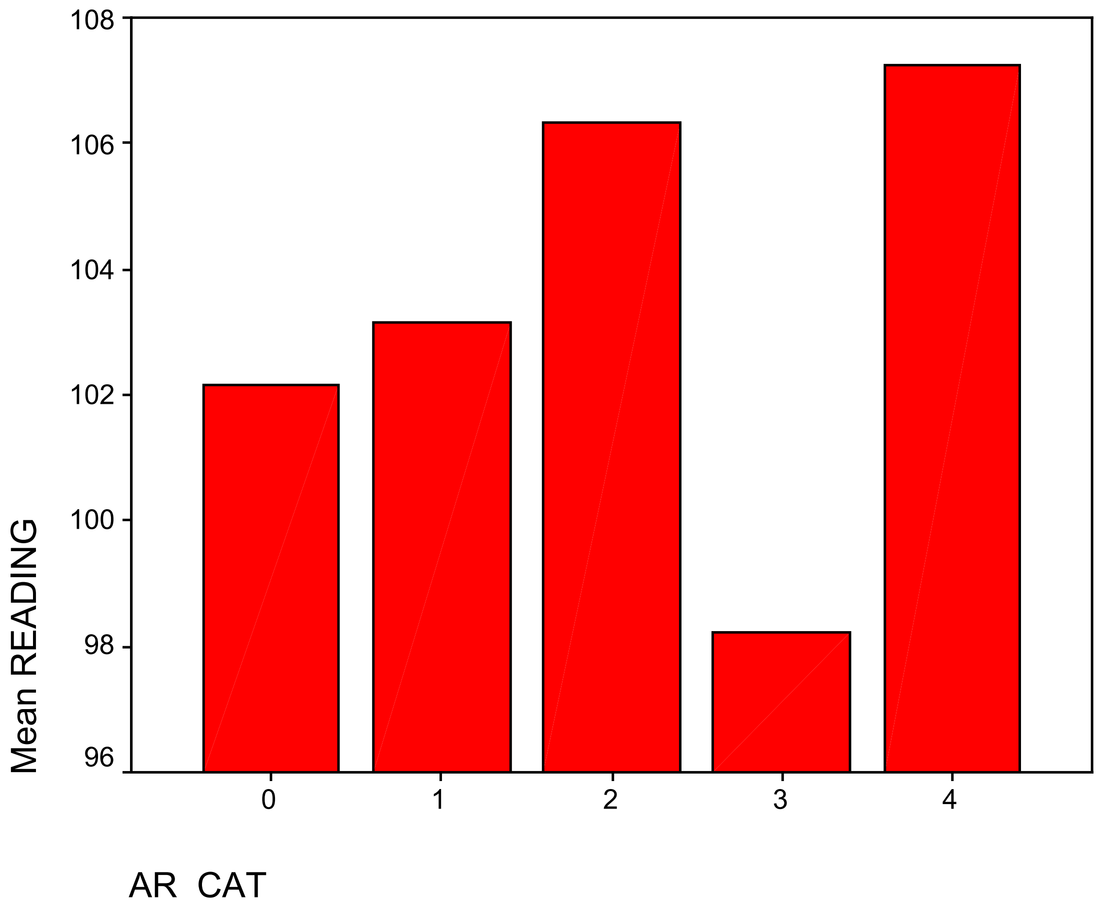

Figure 5: All TN Public Schools Including Grades 1-5 – Value-Added Reading Achievement by Level of AR Implementation, Spring 2001

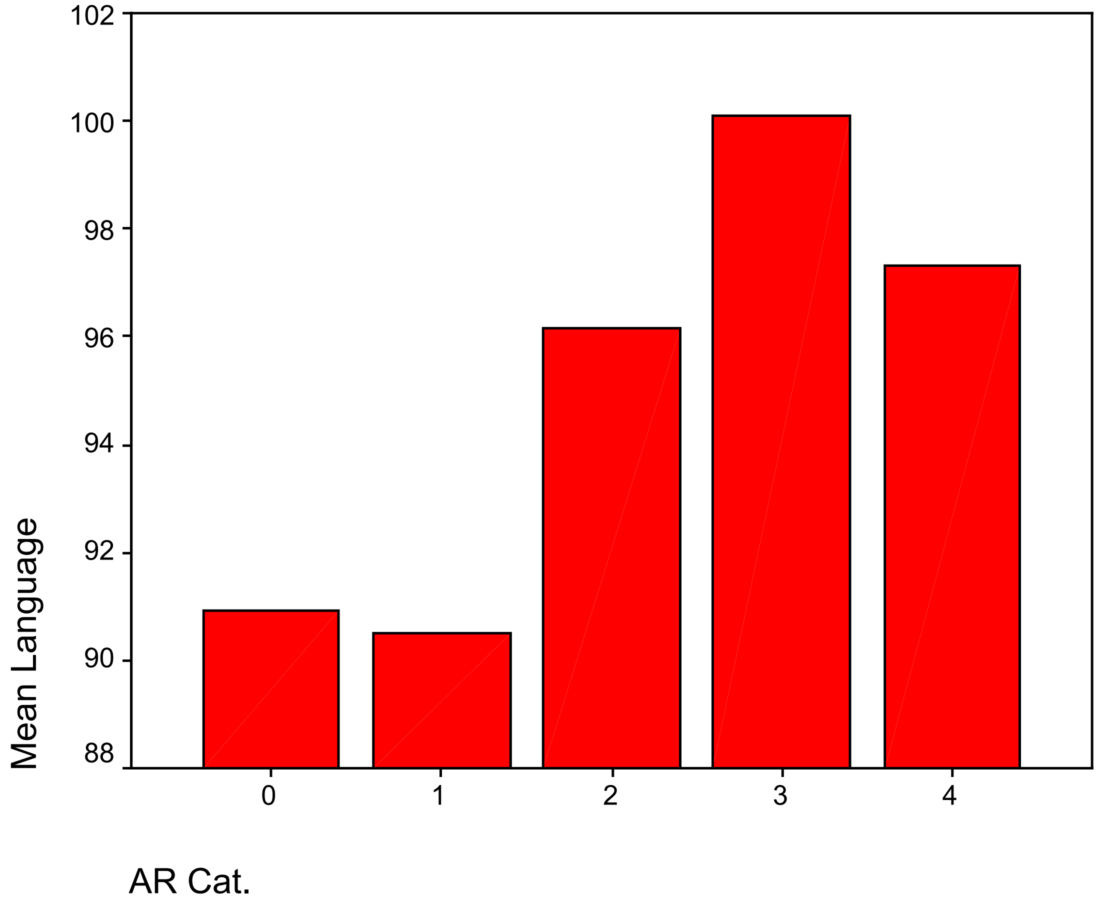

Figure 6: All TN Public Schools Including Grades 1-5 – Value-Added Language Achievement by Level of AR Implementation, Spring 2001

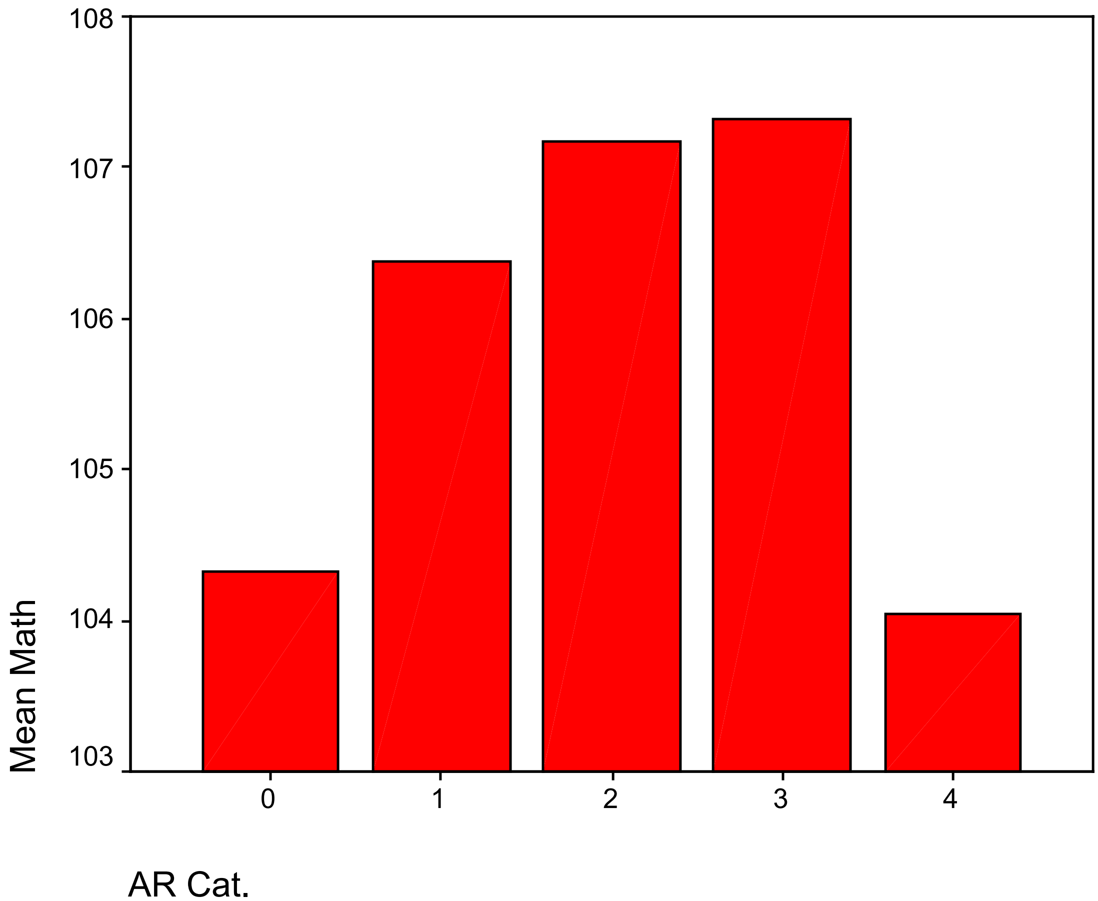

Figure 7: All TN Public Schools Including Grades 1-5 – Value-Added Math Achievement by Level of AR Implementation, Spring 2001

It appears that Cat. 2 schools (those with one or two AR model classrooms) post the highest average gains in **social studies** (Figure 9), followed by schools that do not own AR (Cat. 0). Once again, the five AR "Model" schools (Cat. 4) have the lowest average value-added social studies gains. The social studies mean gains, however, are not significantly different by AR category.

Summary of Findings and Analysis of Data

Since nine out of ten Tennessee public schools that include grades one through five own AR, and these are among more than 50,000 schools nationwide that subscribe to the program, it was anticipated that looking at student achievement in relation to AR ownership and use (and other factors) might yield some significant findings, especially in reading. Although there is an occasional hint of significance between a few of the variables and the criterion variables of value-added achievement on the Terra Nova® achievement tests taken by Tennessee students, by and large there is no combination of predictor variables that accounts for a meaningful school-level effect. This is especially true for the AR level-of-implementation variables, which, with a few exceptions previously noted, indicate no significant correspondence with achievement in any subject.

The next and final chapter is devoted to the conclusions that may be drawn from this study, and some recommendations for further, and hopefully more fruitful, research in this important field.

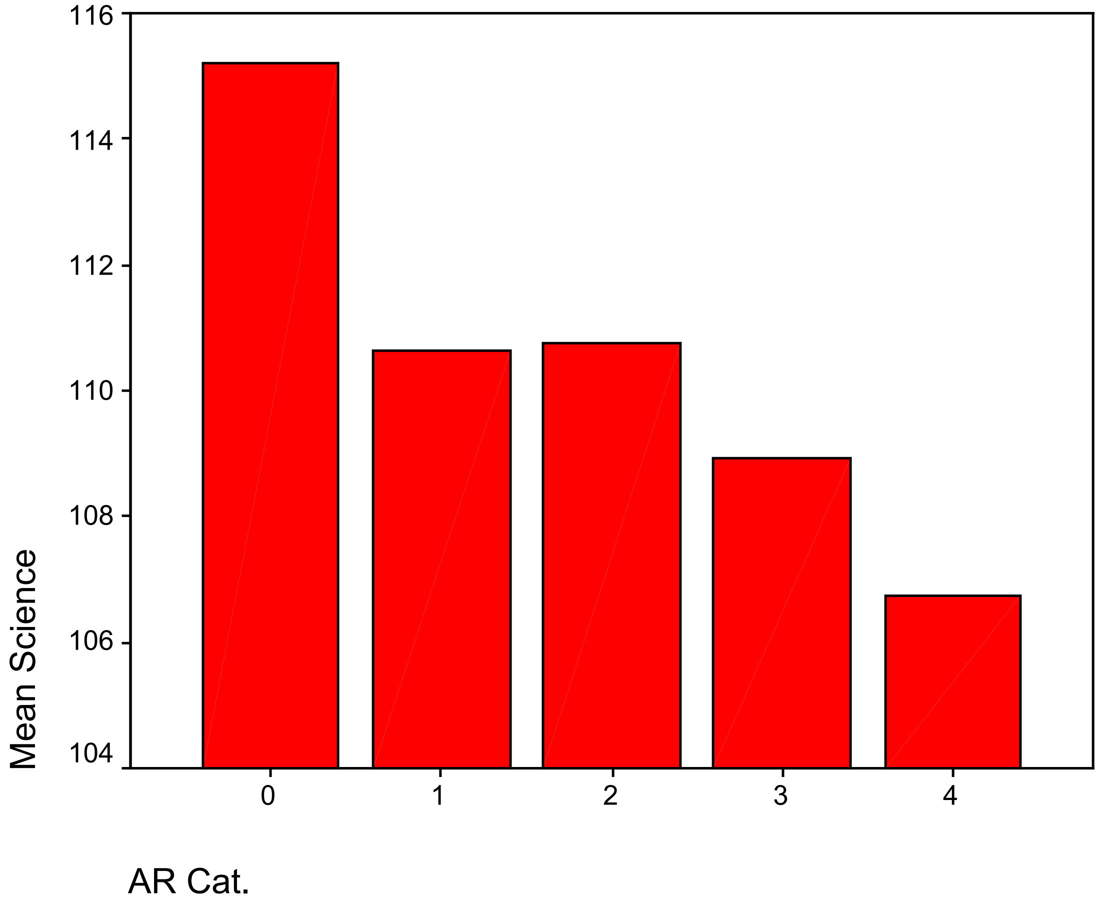

Figure 8: All TN Public Schools Including Grades 1-5 – Value-Added Science Achievement by Level of AR Implementation, Spring 2001

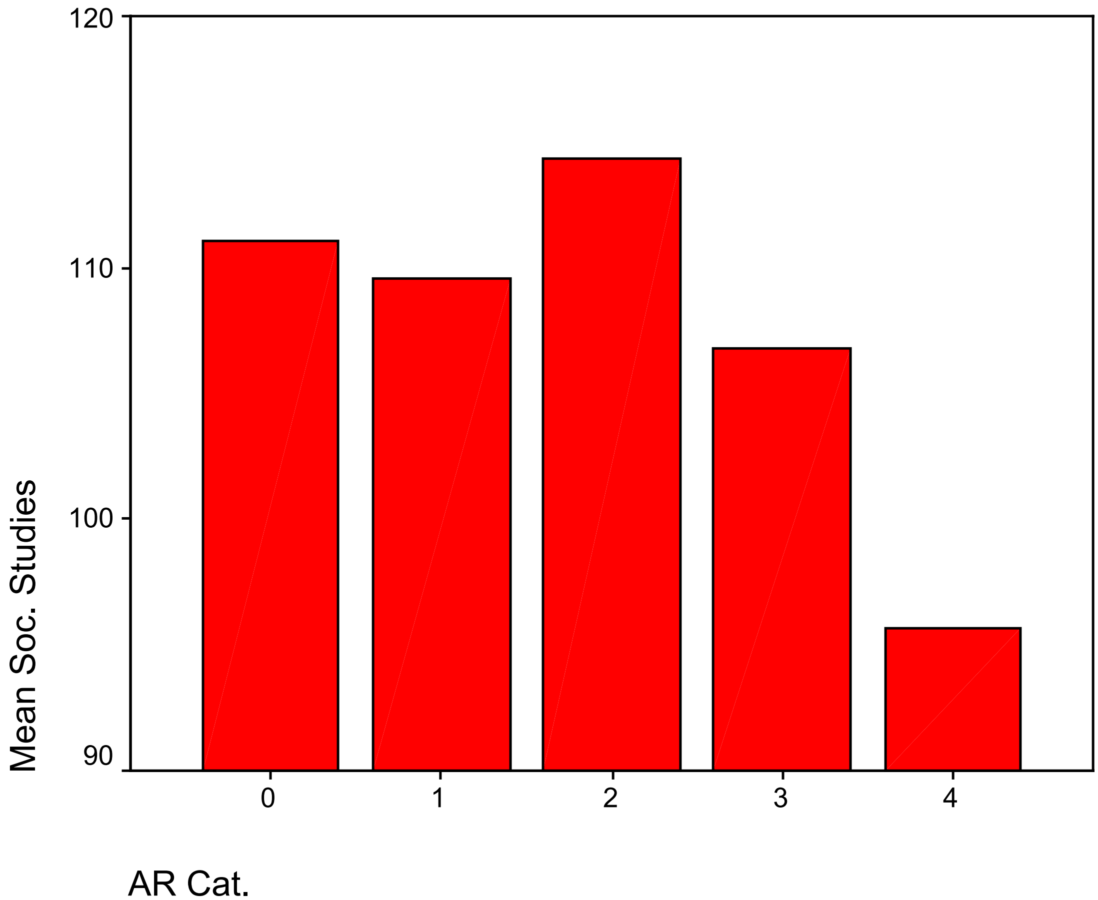

Figure 9: All TN Public Schools Including Grades 1-5 – Value-Added Social Studies Achievement by Level of AR Implementation, Spring 2001

CHAPTER 5

SUMMARY OF THE STUDY, CONCLUSIONS, AND RECOMMENDATIONS FOR FURTHER RESEARCH

Summary of the Study

The purpose of this study was to investigate the relationships between value-added achievement in Tennessee public elementary schools and a number of independent variables. The schools' use of the reading practice and monitoring software known as Accelerated Reader (AR) was of particular interest, as considerable research reviewed in Chapter 2 has suggested its effectiveness in raising achievement not only in reading, but in other subjects as well.

Data for the investigation were derived from three sources. First, the dependent variables, cumulative three-year average (1999, 2000, and 2001) value-added achievement scores in reading language, math, science, and social studies, expressed as a percentage of the expected scale score national norm gain, were obtained from public records published by the Tennessee Department of Education. Second, demographic data for each school and system for the school year 2000-2001, consisting of the school enrollment, the per-pupil annual expenditure for the system, the percentage of students in the school eligible for free or reduced price meals, and the percentage of minority students in the school, were likewise obtained from the Tennessee Department of Education through the release of the annual "Report Card" for each public school and system in the state. Third, information on whether and to what extent AR had been

purchased and implemented at each school since August 1, 1999 came from Renaissance Learning®, parent company of AR, with the explicit understanding that such information would be kept confidential with respect to individual schools. Four levels of AR ownership/implementation were distinguished, in cooperation with Renaissance Learning®, as (1) ownership without any "model classrooms," (2) having one or two model classrooms, (3) having three or more model classrooms, or (4) being certified as a "model school."

Multiple regression analysis was used to search for statistically significant relationships between the independent demographic variables and AR use and the dependent variables of value-added achievement at the .05 level of significance, in the hope that a useful model could be designed for predicting value-added achievement from AR use, school enrollment, per-pupil expenditure, free or reduced-price meal eligibility, and minority enrollment.

Analysis of the data uncovered almost no significant relationships or school-level effects. In no instance was AR implementation a significant factor in relation to value-added achievement *at the school level*. While no useful regression model was developed from this study, one significant finding was that, in schools ending at grade six, school enrollment and especially minority enrollment are negatively correlated with math achievement.

Summary Data on the Schools in the Study

The descriptive statistics for the 764 schools in the study (Table 4) reveal the great variety of educational environments and opportunities across the State of Tennessee. While students in Smith County receive less than $4,300 per year, those in Alcoa have almost $7,400 allotted to their education annually. Yet value-added achievement is generally unrelated to the amount spent per student. Some of the state's schools have no minority students enrolled; others are 100% minority. In some schools, all students qualify for free or reduced-price meals by virtue of their family income. In other schools, no students fall into that socioeconomic category. The largest of the schools is 160 times the size of the smallest. Yet none of these demographic factors—with the aforementioned exception of racial composition and math achievement in one group of schools—has any significant correlation with school-level achievement.

In terms of value-added achievement at the school level, there is equally dramatic variety. Although the range of mean scores indicates that at some schools the students actually regressed academically in some subjects over the past three years, at other schools the average student gained at more than twice the expected rate. In four of the five subject areas—language being the exception—the mean gains exceeded the expected cumulative gain for the three years (grades 3-5, 4-6, or 6-8, respectively).

Tennessee Schools and AR

Although most (89%) of the schools have purchased AR, relatively few of them have documented more intensive levels of implementation. In the 79% of the schools that have purchased the program but not certified any model classrooms, the vigor with which AR is or is not being used is not known. Teacher "A" may be requiring her students to read a certain number of books, take a certain number of AR quizzes each grading period, and making AR points a factor in the students' grades. She may be setting aside time each day for silent reading practice. She may be closely monitoring her students' reading levels and helping them select books within their zones of proximal development, as recommended by AR. Teacher "B" across the hall, teaching the same number of students in the same grade, may not be doing any of those things in an effort to leverage or maximize the effectiveness of AR. Teacher "A's" value-added achievement scores may or may not be significantly higher than Teacher "B's" scores. These are the kinds of data pieces that might significantly affect the conclusions of future studies of the effectiveness of AR.

Multiple regression analyses – schools including grades one through five and ending at grade five

Although as stated earlier, no significant relationships were found among the variables examined for this group of schools, it may be useful to note the implications of some of the data, however statistically insignificant.

Reading

Within this group of schools (N=356), the adjusted R^2 of .02 may be interpreted to mean that only 2% of the variability in reading value-added achievement is attributable to the variation in the combination of all the predictor variables in the regression. Within this very low coefficient of determination, only dollars per pupil contributed significantly to the regression, implying that the level of district monetary support means more to reading achievement among these schools than any of the other factors examined, but it still makes no substantial contribution to higher scores.

Language

Again, the adjusted multiple R^2 value (.09) is too small to suggest any meaningful relationships, but percentage minority and percentage free and reduced lunch (F&RL) may be slightly negatively correlated with language achievement.

Math

The adjusted R^2 of .12 means that less than one-eighth of the variation in math scores is owing to the factors in the regression. The same subordinate relationships are noted as with language, however.

Science

As with reading, only 2% of science achievement can be associated with the regression variables. Oddly, percentage on F&RL is slightly positively related to science achievement.

Social Studies

The regression value is 7%. It would appear that percentage minority and three of the four categories of AR implementation may be negatively associated with social studies achievement.

Multiple regression analyses – schools including grades one through six and ending at grade six

There were no AR model schools among the 160 schools in this category.

Reading

The correlation coefficient of -.02 suggests a negative, although far from significant, relationship with all of the variables.

Language

R^2 = .09. School size may be negatively associated; owning AR may be a positive.

Math

The coefficient for math achievement among these schools was .291, the strongest relationship of any examined, though still not conclusive. All variables were negatively (if at all) correlated with math scores; by far the most significant was minority enrollment. Schools ending at grade six that have a high percentage of minority students should pay extra attention to math achievement.

Science

R^2 = .057. Percentage minority and ownership of AR were both slightly negatively associated.

Social Studies

R^2 = .158. Only percentage minority (-) had any apparent relationship.

<u>Multiple regression analyses – schools including grades one through eight</u>

Two hundred twenty-six Tennessee public schools contain grades one through eight and have associated three-year cumulative value-added achievement gain scores.

Reading

R^2 = .061. Dollars per pupil and AR Model School status appear to be positive influences. Percentage F&RL is negative.

Language

R^2 = .023. School size and percentage F&RL are negative.

Math, Science, and Social Studies

The coefficients for achievement in these subjects among these schools were .004 or less. It may be safely said that achievement in these subjects for this group of schools cannot be predicted from the variables in question.

Multiple regressions – all schools combined

When the analyses described above did not yield significant results, it was suspected that the small number of observations in some AR categories might be masking effects of AR implementation. It was therefore determined to combine the three groups of schools and perform the multiple regressions again. The results of this analysis were as follows:

Reading

$R^2 = .029$. Per-pupil expenditure is positive; percentage minority and F&RL are negative.

Language

$R^2 = .041$. Percentage minority is negative.

Math

$R^2 = .103$. Percentage minority and F&RL are negative.

Science

$R^2 = .014$. No variables appear significant.

Social Studies

$R^2 = .051$. Dollars per pupil is positive. Percentage minority and (interestingly) AR Model School status appear negative.

ANOVA's – all schools combined

When all of the multiple regression analyses heretofore described failed to disclose meaningful relationships among the variables in the study, analysis of variance was applied to the means of the value-added scores in each subject according to level of AR implementation among all the subject schools (see Chapter 4.) From this analysis, the following points seem evident:

- In reading, value-added achievement tends to increase with the level of AR implementation, though not significantly, and not for the 43 schools with more than two model classrooms and not model school status.
- In language, schools with model classrooms scored higher than those that do not own AR. Unfortunately, even the mean gain of the model classroom schools was only 97.32%, indicating gains below the national norm expected gain of 100%.
- In math, scores tend to climb slightly, but not significantly, with increased AR implementation, until schools achieve model school status. The five schools in this category scored lower in math, but the difference is not significant at the .05 level of confidence.
- In both science and social studies, however, scores tend to decline slightly, but not significantly, with increased AR implementation.

Conclusions

As is probably the case in most correlational studies, it had been hoped and anticipated at the outset of this project that analysis of the data would reveal some

significant statistical relationships among at least some of the variables involved, so that conclusions about those relationships could be drawn and described with some confidence. Since much of the research reviewed in Chapter 2 tended to support claims of increased academic achievement in schools implementing AR, it seemed intuitive that those schools that implemented the program more vigorously might demonstrate gains significantly higher than their counterparts who do not even own the program, or who are using it with less intensity, training, or commitment. It also seemed logical that the great variance in the other factors considered—per-pupil expenditure, school enrollment, minority enrollment, and proportion of students qualifying for free or reduced-price meals—might translate into instructive correlations with student achievement in one or more subjects, either by themselves or in combination with other predictor variables. Finally, one would think that a program with such national popularity as AR, which is owned and presumably used to some extent by more than 50,000 schools across the country and a total of 1,169 Tennessee public and private schools, would have some demonstrable efficacy in raising achievement scores, especially in reading.

The findings of this study, taken as a whole, do not suggest any significant school-level relationships between any of the factors examined—including the use of AR—and value-added achievement in the 781 Tennessee public schools that include grades one through five. In no case was the size of the multiple correlation coefficients large enough to permit any interpretation other than what Hinkle, Wiersma, and Jurs (1994) call “little if any correlation.”

One exception must be noted. Among the 160 schools that include grades one through six only, the demographic of minority enrollment displayed a significant negative correlation with value-added math achievement. It is certainly outside the parameters of this investigation to suggest explanations for this finding, but a more in-depth analysis of those schools might reveal some factors contributing to this relationship. Clearly, educators in schools ending at grade six and having a large proportion of minority students should be aware that math achievement merits concentrated focus.

Although the results of this study did not reveal significant relationships between the use of AR and value-added achievement gains in the subject schools, it seems reasonable that any program that encourages reading practice and helps teachers to monitor students' reading growth can do little harm. And of course there remains considerable research, cited in Chapter 2, supporting the efficacy of AR in other settings and under various conditions.

Certainly many factors influence student achievement and value-added gains. The reports of research by Dr. William Sanders and others have indicated that the individual teacher working in a classroom may be the most powerful force acting upon academic achievement, far more dramatic in effect than any quantifiable differences among schools. The Sanders data must be regarded as "controlling" in that the data he and his colleagues analyzed are primary in type and measure a one-on-one relationship between individual student achievement and AR scores. The study reported herein sought to investigate whether selected data gathered from the Tennessee Report Card had any relationship with self-reported level of implementation of AR *at the school level*.

The current study represents the “macro” view, whereas the Sanders data represent the “micro” view. Clearly the micro view provides the most definitive picture of the interaction of students with the AR program. Perhaps this is why it is difficult for researchers to uncover significant school-level effects. And what about the influence of the curriculum, the home environment, and other factors? Obviously, when one attempts to measure, or more accurately to estimate, student achievement gains, the potential number of variables that could have an impact is hard to imagine.

Furthermore, in this study there was no way to assure that the self-reported levels of implementation were directly applicable to the grades tested. The validity of self-reporting was also viewed as a limitation of the study. In addition, the test data represented a three-year average of achievement gains. The use of this statistic was initially thought beneficial in terms of mitigating single-year effects, but it may have served to mask school-level effects. It is simply impossible to know without classroom-level data. Given the results of the studies reported in Chapter 2, especially the Sanders study, it would appear from the results of the current study that it may be unrealistic to expect that we can develop a useful prediction equation for value-added achievement from a group of variables that represent school-level measures.

<u>Recommendations for Further Research</u>

Others researchers may wish to extend and refine these explorations by conducting studies on a smaller (or larger) scale than this one, looking at individual classes or students within schools on the one hand, or thousands of students’ value-added

achievement across the state on the other. For example, classes within schools or a group of schools could be selected at random, matched with classes or schools with similar characteristics, and their value-added performance compared according to whether or to what extent they are utilizing AR. It may be time to replicate the study done by Paul, Swanson, Zhang, and Hehenberger (1997), in which *scale scores* and value-added gains for one year were compared among schools according to AR ownership. A useful variation from the original research would be to utilize the three-year cumulative value-added scores now available and implementation data from AR, as in the present study.

To be sure, the arena of improving student achievement and increasing value-added gains deserves and will receive ongoing and rigorous study. Educators have an inescapable obligation to explore and share their findings on which factors affect student learning and which programs can be expected to enhance student growth.

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Appendices

Appendix A

Reading Renaissance® Model Classroom

Educator ____ Grade (s) _____________

School ____

This checklist includes the top 10 things you need to do to create a Reading Renaissance. For more detailed information about any of the following strategies refer to the *Getting Started With Accelerated Reader and Reading Renaissance* book or the *Reading Renaissance* seminar workbooks.

How to Use This Checklist

To certify as a Reading Renaissance Model Classroom, you must be fully implementing a majority of the 10 keys to success listed below. Under each of the 10 keys, you'll find several techniques. Check each of the techniques you are using in your classroom. If you are implementing all of the techniques underneath the main key, it is fully implemented. If you are implementing only some of the techniques, it is partially implemented.

IMPLEMENTATION
None ☐ Partial ☐ Full ☐

#1 Schedule time for reading practice

Reading practice is essential for student reading growth.

- ❑ Schedule 60 minutes of in-school reading practice per day. (Kindergarten students may begin at 30 minutes a day, but their practice time should increase to 60 minutes by the end of the first semester of first grade.)
- ❑ Use a mix of reading practice (Reading To, Reading With, and Reading Independently) with students of all grades and ability levels.
- ❑ Provide students with daily access to computers on which to take Reading Practice quizzes.
- ❑ Use short, sharply focused power lessons to help make the time for 60 minutes of reading practice.
- ❑ Recruit volunteer help. Especially in primary grades, volunteers can help with Read To and Read With practice, and with quizzing.

	To	With	Independently
K: 1st semester	30 min.	0 min.	0 min.
K: 2nd semester	30 min.	5 min.	5 min.

1: 1st semester	30 min.	10 min.	10 min.
1: 2nd semester	15 min.	15 min.	30 min.
2: 1st semester	15 min.	10 min.	35 min.
2: 2nd semester	15 min.	5 min.	40 min.
3 and up	5-15 min.	5-15 min.	60 min.

IMPLEMENTATION
None Partial Full

#2 Find the zone of proximal development (ZPD) ☐ ☐ ☐

A student's ZPD represents a level of difficulty that is neither too hard nor too easy, and is the level at which optimal learning takes place.

- ☐ Identify each student's ZPD using past performance, tested GE scores and the Goal-Setting Chart, or your professional judgment.
- ☐ Monitor students' AR Reading Practice quiz results to make sure students are reading within their ZPDs, maintaining an average percent correct between 85 and 92. (Model Classroom criteria require a class average percent correct between 85 and 92.)
- ☐ Make sure students know their ZPDs and use them to select appropriate books.
- ☐ Use different ZPDs for different kinds of reading practice. For Read To and Read With practice, students usually can take on more difficult books than they can read independently.
- ☐ Supply adequate books and quizzes.
- ☐ Make it easy for students to locate books in their ZPD ranges by labeling books with book levels and/or providing book lists.

#3 Use the student reading log ☐ ☐ ☐

On student reading logs, students record their ZPD range, the name of the book they are reading, its reading level and point value, the number of pages read each day, and when they finish the book, their score on the AR Reading Practice quiz.

- ☐ Use the simplified primary student reading log for emergent and younger readers, and the student reading log for independent readers.
- ☐ Use the log as a "ticket" to take a quiz—students can't take a quiz unless you see the book listed on the log.

#4 Take Status of the Class daily ☐ ☐ ☐

During reading practice time, go around the room, speak briefly with each student, and check student reading logs. Each conversation should last about 30 seconds to a minute.

- ☐ Review the student reading log.
- ☐ If the student had just started a new book, check to see if the reading level is within her ZPD and if its length is appropriate.

- ❑ If the student is partway though a book, have a short conversation about its content.
- ❑ If you have given a power lesson, check to see that students are able to apply the skill you've taught.
- ❑ If you notice that the student is struggling, arrange a conference to intervene.
- ❑ Initial the student reading log.

	IMPLEMENTATION	
None	Partial	Full

#5 Set student reading goals ☐ ☐ ☐

Goal setting is highly motivating for students. It also individualizes reading practice, encourages self-directed learning, and results in greater skill development.

- ❑ Set individualized goals with every student. Work with students to set challenging, yet achievable goals.
- ❑ Set goals for book level, points, minimum average percent correct on quizzes, reader certification levels, and any other area you feel is appropriate.
- ❑ Use the student reading plan and Goal Setting chart to help set goals.
- ❑ Base goals on whether the student needs to experience success or challenge.

#6 Check the TOPS Report immediately ☐ ☐ ☐

We recommend that you print a TOPS Report after each quiz taken. It includes information about the quiz that the student just took, in addition to cumulative data.

- ❑ Instruct your students to show the TOPS Report to you immediately after they take a quiz.
- ❑ Use that time to give praise and offer guidance.
- ❑ Send TOPS Reports home with students.

#7 Review the Diagnostic Report weekly ☐ ☐ ☐

The Diagnostic Report summarizes significant information about every student in your class (number of quizzes passed and taken, average book level, average percent correct, and points earned) so that you can quickly see how each of them is doing.

- ❑ Check for students with at-risk codes so you can plan interventions. (Model Classroom criteria require that no more than 10 percent of students in a class are at risk.)
- ❑ Use the Student Record Report when needed to review student reading and diagnose individual student problems.

- ❑ If your students are engaged in Read To and Read With practice, in addition to independent reading, check the TWI report weekly.

IMPLEMENTATION
None Partial Full

❑ ❑ ❑

#8 Adjust book levels so that students maintain an average of 85 to 92 percent on quizzes

- ❑ Look for TOPS Reports with a quiz score of less than 80 percent or an average percent correct below 85. Direct these students to try shorter books or lower-level books.
- ❑ For students averaging above 92 percent correct, adjust the reading level upward or encourage them to read longer books.
- ❑ When you raise book levels, keep point expectations the same to start, so the student will feel more comfortable taking on a challenging book.
- ❑ Adjust goals you feel are too challenging or too easy for students.
- ❑ Intervene with students who are struggling: Try adding Read With practice, take an active role in helping the student find appropriate books, involve students in book discussion groups, emphasize motivational techniques for meeting personal goals, and make sure the library has enough books and quizzes to match your students' needs.

❑ ❑ ❑

#9 Create a system of motivators
Motivated students are students who have successful and rewarding encounters with books.

- ❑ Have students practice within their zone of proximal development.
- ❑ Allow students to select their own books.
- ❑ Provide immediate feedback.
- ❑ Set goals.
- ❑ Recognize students who meet their goals.
- ❑ Employ other motivational techniques as needed: Reading Wall of Fame, cooperative reading teams, book discussions, reading aloud to students, book voting, Family Reading Night. (See *Great Ways to Motivate Students to Read* for more details and ideas.)

❑ ❑ ❑

#10 Assess skills with Literacy Skills tests (optional)
Literacy Skills tests enable you to monitor student growth in the comprehension and literary skills that are most often assessed on high-stakes tests.

- ❑ Make sure students pass the Reading Practice quiz before taking the Literacy Skills tests.
- ❑ Monitor results to help you plan instruction to meet the needs of individual students, groups of students, or the class as a whole.

Comments:

Appendix B

The Renaissance Certification Program At a Glance

The School Renaissance Institute established the Renaissance Certification program to recognize educators who demonstrate an outstanding commitment to Reading Renaissance principles in their daily classroom practices.

The Institute considers a variety of factors in determining Model Certification. These include the size and socioeconomic makeup of the class or school as well as the creativity and resourcefulness with which the teacher, librarian, Reading Renaissance coordinator, or principal has applied Reading Renaissance principles.

If you have any questions about the Renaissance Certification program, please call the Institute at (800) 200-4848, x3912.

Model Classroom

To be certified as a Model Classroom, you must verify that a majority of the Reading Renaissance principles outlined on the Model Classroom checklist have been implemented. In addition, you need to complete the Model Classroom Application, Model Classroom Survey, and the following three criteria must be met on your classroom's Diagnostic Report for a recent 6- or 9-week period:

- Average percent correct should be between 85 and 92.
- No more than 10 percent of students classified as at-risk. (Students not within your classroom for the past 12 weeks are not required to be included in the report.)
- Median points earned must be at least 80 percent of the expected points as indicated on the goal setting chart. (To calculate this, you should go to your Diagnostic Report, finding the average book level for your students, go to the Goal Setting Chart for Independent Readers, and verify that your students' Median of Points Earned are at least 80 percent of the expected point value on the Chart.)

Model Library

In addition to completing the Model Library Application and Model Library Survey, the following criteria apply:

- Either three teachers or 10 percent of reading teachers (whichever is greater) at the school must have achieved Model Classroom certification during the current school year.
- The librarian must document a flexible library schedule, an adequate supply of books, and books labeled according to Reading Renaissance guidelines (as outlined on the Model Library Checklist).

Model School

The principal or Reading Renaissance coordinator must submit an essay about the use of Reading Renaissance and Accelerated Reader in the school and demonstrate meeting these criteria:

- At least five teachers or 30 percent of reading teachers (whichever is greater) must have achieved Model Classroom certification during the current school year.
- No more than 15 percent of students school wide may be classified as at-risk on the Diagnostic Report.
- All students (all represented within the school from in grades K-12) must be using Accelerated Reader at least to some degree (as document by Diagnostic Reports). To receive further detail on this requirement, please call the Institute's Renaissance Certification team at 800-200-4848, x3912.
- Demonstrate an average of at least 45 minutes daily TWI time school wide.
- The principal and Reading Renaissance coordinator must be able to show, using the Checklist, that Reading Renaissance principles are being applied throughout their school.

Certify Every Year

Renaissance Model Certification status is active for one year from your certification. Each school year, you'll need to recertify to maintain Model Certification status. If you continue to meet Model Certification criteria, we will recertify you for another year.

Recertification is easy. There are no additional enrollment fees. Teachers, principals, and Reading Renaissance coordinators simply submit a qualifying Diagnostic Report for a six- or nine-week period with their full name and the grade level(s) currently taught. Librarians complete a Model Library Survey that includes a comparison of circulation statistics, the names of teachers in the school who have certified or recertified that school year.

Vita

Carl William (Bill) Chaney is a native of Lebanon, Tennessee. He attended public schools in Lebanon and Nashville, and earned his bachelor's degree in 1970 from Belmont University, majoring in Latin and with minors in English, speech, and political science.

Chaney began his career in education as a teacher at East Robertson High School in Cross Plains. He taught Latin, English, speech, and graphic arts while completing his master's in educational administration at Austin Peay State University in 1974. The same year he became Assistant Principal at East Robertson, and four years later became Principal of the High School.

In 1980, Chaney was enlisted as the founding head of Madison Christian School, the forerunner of Davidson Academy, a private Christian school in Nashville. The school grew during the following two decades from 62 students in grades one through four to over 1,000 in grades PK-12. Chaney continues as Davidson Academy's first and only headmaster.

Chaney's wife, Dr. Sharon Henderson Chaney, is also an educator. She currently coordinates the International Baccalaureate program at Hunters Lane High School. The Chaneys have two grown sons, Daniel and David.