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### Effects of Technology Education on Middle School Language Arts (Reading) Achievement

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EFFECTS OF TECHNOLOGY EDUCATION ON MIDDLE  
SCHOOL LANGUAGE ARTS (READING) ACHIEVEMENT

A RESEARCH PAPER

PRESENTED TO

THE FACULTY OF THE DEPARTMENT OF  
OCCUPATIONAL AND TECHNICAL STUDIES

AT

OLD DOMINION UNIVERSITY

IN PARTIAL FULFILLMENT FOR THE

REQUIREMENTS FOR THE

MASTER OF SCIENCE IN OCCUPATIONAL and TECHNICAL STUDIES

BY

MARK A. BOLT

AUGUST 2005

## APPROVAL PAGE

This research paper was prepared by Mark A. Bolt under the direction of John M. Ritz in OTED636, Problems in Occupational and Technical Studies. This paper was submitted to the Graduate Program Director as partial fulfillment of the requirements for the degree of Masters of Science in Occupational and Technical Studies.

Approved by: \_\_\_\_\_

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Date

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# **CHAPTER I**

## **INTRODUCTION**

The middle school Technology Education experience has become an integral part to every child's education at Rachel Carson Middle School in Fairfax County Public Schools. The content covered in the middle school Technology Education program at Rachel Carson Middle School reinforces the Virginia Standards of Learning in mathematics, science, language arts, social studies, and technology. This is accomplished through the use of computer technology and curriculum to align and enhance student preparation for Virginia's Standards of Learning tests.

The eighth grade middle school Technology Education curriculum at Rachel Carson Middle School, called Technological Systems, is taught through the laboratory and modular approach, known as Modular Technology Education (MTE). English language and reading proficiency are two skills students practice and expand upon when taking Technological Systems. Students have to utilize language and reading skills daily in order to understand and accomplish tasks for assessment, which in turn, strengthen their language and reading proficiency.

### **STATEMENT OF THE PROBLEM**

The purpose of this study was to compare eighth grade students at Rachel Carson Middle School who took eighth grade Technology Education and the affect it had on student achievement on the reading section of the Virginia English Standards of Learning test.



## **HYPOTHESIS**

To guide this study, the following hypothesis was established:

H<sub>1</sub>: Students who took eighth grade Technology Education at Rachel Carson Middle School would have higher achievement scores on the reading section of the 2003-04 Virginia English Standards of Learning test.

## **BACKGROUND AND SIGNIFICANCE**

It was important to understand that the Technology Education curriculum has evolved and changed a great deal over the last fifteen years. This evolution had brought with it new and innovative ways to present and teach the curriculum to students, as well as the need to integrate more mathematics, science, language arts, social studies, and technology content. But, to this day, a set of state mandated standards of learning for Technology Education had not yet been created. National standards for Technological Literacy, yes, state mandated standards for Technology Education, no, unlike some other elective subjects. But, as the field and curriculum continued to change, state mandated Technology Education standards might become a reality.

Culbertson, Daugherty, and Merrill (2004) indicated that taking Technology Education in the middle school would have no affect on students achieving higher test scores on their mathematics, science, language arts, and social studies standards tests. Instead, their research showed that the impact of taking a Technology Education course and its affect on student learning standards test scores was minimal, if any. But to assume this was true in every Technology Education classroom, where so many teachers present and teach the curriculum in so many different ways, was inaccurate. Having the

right “formula” of instruction could prove to be effective to the achievement of higher standards of learning scores, especially in reading.

### **LIMITATIONS**

The limitations of this research were population, time, teaching style, and Language Arts (English language and reading) background. The population for this research was 540 eighth grade students (13-14 years old) at Rachel Carson Middle School during the 2003-04 school year. More students (data), over a longer period of time, could have proven to be more effective and accurate when comparing student achievement. The teaching styles used were those of the researcher, which may have differed from other teachers in the same field. How the curriculum was taught by the teacher to align and enhance student preparation for Virginia’s Standards of Learning could have affected the level of aptitude the students achieved when taking the course.

### **ASSUMPTIONS**

The foundation of this research was based on the following assumptions. The Technological Systems course, offered as a semester course (unlike core classes which are all year courses), gave students a limited amount of time to strengthen student language and reading skills in the course. All year Technology Education courses might have contributed to higher student achievement on standardized test scores in reading. Utilizing only one method of instruction and delivery in the classroom, such as modular learning, cannot address the varying language and reading levels among students. The curriculum was not written to address the needs of all students having diverse language and reading abilities. The use of varied instruction (modular and laboratory) allowed the

teacher to tailor their instruction, such as language and reading activities, so that all students could better understand and build upon their personal language and reading abilities.

## **PROCEDURES**

The data used to conduct the research were the student test scores for the reading section of the 2003-04 English Standards of Learning test taken from the “Virginia Standards of Learning: School List Report”. The data was provided by the Director of Student Services at Rachel Carson Middle School. Upon receipt of the data, individual English Standards of Learning test scores for the reading section were sorted and recorded for those students who did and did not take the eighth grade Technology Education course during the 2003-04 school year. Test scores were then tabulated and displayed to show the correlation between those students who did and did not take Technology Education and their achievement on the reading section of the English Standards of Learning test.

## **DEFINITION OF TERMS**

The following terms were defined in order to give the reader a better understanding of the content discussed within the research paper.

- The *Standards of Learning* for Virginia Public Schools are the “Commonwealth's expectations for student learning and achievement in grades K-12 in English, mathematics, science, history/social science, technology, the fine arts, foreign language, health and physical education, and driver education. These standards

represent a broad consensus of what parents, classroom teachers, school administrators, academics, and business and community leaders believe schools should teach and students should learn.” (Virginia Department of Education, <http://www.pen.k12.va.us/VDOE/Superintendent/Sols/home.shtml>)

- The *Standards of Learning for English* are composed of three sections (strands): oral language, reading and writing. Student achievement on the *reading* section was the focus of this research. The reading section focuses on the following: “At the eighth grade level, students will continue to develop appreciation of literature through the study of literary elements in classic and contemporary selections. They will describe themes and inferred main ideas, interpret cause-effect relationships, and draw conclusions from a variety of literary and informational selections. Students will build on the foundations for literacy developed in the previous grades. Students will apply critical reading and reasoning skills across the content areas, including history and social science, science, and mathematics.” (<http://www-test.pen.k12.va.us/VDOE/Instruction/Grade08.doc>)
- *Technology Education* is a “laboratory-type program designed to prepare students for more effective living in our growing industrial and highly technological society. The focus is to integrate mathematics, science, English, history, and technology skills to increase student success in their academics and prepare them for college and technical careers.” (Fairfax County Public Schools website, <http://www.fcps.edu/DIS/OPTS/tech/index.htm>)
- The middle school Technology Education curriculum, *Technological Systems*, is the “concluding technology education experience at the middle school level. By

simulating technological systems and assessing their impacts as well as applying and expanding what they have learned in academic subjects and previous technology education courses, students acquire a global view of technology. Schools with modular "synergistic" labs provide active learning situations that allow students to explore technology and related careers. The content covered in all modular labs was designed to reinforce the Virginia Standards of Learning (SOL) in math, science, language arts, social studies, and technology.” (Fairfax County Public Schools website, <http://www.fcps.edu/DIS/OPTS/tech/index.htm>)

## **OVERVIEW OF CHAPTERS**

“You must read to succeed” was a philosophy the teacher and student worked by in the Technological Systems course at Rachel Carson Middle School. Students taking this Technology Education course utilized language and reading skills daily in order to understand concepts to accomplish tasks for assessment. This allowed all students to strengthen their English language and reading proficiency. The research showed the correlation between students who did and did not taken Technological Systems during the 2003-04 school year at Rachel Carson Middle School and their achievement on the reading section of the Virginia English Standards of Learning test.

The following chapter, Review of Literature, presented other research studies on the topic. Culbertson, Daugherty, and Merrill (2004) had indicated that students’ taking a Technology Education course and their achievement on state mandated standards was minimal, if any. In the Methods and Procedures chapter, the researcher explained those methods that were used to gather and analyze the data. The data used to conduct the research were the test scores for the reading section of the Virginia English Standards of

Learning test. In conclusion, the last two chapters, Findings and Summary, Conclusions, and Recommendations, presented the data which allowed the researcher to determine if the hypothesis would be accepted or rejected. Lessons learned from conducting the research led to recommendations for future research in the area.

## **CHAPTER II**

### **REVIEW OF LITERATURE**

The Standards of Learning for Virginia public schools are those expectations the state has mandated for student learning and achievement in grades K-12 in core and elective subject areas. The Standards of Learning have set the stage for teachers to implement rigorous teaching methods and relevant curriculum into the classroom so that students are prepared for those standardized tests the state has put in place. This was a great responsibility for the teacher, core or elective, to prepare students to achieve high marks on standardized tests, at the same time, instilling essential knowledge and skills for success in the classroom.

Taking a Technology Education course can be beneficial to student success on standardized testing. The Technology Education curriculum has the ability to strengthen students' achievement in all core subjects if the right “formula” of instruction is in place. The 8<sup>th</sup> grade Technology Education curriculum at Rachel Carson Middle School integrates both laboratory and modular instruction in the classroom. These two styles of instruction, when used together, can be effective in providing students with knowledge and skills essential for academic success, especially in the areas of language and reading. Building upon (English) language and reading skills were two areas that 8<sup>th</sup> grade Technology Education students at Rachel Carson had the opportunity to improve and expand upon, in conjunction with their core English classes, in preparation for the 2003-04 Virginia English Standards of Learning test.

This chapter describes the literature relevant to Technology Education and its credibility as a course which can help prepare students for high achievement on the

reading section of Virginia's English Standards of Learning test. It was organized into three sections: (1) "Technology Education", (2) "Modular Technology Education in the Middle School", and (3) "Enhancing Language Proficiency and Reading Skills through Technology Education". The relevance of the literature to the research was discussed at the end of this chapter.

## **TECHNOLOGY EDUCATION**

Literature in this section explained the differences between Technology Education and Industrial Arts Education. It was important that the reader understood how the two compared and how they impacted student learning. The Technology Education curriculum was used at Rachel Carson Middle School.

Technology Education evolved from Industrial Arts Education, a curriculum which still exists in many schools today (shop work). Industrial Arts Education in the middle school utilizes more laboratory forming and shaping equipment to explore the methods men and women use to manipulate the environment to meet his/her own needs and extend human potential. Technology Education has blended the use of contemporary machinery (e.g., CNC Mills/Lathes) with a variety of hardware and software applications to allow students to learn about how technology impacts their lives and how it can be used to solve problems we face in today's society. The difference between the two is not so much about philosophy, as some thought, but rather the tools and methods used to instruct and prepare students with relevant skills and knowledge for the workplace. Foster (1994) explained this theory by stating:

If technology education and industrial arts are not significantly disparate



philosophically, then perhaps the difference between them, assuming it to be more than nominal, is methodological. An instructional strategy prevalent in technology education is that of integrating technology with other subject areas taught in the public schools. This “interdisciplinary approach” is a recognition in education that subject areas are inherently related and should be taught in such a way so as to suggest this to students (p. 20).

It was important for the reader to understand that both Industrial Arts Education and Technology Education curriculum integrate and build upon knowledge from other disciplines (interdisciplinary approach). It is the approach, or methods, used to accomplish certain tasks which separate the two. The benefits of one curriculum over the other and its impacts on student learning have always been mixed among teachers in the field. It was important for the reader to understand that Technology Education provides students with contemporary tools (machinery, hardware, software) to accomplish, in fact, what Industrial Arts Education had stated years ago. Foster (1994) quoted Bonser & Mossman (1923) with their definition of “industrial arts” written more than seventy years ago:

[Industrial arts] was a study of the changes made by man in the forms of materials to increase their values, and of the problems of life related to these changes (p. 2).

Students will be dealing with *technological* problems and issues as they progress through life, making Technology Education an essential component to a child’s educational experience. Technology Education blends both old (Industrial Arts Education) and new philosophies to provide its students with essential skills and

knowledge to succeed in school and the workplace. The Technology Education experience seems fitting for middle school students in hopes of preparing them academically and with essential workplace skills.

### **MODULAR TECHNOLOGY EDUCATION IN THE MIDDLE SCHOOL**

Literature in this section provided the reader with information on Modular Technology Education (MTE), a curriculum used at Rachel Carson Middle along with other methods of instruction to help students develop their English language and reading proficiency. MTE helps students understand and assess the impact of technology on society today in order to make informed decisions about how they will use, manage, and even create technologies in the future (Schwaller, 2002).

There was no data to support that MTE does in fact improve student achievement in English language and reading. Instead, Culbertson, Daugherty, and Merrill (2004) indicated in their research that:

Researchers have concluded that the new curriculum does as good of a job as the old one. No research exploring the claim that modular technology education improves student achievement in other disciplines could be located. Based on analysis of the data collected in this study, it can be concluded that there was no significant difference in reading, language arts...between those students who have participated in a unit of modular technology education and those who have not (p. 11).

The Culbertson, Daugherty, and Merrill (2004) study did not support the claim that participation in a modular technology unit could in fact increase students'

achievement in other academic subjects, one of them being reading. The fact that their research reflected the impact of only one mode of instruction (modular instruction) in a short length of time (12 weeks) showed a lack of time and varied instruction for the students to actually show any type of improvement in other disciplines. Teachers cannot simply rely on only MTE to do all the teaching to enhance student achievement. MTE is a system which must be used in conjunction with our Technology Education laboratories (as well as with other instructional strategies) to give our students those experiences MTE does not provide.

Culbertson, Daugherty, and Merrill (2004) also indicated that “longer exposure to a technology curriculum may produce measurable differences where this study did not” (p. 18). This might have proven to be more accurate, such as a semester (18 week) or all year course (36 weeks), which would have given those students used in their research more time to build on those skills learned to achieve greater tasks. Trimester courses gave the student only a taste of what Technology Education was all about. Adequate content could not have been addressed in the depth that longer courses might have provided. Instead, the teacher was pressed for time to complete as much as possible in a limited amount of time, resulting in a whirlwind effect of information and activities, not necessarily giving the student the time to reflect or build upon what he or she had learned.

Through the use of other (traditional) delivery methods in conjunction with MTE, the teacher could implement other activities and topics into their instruction not addressed by the MTE curriculum. Use of a variety of content delivery methods, other than just

MTE, could have impacted student achievement in the Culbertson, Daugherty, and Merrill (2004) study. Culbertson, Daugherty, and Merrill (2004) stated that:

This study examined a modular technology course with content provided by one commercial vendor. One could reasonably expect differing results when testing technology education's impact on achievement when other content delivery methods (standards-based, laboratory, or courses delivered with other commercial products) were utilized. Further research could identify types of technology education that are more effective at raising achievement in certain areas (p. 18).

The commercial vendor used at Rachel Carson Middle School had provided an excellent product which enabled the teacher to effectively present vital knowledge and technology skills to students, as well as, the ability to customize the content and activities presented. The reality is that MTE is a system which needs to be part of the big picture. The integration of MTE into our Technology Education curriculum, with the use of other instructional strategies, allows teachers to reach students with diverse learning styles and abilities. Activities which strengthen psychomotor, verbal, and mental abilities, like those made popular in Industrial Arts Education (CO<sub>2</sub> dragster, CO<sub>2</sub> airplanes, bridges, cantilevers) are activities which have been used to tap into a variety of academic disciplines through a different mode of instruction. Having the right "formula" of instruction might prove to be effective to the achievement of higher Standards of Learning scores, especially in English.

## **ENHANCING LANGUAGE PROFICIENCY AND READING SKILLS THROUGH TECHNOLOGY EDUCATION**

This section provided the reader with some background information on how students strengthened their language proficiency and reading skills in the Technology Education course at Rachel Carson Middle School. The English core in the middle school encompasses the areas of reading, spelling, and composition, aimed at developing students reading and writing skills. The content provided by the commercial vendor and how it was delivered had a large impact on how students strengthened their language and reading proficiency. The delivery method used for MTE instruction set this vendor apart from the other where students had the opportunity to strengthen their language and reading proficiency on a daily basis. The method of instruction used was comprised of a multimedia application and a student workbook. Both were used in conjunction to deliver the content to the student. The use of a student workbook required the student to read (instructions) on a daily basis in order to better understand the content and complete a variety of assessments. This dual method of delivery separated this modular approach from other commercial products which simply “regurgitated” the information to the student through a multimedia application with little or no additional literature/reading involved. Technology Education students at Rachel Carson Middle School utilized this dual method of delivery to gain a deeper understanding of the content and the processes associated with completing specific tasks (not to mention troubleshooting skills...*not all instructions are perfect*). Students practiced and strengthened their language and reading abilities while enrolled in the Technology Education program.

As Panell (2005) explained, “I’ve learned that, as technology instructors, our job isn’t to simply “shovel out” knowledge. Rather, we must inspire our students to seek out information on their own“ (p. 23). Putting the responsibility on the student to discover, think outside the box, and brainstorm ideas through oral and written instruction gives students the opportunity to show-off what they have learned by demonstrating their ability to successfully complete an activity.

### **SUMMARY**

The Review of Literature discussed how taking Technology Education helped students strengthen their English language and reading comprehension and how it prepared them for the reading section of the Virginia’s English Standards of Learning test. Students who took the Technology Education course at Rachel Carson Middle School utilized language and reading skills daily in order to understand concepts to accomplish tasks for assessment. “Allowing students to gain the ability to read...and to research solutions to problems is central to the mission of teaching technology” (Panell, 2005). It is important that Technology Education continue evolving into a course integral to the preparation of students academically (standardized testing) and for the future (workplace). As DeKeyser (2004) states: “most technical jobs will also require good reading, writing, and oral communication skills” (p. 22).

Teacher and students in the Technology Education program at Rachel Carson Middle School worked under the philosophy that “You must read to succeed”. Reading, as well as, written and oral communication, were addressed and presented in a variety of formats. Through the use of MTE and laboratory instruction, students at Rachel Carson Middle School strengthened their proficiency in the English language and reading (skills

also taught and reinforced in their core English classes) in preparation for the reading section of the Virginia English Standards of Learning test.

In the next chapter, Methods and Procedures, the researcher explained those methods used to gather and analyze the data. The data used to conduct the research were the student test scores for the reading section of the 2003-04 English Standards of Learning test. Additional subject matter included the population used for the research, research variables, instrument design, field/classroom/lab procedures, methods of data collection, statistical analysis, and a summary of the chapter.

## **CHAPTER III**

### **METHODS AND PROCEDURES**

The purpose of this study was to compare student test scores on the reading section of the Virginia English Standards of Learning test between eighth grade students at Rachel Carson Middle School who did and did not take Technology Education. This chapter identifies the methods and procedures that were used to collect the data necessary for this study. Additional subject matter includes the population used for the study, research variables, instrument design, methods of data collection, statistical analysis, and a summary of the chapter.

#### **POPULATION**

The population used for this study was the eighth grade class at Rachel Carson Middle School during the 2003-04 school year. The eighth grade class consisted of 565 students. A total of 277 students took the eighth grade Technology Education course known as Technological Systems. There were 263 students who did not take Technological Systems, rather, other electives offered at Rachel Carson Middle School. The remaining twenty-five test scores were not recorded because students either 1) did not test in the content area, 2) the student had a non-standard accommodation, or 3) the student was not enrolled in the course at time of test.

#### **RESEARCH VARIABLES**

The dependent variable in this study was the content covered on the reading section of the Virginia's English Standards of Learning test. The content and test questions were developed by Virginia's Department of Education.



The independent variable in this study was the material and instruction presented to the students by the researcher to help prepare students for high achievement on the reading section of Virginia's English Standards of Learning test. In the laboratory environment, the teacher had much control over the curriculum content and how it was presented. In the modular environment, the curriculum was created by the manufacturer. Specific modules were selected and implemented by the Technology Education department to help support the content covered on Virginia's Standards of Learning tests.

### **INSTRUMENT DESIGN**

The "Virginia Standards of Learning: School List Report" was used for the study. It included all eighth grade students at Rachel Carson Middle School who took (or even did not take) the Virginia English Standards of Learning test during the 2003-04 school year. The report included student names and individual test scores for the reading section of the Virginia English Standards of Learning test taken in the spring of 2004. The reading section of the Virginia English Standards of Learning test focuses on the following:

At the eighth grade level, students will continue to develop appreciation of literature through the study of literary elements in classic and contemporary selections. They will describe themes and inferred main ideas, interpret cause-effect relationships, and draw conclusions from a variety of literary and informational selections. Students will build on the foundations for literacy developed in the previous grades. Students will apply critical reading and

reasoning skills across the content areas, including history and social science, science, and mathematics (Virginia Department of Education, 2005).

### **METHOD OF DATA COLLECTION**

The Virginia English Standards of Learning test scores were collected, sorted, and tabulated by the researcher. Tables and figures were designed to show the data (test scores) from the reading section of the 2003-04 Virginia English Standards of Learning test between students who did and did not take Technology Education.

### **STATISTICAL ANALYSIS**

These data were provided by the Director of Student Services at Rachel Carson Middle School. Data (test scores) from the reading section of the Virginia English Standards of Learning test were recorded into a Microsoft Excel spreadsheet for students who did and did not take the eighth grade Technology Education course during the 2003-04 school year. A two sample t-test was used to determine if there was a significant difference between both groups of students and their achievement on the reading section of the Virginia English Standards of Learning test.

### **SUMMARY**

This chapter identified the methods and procedures that were used to collect the data necessary for this study. From the sample group of 540 eighth graders from Rachel Carson Middle School, a total of 277 students took the eighth grade Technology Education course known as Technological Systems during the 2003-04 school year. The

remaining 263 students did not take Technological Systems, rather, other electives offered at Rachel Carson Middle School. Additional information included research variables, instrument design, methods of data collection, and statistical analysis, each provided the reader with the validity of the methods and procedures used to collect and tabulate the data for this study to ensure accuracy. In the following chapter, Findings, the data and findings were reported for this study. Tables and figures were used to present information effectively and accurately, allowing the reader to examine the data.

## CHAPTER IV

### FINDINGS

The purpose of this study was to compare eighth grade students at Rachel Carson Middle School who took eighth grade Technology Education and its affects on student achievement on the reading section of the eighth grade English Standards of Learning test. The purpose of this chapter was to report the findings from the “Virginia Standards of Learning: School List Report” (provided by the Director of Student Services at Rachel Carson Middle School). Tables and figures were used to present this information effectively and accurately. A summary of the findings will be presented at the end of this chapter.

#### REPORT OF FINDINGS

Data from the “Virginia Standards of Learning: School List Report” was used for this research. The total population of students who took (and did not take) the reading section of the eighth grade English Standards of Learning test during the 2003-04 school year was 565 students. A two sample t-test was used for this research since the means come from two independent samples. The two sample t-test was a one-tailed test.

The population was divided into two sample groups: those students who took Technology Education (**TECHED** group) and those students who did not take Technology Education (**CONTROL** group). From the total population of 565 students, a total of 540 students took the reading test according to the “Virginia Standards of Learning: School List Report”. A total of 277 (TECHED) students took the eighth grade Technology Education course and 263 (CONTROL) students did not, rather, other electives offered at Rachel Carson Middle School. Twenty-five test scores were not

recorded because those students either 1) did not test in this content area, 2) the student had a non-standard accommodation, or 3) the student was not enrolled in the course at time of test. Test scores from the population of 540 students were collected, sorted, and tabulated by the researcher. Tables and figures were created using Microsoft Excel to show the data which was calculated from the two sample *t-test*.

Table 1 shows the total number of students for TECHED and CONTROL group and level of proficiency achieved on the reading section of the English Standards of Learning test. Students reached a proficiency level of either fail/does not meet, pass/proficient, or pass/advanced on the reading section. These levels of proficiency were created by the Virginia Department of Education for the reading section of the English Standards of Learning test.

**Table 1. Student Totals for Level of Proficiency Achieved on Reading Section**

<b>PROFICIENCY LEVEL ACHIEVED (reading section of English SOL)</b>	<b>CONTROL (student total)</b>	<b>TECHED (student total)</b>
FAIL/DOES NOT MEET	20	21
PASS/PROFICIENT	110	134
PASS/ADVANCED	133	122
<b>TOTAL STUDENTS</b>	<b>263</b>	<b>277</b>

Figure 1 shows the total number of students by proficiency level for the TECHED and CONTROL group using a bar graph.

**Figure 1. Student Totals for Proficiency Level Achieved by Control and Technology Education Students**

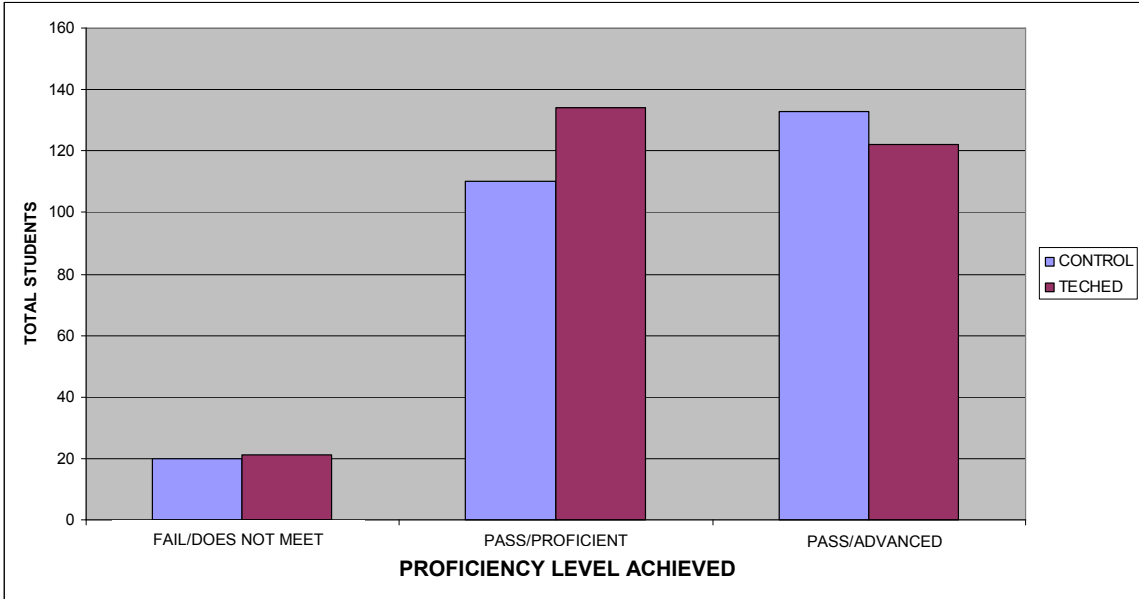


Figure 2 displays the standard deviation for the SOL test score averages for both the CONTROL and TECHED group. The CONTROL group had an average test score of 495.93 with a standard deviation of 71.46. The TECHED group had an average test score of 487.19 with a standard deviation of 65.71.

**Figure 2. Standard Deviation for SOL Test Score Averages (Reading Section of the English SOL Test)**

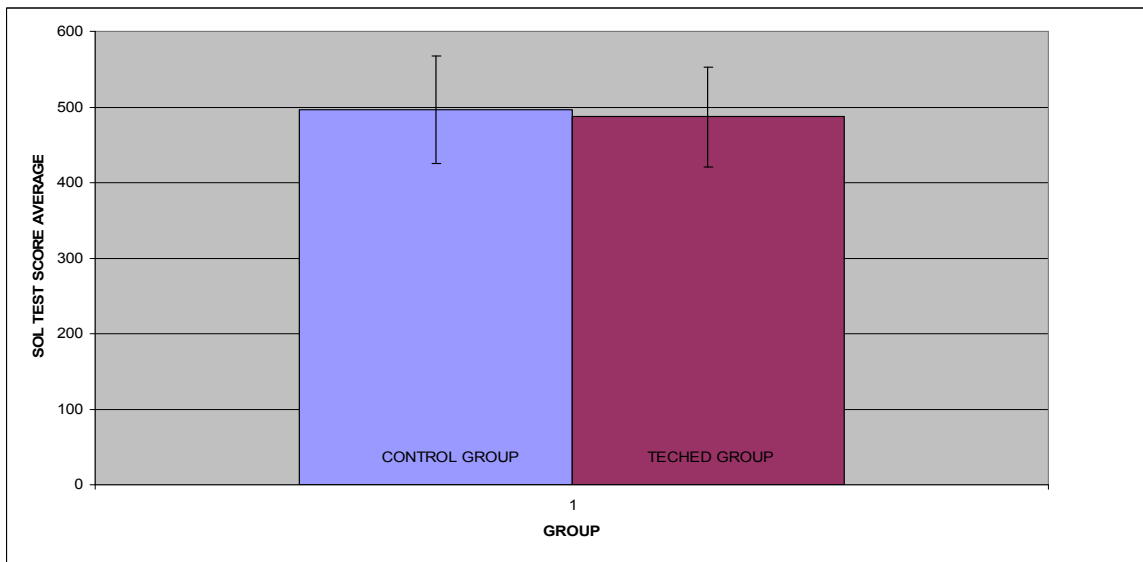


Table 2 shows the findings from the data taken from the “Virginia Standards of Learning: School List Report”. The data (test scores) were tabulated using a two sample t-test in Microsoft Excel. The mean for the CONTROL group was 495.93 and 487.19 for the TECHED group. The t-value obtained was 1.48 at 538 degree of freedom. The level of significance at the .05 level was 1.65.

**Table 2. Two Sample *t*-test Results Assuming Equal Variances (.05 alpha)**

	<b>CONTROL</b>	<b>TECHED</b>
Mean	495.93	487.19
Variance	5105.92	4318.31
Observations	263	277
Pooled Variance	4701.87	
Hypothesized Mean Difference	0.00	
df	538.00	
t Stat	1.48	
P(T<=t) one-tail	0.05	
t Critical one-tail	1.65	

## SUMMARY

In this chapter, the researcher collected, sorted, and tabulated the 2003-04 Virginia English Standards of Learning test scores for the eighth grade class at Rachel Carson Middle School. Data were processed using a two sample t-test in Microsoft Excel. The t-test used by the researcher was a one-tailed test. Tables and figures were then designed using Microsoft Excel to display the data gathered. Chapter V will provide an overall summary of the research, a conclusion to answer the research goal based upon the data collected, and recommendations based upon the results of the study for future studies.

## **CHAPTER V**

### **SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS**

The purpose of this chapter was to provide a summary of the research. The conclusions along with the recommendations provided in this chapter were based on the information collected, sorted, and tabulated by the researcher for this study.

#### **SUMMARY**

It was important to understand that the Technology Education curriculum has evolved and changed a great deal over the last fifteen years. This change brought with it new and innovative ways to present and teach the curriculum to students, as well as the need to integrate more mathematics, science, language arts, social studies, and technology content. The Technology Education program at Rachel Carson Middle School is an integral part of every child's education where students learn and develop a variety of technical skills. The content covered in the middle school Technology Education program helped reinforce the Virginia Standards of Learning. This was accomplished through the use of computer technology and laboratory equipment to supplement student preparation for the Virginia Standards of Learning tests.

The purpose of this study was to compare eighth grade students at Rachel Carson Middle School who took eighth grade Technology Education and its affects on student achievement on the reading section of the English Standards of Learning test. The hypothesis stated that students who took the eighth grade Technology Education course at Rachel Carson Middle School would have higher achievement scores on the reading



section of the Virginia English Standards of Learning test than those that did not take the Technology Education course.

The eighth grade Technology Education curriculum at Rachel Carson Middle School, called Technological Systems, was taught through the laboratory and modular approach, known as Modular Technology Education (MTE). English language and reading proficiency were two skills students practiced and expanded upon when taking Technological Systems. Students had to utilize language and reading skills daily in order to understand and accomplish tasks for assessment, which in turn, strengthened their language and reading proficiency. Research and articles had been written about Technology Education and its affects on student achievement in core subject areas such as English (or Language Arts). “Allowing students to gain the ability to read...and to research solutions to problems was central to the mission of teaching technology” (Panell, 2005). It is important for Technology Education teachers to become involved in preparing our students academically (standardized testing) and for their future (workplace). DeKeyser (2004) stated: “most technical jobs will also require good reading, writing, and oral communication skills.” (p. 22)

A study done by Culbertson, Daugherty, and Merrill (2004) reported that taking Technology Education in the middle school had no affect on students achieving higher test scores on their mathematics, science, language arts, and social studies standards tests. Instead, their research showed that the impact of taking a Technology Education course and its affect on student learning standards test scores was minimal, if any. But to assume this was true in every Technology Education classroom, where every teacher presents and teaches the curriculum in so many different ways, was inaccurate. Having

used the right “formula” of instruction might have proven to have been more effective to the achievement of higher standards of learning scores, especially in reading.

The limitations of this research were population, time, teaching style, and Language Arts (English language and reading) background. The population for this research was 540 eighth grade students (13-14 years old) at Rachel Carson Middle School during the 2003-04 school year. More students (data), over a longer period of time, could have proven to be more effective and accurate when comparing student achievement. The teaching styles used were those of the researcher, which may have differed from other teachers in the same field. How the curriculum was taught by the teacher to align and enhance student preparation for Virginia’s Standards of Learning could have affected the level of aptitude the students achieved when taking the course.

The instrument used for this study was the “Virginia Standards of Learning: School List Report”. The report included student names and individual test scores for the reading section of the Virginia English Standards of Learning test taken by a majority (96%) of the eighth grade students in the spring of 2004. These data were provided by the Director of Student Services at Rachel Carson Middle School. Data (test scores) from the reading section of the “Virginia Standards of Learning: School List Report” were sorted and then recorded into a Microsoft Excel spreadsheet for students who did and did not take the eighth grade Technology Education course during the 2003-04 school year. A two sample t-test was then used to determine if there was a significant difference between those two groups of students and their achievement on the reading section of the English Standards of Learning test.

## CONCLUSIONS

The researcher used a two sample t-test to test the hypothesis. The t-test was a one-tailed test. The eighth grade population was divided into two sample groups: students who took Technology Education (**TECHED** group = 277 students) and those students who did not take Technology Education (**CONTROL** group = 263 students). The reading test scores taken from the “Virginia Standards of Learning: School List Report” were collected, sorted, and tabulated by the researcher (Note: their were twenty-five test scores (4%) that were not recorded because students either 1) did not test in this content area, 2) the student had a non-standard accommodation, or 3) the student was not enrolled in the course at time of test).

The English Standards of Learning test score average for the reading section was almost equal for both student sample group. The CONTROL group had a mean score of 495.93 and the TECHED group, a mean score of 487.19. The standard deviation for the CONTROL group was 71.46 and 65.71 for the TECHED group. After tabulating the mean scores, the t-value obtained was 1.48 with a critical t-value of 1.65 at the .05 level of significance. Since the t-value obtained was smaller than the level of significance (critical t-value) at the .05 level, the researcher concluded that there was no significant difference between the test scores for the CONTROL group and TECHED group at the .05 level. In conclusion, the researcher rejected the hypothesis that students who took an eighth grade Technology Education course at Rachel Carson Middle School would have higher achievement scores on the reading section of the Virginia English Standards of Learning test.

The results of this study did not support the claim that students who took the eighth grade Technology Education course at Rachel Carson Middle School would have achieved higher test scores on the reading section of the 2003-04 Virginia English Standards of Learning test. Those students who did take Technology Education that year, in fact, had a lower test score averages for the reading section of the Virginia English Standards of Learning test compared to the CONTROL group. Based on the analysis of the data collected in this study, it was concluded that there was no significant difference in the average test scores on the reading section of the Virginia English Standards of Learning test for students who took Technology Education and those that did not.

### **RECOMMENDATIONS**

Based upon the findings and conclusions of this study, the researcher recommended the following for future studies:

1. For future studies, more student data, over a longer period of time, might prove to be more effective and accurate.
2. Use of both seventh grade (practice) and eighth grade Virginia English Standards of Learning (reading) test scores could be used to track the progress of those students who took one or two years of Technology Education at the middle school level (or none at all) and its affect on student achievement on the reading section of the Virginia English Standards of Learning test.
3. Technology Education educators need to develop (or reform) a scope and sequence for their programs that follows and addresses the Virginia Standards of Learning (English, Mathematics, Science, and History). Each one of these

disciplines adds a critical piece to the make-up of Technology Education. Taking Technology Education would then allow students to practice and build upon those skills learned in their core subject areas while taking a Technology Education course.

4. It is important that students taking Technology Education reach a certain level of proficiency on the subject area. Creation of state mandated standards of learning and proficiency tests for Technology Education would serve as a guide for educators to develop and deliver the right “formula” of instruction to meet these standards. Educators could also use state mandated standards to evaluate and test their methods of instruction for accountability reasons.

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